

# HYDAC

# INTERNATIONAL

## Electronic Product Catalogue



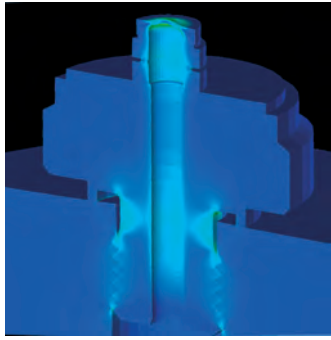
## HYDAC ELECTRONIC

HYDAC is best known for hydraulics, systems and fluid engineering. For over 50 years, HYDAC has been developing and manufacturing components and system solutions for specific applications in these fields.

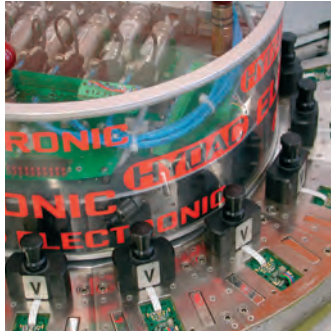
Over 30 years ago, inspired by its industry and application experience, HYDAC expanded its portfolio to include sensors, measuring instruments and electronic controls.

The range of sensors includes products for the measurement of pressure, temperature, distance, position, level, flow volume, speed as well as contamination and oil condition. In addition to products for standard applications, the product portfolio also covers special applications such as potentially explosive atmospheres or applications with increased functional safety.

Almost all these products are developed, manufactured and marketed by HYDAC ELECTRONIC. Suitability for the application is tested on HYDAC test rigs. As a Tier 1 automotive supplier, HYDAC ELECTRONIC is certified in accordance with the rigorous quality standard ISO/TS 16949 and therefore fulfils the very high requirements regarding product quality, production processes and continuous improvement processes. Our international sales network provides customers with worldwide product availability, expert advice and support. An extensive service package completes our offer.



Computer simulation of a HYDAC pressure transmitter.



Production and automatic function testing.



Development and manufacturing plant in Saarbrücken-Gersweiler.



HYDAC Servicenter, a complete package of services.



Technical advice and training.



## NOTE

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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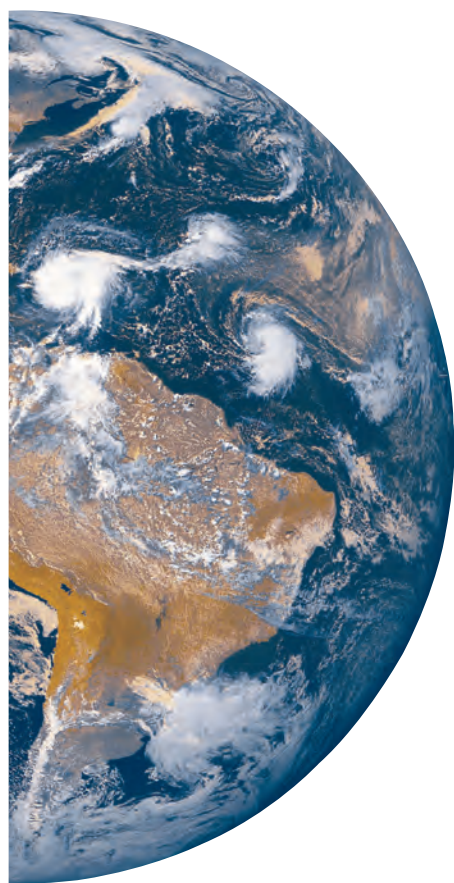
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## Industries and applications

There is almost no hydraulic or pneumatic medium or system that could not be monitored and controlled by HYDAC measurement technology - quickly, precisely and safely.

It is not surprising, therefore, that the individually designed HYDAC Measuring Technology is employed by well-known manufacturers and operators in all industries.

These applications range from analysis and diagnostics of operating fluids in the laboratory and on site, to controlling complex industrial systems and to miniaturised systems in construction and road vehicles.



### Excavators

Electronic controls and sensors to complete the system electronics.

- Load limit control
- Electro-hydraulic load sensing
- Integrated operating data logging
- Controls of special equipment
- Cut-off devices
- Safety cut-off devices



### Wheel Loaders

Electronic controls and sensors to complete the system electronics.

- Load limit control
- Electro-hydraulic load sensing
- Integrated operating data logging
- Controls of special equipment
- Cut-off devices
- Safety cut-off devices



### Road Construction Machinery

Sensor technology and system electronics to generate modern control concepts or ready-to-install total concepts.

- Load spectra
- Condition monitoring
- Safety systems
- Load limiting
- Function controls
- Energy management



### Telescopic Cranes

Sensor technology and system electronics to generate modern control concepts or ready-to-install total concepts.

- Load torque limiting
- Load spectra
- Load sensing
- Load limit control
- Energy management
- Condition monitoring



### Municipal Machines

Sensors, system electronics and condition monitoring.

- Working hydraulics
- Axle suspension systems
- Cab suspension systems
- Levelling systems



### Tractors

Sensors, system electronics and condition monitoring.

- Cab suspension
- Central hydraulics
- Front axle suspension
- Transmission shift control
- Level control
- Anti-roll stabilisation



### Agricultural Technology

Electronic controls and sensors to complete the system electronics.

- Load limit control
- Electro-hydraulic load sensing
- Integrated operating data logging
- Controls of special equipment
- Cut-off devices
- Safety cut-off devices



### Mining

Electronic measurement technology for underground applications.

- Pump station / Media supply
- Mining of raw materials
- Heading
- Material-handling and passenger transportation
- Analysis and diagnostics
- Condition monitoring



### Aviation and Aerospace Industry

Sensors, system electronics and condition monitoring.

- Rocket test rigs
- Test rigs for aircraft hydraulics
- Satellite test rigs
- Flight simulators



### Iron - Steel - Metal

Measuring technology and electronics.

- Pump stations
- Valve stations
- Accumulator stations
- Heat exchangers
- Condition monitoring



### Wind Turbines

Sensors, system electronics and condition monitoring.

- Condition monitoring of hydraulic and lubrication oils
- Measurement technology
- Safety and yaw brakes
- Pitch control
- Performance testing stations for transmission systems



### Machine Tools

Sensors, system electronics and condition monitoring.

- Hydraulic weight counter-balance
- Hydrostatic slide bearing
- Pressure boost station
- Central processing of cooling lubricants
- Tool clamping device



### Power Plant Technology

Sensors, system electronics and condition monitoring.

- Condition monitoring of hydraulic and lubrication oils
- Hydraulic drive and control systems including electronic controls



### Pulp and Paper Industry

Sensors, system electronics and condition monitoring.



### Transformers

Measuring technology, electronics and condition monitoring.

- Insulating oil conditioning
- Insulating oil monitoring
- Cooling



### Automotive Production

Measurement technology and condition monitoring for machine tools and presses, Cooling lubricant supply and test rigs.



### Oil and Gas Industry

Sensors, system electronics and condition monitoring for offshore, subsea or onshore applications.



### Shipping

Measuring technology, electronics and condition monitoring for:

- Engines
- Control of motion sequences
- Steering gear/Propeller
- Ballast water treatment
- Deck superstructures



### Condition Monitoring

Data logging and interpretation providing information on the condition of machines, systems and their components.

## ELECTRONIC PRESSURE TRANSMITTERS











The right pressure transmitter for every application! The wide ranging product choice from HYDAC offers solutions for all industries, whether systems or machinery manufacture, mobile technology or for laboratory applications.

The pressure transmitters are available with a variety of output signals, connectors and fluid port connection options.

Pressure transmitters for general applications:

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Further pressure transmitters for special applications can be found in the sections "Pressure Sensors with Flush Membrane", "Service Instruments", "Sensors for Potentially Explosive Atmospheres" and "OEM Products for Large Volume Production".

Electronic Pressure Transmitters	HDA 4800	HDA 4700	HDA 4400	HDA 4300	HDA 4100	HDA 3800	HDA 7400	HDA 8700	HDA 8400	HDA 9000
										
Accuracy (max. error)	0.25	0.5	1.0	1.0	1.0	0.3	1.0	0.5	1.0	1.0
Low pressure (up to 40 bar)	✓	✓	✓	✓	✓	✓				✓
High pressure (from 40 bar)	✓	✓	✓			✓	✓	✓	✓	✓
Relative pressure	✓	✓	✓	✓		✓	✓	✓	✓	✓
Absolute pressure					✓					
Available as individual units	✓	✓	✓	✓	✓	✓	✓			
OEM product for large volume production							✓	✓	✓	✓
Flush membrane		✓	✓	✓			✓			
CANopen Version		✓					✓			
ECE type authorisation (approved for road vehicles)									✓	
Approval for potentially explosive atmospheres		✓	✓	✓	✓					
Approvals for Shipping		✓	✓	✓	✓					
UL Approval	✓	✓	✓	✓	✓		✓	✓	✓	
Increased functional safety		✓						✓		

**Note:**

Not all feature combinations are possible. For precise information, please consult the relevant data sheet.





## Electronic Pressure Transmitter HDA 4800

### Description:

The pressure transmitter series HDA 4800 has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Outstanding technical specifications and robust construction make the HDA 4800 particularly suited to the field of test rig and diagnostic technology. It is also suitable for a broad range of industrial applications.

Since the accuracy of a pressure transmitter varies greatly with the temperature of the fluid, the instrument has excellent characteristics in this respect. The output signals 4 .. 20 mA, 0 .. 10V and 0 .. 20 mA (source) are available as standard.

### Special features:

- Accuracy  $\leq \pm 0.125\%$  FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Excellent long term stability

### Technical data:

Input data	
Measuring ranges	6; 16; 60; 100; 250; 400; 600 bar
Overload pressures	15; 32; 120; 200; 500; 800; 1000 bar
Burst pressures	100; 200; 300; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{L,max} = (U_B - 10 V) / 20 \text{ mA}$ [k $\Omega$ ] 0 .. 10 V, 3 conductor $R_{L,min} = 2 \text{ k}\Omega$ 0 .. 20 mA, 3 conductor source $R_{L,max} = (U_B - 4 V) / 20 \text{ mA}$ [k $\Omega$ ]
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.125\%$ FS typ. $\leq \pm 0.25\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.06\%$ FS typ. $\leq \pm 0.125\%$ FS max.
Temperature compensation	$\leq \pm 0.005\%$ FS / °C typ.
Zero point	$\leq \pm 0.01\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.005\%$ FS / °C typ. $\leq \pm 0.01\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.15\%$ FS max.
Hysteresis	$\leq \pm 0.1\%$ FS max.
Repeatability	$\leq \pm 0.05\%$ FS
Rise time	$\leq 1 \text{ ms}$
Long-term drift	$\leq \pm 0.1\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
cULus mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (M12x1, when an IP 67 connector is used)
Other data	
Supply voltage	10 .. 30 V DC 2-conductor 12 .. 30 V DC 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 15 \text{ mA}$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Model code:

HDA 4 8 4 X - X - XXX - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

4 = Male, 4 pole Binder series 714 M18  
(connector not supplied)

5 = Male, 3 pole+ PE, EN175301-803 (DIN 43650)  
(connector supplied)

6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

B = 0 .. 10 V, 3 conductor

E = 0 .. 20 mA, 3 conductor

### Pressure ranges in bar

006, 016; 060; 100; 250; 400; 600

### Modification number

000 = Standard

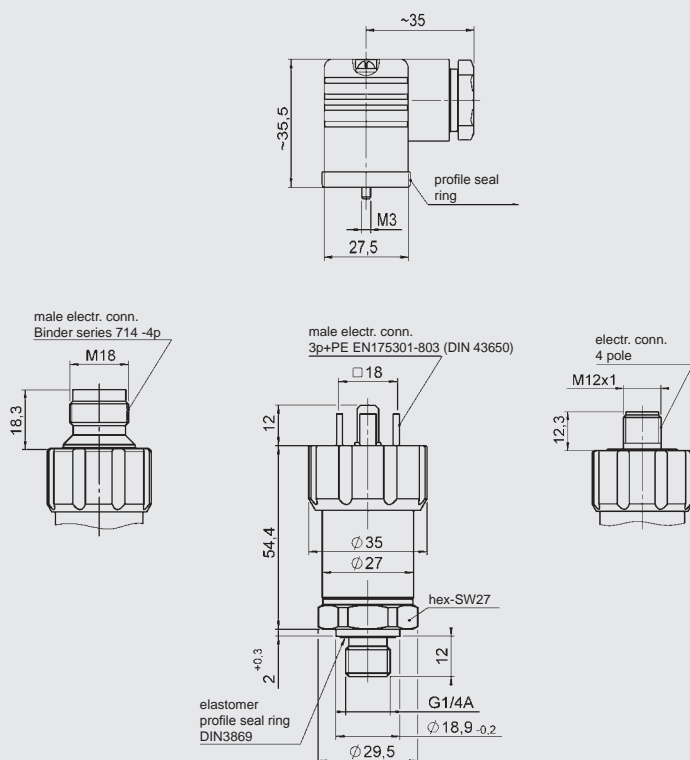
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

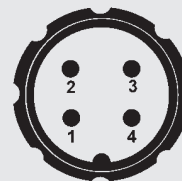
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:



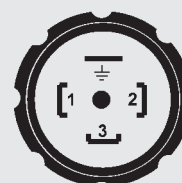
## Pin connections:

Binder series 714 M18



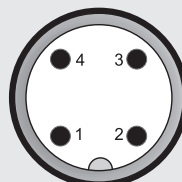
Pin	HDA 4844-A	HDA 4844-B	HDA 4844-E
1	n.c.	+U <sub>B</sub>	+U <sub>B</sub>
2	Signal+	Signal	Signal
3	Signal-	0 V	0 V
4	n.c.	n.c.	n.c.

EN175301-803 (DIN 43650)



Pin	HDA 4845-A	HDA 4845-B	HDA 4845-E
1	Signal+	+U <sub>B</sub>	+U <sub>B</sub>
2	Signal-	0 V	0 V
3	n.c.	Signal	Signal
⊥	Housing	Housing	Housing

M12x1



Pin	HDA 4846-A	HDA 4846-B	HDA 4846-E
1	Signal+	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	n.c.	n.c.
3	Signal-	0 V	0 V
4	n.c.	Signal	Signal

### Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Electronic Pressure Transmitter HDA 4700

### Description:

The pressure transmitter series HDA 4700 has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

The 4 .. 20 mA or 0 .. 10 V output signals enable connection to all measurement and control devices of HYDAC ELECTRONIC GMBH as well as standard evaluation systems (e.g. PLC controls).

The main areas of application are in the mobile or industrial sectors of hydraulics and pneumatics, particularly in applications with restricted installation space.

### Special features:

- Accuracy  $\leq \pm 0.25\%$  FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Very compact design
- Persuasive price / performance ratio

### Technical data:

Input data	
Measurement ranges <sup>1)</sup>	6; 16; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	15; 32; 120; 200; 500; 800; 1000; 1600 bar
Burst pressures	100; 200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>1)</sup>	G1/4 A DIN 3852; G1/2 A DIN3852
Torque value	20 Nm (G1/4); 45 Nm (G1/2)
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{l,max} = (U_e - 8 V) / 20 mA [k\Omega]$ 0 .. 10 V, 3 conductor $R_{l,min} = 2 k\Omega$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.
Temperature compensation	$\leq \pm 0.008\%$ FS / °C typ.
Zero point	$\leq \pm 0.015\%$ FS / °C max.
Temperature compensation	$\leq \pm 0.008\%$ FS / °C typ.
Over range	$\leq \pm 0.015\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.1\%$ FS max.
Repeatability	$\leq \pm 0.05\%$ FS
Rise time	$\leq 1$ ms
Long-term drift	$\leq \pm 0.1\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>2)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>3)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (M12x1, when an IP 67 connector is used)
Other data	
Supply voltage	8 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25$ mA
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 145 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> 1000 bar only with mechanical connection G 1/2 A DIN 3852 and vice versa

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

<sup>3)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Model code:

HDA 4 7 X X - X - XXX - 000

### Mechanical connection

- 2 = G1/2 A DIN 3852 (only for "1000 bar" press. range)
- 4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
- 5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
- 6 = Male M12x1, 4 pole (connector not supplied)

### Signal

- A = 4 .. 20 mA, 2 conductor
- B = 0 .. 10 V, 3 conductor

### Pressure ranges in bar

006; 016; 060; 100; 250; 400; 600  
1000 bar (only in conjunction with mechanical connection type "2")

### Modification number

000 = Standard

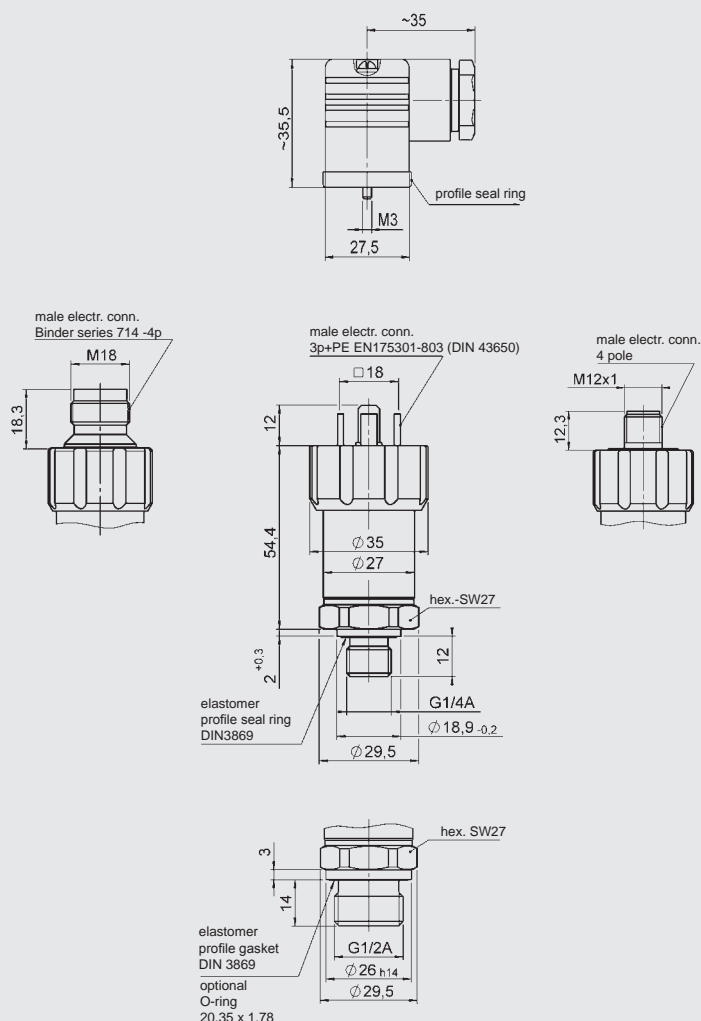
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

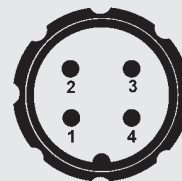
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:



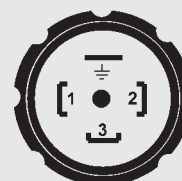
## Pin connections:

Binder series 714 M18



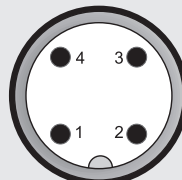
Pin	HDA 47X4-A	HDA 47X4-B
1	n.c.	+U <sub>B</sub>
2	Signal+	Signal
3	Signal-	0 V
4	n.c.	n.c.

EN175301-803 (DIN 43650)



Pin	HDA 47X5-A	HDA 47X5-B
1	Signal+	+U <sub>B</sub>
2	Signal-	0 V
3	n.c.	Signal
⊥	Housing	Housing

M12x1



Pin	HDA 47X6-A	HDA 47X6-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0 V
4	n.c.	Signal

### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Transmitter HDA 4700 with Approvals for Shipping

### Description:

This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series.

With its stainless steel measurement cell and thin-film strain gauge, the HDA 4700 is designed to measure relative pressures in the high pressure range.

The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.

The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

### Approvals:

- American Bureau of Shipping



- Lloyds Register of Shipping



- Det Norske Veritas



- Germanischer Lloyd



- Bureau Veritas



Other approvals on request

### Technical data:

Input data	
Measurement ranges	6; 16; 40; 60; 100; 250; 400; 600 bar
Overload pressures	15; 32; 80; 120; 200; 500; 800; 1000 bar
Burst pressures	100; 200; 200; 300; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM

Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 10 V) / 20 mA [k\Omega]$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.25 \% FS$ typ. $\leq \pm 0.5 \% FS$ max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15 \% FS$ typ. $\leq \pm 0.25 \% FS$ max.
Temperature compensation	$\leq \pm 0.008 \% FS / ^\circ C$ typ.
Zero point	$\leq \pm 0.015 \% FS / ^\circ C$ max.
Temperature compensation Range	$\leq \pm 0.008 \% FS / ^\circ C$ typ. $\leq \pm 0.015 \% FS / ^\circ C$ max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3 \% FS$ max.
Hysteresis	$\leq \pm 0.1 \% FS$ max.
Repeatability	$\leq \pm 0.05 \% FS$
Rise time	$\leq 1 ms$
Long-term drift	$\leq \pm 0.1 \% FS$ typ. / year

Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 g$
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650)) IP 67 (for M12x1 male, when an IP 67 connector female is used)

Other data	
Supply voltage	10 .. 32 V DC
Residual ripple of supply voltage	$\leq 5 \%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

## Model code:

HDA 4 7 4 X - A - XXXX - S00

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

5 = Male, 3 pole + PE, EN175301-803 (DIN 43650)  
(connector supplied)

6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600

### Modification number

S00 = With approvals for shipping

### Note:

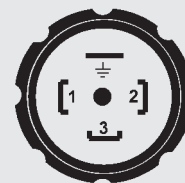
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Pin connections:

EN175301-803 (DIN 43650)



Pin HDA 4745-A

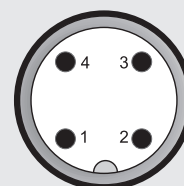
1 Signal+

2 Signal-

3 n.c.

⊥ Housing

M12x1



Pin HDA 4746-A

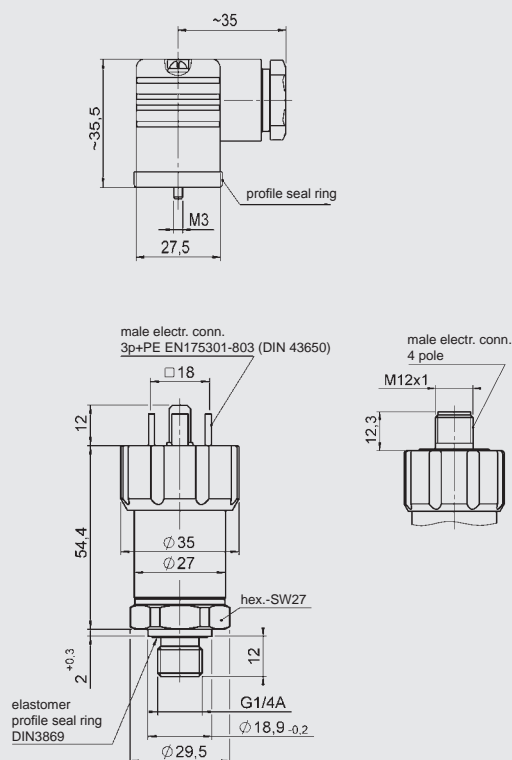
1 Signal+

2 n.c.

3 Signal-

4 n.c.

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Transmitter HDA 4700 CANopen

### Description:

The HDA 4700 CAN is a digital pressure transmitter which is used to measure relative pressures in hydraulics and pneumatics. The measured pressure value is digitized and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

This pressure transmitter, which is based on the HDA 4700, has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Due to their outstanding temperature and EMC characteristics, together with their compact dimensions, these instruments can be used in a wide range of applications in the mobile and industrial sectors.

### Special features:

- CANopen interface
- Accuracy  $\leq \pm 0.25\%$  FS typ.
- Robust thin-film cell
- Excellent EMC characteristics
- Very compact design

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	40; 100; 250; 400; 600; 1000 bar
Overload pressures	80; 200; 500; 800; 1000; 1600 bar
Burst pressures	200; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>1)</sup>	G1/4 A DIN 3852; G1/2 A DIN 3852
Torque value	20 Nm (G1/4); 45 Nm (G1/2)
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal	CANopen protocol
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.
Temperature compensation Zero point	$\leq \pm 0.008\%$ FS / °C typ. $\leq \pm 0.015\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.008\%$ FS / °C typ. $\leq \pm 0.015\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.1\%$ FS max.
Repeatability	$\leq \pm 0.08\%$ FS
Rise time	$\leq 1$ ms
Long-term drift	$\leq \pm 0.1\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>2)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
eNEC mark <sup>3)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage for use acc. to UL spec.	10 .. 35 V DC - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25$ mA
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	approx. 150 g

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.  
**FS (Full Scale)** = relative to complete measuring range  
**B.F.S.L. = Best Fit Straight Line**

Special models available on request.

<sup>1)</sup> 1000 bar only with mechanical connection G1/2 A DIN 3852 and vice versa

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

<sup>3)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Model code:

HDA 4 7 X 8 - K - XXXX - 000

### Mechanical connection

2 = G1/2 A DIN 3852 (only for "1000 bar" press. range)

4 = G1/4 A DIN 3852 (male)

### Electrical connection

8 = Male M12x1, 5 pole  
(connector not supplied)

### Signal

K = CANopen

### Pressure ranges in bar

0040; 0100; 0250; 0400; 0600

1000 (only in conjunction with mechanical connection type "2")

### Modification number

000 = Standard (Baud Rate: 250k Node Id: 1)

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

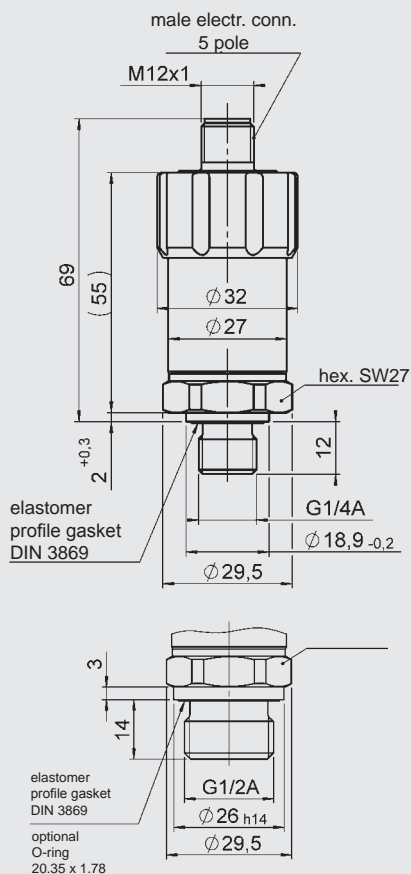
### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Protocol data for CANopen:

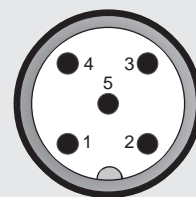
Communication profile	CiA DS 301 V4.2
Device profile	CiA DS 404 V1.3
Layer setting services and protocol	CiA DSP 305 V2.2
Automatic bit-rate detection	CiA AN 801
Baud rates	10 kbit .. 1 Mbit corresp. to DS305 V2.2
Transmission services	
- PDO	Measured value as 16/32 bit, float status
- Transfer	synchronous, asynchronous, cyclical, measured value change, exceeding boundaries
Node ID/Baud rate	Can be set via Manufacturer Specific Profile

## Dimensions:



## Pin connections:

M12x1



Pin	Signal	Description
1	Housing	shield/housing
2	+U <sub>B</sub>	supply +
3	0 V	supply -
4	CAN_H	bus line dominant high
5	CAN_L	bus line dominant low

### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Transmitter HDA 4400

### Description:

The pressure transmitter series HDA 4400 has a pressure measurement cell with thin-film strain gauge on a stainless steel membrane.

The 4 .. 20 V or 0 .. 10 V output signals enable connection to all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. PLC controls).

The main areas of application are in the mobile or industrial sectors of hydraulics and pneumatics, particularly in applications with restricted installation space.

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Very compact design
- Persuasive price / performance ratio

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	16; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	32; 120; 200; 500; 800; 1000; 1600 bar
Burst pressures	200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>1)</sup>	G1/4 A DIN 3852; G1/2 A DIN 3852
Torque value	20 Nm (G1/4); 45 Nm (G1/2)
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{L,max.} = (U_B - 8 \text{ V}) / 20 \text{ mA}$ [k $\Omega$ ] 0 .. 10 V, 3 conductor $R_{L,min.} = 2 \text{ k}\Omega$
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Zero point	$\leq \pm 0.025\%$ FS / °C max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Over range	$\leq \pm 0.025\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 1 \text{ ms}$
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range	-25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
eURus mark <sup>3)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1, when an IP 67 connector is used)
Other data	
Supply voltage	8 .. 30 V DC, 2 conductor 12 .. 30 V DC, 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25 \text{ mA}$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 145 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L. = Best Fit Straight Line**

<sup>1)</sup> 1000 bar only with mechanical connection G 1/2 A DIN 3852 and vice versa

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

<sup>3)</sup> Environmental conditions in accordance with 1.4.2 UL 61010-1; C22.2 No 61010-1

## Model code:

HDA 4 4 X X - X - XXX - 000

### Mechanical connection

- 2 = G1/2 A DIN 3852 (only for "1000 bar" press. range)
- 4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
- 5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
- 6 = Male M12x1, 4 pole (connector not supplied)

### Signal

- A = 4 .. 20 mA, 2 conductor
- B = 0 .. 10 V, 3 conductor

### Pressure ranges in bar

- 016; 060; 100; 250; 400; 600
- 1000 bar (only in conjunction with mechanical connection type "2")

### Modification number

- 000 = Standard

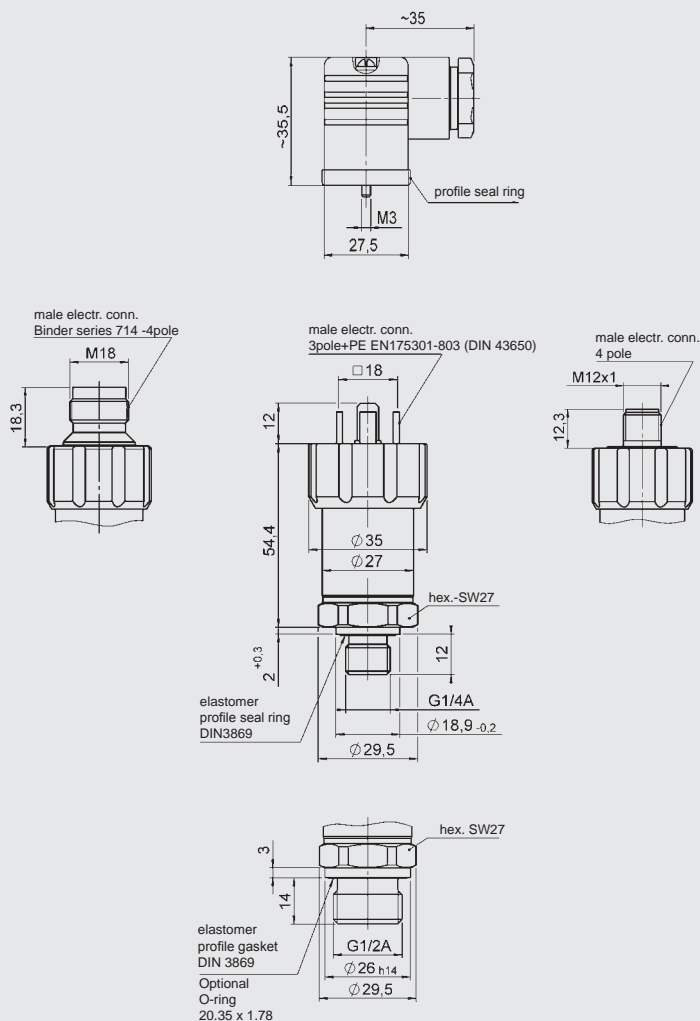
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

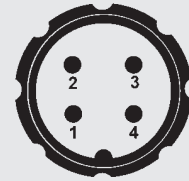
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:



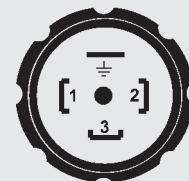
## Pin connections:

Binder series 714 M18



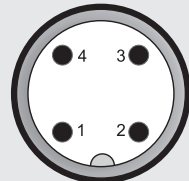
Pin	HDA 44X4-A	HDA 44X4-B
1	n.c.	+U <sub>B</sub>
2	Signal+	Signal
3	Signal-	0 V
4	n.c.	n.c.

EN175301-803 (DIN 43650)



Pin	HDA 44X5-A	HDA 44X5-B
1	Signal+	+U <sub>B</sub>
2	Signal-	0 V
3	n.c.	Signal
⊥	Housing	Housing

M12x1



Pin	HDA 44X6-A	HDA 44X6-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0 V
4	n.c.	Signal

### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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 Internet: www.hydac.com



## Electronic Pressure Transmitter HDA 4400 with Approvals for Shipping

### Description:

This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series. With its stainless steel measurement cell and thin-film strain gauge, the HDA 4400 is designed to measure relative pressures in the high pressure range. The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.

The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

### Approvals:

- American Bureau of Shipping



- Lloyds Register of Shipping



- Det Norske Veritas



- Germanischer Lloyd



- Bureau Veritas



Other approvals on request

### Technical data:

Input data	
Measuring ranges	6; 16; 40; 60; 100; 250; 400; 600 bar
Overload pressures	15; 32; 80; 120; 200; 500; 800; 1000 bar
Burst pressures	100; 200; 200; 300; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. connector: Stainless steel Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 10 V) / 20 mA [k\Omega]$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5 \% FS$ typ. $\leq \pm 1 \% FS$ max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25 \% FS$ typ. $\leq \pm 0.5 \% FS$ max.
Temperature compensation	$\leq \pm 0.015 \% FS / ^\circ C$ typ.
Zero point	$\leq \pm 0.025 \% FS / ^\circ C$ max.
Temperature compensation	$\leq \pm 0.015 \% FS / ^\circ C$ typ.
Range	$\leq \pm 0.025 \% FS / ^\circ C$ max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3 \% FS$ max.
Hysteresis	$\leq \pm 0.4 \% FS$ max.
Repeatability	$\leq \pm 0.1 \% FS$
Rise time	$\leq 1 ms$
Long-term drift	$\leq \pm 0.3 \% FS$ typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 g$
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650)) IP 67 (for M12x1 male when an IP 67 connector is used)
Other data	
Supply voltage	10 .. 32 V DC
Residual ripple of supply voltage	$\leq 5 \%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

## Model code:

HDA 4 4 4 X - A - XXXX - S00

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

5 = Male, 3 pole + PE, EN175301-803 (DIN 43650)  
(connector supplied)

6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600

### Modification number

S00 = With approvals for shipping

### Note:

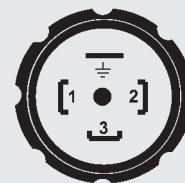
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Pin connections:

EN175301-803 (DIN 43650)



Pin HDA 4445-A

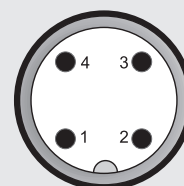
1 Signal+

2 Signal-

3 n.c.

⊥ Housing

M12x1



Pin HDA 4446-A

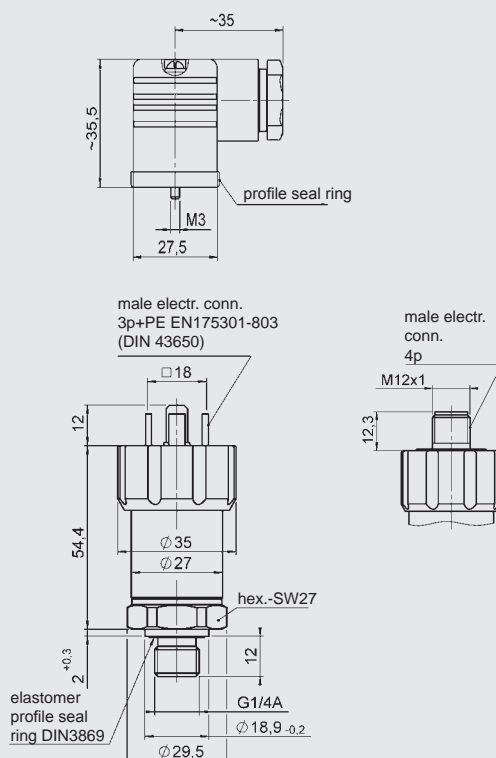
1 Signal+

2 n.c.

3 Signal-

4 n.c.

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

**HYDAC ELECTRONIC GMBH**  
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Internet: [www.hydac.com](http://www.hydac.com)



## Electronic Pressure Transmitter HDA 4300

### Description:

The pressure transmitter series HDA 4300 has a ceramic pressure measurement cell with a thick-film strain gauge which has been specially developed for measuring relative pressure in the low pressure range.

The output signals 4 .. 20 mA or 0 .. 10 V allow connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as industry standard control and monitoring instruments.

The main areas of application are low-pressure applications in hydraulics and pneumatics, particularly in refrigeration and air-conditioning technology, the food and pharmaceutical industries.

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Very small temperature error
- Excellent EMC characteristics
- Very compact design
- Persuasive price / performance ratio

### Technical data:

Input data	
Measuring ranges	1; 2.5; 4; 6; 10; 16; 25; 40 bar -1 .. 5; -1 .. 9 bar
Overload pressures	3; 8; 12; 20; 32; 50; 80; 120 bar 20; 32 bar
Burst pressures	5; 12; 18; 30; 48; 75; 120; 180 bar 30; 48 bar
Mechanical connection	G1/4 A DIN 3852; G1/2 B DIN-EN 837
Torque value	20 Nm (G1/4); 45 Nm (G1/2)
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: Copper (G1/2) / FPM / EPDM (as per model code)
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{L,max.} = (U_B - 8 V) / 20 \text{ mA} [\text{k}\Omega]$ 0 .. 10 V, 3 conductor $R_{L,min.} = 2 \text{ k}\Omega$
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation	$\leq \pm 0.02\%$ FS / °C typ.
Zero point	$\leq \pm 0.03\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.02\%$ FS / °C typ. $\leq \pm 0.03\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 1 \text{ ms}$
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range	-25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (M12x1, when an IP 67 connector is used)
Other data	
Supply voltage	8 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25 \text{ mA}$
Life expectancy	> 10 million cycles, 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L. = Best Fit Straight Line**

<sup>1)</sup> -25 °C with FPM or EPDM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Model code:

HDA 4 3 X X - X - XXXX - 000 - X 1

### Mechanical connection

- 1 = G1/2 B DIN-EN 837 (male)
- 4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
- 5 = Male, 3 pole + PE, DIN EN175301-803 (DIN 43650) (connector supplied)
- 6 = Male M12x1, 4 pole, (connector not supplied)

### Signal

- A = 4 .. 20 mA, 2 conductor
- B = 0 .. 10 V, 3 conductor

### Pressure ranges in bar

01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040  
0005 (-1 .. 5); 0009 (-1 .. 9)

### Modification number

000 = Standard

### Seal material (in contact with fluid)

- F = FPM seal (e.g.: for hydraulic oils)
- E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

- 1 = Stainless steel

### Note:

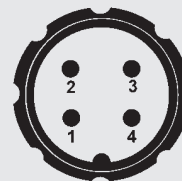
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

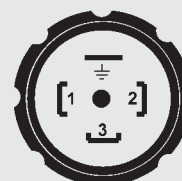
## Pin connections:

Binder series 714 M18



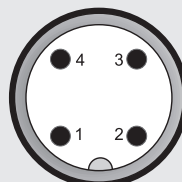
Pin	HDA 43X4-A	HDA 43X4-B
1	n.c.	+U <sub>B</sub>
2	Signal+	Signal
3	Signal-	0 V
4	n.c.	n.c.

EN175301-803 (DIN 43650)



Pin	HDA 43X5-A	HDA 43X5-B
1	Signal+	+U <sub>B</sub>
2	Signal-	0 V
3	n.c.	Signal
⊥	Housing	Housing

M12x1



Pin	HDA 43X6-A	HDA 43X6-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0 V
4	n.c.	Signal

### Note:

The information in this brochure relates to the operating conditions and applications described.

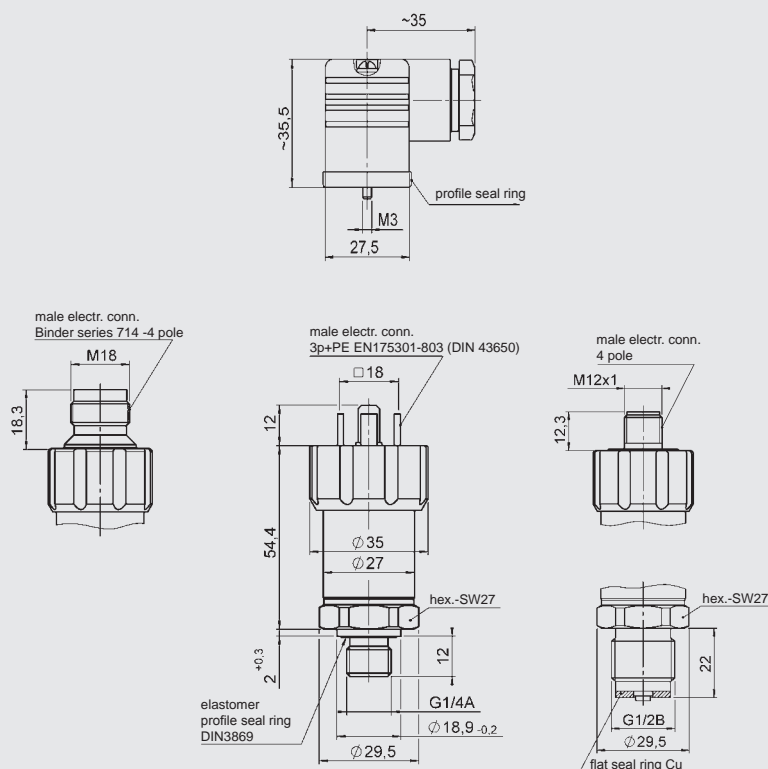
For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Dimensions:





## Electronic Pressure Transmitter HDA 4300 with Approvals for Shipping

### Description:

This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series.

The HDA 4300 has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range.

The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.

The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

### Approvals:

- American Bureau of Shipping



- Lloyds Register of Shipping



- Det Norske Veritas



- Germanischer Lloyd



- Bureau Veritas



Other approvals on request

### Technical data:

#### Input data

Measuring ranges	1; 2.5; 4; 6; 10; 16; 25; 40 bar -1 .. 5; -1 .. 9 bar
Overload pressures	3; 8; 12; 20; 32; 50; 80; 120 bar 20; 32 bar
Burst pressures	5; 12; 18; 30; 48; 75; 120; 180 bar 30; 48 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)

#### Output data

Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 10 V) / 20 mA [k\Omega]$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5 \% FS$ typ. $\leq \pm 1 \% FS$ max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25 \% FS$ typ. $\leq \pm 0.5 \% FS$ max.
Temperature compensation Zero point	$\leq \pm 0.02 \% FS / ^\circ C$ typ. $\leq \pm 0.03 \% FS / ^\circ C$ max.
Temperature compensation Over range	$\leq \pm 0.02 \% FS / ^\circ C$ typ. $\leq \pm 0.03 \% FS / ^\circ C$ max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5 \% FS$ max.
Hysteresis	$\leq \pm 0.4 \% FS$ max.
Repeatability	$\leq \pm 0.1 \% FS$
Rise time	$\leq 1 ms$
Long-term drift	$\leq \pm 0.3 \% FS$ typ. / year

#### Environmental conditions

Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-30 .. +85°C / -25 .. +85 °C
Storage temperature range	-30 .. +100 °C
Fluid temperature range <sup>1)</sup>	-30 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 g$
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650)) IP 67 (for M12x1 male, when an IP 67 connector is used)

#### Other data

Supply voltage	10 .. 32 V DC
Residual ripple of supply voltage	$\leq 5 \%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -25 °C with FPM or EPDM seal, -30 °C on request

## Model code:

HDA 4 3 4 X - A - XXXX - S00 - X 1

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

5 = Male, 3 pole + PE,  
EN175301-803 (DIN 43650)  
(connector supplied)

6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040  
0005 (-1 .. 5); 0009 (-1 .. 9)

### Modification number

S00 = With approvals for shipping

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

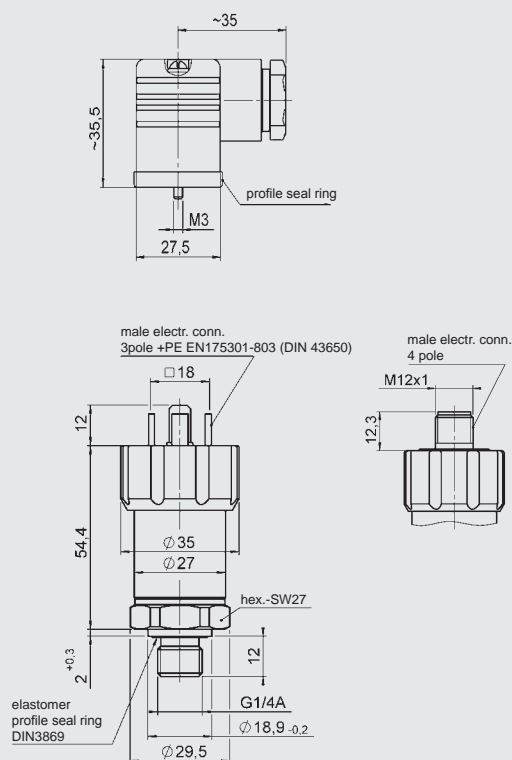
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

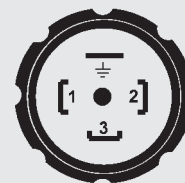
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

## Dimensions:



## Pin connections:

EN175301-803 (DIN 43650)



Pin HDA 4345-A

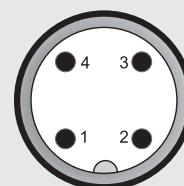
1 Signal+

2 Signal-

3 n.c.

⊥ Housing

M12x1



Pin HDA 4346-A

1 Signal+

2 n.c.

3 Signal-

4 n.c.

### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Transmitter HDA 4100

### Description:

The pressure transmitter series HDA 4100 has a ceramic pressure measurement cell with thick-film strain gauge which has been specially developed for measuring absolute pressure in the low-pressure range.

The 4 .. 20 mA or 0 .. 10 V output signals enable connection to all HYDAC ELECTRONIC GMBH measurement and control devices as well as standard control and evaluation systems.

The main areas of application are low-pressure applications in hydraulics and pneumatics, particularly in refrigeration and air-conditioning technology, the food and pharmaceutical industries.

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Very small temperature error
- Excellent EMC characteristics
- Very compact design
- Persuasive price / performance ratio

### Technical data:

Input data	
Measuring ranges	1; 2.5 bar
Overload pressures	3; 8 bar
Burst pressures	5; 12 bar
Mechanical connection	G1/4 A DIN 3852; G1/2 B DIN-EN 837
Torque value	20 Nm (G1/4); 45 Nm (G1/2)
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: Copper (G1/2) / FPM / EPDM (as per model code)
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 8 V) / 20 \text{ mA}$ [k $\Omega$ ] 0 .. 10 V, 3 conductor $R_{Lmin} = 2 \text{ k}\Omega$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1.0\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation	$\leq \pm 0.02\%$ FS / °C typ.
Zero point	$\leq \pm 0.03\%$ FS / °C max.
Temperature compensation	$\leq \pm 0.02\%$ FS / °C typ.
Over range	$\leq \pm 0.03\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 1 \text{ ms}$
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range	-25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1, when an IP 67 connector is used)
Other data	
Supply voltage	8 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25 \text{ mA}$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 145 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L.** = Best Fit Straight Line

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Model code:

HDA 4 1 X X - X - XXXX - 000 - X 1

### Mechanical connection

- 1 = G1/2 B DIN-EN 837 (male)
- 4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
- 5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
- 6 = Male M12x1, 4 pole (connector not supplied)

### Signal

- A = 4 .. 20 mA, 2 conductor
- B = 0 .. 10 V, 3 conductor

### Pressure ranges in bar

01.0; 02.5

### Modification number

000 = Standard

### Seal material (in contact with fluid)

- F = FPM seal (e.g.: for hydraulic oils)
- E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

- 1 = Stainless steel

### Note:

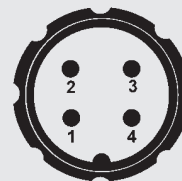
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

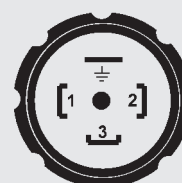
## Pin connections:

Binder series 714 M18



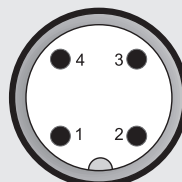
Pin	HDA 41X4-A	HDA 41X4-B
1	n.c.	+U <sub>B</sub>
2	Signal+	Signal
3	Signal-	0 V
4	n.c.	n.c.

EN175301-803 (DIN 43650)



Pin	HDA 41X5-A	HDA 41X5-B
1	Signal+	+U <sub>B</sub>
2	Signal-	0 V
3	n.c.	Signal
⊥	Housing	Housing

M12x1



Pin	HDA 41X6-A	HDA 41X6-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0 V
4	n.c.	Signal

### Note:

The information in this brochure relates to the operating conditions and applications described.

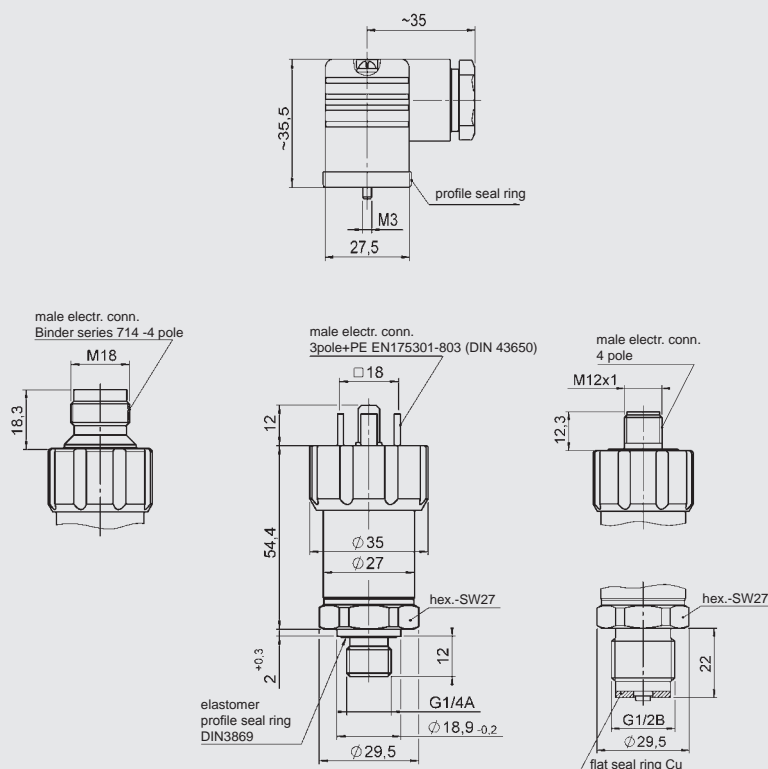
For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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 Internet: www.hydac.com

## Dimensions:





## Electronic Pressure Transmitter HDA 4100 with Approvals for Shipping

### Description:

This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series.

The HDA 4100 has a ceramic measurement cell with thick-film strain gauge for measuring absolute pressure in the low pressure range. The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.

The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

### Approvals:

- American Bureau of Shipping



- Lloyds Register of Shipping



- Det Norske Veritas



- Germanischer Lloyd



- Bureau Veritas



Other approvals on request

### Technical data:

#### Input data

Measuring ranges	1; 2.5 bar
Overload pressures	3; 8 bar
Burst pressures	5; 12 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)

#### Output data

Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 10 V) / 20 \text{ mA} [\text{k}\Omega]$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5 \% \text{ FS typ.}$ $\leq \pm 1 \% \text{ FS max.}$
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25 \% \text{ FS typ.}$ $\leq \pm 0.5 \% \text{ FS max.}$
Temperature compensation Zero point	$\leq \pm 0.02 \% \text{ FS} / ^\circ\text{C typ.}$ $\leq \pm 0.03 \% \text{ FS} / ^\circ\text{C max.}$
Temperature compensation Over range	$\leq \pm 0.02 \% \text{ FS} / ^\circ\text{C typ.}$ $\leq \pm 0.03 \% \text{ FS} / ^\circ\text{C max.}$
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5 \% \text{ FS max.}$
Hysteresis	$\leq \pm 0.25 \% \text{ FS max.}$
Repeatability	$\leq \pm 0.1 \% \text{ FS}$
Rise time	$\leq 1 \text{ ms}$
Long-term drift	$\leq \pm 0.3 \% \text{ FS typ.} / \text{year}$

#### Environmental conditions

Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-30 .. +85 °C / -25 .. +85 °C
Storage temperature range	-30 .. +100 °C
Fluid temperature range <sup>1)</sup>	-30 .. +85 °C / -25 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650)) IP 67 (for M12x1 male, when an IP 67 connector is used)

#### Other data

Supply voltage	10 .. 32 V DC
Residual ripple of supply voltage	$\leq 5 \%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -25 °C with FPM or EPDM seal, -30 °C on request

## Model code:

HDA 4 1 4 X - A - XXXX - S00 - X 1

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

5 = Male, 3 pole + PE,  
EN175301-803 (DIN 43650)  
(connector supplied)

6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

01.0; 02.5

### Modification number

S00 = With approvals for shipping

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

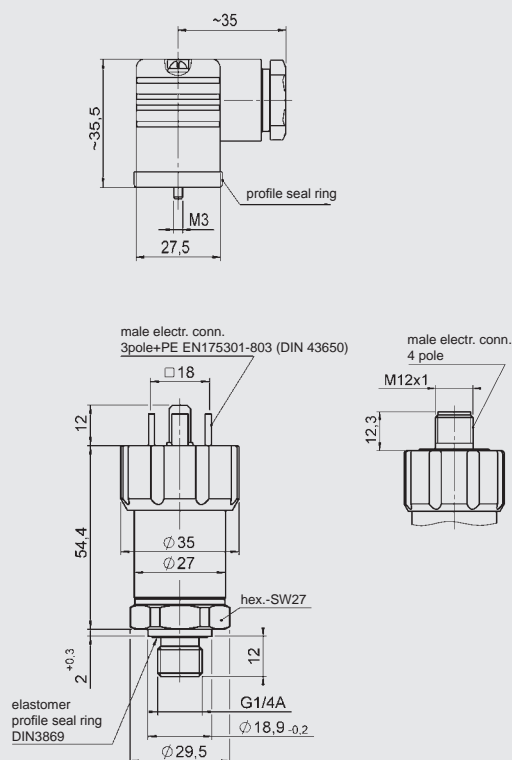
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

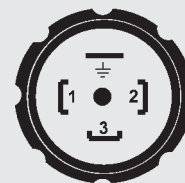
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

## Dimensions:



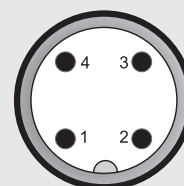
## Pin connections:

EN175301-803 (DIN 43650)



Pin	HDA 4145-A
1	Signal+
2	Signal-
3	n.c.
⊥	Housing

M12x1



Pin	HDA 4146-A
1	Signal+
2	n.c.
3	Signal-
4	n.c.

### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

### HYDAC ELECTRONIC GMBH

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Internet: [www.hydac.com](http://www.hydac.com)



## Electronic Pressure Transmitter HDA 7446

### Description:

The pressure transmitter series HDA 7400 combines excellent technical specifications with a highly compact design.

The HDA 7446 was specifically developed for OEM applications e.g. in mobile applications. A strain gauge sensor cell is the basis for a robust, long-life pressure transmitter.

Various pressure ranges between 0 .. 40 bar and 0 .. 600 bar provide versatility when adapting to particular applications.

For integration into modern controls (e.g. with PLC), the analogue output signals 4 .. 20 mA or 0 .. 10V are also available on the standard version.

Other output signals are available on request.

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Highly robust sensor cell
- Very compact design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	40; 60; 100; 250; 400; 600 bar
Overload pressures	80; 120; 200; 500; 800; 1000 bar
Burst pressures	200; 300; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax.} = (U_B - 8 V) / 20 \text{ mA} [k\Omega]$ 0 .. 10 V, 3 conductor $R_{Lmin.} = 2 \text{ k}\Omega$
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Zero point	$\leq \pm 0.025\%$ FS / °C max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Over range	$\leq \pm 0.025\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 2 \text{ ms}$
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +85 °C / -25 ... +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
RoHS mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 67 (for M12x1, when an IP 67 connector is used)
Other data	
Supply voltage	8 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25 \text{ mA}$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 60 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L. = Best Fit Straight Line**

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Model code:

HDA 7 4 4 6 - X - XXX - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

B = 0 .. 10 V, 3 conductor

### Pressure ranges in bar

040; 060; 100; 250; 400; 600

### Modification number

000 = Standard

### Note:

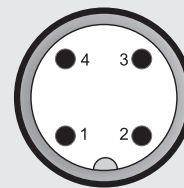
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

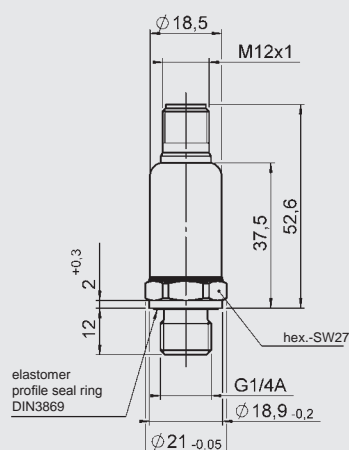
## Pin connections:

M12x1



Pin	HDA 7446-A	HDA 7446-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0 V
4	n.c.	Signal

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Transmitter HDA 7400 CANopen

### Description:

The HDA 7400 CAN is a digital pressure transmitter which is used to measure relative pressures in hydraulics and pneumatics. The measured pressure value is digitized and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

This pressure transmitter, which is based on the HDA 7400, has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Due to their outstanding temperature and EMC characteristics, together with their compact dimensions, these instruments can be used in a wide range of applications in the mobile and industrial sectors.

### Special features:

- CANopen interface
- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Robust thin-film cell
- Excellent EMC characteristics
- Very compact design

### Technical data:

Input data	
Measuring ranges	40; 100; 250; 400; 600 bar
Overload pressures	80; 200; 500; 800; 1000 bar
Burst pressures	200; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal	CANopen protocol
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Zero point	$\leq \pm 0.025\%$ FS / °C max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Over range	$\leq \pm 0.025\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 2$ ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
us mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage for use acc. to UL spec.	10 .. 35 V DC - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25$ mA
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 60 g

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L.** = Best Fit Straight Line

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Model code:

HDA 7 4 4 8 - K - XXXX - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

8 = Male M12x1, 5 pole  
(connector not supplied)

### Signal

K = CANopen

### Pressure ranges in bar

0040; 0100; 0250; 0400; 0600

### Modification number

000 = Standard (Baud Rate: 250k Node Id: 1)

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

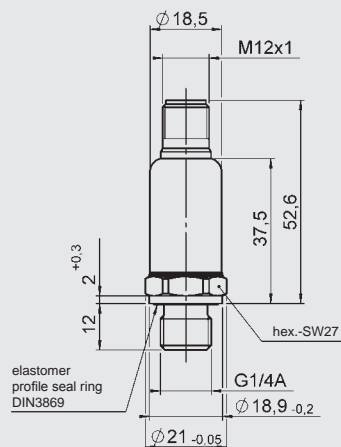
### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Protocol data for CANopen:

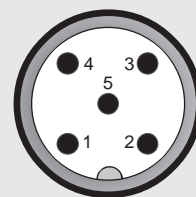
Communication profile	CiA DS 301 V4.2
Device profile	CiA DS 404 V1.3
Layer setting services and protocol	CiA DSP 305 V2.2
Automatic bit-rate detection	CiA AN 801
Baud rates	10 kbit .. 1 Mbit corresp. to DS305 V2.2
Transmission services	
- PDO	Measured value as 16/32 bit, float status
- Transfer	synchronous, asynchronous, cyclical, measured value change, exceeding boundaries
Node ID/Baud rate	Can be set via Manufacturer Specific Profile

## Dimensions:



## Pin connections:

M12x1



Pin	Signal	Description
1	Housing	shield/housing
2	+U <sub>B</sub>	supply +
3	0 V	supply -
4	CAN_H	bus line dominant high
5	CAN_L	bus line dominant low

Configuration corresp. to CIA-DR-303-1

## Note:

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## Electronic Pressure Transmitter HDA 3800 for Iron & Steel Works Applications

### Description:

This high-precision pressure transmitter was specially developed and adapted for the sophisticated measurement demands of steelworks technology.

The instrument has a very robust sensor cell with a thin-film strain gauge on a stainless steel membrane. Its outstanding specifications in respect of temperature effect (temperature drift for zero point and range are in each case max.  $\leq \pm 0.01$  % FS / °C) and accuracy ( $\leq \pm 0.15$  % FS typ.) make it ideally suited for use in the environmental conditions found in steelworks.

The excellent EMC characteristics guarantee signal stability during the harshest high-frequency, electro-magnetic interference.

### Special features:

- Accuracy  $\leq \pm 0.15$  % FS typ.
- Specially designed for use in steelworks and rolling mills
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Excellent long term stability

### Technical data:

Input data	
Measurement ranges <sup>1)</sup>	16; 60; 100; 150; 250; 300; 350; 400; 500; 600 bar
Overload pressures	32; 120; 200; 500; 800; 900; 900; 900; 1000 bar
Burst pressures	200; 300; 500; 1000; 2000; 2000; 2000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852 G1/2 A DIN 3852
Torque value	20 Nm (G1/4 A) 45 Nm (G1/2 A)
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM (G1/4 A) NBR O-ring (G1/2 A)
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 10 \text{ V}) / 20 \text{ mA}$ [kΩ] 0 .. 20 mA, (3 conductor rising) $R_{Lmax} = (U_B - 10 \text{ V}) / 20 \text{ mA}$ [kΩ]
Accuracy to DIN 16086	$\leq \pm 0.15$ % FS typ.
Max. setting	$\leq \pm 0.3$ % FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.1$ % FS typ. $\leq \pm 0.15$ % FS max.
Temperature compensation	$\leq \pm 0.005$ % FS / °C typ.
Zero point	$\leq \pm 0.01$ % FS / °C max.
Temperature compensation Over range	$\leq \pm 0.005$ % FS / °C typ. $\leq \pm 0.01$ % FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.2$ % FS max. (from 100 bar $\leq \pm 0.15$ % FS max.)
Hysteresis	$\leq \pm 0.1$ % FS max.
Repeatability	$\leq \pm 0.05$ % FS
Rise time	$\leq 1.5$ ms
Long-term drift	$\leq \pm 0.1$ % FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>2)</sup>	-40 .. +85°C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 25$ g
Protection class to IEC 60529	IP 68
Other data	
Supply voltage 2 conductor	10 .. 30 V DC
Supply voltage 3 conductor	12 .. 30 V DC
Residual ripple of supply voltage	$\leq 5$ %
Current consumption 3 conductor	approx. 25 mA
Life expectancy	> 10 million cycles, 0 .. 100 % FS
Weight	~ 210 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> Other measuring ranges on request

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

## Model code:

HDA 3 8 X 0 - X - XXX - 124 (XXM)

### Mechanical connection

0 = G1/2 A DIN 3852 (male)

4 = G1/4 A DIN 3852 (male)

### Electrical connection

0 = Flying lead

### Signal

A = 4 .. 20 mA, 2 conductor

E = 0 .. 20 mA, 3 conductor

### Pressure ranges in bar

016; 060; 100; 150; 250; 300; 350; 400; 500; 600

### Modification number

124 = Iron & steel works

### Cable length in metres

06; 10; 15

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Cable assignment:

Core	HDA 38X0-A	HDA 38X0-E
black	n.c.	+U <sub>B</sub>
brown	Signal+	Signal
blue	Signal-	0 V

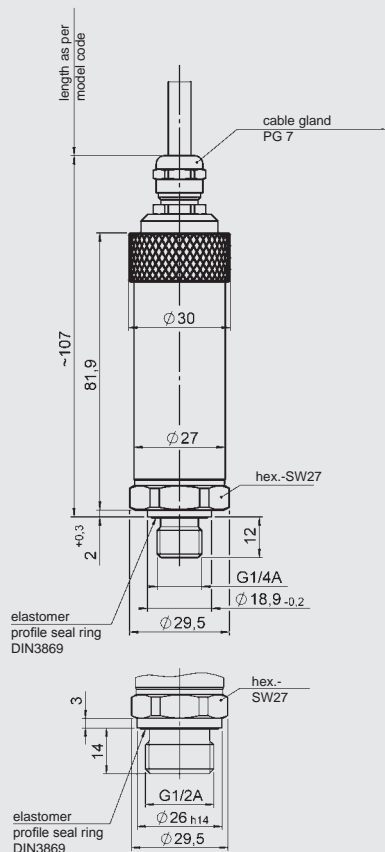
## Cable type:

Ölfon cable 3 x 0.75 mm<sup>2</sup> shielded.

Outer sheath FEP black

Outer diameter 5.9 ± 0.15mm

## Dimensions:



## Note:

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## ELECTRONIC PRESSURE SWITCHES

Electronic pressure switches for general applications:

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Further electronic pressure switches for special applications can be found in the Sections "Pressure Sensors with Flush Membrane", "Sensors for Potentially Explosive Atmospheres" and "OEM Products for Large Volume Production".

Electronic pressure switches offer a multitude of advantages in comparison to mechanical pressure switches and contact pressure gauges. Their superiority is shown through greater accuracy, freedom from wear, long-term stability, simpler operation and the high number of switching cycles, among other things.

Electronic Pressure Switches	EDS 3400	EDS 3300	EDS 3100	EDS 300	EDS 8000	EDS 601	EDS 1700	EDS 4400	EDS 4300	EDS 4100	EDS 820	EDS 810	EDS 710	EDS 410
														
Accuracy (max. error)	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Low pressure (up to 40 bar)		✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
High pressure (from 40 bar)	✓			✓	✓	✓	✓	✓			✓	✓	✓	✓
Relative pressure	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
Absolute pressure			✓							✓				
Number of switching outputs	2	2	2	2	2	2	4	2	2	2	2	2	1	2
Analogue output	✓	✓	✓	✓		✓	✓							
Digital display	✓	✓	✓	✓	✓	✓	✓							
Programmable	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Factory-set (not field-adjustable)								✓	✓	✓		✓	✓	✓
DESINA-compliant	✓	✓	✓											
VDMA Menu Navigation	✓	✓	✓		✓									
Available as individual units	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
OEM product for large volume production								✓	✓	✓		✓	✓	✓
Flush membrane	✓	✓												
IO Link Interface	✓	✓	✓								✓			
ECE type authorisation (approved for road vehicles)												✓		
Approval for potentially explosive atmospheres								✓	✓	✓				
Approvals for Shipping				✓										
UL Approval	✓	✓	✓		✓							✓		

**Note:** Not all feature combinations are possible. For precise information, please consult the relevant data sheet.

E 180.000.2/11.13



## Electronic Pressure Switch EDS 3400

### Description:

The EDS 3400 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the high-pressure range. The instrument has a stainless steel measurement cell with thin-film strain gauge. The instrument can have one or two switching outputs and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3400 is that the display can be moved in two planes. The device can be installed in almost any position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in **bar**, **psi** or **MPa**.

The user can select the particular unit of measurement. When changing to a different measurement unit, the instrument automatically converts all the switching settings to the new unit of measurement. In addition, the EDS 3400 is also available in a DESINA®-compliant version. The main applications of the EDS 3400 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

### Special features:

- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy  $\leq \pm 1\%$  FS
- Optional switchable analogue output (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two planes (axes)
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions
- Optional Desina®-compliant pin configuration with diagnostic function



### Technical data:

Input data	
Measuring ranges	40; 100; 250; 400; 600 bar
Overload pressures	80; 200; 500; 800; 1000; bar
Burst pressures	200; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852 Threaded port DIN 3852-G1/4
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM (G1/4 A DIN 3852)
Output data	
Accuracy to DIN 16086, Max. setting (display, analogue output)	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.25\%$ FS max.
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA      load resistance max. 500 $\Omega$ 0 .. 10 V      load resistance min. 1 k $\Omega$
Switch outputs	
Type	PNP transistor output
Switching current	max. 1.2 A
Switching cycles	> 100 million
Reaction time	< 10 ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
DESINA® diagnostic signal (Pin 2)	
Function	OK: HIGH level / not OK: LOW level
Level	HIGH: approx. +U <sub>B</sub> / LOW: < +0.3 V
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>1)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
for use acc. to UL spec.	
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided.

FS (Full Scale) = relative to the complete measurement range  
1) Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All settings available on the EDS 3400 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

## Setting ranges for the switch outputs:

Switching point function

Meas. range in bar	Switch point in bar	Hysteresis in bar	Increment* in bar
0 .. 40	0.6 .. 40	0.2 .. 39.6	0.1
0 .. 100	1.6 .. 100	0.6 .. 99.0	0.2
0 .. 250	4.0 .. 250	1.5 .. 247.5	0.5
0 .. 400	6.0 .. 400	2.0 .. 396	1
0 .. 600	9.0 .. 600	3.0 .. 594	1

Window function

Meas. range in bar	Lower switch value in bar	Upper switch value in bar	Increment* in bar
0 .. 40	0.6 .. 39.2	0.9 .. 39.6	0.1
0 .. 100	1.6 .. 98.2	2.4 .. 99	0.2
0 .. 250	4.0 .. 245.5	6.0 .. 247.5	0.5
0 .. 400	6.0 .. 392	9.0 .. 396	1
0 .. 600	9.0 .. 589	14 .. 594	1

\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Optional analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in the measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

## EDS 3400 for self diagnostics:



The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification. A diagnostic signal enables errors to be detected and an "ERROR" message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

## Model code:

EDS 3 4 X X - X - XXXX - 000

### Mechanical connection

- 4 = G1/4 A DIN 3852 (male)
- 9 = Threaded port DIN 3852-G1/4

### Electrical connection

- 6 = Male M12x1, 4 pole  
only possible on output models "1", "2" and "3"
- 8 = Male M12x1, 5 pole  
only possible on output model "5"

### Output

- 1 = 1 switching output  
only in conjunction with electrical connection type "6"
- 2 = 2 switching outputs  
only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output  
only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analogue output  
only in conjunction with electrical connection type "8"

### Pressure ranges in bar

0040; 0100; 0250; 0400; 0600

### Modification number

000 = Standard

## Model code:

DESINA®-compliant or  
can be connected to DESINA®:



EDS 3 4 X 8 - X - XXXX - D00

### Mechanical connection

- 4 = G1/4 A DIN 3852 (male)
- 9 = Threaded port DIN 3852-G1/4

### Electrical connection

- 8 = Male M12x1, 5 pole

### Output

- 1 = 1 switching output
- 3 = 1 switching output and 1 analogue output

### Pressure ranges in bar

0040; 0100; 0250; 0400; 0600

### Modification number

D00 = DESINA®-compliant pin configuration for self-diagnostics

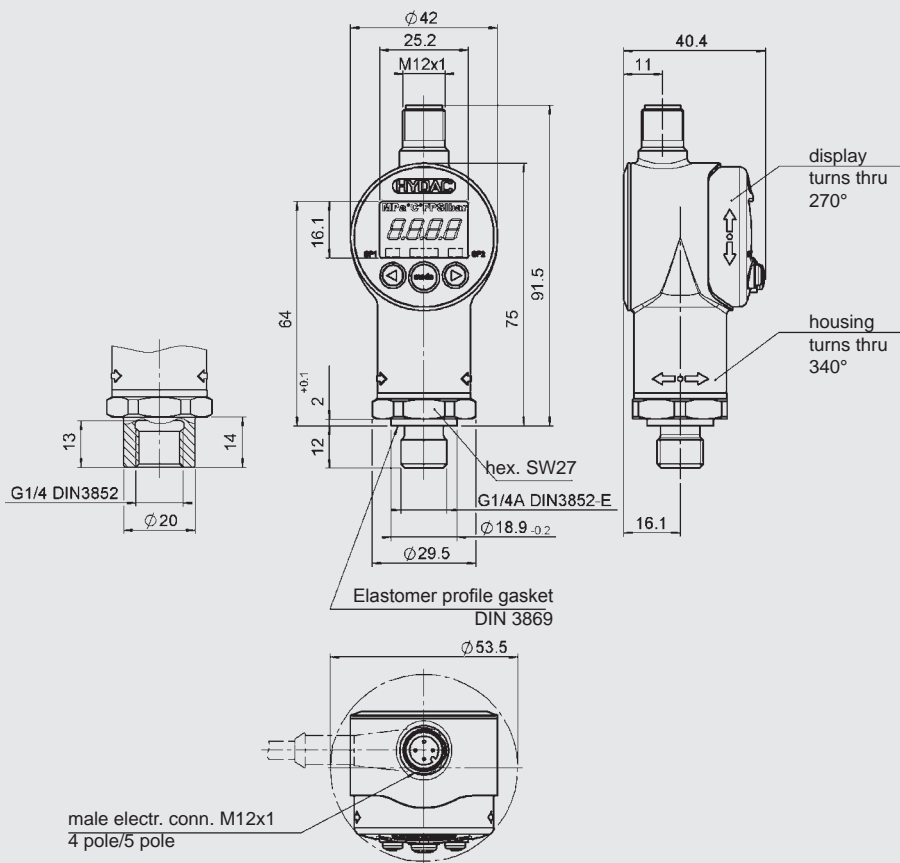
### Note:

For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

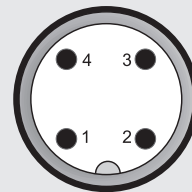
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



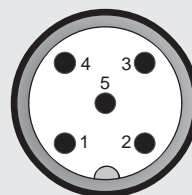
## Pin connections:

M12x1, 4 pole



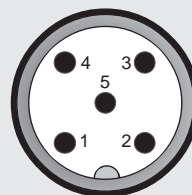
Pin	EDS 34X6-1	EDS 34X6-2	EDS 34X6-3
1	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2	Analogue
3	0 V	0 V	0 V
4	SP 1	SP 1	SP 1

M12x1, 5 pole



Pin	EDS 34X8-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

M12x1, 5 pole



Pin	EDS 34X8-1	Can be connected to DESINA® EDS 34X8-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Diagnostics	Diagnostics
3	0 V	0 V
4	SP 1	SP 1
5	n.c.	Analogue

## Note:

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## Description:

The EDS 3400 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the high-pressure range.

The device has a stainless steel measurement cell with thin-film strain gauge.

The device can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3400 is that the display can be moved in two planes. The unit can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in **bar**, **psi** or **MPa**. The user can select the individual measurement unit. When changing to a different measurement unit, the EDS 3400 automatically converts all the switching settings to the new unit of measurement.

The main applications of the EDS 3400 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

## Special features:

- Menu navigation according to VDMA
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy  $\leq \pm 1\%$  FS
- Optional analogue output selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Rotation in two planes (axes) for optimum alignment
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions

## Electronic Pressure Switch EDS 3400 with Menu Navigation to VDMA

### Technical data:

Input data	
Measuring ranges	40; 100; 250; 400; 600 bar
Overload pressures	80; 200; 500; 800; 1000 bar
Burst pressure	200; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852 Threaded port DIN 3852-G1/4
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Stainless steel Seal: FPM
Output data	
Accuracy to DIN 16086, Max. setting (display, analogue output)	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.25\%$ FS max.
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA      load resistance max. 500 $\Omega$ 0 .. 10 V      load resistance min. 1 k $\Omega$
Switch outputs	
Type	PNP transistor output
Switching current	max. 1.2 A
Switching cycles	> 100 million
Reaction time	< 10 ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>1)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
for use acc. to UL spec.	
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided.  
**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All terms and symbols used for setting the EDS 3400 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-1) for pressure switches.

The EDS 3400 can easily be adjusted via three buttons.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
0 .. 40	0.4	40.0
0 .. 100	1.0	100.0
0 .. 250	2.5	250.0
0 .. 400	4	400
0 .. 600	6	600

Measuring range in bar	Min. difference betw. RP and SP & FL and FH in bar	Increment* in bar
0 .. 40	0.4	0.1
0 .. 100	1.0	0.2
0 .. 250	2.5	0.5
0 .. 400	4	1
0 .. 600	6	1

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

FL = pressure window lower value

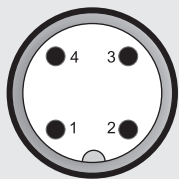
FH = pressure window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

## Pin connections:

M12x1, 4 pole



Pin	EDS 34X6-1	EDS 34X6-2	EDS 34X6-3
1	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2	Analogue
3	0 V	0 V	0 V
4	SP 1	SP 1	SP 1

## Model code:

EDS 3 4 X 6 - X - XXXX - V00

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

9 = Threaded port DIN 3852-G1/4

### Electrical connection

6 = Male M12x1, 4 pole

### Output

1 = 1 switching output

2 = 2 switching outputs

3 = 1 switching output and 1 analogue output

### Pressure ranges in bar

040; 100; 250; 400; 600

### Modification number

V00 = Menu navigation in accordance with VDMA (Standard Sheet 24574)

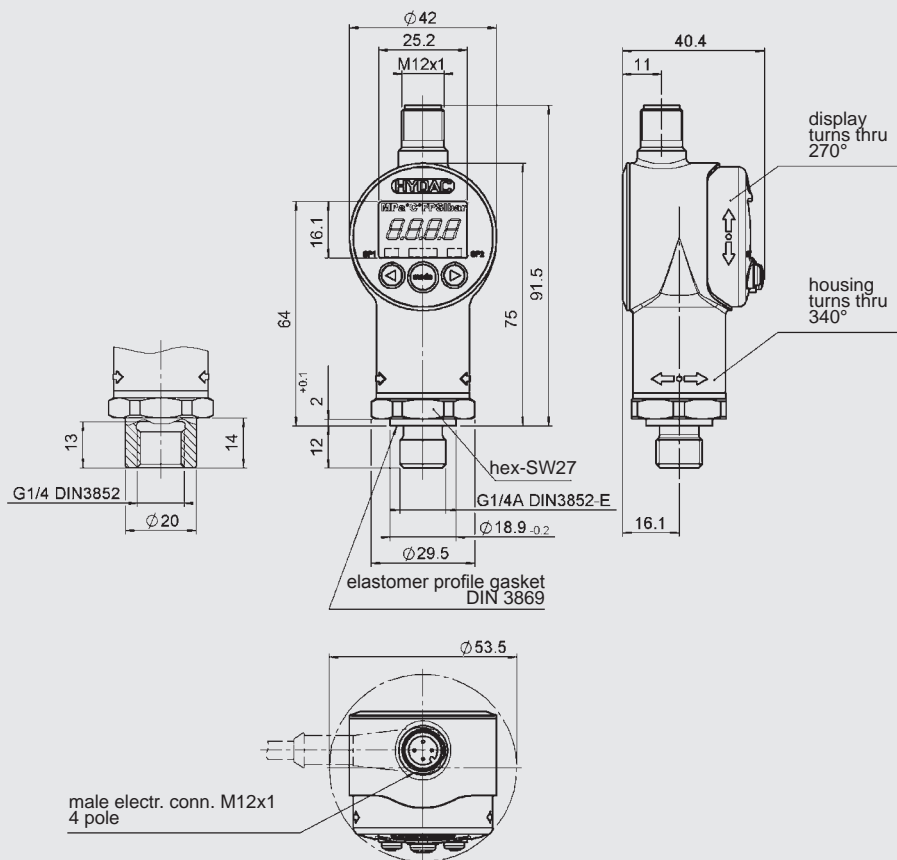
## Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

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## Electronic Pressure Switch EDS 3400 with IO-Link Interface



### Description:

The EDS 3400 with IO-Link communication interface is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the high-pressure range.

The device is equipped with a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control.

Parameterisation and cyclical transmission of process and service data is therefore possible.

The pressure switch series EDS 3400 with communication interface IO-Link according to specification V1.1 has been specially designed for connecting sensors in automation systems.

Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- 1 PNP transistor switching output
- 1 universal output, configurable as PNP transistor switching output or analogue output
- Accuracy  $\leq \pm 1\%$  FS
- 4-digit digital display
- Optimum alignment: can be rotated in two axes

### Technical data:

Input data	
Measuring ranges	40; 100; 250; 400; 600 bar
Overload range	80; 200; 500; 800; 1000 bar
Burst pressures	200; 500; 1000; 2000, 2000 bar
Mechanical connection	G1/4 A DIN 3852 Threaded port DIN 3852-G1/4
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Stainless steel Seal: FPM
Output data	
Output signals	Output 1: PNP Transistor switching output Output 2: can be configured as PNP transistor switching output or analogue output
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting (display, analogue output)	$\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.25\%$ FS max.
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range
Analogue output	
Signal	selectable: 4 .. 20 mA load resistance max. 500 $\Omega$ 0 .. 10 V load resistance min. 1 k $\Omega$
Switch outputs	
Type	PNP transistor switching output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Reaction time	< 10 ms
Long term drift	$\leq \pm 0.3\%$ FS typ. / year
Parameterisation	
<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the EDS 3400</b>	
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE - mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	$\leq 10$ g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output
Current consumption	$\leq 0.535$ A with active switching outputs $\leq 35$ mA with inactive switching outputs $\leq 55$ mA with inactive switching output and analogue output
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight	~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range

## Setting options:

All terms and symbols used for setting the EDS 3400 as well as the menu structure comply with the specifications in the VDMA Standard for pressure switches.

## Setting ranges for the switch outputs:

Measuring range in bar	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
0 .. 40	0.4	40.0
0 .. 100	1.0	100.0
0 .. 250	2.5	250.0
0 .. 400	4	400
0 .. 600	6	600

Measuring range in bar	Min. difference betw. RP and SP & FL and FH in bar	Increment* in bar
0 .. 40	0.4	0.1
0 .. 100	1.0	0.2
0 .. 250	2.5	0.5
0 .. 400	4	1
0 .. 600	6	1

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

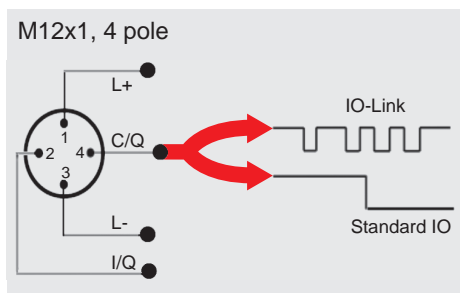
FL = pressure window lower value

FH = pressure window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable: 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in bar, psi, MPa.

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

**EDS 3 4 X 6 - L - XXXX - 000**

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

9 = Threaded port DIN 3852-G1/4

### Electrical connection

6 = Male M12x1, 4 pole (connector not supplied)

### Output

L = IO Link Interface

### Pressure ranges in bar

0040; 0100; 0250; 0400; 0600

### Modification number

000 = Standard

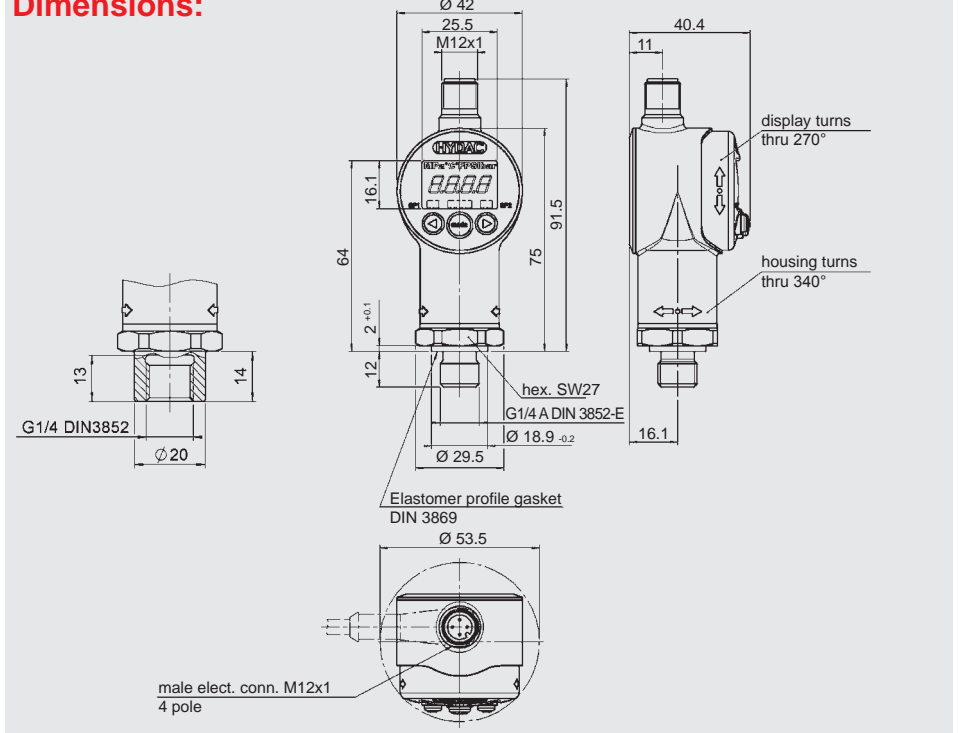
## Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Description:

The EDS 3300 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the low-pressure range. It has a ceramic measuring cell with thick-film strain gauge. The instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V). A special design feature of the EDS 3300 is that the display can be moved in two planes (axes). The instrument can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in **bar**, **psi** or **MPa**. The user can select the particular unit of measurement. When changing to a different measurement unit, the instrument automatically converts all the switching settings to the new unit of measurement. In addition, the EDS 3300 is also available in a DESINA®-compliant version. The main applications of the EDS 3300 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

## Special features:

- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy  $\leq \pm 1\%$  FS
- Optional switchable analogue output (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two axes
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions
- Optional Desina®-compliant pin configuration with diagnostic function



## Electronic Pressure Switch EDS 3300

### Technical data:

Input data	
Measuring ranges	-1 .. 1; 1; 2.5; 6; 10; 16 bar
Overload pressures	3; 3; 8; 18; 30; 48 bar
Burst pressures	5; 5; 12; 30; 50; 80 bar
Mechanical connection	G1/4 A DIN 3852 G1/2 B DIN-EN 837 Threaded port DIN 3852-G1/4
Torque value	20 Nm (G1/4) 45 Nm (G1/2)
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: copper (G1/2) / FPM / EPDM (as per model code)
Output data	
Accuracy to DIN 16086, Max. setting (display, analogue output)	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.25\%$ FS max.
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA      load resistance max. 500 $\Omega$ 0 .. 10 V      load resistance min. 1 k $\Omega$
Switch outputs	
Type	PNP transistor output
Switching current	max. 1.2 A
Switching cycles	> 100 million
Reaction time	< 10 ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
DESINA® diagnostic signal (Pin 2)	
Function	OK: HIGH level / not OK: LOW level
Level	HIGH: approx. +U <sub>B</sub> / LOW: < +0.3 V
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>1)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
for use acc. to UL spec.	
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 120 g

Note: Excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range  
Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

<sup>1)</sup>

## Setting options:

All settings offered by the EDS 3300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

## Setting ranges for the switch outputs:

### Switching point function

Meas. range in bar	Switch point in bar	Hysteresis in bar	Increment* in bar
-1 .. 1	-0.97 .. 1	-0.99 .. 0.98	0.01
0 .. 1	0.016 .. 1	0.006 .. 0.99	0.002
0 .. 2.5	0.04 .. 2.5	0.015 .. 2.475	0.005
0 .. 6	0.09 .. 6	0.3 .. 5.94	0.01
0 .. 10	0.16 .. 10	0.06 .. 9.9	0.02
0 .. 16	0.25 .. 16	0.1 .. 15.8	0.05

### Window function

Meas. range in bar	Lower switch value in bar	Upper switch value in bar	Increment* in bar
-1 .. 1	-0.97 .. 0.96	-0.95 .. 0.98	0.01
0 .. 1	0.016 .. 0.982	0.024 .. 0.99	0.002
0 .. 2.5	0.04 .. 2.455	0.06 .. 2.475	0.005
0 .. 6	0.09 .. 5.89	0.14 .. 5.94	0.01
0 .. 10	0.16 .. 9.82	0.24 .. 9.9	0.02
0 .. 16	0.25 .. 15.7	0.4 .. 15.8	0.05

\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in the measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

## EDS 3300 for self diagnostics:



The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification. A diagnostic signal enables errors to be detected and an "ERROR" message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

## Model code:

EDS 3 3 X X - X - XXXX - 000 - X 1

### Mechanical connection

- 1 = G1/2 B DIN-EN 837 (male)
- 4 = G1/4 A DIN 3852 (male)
- 9 = Threaded port DIN 3852-G1/4

### Electrical connection

- 6 = Male M12x1, 4 pole only possible on output models "1", "2" and "3"
- 8 = Male M12x1, 5 pole only possible on output model "5"

### Output

- 1 = 1 switching output only in conjunction with electrical connection type "6"
- 2 = 2 switching outputs only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8"

### Pressure ranges in bar

0001 (-1 .. 1); 01.0; 02.5; 06.0; 0010; 0016

### Modification number

000 = Standard

### Seal material (in contact with fluid)

- F = FPM seal (e.g.: for hydraulic oils)
- E = EPDM seal (e.g.: for water, refrigerants)

### Material of connection (in contact with fluid)

- 1 = Stainless steel

## Model code:

**DESINA®-compliant or can be connected to DESINA®:**



EDS 3 3 X X - X - XXXX - D00 - X 1

### Mechanical connection

- 1 = G1/2 B DIN-EN 837 (male)
- 4 = G1/4 A DIN 3852 (male)
- 9 = Threaded port DIN 3852-G1/4

### Electrical connection

- 8 = Male M12x1, 5 pole

### Output

- 1 = 1 switching output
- 3 = 1 switching output and 1 analogue output

### Pressure ranges in bar

0001 (-1 .. 1); 01.0; 02.5; 06.0; 0010; 0016

### Modification number

D00 = DESINA®-compliant pin configuration for self-diagnostics

### Seal material (in contact with fluid)

- F = FPM seal (e.g.: for hydraulic oils)
- E = EPDM seal (e.g.: for water, refrigerants)

### Material of connection (in contact with fluid)

- 1 = Stainless steel

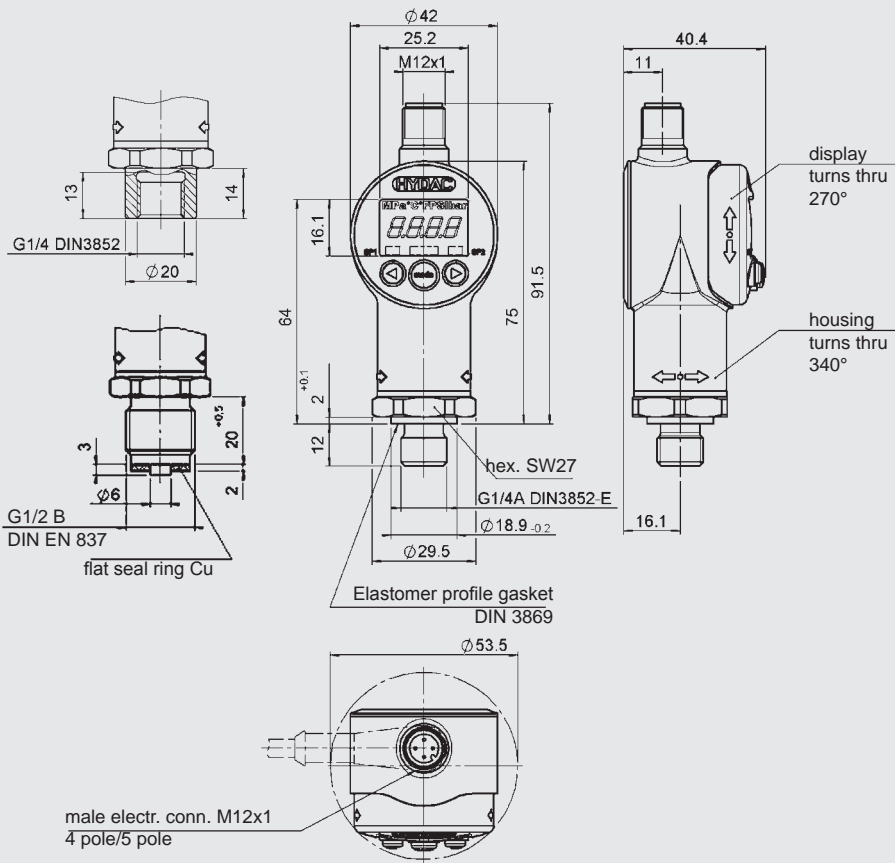
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

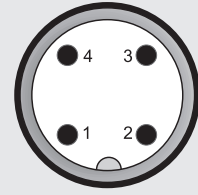
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



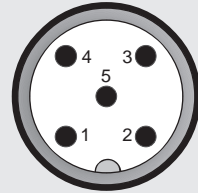
## Pin connections:

M12x1, 4 pole



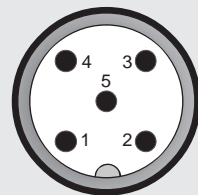
Pin	EDS 33X6-1	EDS 33X6-2	EDS 33X6-3
1	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2	Analogue
3	0 V	0 V	0 V
4	SP 1	SP 1	SP 1

M12x1, 5 pole



Pin	EDS 33X8-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

M12x1, 5 pole



	DESINA®- compliant	Can be connected to DESINA®
Pin	EDS 33X8-1	EDS 33X8-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Diagnostics	Diagnostics
3	0 V	0 V
4	SP 1	SP 1
5	n.c.	Analogue

## Note:

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## Electronic Pressure Switch EDS 3300 with Menu Navigation to VDMA

### Description:

The EDS 3300 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the low-pressure range.

It has a ceramic measuring cell with thick-film strain gauge. The instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3300 is that the display can be rotated in two planes. The unit can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in **bar**, **psi** or **MPa**. The user can select the particular measurement unit. When changing to a different measurement unit, the EDS 3300 automatically converts all the switching settings to the new unit of measurement.

The main applications of the EDS 3300 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

### Special features:

- Menu navigation according to VDMA
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy  $\leq \pm 1\%$  FS
- Optional analogue output selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two planes (axes)
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions

### Technical data:

Input data	
Measuring ranges	-1..1; 1; 2.5; 6; 10; 16 bar
Overload pressures	3; 3; 8, 18, 30, 48 bar
Burst pressures	5; 5; 12; 30; 50; 80 bar
Mechanical connection	G1/4 A DIN 3852 Threaded port DIN 3852-G1/4
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)
Output data	
Accuracy to DIN 16086, Max. setting (display, analogue output)	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.25\%$ FS max.
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA load resistance max. 500 $\Omega$ 0 .. 10 V load resistance min. 1 k $\Omega$
Switch outputs	
Type	PNP transistor output
Switching current	max. 1.2 A
Switching cycles	> 100 million
Reaction time	< 10 ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C (-25 ... +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>1)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output for use acc. to UL spec. - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All terms and symbols used for setting the EDS 3300 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-1) for pressure switches.

The EDS 3300 can easily be adjusted via three buttons.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
-1 .. 1	-0.98	1.00
0 .. 1	0.010	1.000
0 .. 2.5	0.025	2.500
0 .. 6	0.06	6.00
0 .. 10	0.10	10.00
0 .. 16	0.20	16.00

Measuring range	Min. difference betw. RP and SP & FL and FH in bar	Increment* in bar
-1 .. 1	0.02	0.01
0 .. 1	0.010	0.002
0 .. 2.5	0.025	0.005
0 .. 6	0.06	0.01
0 .. 10	0.10	0.02
0 .. 16	0.20	0.05

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

FL = pressure window lower value

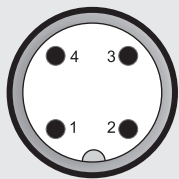
FH = pressure window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

## Pin connections:

M12x1, 4 pole



Pin	EDS 33X6-1	EDS 33X6-2	EDS 33X6-3
1	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2	Analogue
3	0 V	0 V	0 V
4	SP 1	SP 1	SP 1

## Model code:

EDS 3 3 X 6 - X - XXXX - V00 - X 1

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

9 = Threaded port DIN 3852-G1/4

### Electrical connection

6 = Male M12x1, 4 pole

### Output

1 = 1 switching output

2 = 2 switching outputs

3 = 1 switching output and 1 analogue output

### Pressure ranges in bar

0001 (-1 .. 1 bar); 01.0; 02.5; 06.0; 0010; 0016

### Modification number

V00 = Menu navigation in accordance with VDMA (Standard Sheet 24574)

### Seal material (in contact with fluid)

F = FPM seal (e.g. for hydraulic oils)

E = EPDM seal (e.g. for water, refrigerants)

### Connection material (in contact with fluid)

1 = Stainless steel

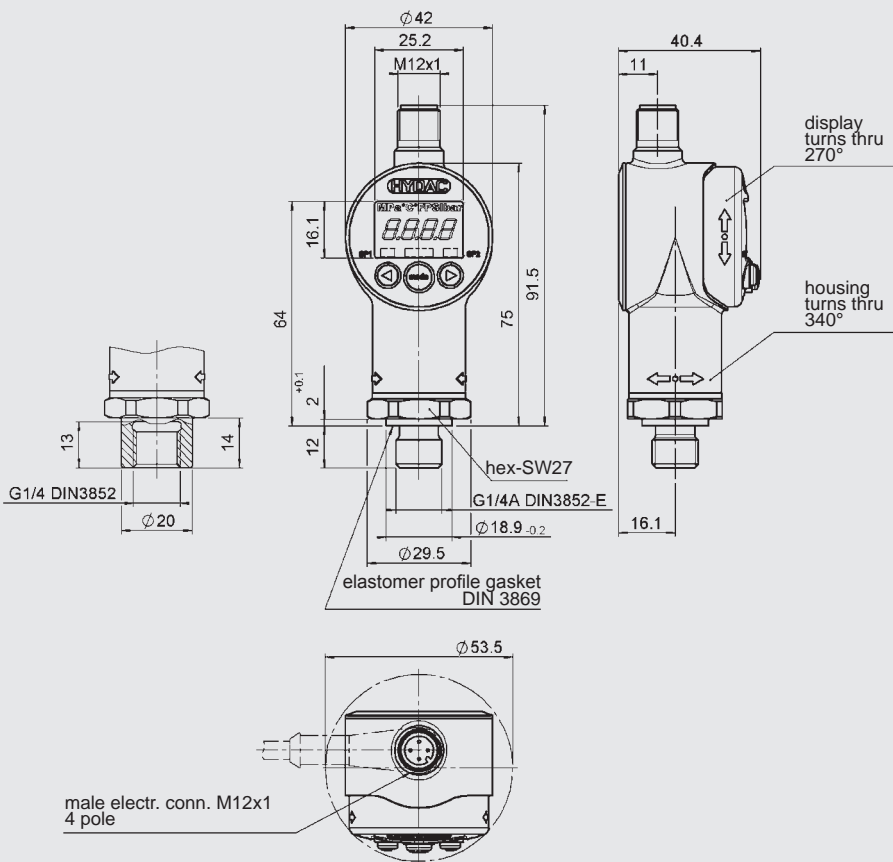
### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Switch EDS 3300 with IO-Link Interface



### Description:

The EDS 3300 with IO-Link communication interface is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the low-pressure range.

The device is equipped with a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control.

Parameterisation and cyclical transmission of process and service data is therefore possible.

The pressure switch series EDS 3300 with communication interface IO-Link according to specification V1.1 has been specially designed for connecting sensors in automation systems.

Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO Link Interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- Accuracy  $\leq \pm 1\%$  FS
- 4-digit digital display
- Display can be rotated in two axes for optimal alignment

### Technical data:

Input data	
Measuring ranges	-1..1; 1; 2.5; 6; 10; 16 bar
Overload range	3; 3; 8; 18; 30; 48 bar
Burst pressures	5; 5; 12; 30; 50; 80 bar
Mechanical connection	G1/4 A DIN 3852 Threaded port DIN 3852-G1/4
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analogue output
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting (display, analogue output)	$\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.25\%$ FS max.
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range
Analogue output	
Signal	selectable: 4 .. 20 mA load resistance max. 500 Ω 0 .. 10 V load resistance min. 1 kΩ
Switch outputs	
Type	PNP transistor switching output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Reaction time	< 10 ms
Long term drift	$\leq \pm 0.3\%$ FS typ. / year
Parameterisation	
<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the EDS 3300</b>	
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE - mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	$\leq 10$ g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output
Current consumption	$\leq 0.535$ A with active switching outputs $\leq 35$ mA with inactive switching outputs $\leq 55$ mA with inactive switching output and analogue output
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight	~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range

## Setting options:

All terms and symbols used for setting the EDS 3300 as well as the menu structure comply with the specifications in the VDMA Standard for pressure switches.

## Setting ranges for the switch outputs:

Measuring range in bar	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
-1 .. 1	-0.98	1.00
0 .. 1	0.010	1.000
0 .. 2.5	0.025	2.500
0 .. 6	0.06	6.00
0 .. 10	0.10	10.00
0 .. 16	0.20	16.00

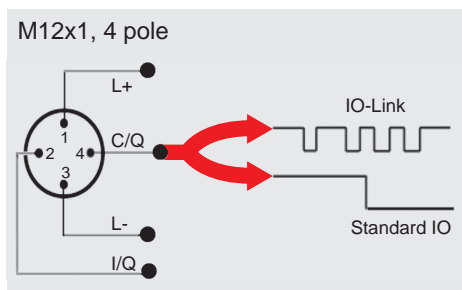
Measuring range in bar	Min. difference betw. RP and SP & FL and FH in bar	Increment* in bar
-1 .. 1	0.02	0.01
0 .. 1	0.010	0.002
0 .. 2.5	0.025	0.005
0 .. 6	0.06	0.01
0 .. 10	0.10	0.02
0 .. 16	0.20	0.05

\* All ranges given in the table are adjustable by the increments shown.  
 SP = switch point  
 RP = switch-back point  
 FL = pressure window lower value  
 FH = pressure window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable to 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in bar, psi, MPa.

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

EDS 3 3 X 6 - L - XXXX - 000 - X 1

### Mechanical connection

- 4 = G1/4 A DIN 3852 (male)
- 9 = Threaded port DIN 3852-G1/4

### Electrical connection

- 6 = Male M12x1, 4 pole (connector not supplied)

### Output

- L = IO Link Interface

### Pressure ranges in bar

0001 (-1 .. 1 bar); 01.0; 02.5; 06.0; 0010; 0016

### Modification number

000 = Standard

### Seal material (in contact with fluid)

- F = FPM seal (e.g. for hydraulic oils)
- E = EPDM seal (e.g. for water, refrigerants)

### Material of connection (in contact with fluid)

- 1 = Stainless steel

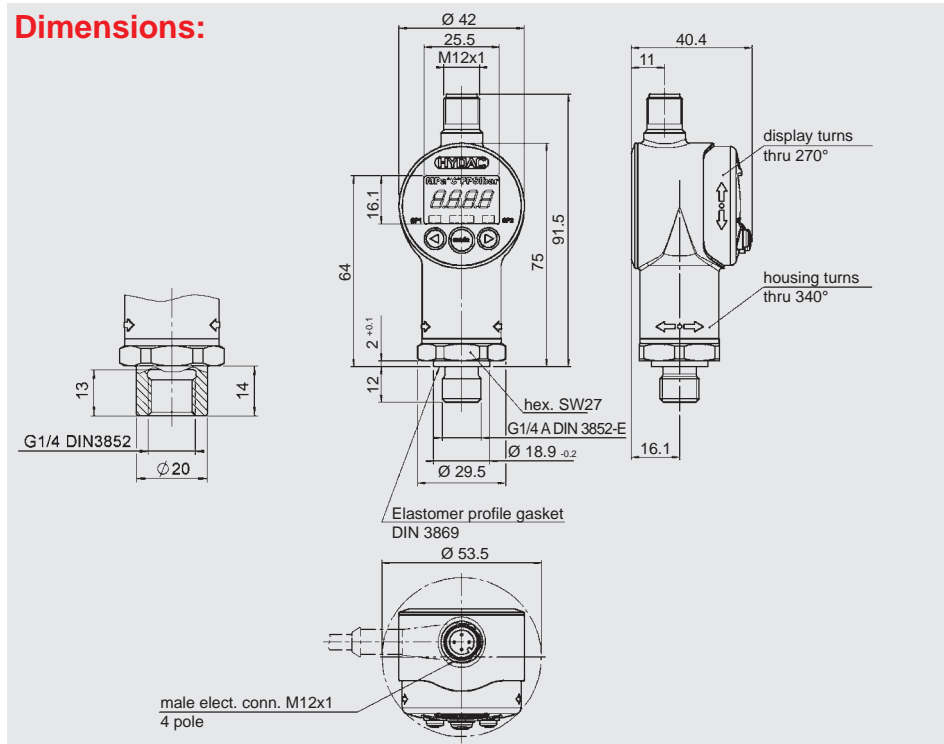
### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Description:

The EDS 3100 is a compact electronic pressure switch with integrated digital display for absolute pressure measurement in the low-pressure range. It has a ceramic measuring cell with thick-film strain gauge. The instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3100 is that the display can be rotated in two planes. The instrument can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in **bar**, **psi** or **MPa**. The user can select the particular unit of measurement. When changing to a different measurement unit, the instrument automatically converts all the switching settings to the new unit of measurement. In addition, the EDS 3100 is also available in a DESINA®-compliant version.

The main applications of the EDS 3100 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

## Special features:

- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy  $\leq \pm 1\%$  FS
- Optional switchable analogue output (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two axes
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions
- Optional Desina®-compliant pin configuration with diagnostic function



## Electronic Pressure Switch EDS 3100

### Technical data:

Input data	
Measuring ranges	1; 2.5 bar
Overload pressures	3; 8 bar
Burst pressures	5; 12 bar
Mechanical connection	G1/4 A DIN 3852 G1/2 B DIN-EN 837 Threaded port DIN 3852-G1/4
Torque value	20 Nm (G1/4) 45 Nm (G1/2)
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: copper (G1/2) / FPM / EPDM (as per model code)
Output data	
Accuracy to DIN 16086, Max. setting (display, analogue output)	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.25\%$ FS max.
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA      load resistance max. 500 Ω 0 .. 10 V      load resistance min. 1 kΩ
Switch outputs	
Type	PNP transistor output
Switching current	max. 1.2 A
Switching cycles	> 100 million
Reaction time	< 10 ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
DESINA® diagnostic signal (Pin 2)	
Function	OK: HIGH level / not OK: LOW level
Level	HIGH: approx. +U <sub>g</sub> / LOW: < +0.3 V
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>1)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output for use acc. to UL spec. - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided.

FS (Full Scale) = relative to the complete measurement range

<sup>1)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All settings available on the EDS 3100 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

## Setting ranges for the switch outputs:

### Switching point function

Meas. range in bar	Switch point in bar	Hysteresis in bar	Increment* in bar
0 .. 1	0.016 .. 1	0.006 .. 0.99	0.002
0 .. 2.5	0.04 .. 2.5	0.015 .. 2.475	0.005

### Window function

Meas. range in bar	Lower switch value in bar	Upper switch value in bar	Increment* in bar
0 .. 1	0.016 .. 0.982	0.024 .. 0.99	0.002
0 .. 2.5	0.04 .. 2.455	0.06 .. 2.475	0.005

\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

## EDS 3100 for self diagnostics:



The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification.

A diagnostic signal enables errors to be detected and an "ERROR" message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

## Model code:

EDS 3 1 X X - X - XXXX - 000 - X 1

### Mechanical connection

- 1 = G1/2 B DIN-EN 837 (male)
- 4 = G1/4 A DIN 3852 (male)
- 9 = Threaded port DIN 3852-G1/4

### Electrical connection

- 6 = Male M12x1, 4 pole  
only possible on output models "1", "2" and "3"
- 8 = Male M12x1, 5 pole  
only possible on output model "5"

### Output

- 1 = 1 switching output  
only in conjunction with electrical connection type "6"
- 2 = 2 switching outputs  
only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output  
only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analogue output  
only in conjunction with electrical connection type "8"

### Pressure ranges in bar

01.0; 02.5

### Modification number

000 = Standard

### Seal material (in contact with fluid)

- F = FPM seal (e.g.: for hydraulic oils)
- E = EPDM seal (e.g.: for water, refrigerants)

### Material of connection (in contact with fluid)

- 1 = Stainless steel

## Model code:

DESINA®-compliant or can be connected to DESINA®:



EDS 3 1 X 8 - X - XXXX - D00 - X 1

### Mechanical connection

- 1 = G1/2 B DIN-EN 837 (male)
- 4 = G1/4 A DIN 3852 (male)
- 9 = Threaded port DIN 3852-G1/4

### Electrical connection

- 8 = Male M12x1, 5 pole

### Output

- 1 = 1 switching output
- 3 = 1 switching output and 1 analogue output

### Pressure ranges in bar

01.0; 02.5

### Modification number

D00 = DESINA®-compliant pin configuration for self-diagnostics

### Seal material (in contact with fluid)

- F = FPM seal (e.g.: for hydraulic oils)
- E = EPDM seal (e.g.: for water, refrigerants)

### Material of connection (in contact with fluid)

- 1 = Stainless steel

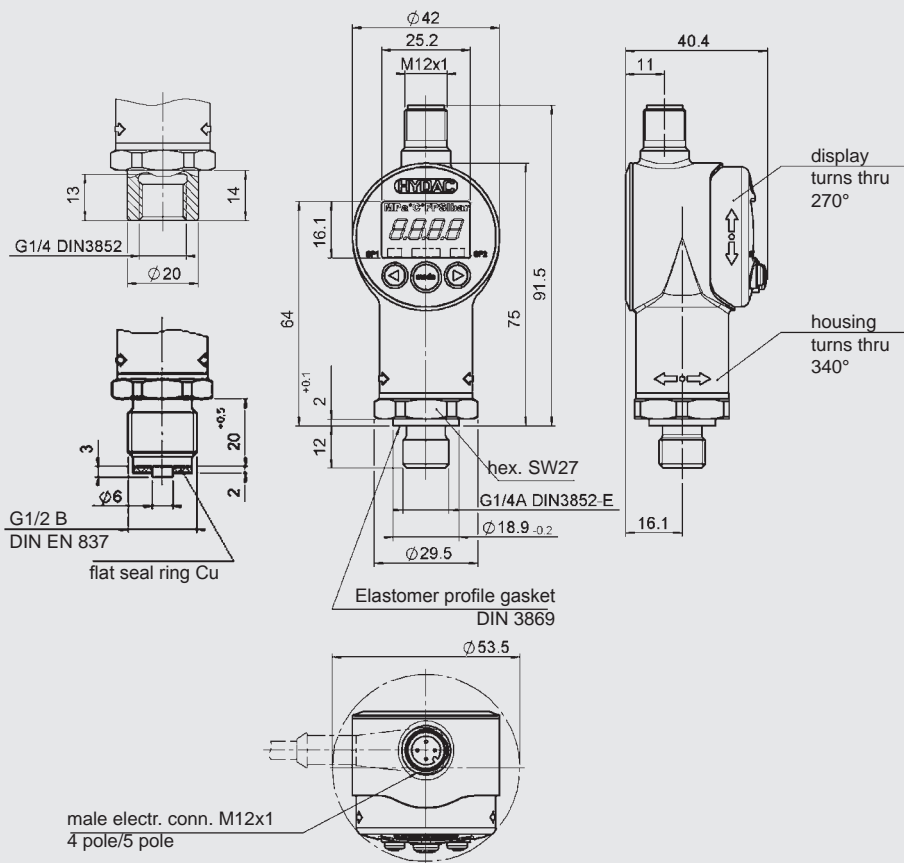
### Note:

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### Accessories:

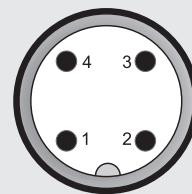
Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



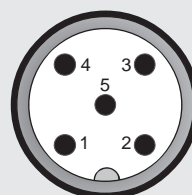
## Pin connections:

M12x1, 4 pole



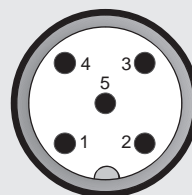
Pin	EDS 31X6-1	EDS 31X6-2	EDS 31X6-3
1	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2	Analogue
3	0 V	0 V	0 V
4	SP 1	SP 1	SP 1

M12x1, 5 pole



Pin	EDS 31X8-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

M12x1, 5 pole



Pin	EDS 31X8-1	EDS 31X8-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Diagnostics	Diagnostics
3	0 V	0 V
4	SP 1	SP 1
5	n.c.	Analogue

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Electronic Pressure Switch EDS 3100 with Menu Navigation to VDMA

### Description:

The EDS 3100 is a compact electronic pressure switch with integrated digital display for absolute pressure measurement in the low-pressure range.

It has a ceramic measuring cell with thick-film strain gauge. The instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3100 is that the display can be rotated in two planes. The unit can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter. The 4-digit display can indicate the pressure in **bar**, **psi** or **MPa**. The user can select the particular measurement unit. When changing to a different measurement unit, the EDS 3100 automatically converts all the switching settings to the new unit of measurement.

The main applications of the EDS 3100 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

### Special features:

- Menu navigation according to VDMA
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy  $\leq \pm 1\%$  FS
- Optional analogue output selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - can be rotated in two planes (axes)
- Measured value can be displayed in bar, psi or MPa
- User-friendly due to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions

### Technical data:

Input data	
Measuring ranges	1; 2.5 bar
Overload pressures	3; 8 bar
Burst pressures	5; 12 bar
Mechanical connection	G1/4 A DIN 3852 Threaded port DIN 3852-G1/4
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)
Output data	
Accuracy to DIN 16086, Max. setting (display, analogue output)	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.25\%$ FS max.
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA      load resistance max. 500 $\Omega$ 0 .. 10 V      load resistance min. 1 k $\Omega$
Switch outputs	
Type	PNP transistor output
Switching current	max. 1.2 A
Switching cycles	> 100 million
Reaction time	< 10 ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
us mark <sup>1)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
for use acc. to UL spec.	
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All terms and symbols used for setting the EDS 3100 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-1) for pressure switches.

The EDS 3100 can easily be adjusted via three buttons.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
0 .. 1	0.010	1.000
0 .. 2.5	0.025	2.500

Measuring range	Min. difference betw. RP and SP & FL and FH in bar	Increment* in bar
0 .. 1	0.010	0.002
0 .. 2.5	0.025	0.005

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

FL = pressure window lower value

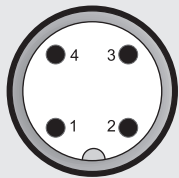
FH = pressure window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

## Pin connections:

M12x1, 4 pole



Pin	EDS 31X6-1	EDS 31X6-2	EDS 31X6-3
1	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2	Analogue
3	0 V	0 V	0 V
4	SP 1	SP 1	SP 1

## Model code:

EDS 3 1 X 6 - X - XXXX - V00 - X 1

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

9 = Threaded port DIN 3852-G1/4

### Electrical connection

6 = Male M12x1, 4 pole

### Output

1 = 1 switching output

2 = 2 switching outputs

3 = 1 switching output and 1 analogue output

### Pressure ranges in bar

01.0; 02.5

### Modification number

V00 = Menu navigation in accordance with VDMA (Standard Sheet 24574)

### Seal material (in contact with fluid)

F = FPM seal (e.g. for hydraulic oils)

E = EPDM seal (e.g. for water, refrigerants)

### Connection material (in contact with fluid)

1 = Stainless steel

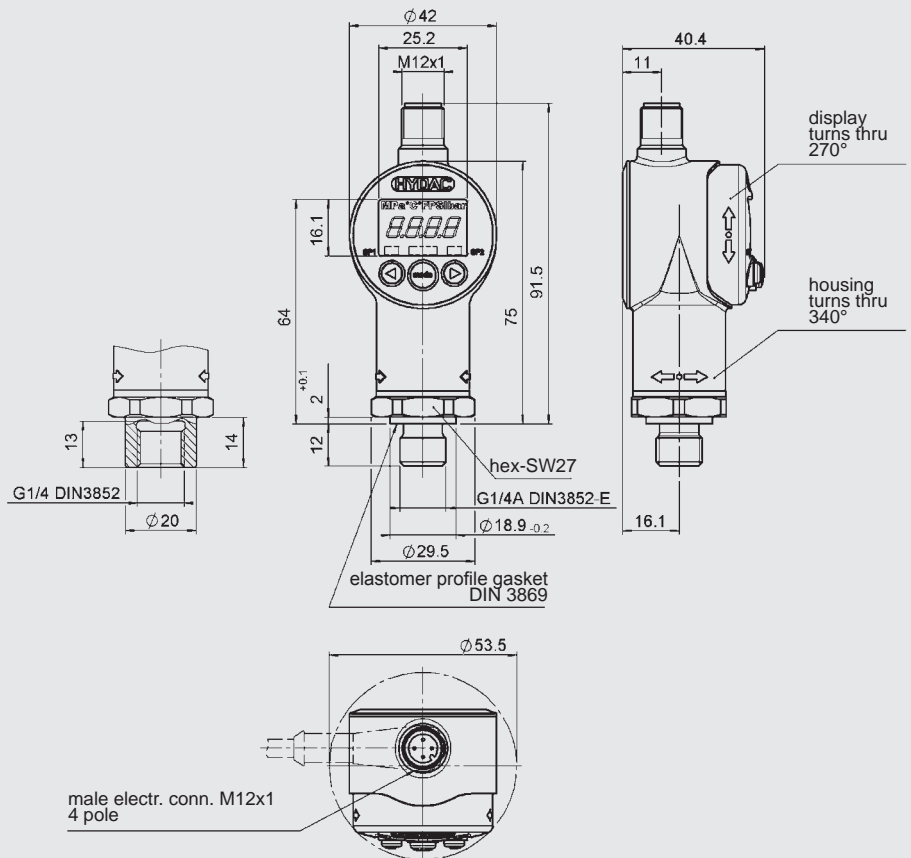
## Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Switch EDS 3100 with IO-Link Interface



### Description:

The EDS 3100 with IO-Link communication interface is a compact electronic pressure switch with integrated digital display for absolute pressure measurement in the low-pressure range.

The instrument is equipped with a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control.

Parameterisation and cyclical transmission of process and service data is therefore possible.

The pressure switch series EDS 3100 with communication interface IO-Link according to specification V1.1 has been specially designed for connecting sensors in automation systems.

Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO Link Interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- Accuracy  $\leq \pm 1\%$  FS
- 4-digit digital display
- Can be rotated in two axes for optimal alignment

### Technical data:

Input data	
Measuring ranges	1; 2.5 bar
Overload pressures	3; 8 bar
Burst pressures	5; 12 bar
Mechanical connection	G1/4 A DIN 3852 Threaded port DIN 3852-G1/4
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analogue output
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting (display, analogue output)	$\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.25\%$ FS max.
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range
Analogue output	
Signal	selectable: 4 .. 20 mA load resistance max. 500 $\Omega$ 0 .. 10 V load resistance min. 1 k $\Omega$
Switch outputs	
Type	PNP transistor switching output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Reaction time	< 10 ms
Long term drift	$\leq \pm 0.3\%$ FS typ. / year
Parameterisation	
<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the EDS 3100</b>	
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE - mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	$\leq 10$ g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60259	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output
Current consumption	$\leq 0.535$ A with active switching outputs $\leq 35$ mA with inactive switching outputs $\leq 55$ mA with inactive switching output and analogue output
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight	~ 120 g

Note: Excess voltage, override protection and short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range

## Setting options:

All terms and symbols used for setting the EDS 3100 as well as the menu structure comply with the specifications in the VDMA Standard for pressure switches.

## Setting ranges for the switch outputs:

Measuring range in bar	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
0 .. 1	0.010	1.000
0 .. 2.5	0.025	2.500

Measuring range in bar	Min. difference betw. RP and SP & FL and FH in bar	Increment* in bar
0 .. 1	0.010	0.002
0 .. 2.5	0.025	0.005

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

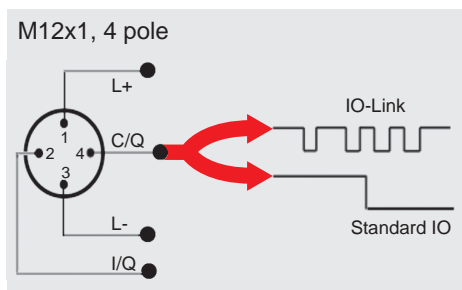
FL = pressure window lower value

FH = pressure window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable: 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in bar, psi, MPa.

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

EDS 3 1 X 6 - L - XXXX - 000 - X 1

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

9 = Threaded port DIN 3852-G1/4

### Electrical connection

6 = Male M12x1, 4 pole (connector not supplied)

### Output

L = IO Link Interface

### Pressure ranges in bar

01.0; 02.5

### Modification number

000 = Standard

### Seal material (in contact with fluid)

F = FPM seal (e.g. for hydraulic oils)

E = EPDM seal (e.g. for water, refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

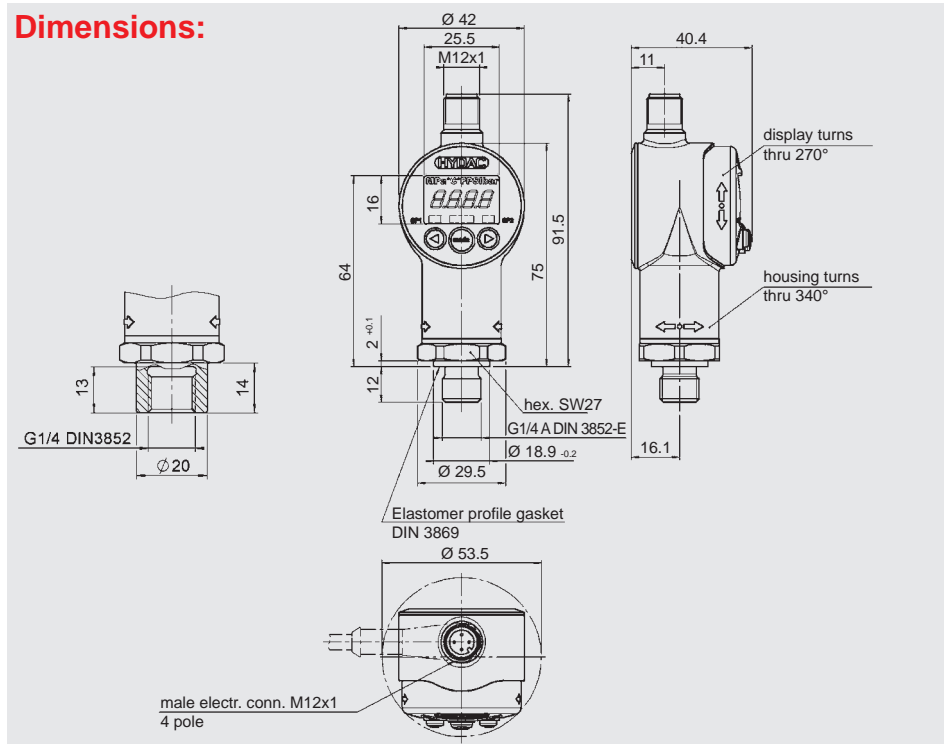
### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

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## Description:

The EDS 300 is a compact, electronic pressure switch with integral digital display.

Four different output models are available: with one switching point, with two switching points and both models can also have an additional analogue output signal 4 .. 20 mA.

The switching points and the associated hystereses can be adjusted using the keypad. For optimum adaptation to a particular application, the instrument has many additional adjustment parameters, e.g. switching delay times, N/O / N/C function of the outputs.

The main applications of the EDS 300 are to indicate pressures and limits in hydraulics and pneumatics and anywhere where high switching frequency or constant switching accuracy would overburden a mechanical pressure switch. The unit is ideal for building accumulator charging circuits or pump and compressor controls.

## Special features:

- Integrated pressure sensor with thin-film strain gauge on stainless steel membrane
- Compact, robust construction
- Accuracy  $\leq \pm 1\%$  FS
- 3-digit digital display
- Easy to operate thanks to key programming
- Switching points and switch-back hystereses can be adjusted independently
- Window function
- Many useful additional functions

## Electronic Pressure Switch EDS 300

### Technical data:

Input data	
Measuring ranges	16; 40; 100; 250; 400; 600 bar
Overload pressures	32; 80; 200; 500; 800; 1000 bar
Burst pressures	200; 200; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Accuracy to DIN 16086, Max. setting (display, analogue output)	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.5\%$ FS max.
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Analogue output (optional)	
Signal	4 .. 20 mA      load resistance $\leq 400 \Omega$
Switch outputs	
Type	PNP transistor output
Switching current	max. 1.2 A per switch output
Switching cycles	> 100 million
Reaction time	approx. 10 ms
Environmental conditions	
Compensation temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 65
Other data	
Supply voltage	20 .. 32 V DC
Current consumption	approx. 100 mA (inactive switch output)
Display	3-digit, LED, 7 segment, red, height of digits 9.2 mm
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range

## Setting options:

All settings available on the EDS 300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

## Setting ranges for the switch outputs:

### Switching point function

Meas. range in bar	Switch point in bar	Hysteresis in bar	Increment* in bar
0 .. 16	0.3 .. 16	0.1 .. 15.8	0.1
0 .. 40	0.6 .. 40	0.2 .. 39.6	0.2
0 .. 100	1.5 .. 100	0.5 .. 99.0	0.5
0 .. 250	3.0 .. 250	1.0 .. 248	1.0
0 .. 400	6.0 .. 400	2.0 .. 396	2.0
0 .. 600	15.0 .. 600	5.0 .. 590	5.0

### Window function

Meas. range in bar	Lower switch value in bar	Upper switch value in bar	Increment* in bar
0 .. 16	0.2 .. 15.9	0.3 .. 16	0.1
0 .. 40	0.4 .. 39.8	0.6 .. 40	0.2
0 .. 100	1.0 .. 99.5	1.5 .. 100	0.5
0 .. 250	2.0 .. 249.0	3.0 .. 250	1.0
0 .. 400	4.0 .. 398.0	6.0 .. 400	2.0
0 .. 600	10.0 .. 595.0	15.0 .. 600	5.0

\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.0 .. 75.0 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4 .. 20 mA
- Subsequent correction of zero point in the range  $\pm 3\%$  FS possible

## Model code:

EDS 3 4 X - X - XXX - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male 4 pole Binder series 714 M18  
only possible on output models "2" and "3"  
(connector not supplied)
- 5 = Male 3 pole + PE, EN175301-803 (DIN 43650)  
only possible on output model "1"  
(connector supplied)
- 6 = Male M12x1, 4 pole  
only possible on output models "1", "2" and "3"  
(connector not supplied)
- 8 = Male M12x1, 5 pole  
only possible on output model "5"  
(connector not supplied)

### Output

- 1 = 1 switching output  
only in conjunction with electrical connection type "5" or "6"
- 2 = 2 switching outputs  
only in conjunction with electrical connection "4" or "6"
- 3 = 1 switching output and 1 analogue output  
only in conjunction with electrical connection type "4" or "6"
- 5 = 2 switching outputs and 1 analogue output  
only in conjunction with electrical connection type "8"

### Pressure ranges in bar

016; 040; 100; 250; 400; 600

### Modification number

000 = Standard

### Notes:

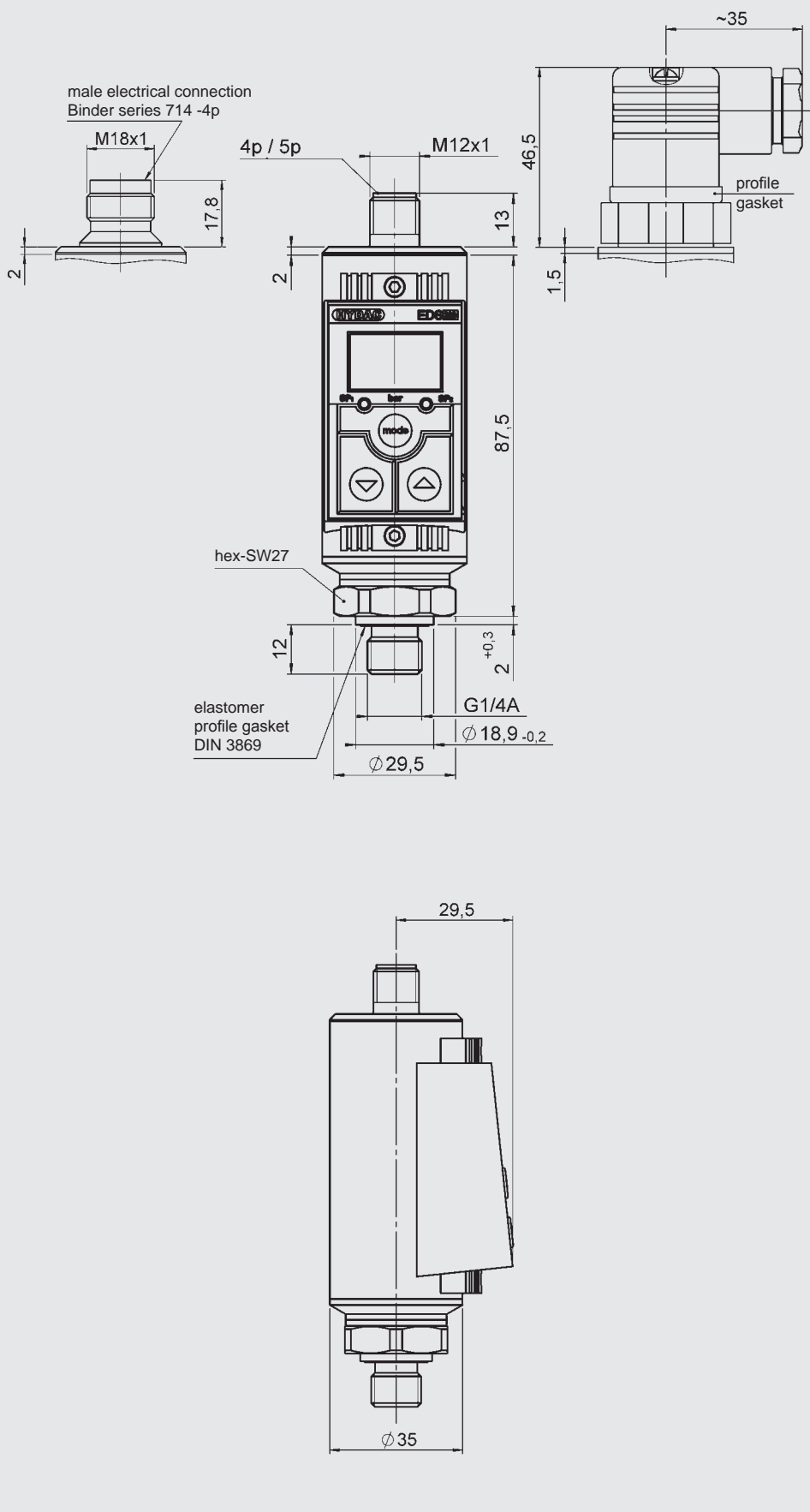
Special models on request.

For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



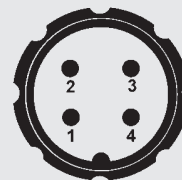
## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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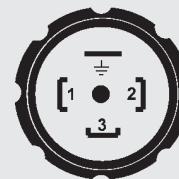
## Pin connections:

### Binder series 714 M18



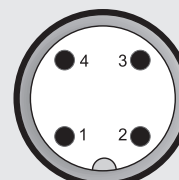
Pin	EDS 344-2	EDS 344-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	0 V	0 V
3	SP 1	SP 1
4	SP 2	Analogue

### EN175301-803 (DIN 43650)



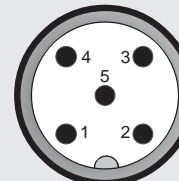
Pin	EDS 345-1
1	+U <sub>B</sub>
2	0 V
3	SP 1
⊥	Housing

### M12x1, 4 pole



Pin	EDS 346-1	EDS 346-2	EDS 346-3
1	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2	Analogue
3	0 V	0 V	0 V
4	SP 1	SP 1	SP 1

### M12x1, 5 pole



Pin	EDS 348-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2







## Electronic Pressure Switch EDS 300 with Approvals for Shipping

### Description:

The EDS 300 is a compact, electronic pressure switch with digital display. The pressure measurement is based on a strain gauge sensor cell in stainless steel. All parts in contact with the medium are in stainless steel, and are welded together. Since no seals are required in the sensor interior, leakage is eliminated.

Two relay switch outputs with N/O function and an additional analogue output signal (4 .. 20 mA) enable the pressure switch to be incorporated into modern controls.

The switch points and the corresponding hystereses can easily be adjusted via the keypad.

For optimum adaptation to a particular application, the instrument has many additional setting parameters, e.g. switching direction of the relays or switching delay times.

Areas of application are pressure or limit monitoring on marine transmissions, diesel engines, pumps and general hydraulic and pneumatic systems.

### Approvals:

- American Bureau of Shipping



- Lloyds Register of Shipping



- Det Norske Veritas



- Germanischer Lloyd



- Bureau Veritas



Other approvals on request

### Technical data:

#### Input data

Measuring ranges	-1..5; 6; 16; 40; 100; 250; 400; 600 bar
Overload pressures	15; 15; 32; 80; 200; 500; 800; 1000 bar
Burst pressures	100; 100; 200; 200; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM

#### Output data

Accuracy to DIN 16086, Max. setting (display, analogue output)	≤ ± 0.5 % FS typ. ≤ ± 1 % FS max.
Repeatability	≤ ± 0.5 % FS max.
Temperature drift	≤ ± 0.03 % FS / °C max. zero point ≤ ± 0.03 % FS / °C max. range

#### Analogue output

Signal	4 .. 20 mA	load resistance ≤ 400 Ω
--------	------------	-------------------------

#### Switch outputs

Type	relay contacts (N/O)
Switching voltage	max. 60 V AC / DC
Switching current	max. 1 A per switch output
Switching capacity	max. 30 W / 30 VA (for inductive load, use varistors)
Switching cycles	20 million at minimum load 0.5 million at maximum load
Reaction time	approx. 10 ms

#### Environmental conditions

Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	5 .. 25 Hz: 3.2 mm 25 .. 500 Hz: 4 g
Shock resistance to DIN EN 60068-2-29 (1 ms)	≤ 50 g
Protection class to IEC 60529	IP 65

#### Other data

Supply voltage	20 .. 32 V DC
Current consumption	approx. 100 mA (inactive switch output)
Display	4-digit, LED, 7 segment, red, height of digits 9.2 mm
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range

## Setting options:

All settings available on the EDS 300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

## Setting ranges for the switch outputs:

Switching point function

Meas. range in bar	Switch point in bar	Hysteresis in bar	Increment* in bar
-1 .. 5	-0.85 .. 5	-0.95 .. 4.9	0.05
0 .. 6	0.15 .. 6	0.05 .. 5.9	0.05
0 .. 16	0.3 .. 16	0.1 .. 15.8	0.1
0 .. 40	0.6 .. 40	0.2 .. 39.6	0.2
0 .. 100	1.5 .. 100	0.5 .. 99.0	0.5
0 .. 250	3.0 .. 250	1.0 .. 248	1.0
0 .. 400	6.0 .. 400	2.0 .. 396	2.0
0 .. 600	15.0 .. 600	5.0 .. 590	5.0

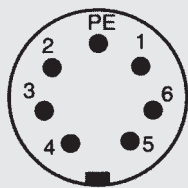
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Scale of the display range adjustable (bar or psi)
- Switching direction of the relays adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.0 .. 75.0 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Subsequent correction of zero point in the range  $\pm 3\%$  FS possible

## Pin connections:

DIN 43651



Pin	EDS 347-4
1	+U <sub>B</sub>
2	Centre relay 1 and 2
3	Relay contact 1 (SP 1)
4	0 V
5	Analogue
6	Relay contact 2 (SP 2)
⊥	Housing

## Model code:

EDS 3 4 7 - 4 - XXX - SXX

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

7 = Male 6 pole + PE, DIN 43651  
(connector ZBE 10 not supplied)

### Output

4 = 2 switch outputs and 1 analogue output

### Pressure ranges in bar

006; 016; 040; 100; 250; 400; 600

### Modification number

S00 = Version in bar (except -1 .. 5)

S13 = Vacuum version -1 .. 5 bar (in conjunction with pressure range 006)

### Notes:

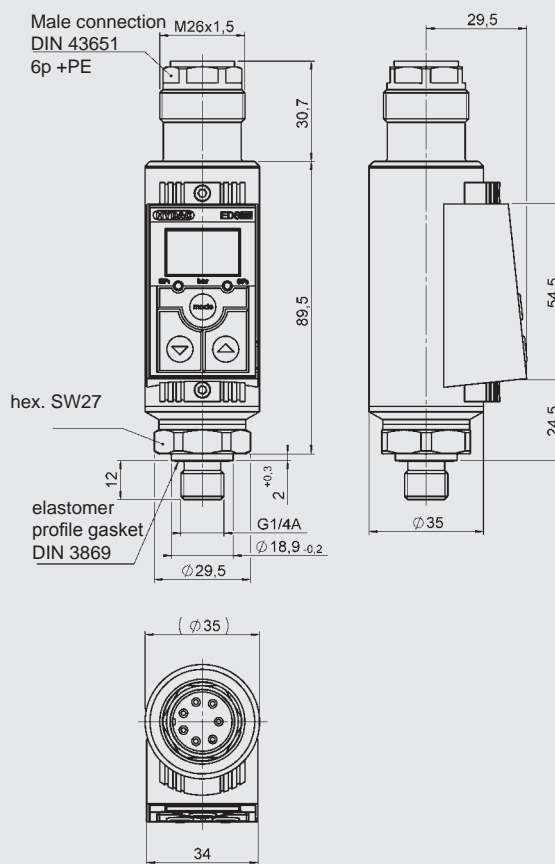
Special models on request.

For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Electronic Pressure Switch EDS 8000

### Description:

EDS 8000 is an electronic pressure switch in compact design which is simple to adjust.

Models with one or two transistor switch outputs (PNP or NPN) are available.

The switch points are set using the two keys and a four-digit display. During operation the switch position is indicated by either a red or a green backlight in the display.

For optimum adaptation to a particular application, the instrument has many additional adjustment parameters, e.g. switching delay times, N/O / N/C function of the outputs.

EDS 8000 is available in various pressure ranges between 0 .. 25 bar and 0 .. 600 bar.

The main applications of the EDS 8000 are to indicate pressures and limits in hydraulics and pneumatics, or any application where high switching frequency or consistent switching accuracy would overburden a mechanical pressure switch.

### Special features:

- Menu navigation according to VDMA
- 1 or 2 PNP transistor switching outputs
- Robust stainless steel measurement cell
- Accuracy class  $\leq \pm 1\%$  FS
- 4-digit display
- Multi-colour switch display
- Protection class IP 67
- Simple operation with key programming
- Many useful additional functions

### Technical data:

#### Input data

Measurement range	25; 40; 100; 250; 400; 600 bar	
Overload pressures	80; 80; 200; 500; 800; 1000 bar	
Burst pressures	200; 200; 500; 1000; 2000; 2000 bar	
Mechanical connection	G $\frac{1}{4}$ A DIN 3852; Form E	
Torque value	20 Nm	
Parts in contact with medium	Mech. conn.:	Stainless steel
	Sensor cell:	Thin-film strain gauge
	Seal:	FPM

#### Output data

Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.	
Max. setting (display)	$\leq \pm 1\%$ FS max.	
Repeatability	$\leq \pm 0.5\%$ FS max.	
Temperature drift (environment)	$\leq \pm 0.03\%$ FS / °C max. zero point	
	$\leq \pm 0.03\%$ FS / °C max. range	
Long-term stability	$\leq \pm 0.25\%$ FS / year max.	

#### Switch outputs

Type	1 or 2 transistor switching outputs PNP or NPN
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Reaction time	< 10 ms

#### Environmental conditions

Compensated temperature range	-25 .. + 85 °C
Ambient temperature range <sup>1)</sup>	-40 .. +100 °C / -25 °C +100 °C
Storage temperature range	-40 .. + 85 °C
Fluid temperature range <sup>1)</sup>	-40 .. +125 °C / -25 .. +125 °C
Nominal temperature range of display (read-out)	-15 .. 70 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	approx. 10 g
Shock resistance to DIN EN 60068-2-29 (11 ms)	approx. 50 g
Protection class to IEC 60529	IP 67 (when an IP 67 connector is used)

#### Other data

Supply voltage	9.6 .. 32 V DC
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	max. 0.535 A total max. 35 mA (with inactive switch output)
Display	4-digit, LED, 7 segment, height of digits 4.5 mm
Life expectancy	> 10 million cycles (0 .. 100 %)
Weight	~ 70 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to the complete measurement range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All the terms and symbols used for setting the EDS 8000 as well as menu structure comply with the specifications of the German Engineering Federation Standard (VDMA 24574-1) for pressure switches. The EDS 8000 is easy and convenient to set up using the two buttons.

## Setting ranges for the switch outputs:

Meas. range in bar	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
0 .. 25	0.25	25.00
0 .. 40	0.4	40.0
0 .. 100	1.0	100.0
0 .. 250	2.5	250.0
0 .. 400	4	400
0 .. 600	6	600

Meas. range in bar	Min. difference betw. RP & SP and FL & FH	Incre-ment* in bar
0 .. 25	0.25	0.05
0 .. 40	0.4	0.1
0 .. 100	1.0	0.2
0 .. 250	2.5	0.5
0 .. 400	4	1
0 .. 600	6	1

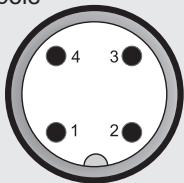
\* All ranges given in the table are adjustable by the increments shown.  
 SP = Switching point  
 RP = Switch-back point  
 FL = Pressure window lower value  
 FH = Pressure window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Display filter for smoothing the display value during pressure pulsations
- Pressure can be displayed in bar, psi, MPa

## Pin connections:

M12x1, 4 pole



Pin	EDS 8446-1	EDS 8446-2
1	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2
3	0 V	0 V
4	SP 1	SP 1

## Model code:

EDS 8 4 4 6 - X - XXXX - X00

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

6 = Male M12x1, 4 pole  
(connector not supplied)

### Output

1 = 1 switching output  
 2 = 2 switching outputs

### Pressure ranges in bar

0025; 0040; 0100; 0250; 0400; 0600

### Modification number

000 = Standard  
 N00 = Version with NPN switching outputs

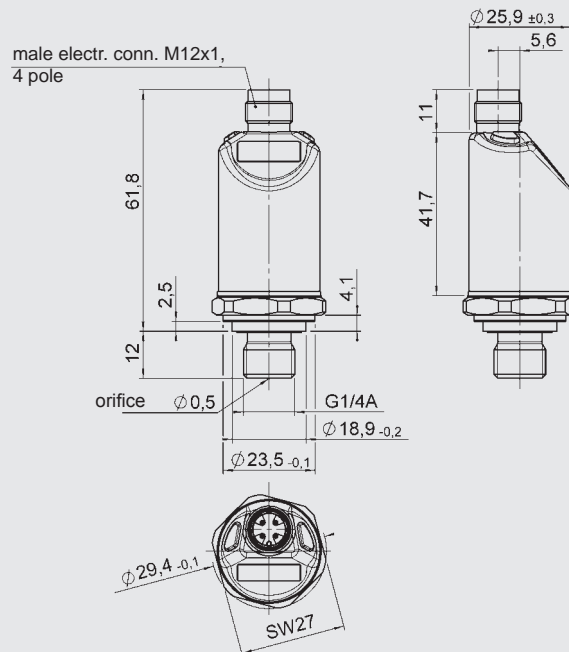
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, etc, can be found in the Accessories brochure.

## Dimensions:



### Note:

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## Electronic Pressure Switch EDS 601

### Description:

The EDS 601 is an electronic two-way pressure switch with display and analogue output. Its digitally adjustable switching points and switching hystereses, make it ideally suited to applications which require frequent change-overs or accurate switch point setting. The variety of setting parameters ensures versatility for use in all control and monitoring tasks in hydraulics, pneumatics, process control and general test and control technology.

### Special features:

- Two-channel pressure switch with change-over contacts
- Accuracy  $\leq \pm 1\%$  FS
- 4-digit LED display
- Signal output 4 .. 20 mA or 0 .. 10 V selectable
- Can be installed as a pressure gauge or as a front panel mounted unit
- Digitally adjustable parameters
- Optional permanent display of the switching point or of the pressure peak value
- Can be set to display values in any unit of measurement e.g.: kN, kg, psi, ...

### Technical data:

Input data	
Measuring ranges	16; 40; 100; 250; 400; 600 bar
Overload pressures	24; 60; 200; 500; 800; 1000 bar
Burst pressures	200; 200; 500; 1000; 2000; 2000 bar
Mechanical connection	Threaded port G1/4 DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel
Output data	
Accuracy to DIN 16086, Max. setting (display, analogue output)	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.5\%$ FS max.
Temperature drift	$\leq \pm 0.05\%$ FS / °C max. zero point $\leq \pm 0.05\%$ FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA ohmic resistance $\leq 400\ \Omega$ 0 .. 10 V ohmic resistance $\geq 2\ k\Omega$
Switch outputs	
Type	2 relay outputs with change-over contacts
Switching voltage	max. 250 V
Switching current	max. 2 A per switch output
Switching capacity	max. 50 W / 400 VA
Switching cycles	10 million without load 1 million with load
Reaction time	approx. 10 ms including electronics
Environmental conditions	
Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +70 °C
Storage temperature range	-25 .. +80 °C
Fluid temperature range	-25 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	$\leq 25\ g$
Shock resistance to DIN EN 60068-2-29 (1 ms)	$\leq 100\ g$
Protection class to IEC 60529	IP 65
Other data	
Supply voltage	20 .. 32 V DC
Current consumption	approx. 120 mA
Switch-on current	approx. 1.5 A (100 ms)
Display	4-digit, LED, 7 segment, red, height of digits 13 mm
Connection supply voltage / analogue output	EN175301-803 (DIN 43650) / ISO 4400 (3 pole + PE)
Connection relay outputs	DIN 43651 (6 pole + PE)
Housing material	aluminium, anodised
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.  
FS (Full Scale) = relative to the full measuring range

## Setting options:

The EDS 601 combines a multitude of functions with easy operation so that frequently-used parameters can be changed quickly.

### Switch point settings:

- Switching point relay 1 and 2 (1 % .. 100 % FS)
- Switching hysteresis 1 and 2 (0.5 % .. 99 % FS)

### Basic settings:

- Switching direction relay 1 and 2 (pull-in/release)
- Switching delay relay 1 and 2 (0.00 .. 90 seconds)
- Switch-off delay relay 1 and 2 (0.00 .. 90 seconds)
- Primary display (pressure / switch point / peak value)
- Display filter (slow / medium / fast)
- Output signal (current / voltage)

### Measuring range setting:

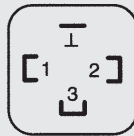
- Number of decimal places (0 .. 3; 4 digits in total)
- Lower measuring range limit (-995 .. 9995)
- Upper measuring range limit (-995 .. 9995)

### Calibration options:

- Zero point of internal sensor
- Final value of internal sensor
- Zero point voltage output (approx. 0 .. 3 V)
- Final value voltage output (approx. 3.5 .. 10 V)
- Zero point current output (approx. 0 .. 7 mA)
- Final value current output (approx. 7.5 .. 24 mA)

## Pin connections:

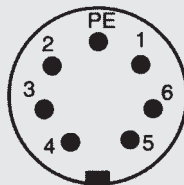
EN175301-803 (DIN 43650)  
(voltage supply / analogue output)



Pin

1	+U <sub>B</sub>
2	0 V
3	Analogue
⊥	Housing

DIN 43651 (relay outputs)



Pin

1	Relay 1 N/C
2	Relay 1 N/O
3	Centre relay 1
4	Relay 2 N/C
5	Relay 2 N/O
6	Centre relay 2
PE	Housing

## Model code:

EDS 6 0 1 - XXX - 000

### Pressure ranges in bar

016; 040; 100; 250; 400; 600

### Modification number

000 = Standard

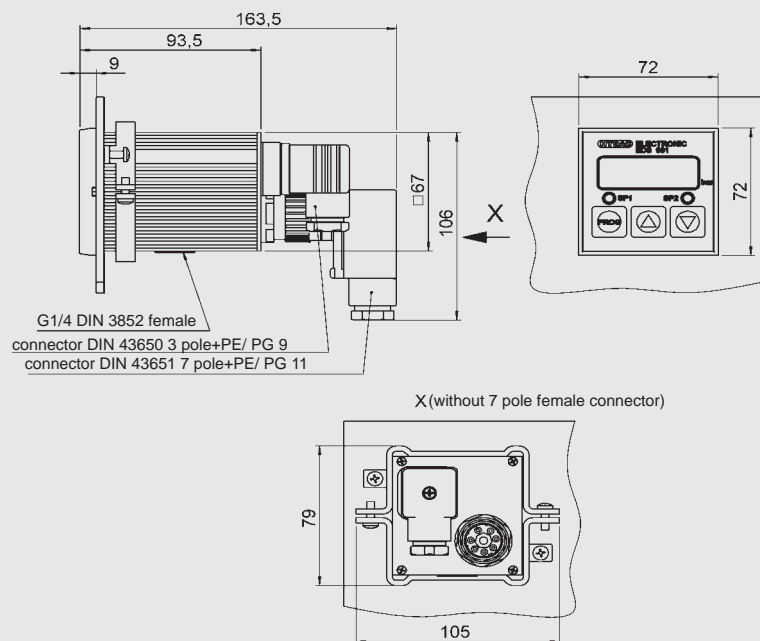
### Note:

Special models on request.  
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Female electrical connectors EN175301-803 (DIN 43650) and DIN 43651 are supplied with the unit. Additional accessories, such as mechanical adapters, installation kits, etc. can be found in the Accessories brochure.

## Dimensions:



### Note:

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## Description:

With its integrated pressure measurement cell, 4-digit display and 4 switching outputs, the EDS 1700 offers the user all the advantages of a modern electronic pressure switch. 4 switching points and switch-back points can be adjusted very simply and independently of one another using the keypad.

For optimum integration in monitoring systems (e.g. with PLC), an analogue output (4 .. 20 mA or 0 .. 10V) is also available.

The main areas of application of the EDS 1700 are in hydraulics and pneumatics. The instrument is ideal for use where frequent switching cycles (several million), stable switching point accuracy or simple and precise adjustability are required.

## Special features:

- Integrated pressure sensor with strain gauge on stainless steel membrane
- Accuracy 0.5 % or 1 % FS
- 4-digit digital display
- Simple operation via key programming
- 4 limit relays, switching points and switch back points can be adjusted independently
- Analogue output signal selectable
- Many useful additional functions
- Optional mounting position (pressure connection on the top/ bottom, keypad and display can be turned through 180°)
- Can be set to display values in any unit of measurement e.g.: kN, kg, psi, ...

## Electronic Pressure Switch EDS 1700

### Technical data:

#### Input data

Measuring ranges	16; 40; 100; 250; 400; 600 bar
Overload pressures	32; 80; 200; 500; 800; 1000 bar
Burst pressures	200; 200; 500; 1000; 2000; 2000 bar
Mechanical connection	Threaded port G1/4 DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel

#### Output data

Accuracy to DIN 16086, Max. setting (display, analogue output)	EDS 1700-P: $\leq \pm 0.5$ % FS max. EDS 1700-N: $\leq \pm 1$ % FS max.
Repeatability	EDS 1700-P: $\leq \pm 0.25$ % FS max. EDS 1700-N: $\leq \pm 0.5$ % FS max.
Temperature drift EDS 1700-P	$\leq \pm 0.02$ % FS / °C max. zero point & range
Temperature drift EDS 1700-N	$\leq \pm 0.03$ % FS / °C max. zero point & range

#### Analogue output

Signal (selectable)	4 .. 20 mA      ohmic resistance $\leq 400\Omega$ 0 .. 10 V        ohmic resistance $\geq 2\text{ k}\Omega$
---------------------	--

#### Switch outputs

Type	4 relays with change-over contacts (2 groups, common supply of each group connected)
Switching voltage	0.1 .. 250 V AC / DC
Switching current	0.009 .. 2 A per switch output
Switching capacity	max. 50 W / 400 VA (for inductive load, use varistors)
Switching cycles	20 million at minimum load 1 million at maximum load
Reaction time	approx. 20 ms

#### Environmental conditions

Compensated temperature range	-10 .. +70 °C
Operating temperature range	-25 .. +60 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range	-25 .. +80 °C

#### CE mark

Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	$\leq 5\text{ g}$
Shock resistance to DIN EN 60068-2-29 (1 ms)	$\leq 10\text{ g}$
Protection class to IEC 60529	IP 65

#### Other data

Supply voltage	22 .. 32 V DC
Current consumption	approx. 200 mA
Residual ripple of supply voltage	$\leq 10$ %
Display	4-digit, LED, 7 segment, red, height of digits 13 mm
Electrical connection	14-pole, terminal block
Housing material	aluminium, anodised
Weight	~ 800 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range

## Setting options:

The core of the unit is a microprocessor which provides many useful extra functions in addition to normal pressure switch operation. It is possible, for example, to activate switching delay times to prevent fast pressure peaks from triggering an unwanted switching cycle. All settings are made using the keypad.

## Setting ranges of the switching points:

- Switching point relay 1 to 4: 1.5 % .. 100 % FS
- Switch-back relay 1 to 4: 1 % .. 99 % FS or alternatively switch-back hysteresis 1 to 4: 1 % .. 99 % FS

Note: **FS (Full Scale)** = relative to the full measurement range

## Additional setting options:

- Switching direction of the relays 1 to 4 (N/C or N/O)
- Switch-on delay relays 1 to 4 in the range 0.00 .. 90 seconds
- Switch-off delay relays 1 to 4 in the range 0.00 .. 90 seconds
- Switch-back mode (either switch-back point or switch-back hysteresis)
- Display of the actual pressure, a switching point or of the peak value
- Display filter (slow / medium / fast)
- Display range scale individually adaptable (bar, psi, user-selectable)
- Measurement unit (bar, psi) is displayed
- Analogue output (4 .. 20 mA or 0 .. 10 V)
- Programming disable

## Terminal assignment:

Pin	
1	+U <sub>B</sub>
2	0 V
3	Analogue output Signal +
4	Analogue output Signal - (0 V)
5	Relay 1 N/C
6	Relay 1 N/O
7	Centre relay 1 and 2
8	Relay 2 N/C
9	Relay 2 N/O
10	Relay 3 N/C
11	Relay 3 N/O
12	Centre relay 3 and 4
13	Relay 4 N/C
14	Relay 4 N/O

## Model code:

EDS 1 7 9 X - X - XXX - 000

### Mechanical connection

9 = Threaded port G1/4 DIN 3852

### Display

1 = 4-digit bar  
2 = 4-digit psi

### Accuracy

P = 0.5 %  
N = 1 %

### Pressure ranges in bar

016; 040; 100; 250; 400; 600

### Modification number

000 = Standard

### Note:

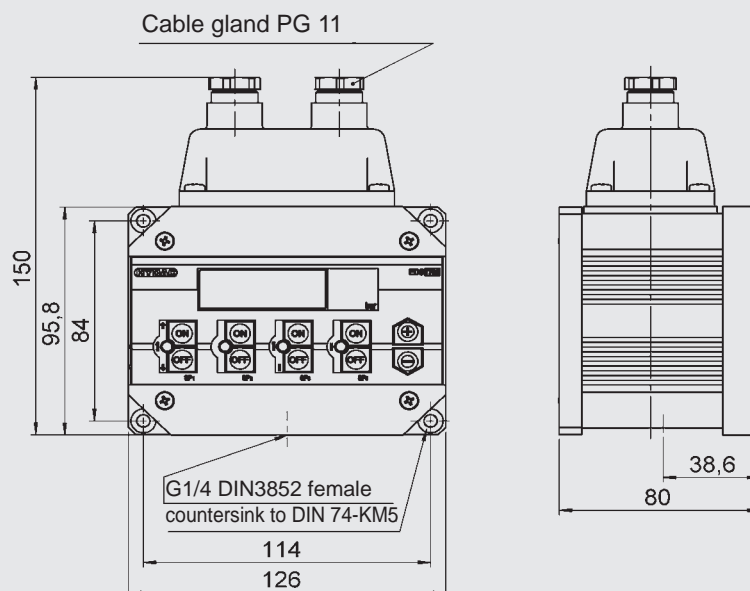
Special models on request.

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as mechanical adapters etc. can be found in the Accessories brochure.

## Dimensions:



### Note:

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## Electronic Pressure Switch EDS 4400 Programmable

### Description:

The programmable electronic pressure switch in the series EDS 4400 has been specially developed to combine the advantages of a compact, robust and cost-effective device with the benefits of a programmable pressure switch.

The EDS 4400 can be easily programmed using the HPG 3000 programming unit.

Once the programming unit is disconnected from the EDS 4400, the pressure switch retains all the settings. This prevents unauthorised or incorrect adjustment of the settings.

The following parameters can be changed:

- Switching point
- Hysteresis
- Switching direction (N/O / N/C)
- Switching delay times

The EDS 4400 is suitable for high-pressure applications (starting at 40 bar) and has a pressure measurement cell with thin-film strain gauge on a stainless steel membrane. In contrast to pressure switches which are factory-set according to customer requirements and are not field-adjustable, the programmable EDS 4400 is highly versatile and replaces a wide range of models. This is advantageous in respect of stock management.

### Special features:

- Option of 1 or 2 switching outputs
- Option of PNP or NPN switching outputs
- High switching output capacity
- Accuracy  $\leq \pm 1\%$  FS
- Flexible user-programming
- Compact and robust design
- Also available in ATEX version for potentially explosive locations

### Technical data:

Input data	
Measuring ranges	40; 100; 250; 400; 600 bar
Overload pressures	80; 200; 500; 800; 1000 bar
Burst pressures	200; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS max.
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Switch output	1 or 2 transistor switch outputs PNP or NPN N/C or N/O
Output load	PNP: max. 1.2 A with 1 switching output max. 1 A each with 2 switching outputs NPN: max. 0.5 A with 1 switching output max. 0.3 A each with 2 switching outputs
Switching points / Hysteresis	user-programmable with HYDAC Programming Unit HPG 3000
Rising switch point and falling switch point delay	8 ms to 2000 ms; User-programmable with HYDAC Programming Unit HPG 3000
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range	-25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Shock resistance to DIN EN 60068-2-29 (1 ms)	$\leq 100$ g
Protection class to IEC 60529	IP 67 (M12x1, when an IP 67 connector is used)
Other data	
Supply voltage for use acc. to UL spec.	8 .. 32 V DC - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	$\leq 25$ mA with inactive switching outputs $\leq 1.225$ A with 1 switching output $\leq 2.025$ A with 2 switching outputs
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles, 0 .. 100 % FS
Weight	~ 145 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the complete measurement range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

## Setting ranges for the switch outputs:

Measuring range in bar	Increment in bar
0 .. 40	0.1
0 .. 100	0.2
0 .. 250	0.5
0 .. 400	1
0 .. 600	1

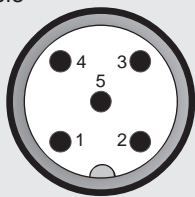
The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay ToF1/ToF2	8	2040

The increment for all instruments is 8 ms.

## Pin connections:

M12x1, 5 pole



Pin	Process connection	HPG connection
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Out 2	n.c.
3	0 V	0 V
4	Out 1	n.c.
5	n.c.	Comport

## Model code:

EDS 4 4 4 8 - XXXX - X - P X - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

8 = Male M12x1, 5 pole

### Pressure ranges in bar

0040; 0100; 0250; 0400; 0600

### Number of switching outputs

1 = 1 switching output

2 = 2 switching outputs

### Output technology

P = Programmable switching output

### Output technology 2

P = PNP switching output

N = NPN switching output

### Modification number

000 = Standard

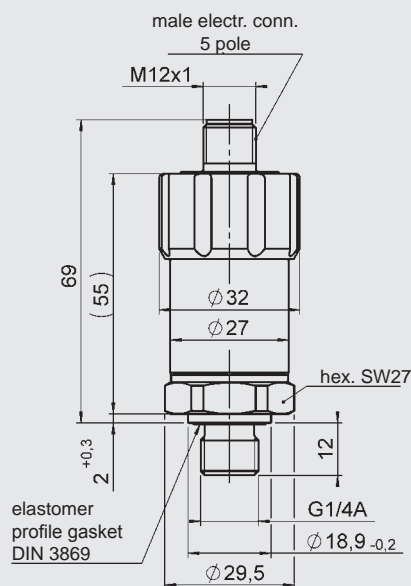
### Note:

For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:

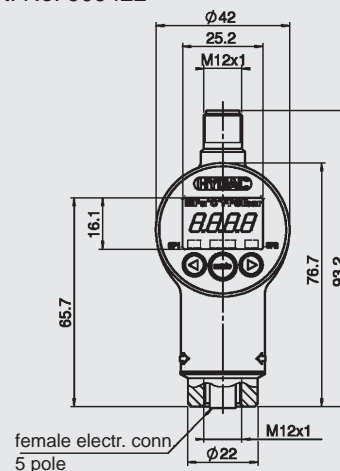


## Programming Unit:

(must be ordered separately)

### HPG 3000 - 000

Portable Programming Unit  
Part. No. 909422



### Note:

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Subject to technical modifications.

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## Electronic Pressure Switch EDS 4300 Programmable

### Description:

The programmable electronic pressure switch in the series EDS 4300 was specially developed to combine the advantages of a compact, robust and cost-effective instrument with the benefits of a programmable pressure switch.

The EDS 4300 can be easily programmed using the HPG 3000 programming unit.

Once the programming unit is disconnected from the EDS 4300, the pressure switch retains all the settings. This prevents unauthorised or incorrect adjustment of the settings.

The following parameters can be changed:

- Switching point
- Hysteresis
- Switching direction (N/O / N/C)
- Switching delay times

The EDS 4300 is suitable for low pressure applications (up to 16 bar) and has a pressure measurement cell with thick-film strain gauge on a ceramic membrane.

In contrast to pressure switches which are factory-set according to customer requirements and not field-adjustable, the programmable EDS 4300 is highly versatile and replaces a wide range of models. This is advantageous in respect of stock management.

### Special features:

- Option of 1 or 2 switching outputs
- Option of PNP or NPN switching outputs
- High switching output capacity
- Accuracy  $\leq \pm 1\%$  FS
- Flexible user-programming
- Compact and robust design
- Also available in ATEX version for potentially explosive locations

### Technical data:

#### Input data

Measuring ranges	1; 2.5; 6; 10; 16 bar -1 .. 1; -1 .. 9 bar
Overload pressures	3; 8; 20; 32; 50 bar 3; 32 bar
Burst pressures	5; 12; 30; 48; 75 bar 5, 48 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FPM / EPDM (as per model code)

#### Output data

Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS max.
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Switch output	1 or 2 transistor switch outputs PNP or NPN N/C or N/O
Output load	PNP: max. 1.2 A with 1 switching output max. 1 A each with 2 switching outputs NPN: max. 0.5 A on version with 1 switching output max. 0.3 A each on version with 2 switching outputs
Switching points / Hysteresis	user-programmable with HYDAC Programming Unit HPG 3000
Rising switch point and falling switch point delay	8 ms to 2000 ms; Freely programmable with HYDAC Programming Unit HPG 3000
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year

#### Environmental conditions

Compensated temperature range	-25 .. +85 °C
Operating temperature range	-25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Shock resistance to DIN EN 60068-2-29 (1 ms)	$\leq 100$ g
Protection class to IEC 60529	IP 67 (M12x1, when an IP 67 connector is used)

#### Other data

Supply voltage for use acc. to UL spec.	8 .. 32 V DC - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	$\leq 25$ mA with inactive switching outputs $\leq 1.225$ A with 1 switching output $\leq 2.025$ A with 2 switching outputs
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles, 0 .. 100 % FS
Weight	~ 145 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the complete measurement range

<sup>1)</sup> -25 °C with FPM or EPDM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

## Setting ranges for the switch outputs:

Measuring range in bar	Increment in bar
-1 .. 1	0.01
0 .. 1	0.002
0 .. 2.5	0.005
0 .. 6	0.01
-1 .. 9	0.02
0 .. 10	0.02
0 .. 16	0.05

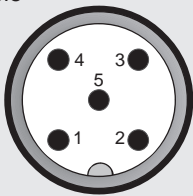
The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay ToF1/ToF2	8	2040

The increment for all instruments is 8 ms.

## Pin connections:

M12x1, 5 pole



Pin	Process connection	HPG connection
1	+Ub	+Ub
2	Out 2	n.c.
3	0 V	0 V
4	Out 1	n.c.
5	n.c.	Comport

## Model code:

EDS 4 3 4 8 - XXXX - X - P X - 000 - X 1

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

8 = Male M12x1, 5 pole

### Pressure ranges in bar

01.0; 02.5; 06.0; 0010; 0016  
0001(-1 .. 1); 0009(-1 .. 9)

### Number of switching outputs

1 = 1 switching output  
2 = 2 switching outputs

### Output technology

P = Programmable switching output

### Output technology 2

P = PNP switching output  
N = NPN switching output

### Modification number

000 = Standard

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for water or refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

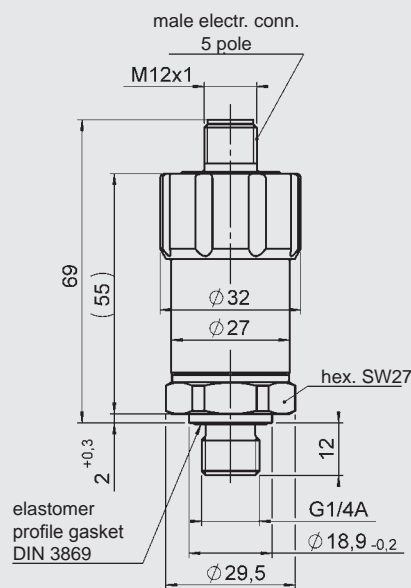
## Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:

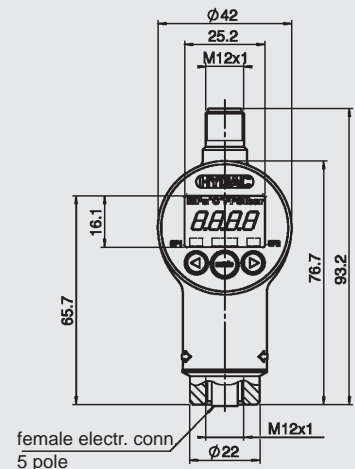


## Programming Unit:

(must be ordered separately)

### HPG 3000 - 000

Portable Programming Unit  
Part. No. 909422



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Switch EDS 820 with IO-Link Interface



### Description:

EDS 820 with IO-Link communication interface is a compact electronic pressure switch for relative pressure measurement in the high-pressure range.

The device has two PNP transistor switch outputs, one of which can serve as the IO communication output.

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control.

Parameterisation and cyclical transmission of process and service data is therefore possible.

The pressure switch series EDS 820 with communication interface IO-Link according to specification V1.1 has been specially designed for connecting sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO-Link interface or PNP transistor switch output
- 1 additional PNP transistor switching output
- Accuracy  $\leq \pm 1.0\%$  FS
- Highly robust sensor cell
- Status LED display for active switch outputs

### Technical data:

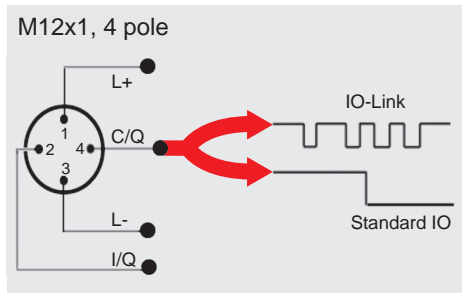
Input data	
Measuring ranges	25; 40; 60; 100; 250; 400; 600 bar
Overload range	50; 80; 120; 200; 500; 800; 1000 bar
Burst pressures	100; 200; 300; 500; 1250; 2000; 2000 bar
Mechanical connection	G $\frac{1}{4}$ A DIN 3852 with 0.5 mm orifice
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM
Output data	
Output signals	Pin 4: IO Link interface or user-configurable switching output Pin 2: user-configurable switching output
Accuracy to DIN 16086,	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1.0\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS max.
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Switch outputs	
Type	PNP transistor output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Reaction time	< 10 ms
Long term drift	$\leq \pm 0.3\%$ FS typ. / year
Parameterisation	
	<b>Via IO-Link interface, with HYDAC programming device HPG 3000</b>
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +125 °C / -25 .. +125 °C
CE-mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 0 .. 500 Hz	$\leq 25$ g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g
Protection class to IEC 60529	IP 67 (M12x1 male connection, for use with an IP 67 connector)
Other data	
Supply voltage	10 .. 32 V DC
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25$ mA with inactive switching outputs $\leq 0.275$ A with 1 active switching output $\leq 0.525$ A with 2 active switching outputs
Weight	~ 65 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to the full measuring range

<sup>1)</sup> -25 °C for EPM seal, -40 °C on request

## Pin connections:

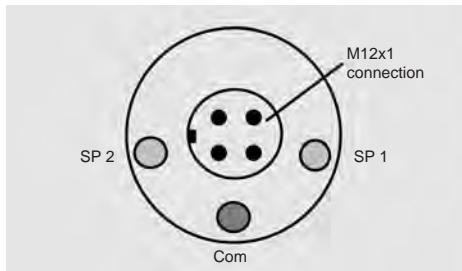


Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## Status LEDs:

The pressure switch has 3 status LEDs on the electrical connection:

2 LEDs (yellow) for the switching statuses of SP1 and SP2 and 1 LED (green) for the operating status



LED 1 (SP 1)	Yellow	Switching output 1 active (high)
LED 2 (SP 2)	Yellow	Switching output 2 active (high)
LED 3 (Com)	Green,	Supply voltage OK permanent switch in SIO mode
	Green, flashing	Supply voltage OK switch in IO-Link mode

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

**EDS 8 2 4 - XXXX - L - 000**

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Pressure ranges in bar

0025; 0040; 0060; 0100; 0250; 0400; 0600

### Output

L = IO Link Interface

### Modification number

000 = Standard

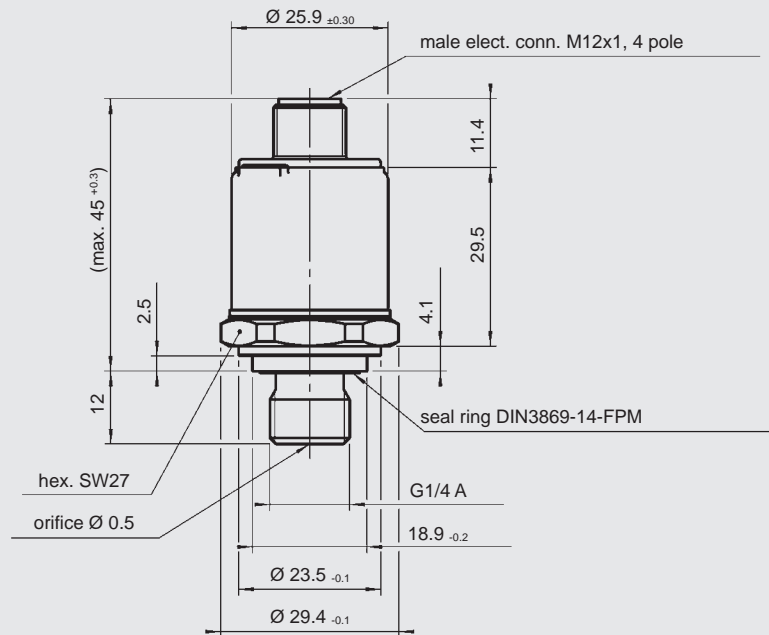
### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:



## Note:

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Subject to technical modifications.

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## PRESSURE SENSORS WITH FLUSH MEMBRANES

Depending on the application and the medium used, it is not always possible to use standard pressure connections.

This is the case, for example, with media which can cause the standard pressure connection to become blocked, clogged or frozen, or for applications where the medium changes frequently and residues can result in mixing or contamination of the media.

For such applications, HYDAC ELECTRONIC provides pressure sensors with flush membranes. On these, the pressure connection is closed off at the end with a flush-fitting, fully-welded stainless steel membrane and is filled internally with a special pressure transfer fluid. The process pressure being measured is transmitted hydrostatically to the sensor cell via the transfer pressure fluid.

Electronic pressure transmitters with flush membrane:

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HDA 4700	81
HDA 4400	83
HDA 4300	85
HDA 7400	87

Electronic pressure switches with flush membrane:

	Page
EDS 3400	89
EDS 3300	93

You can find more sensors with flush membranes for special applications in the Section on "*Sensors for potentially explosive atmospheres*".





## Electronic Pressure Transmitter HDA 4700 with Flush Membrane

### Description:

Pressure transmitter HDA 4700 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 4700 with flush membrane has a stainless steel measurement cell with a thin film strain gauge for relative pressure measurement in the high pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The 4 .. 20 mA or 0 .. 10 V enable connection to all HYDAC measurement and control devices as well as connection to standard evaluation systems (e.g PLC controls).

### Special features:

- Pressure connection has a flush membrane
- Accuracy  $\leq 0.25\%$  FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Small, compact design

### Technical data:

Input data	
Measuring ranges	40; 60; 100; 250; 400; 600 bar
Overload pressures	80; 120; 200; 500; 800; 900 bar
Burst pressures <sup>1)</sup>	200; 300; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/2 A DIN 3852 G1/2 with add. front O-ring seal G1/2 with add. front O-ring seal and cooling section
Pressure transfer fluid	Silicone-free oil
Torque value	45 Nm
Parts in contact with medium <sup>2)</sup>	Mech. conn.: Stainless steel Seal: FPM O-ring: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{L,max} = (U_B - 8 V) / 20 \text{ mA}$ [k $\Omega$ ] 0 .. 10 V, 3 conductor $R_{L,min} = 2 \text{ k}\Omega$
Accuracy to DIN 16086 Max. setting	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.
Temperature compensation Zero point	$\leq \pm 0.008\%$ FS / °C typ. $\leq \pm 0.015\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.008\%$ FS / °C typ. $\leq \pm 0.015\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.1\%$ FS max.
Repeatability	$\leq \pm 0.05\%$ FS max.
Rise time	$\leq 1 \text{ ms}$
Long-term drift	$\leq \pm 0.1\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>3)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>3)</sup>	-40 .. +100 °C / -25 .. +100 °C -40 .. +150 °C / -25 .. +150 °C for G1/2 with cooling section
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>4)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 65 (for EN175301-803 (DIN 43650)) IP 67 (for M12x1, when an IP 67 female connector is used)
Other data	
Supply voltage	8 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25 \text{ mA}$
Life expectancy	> 10 million cycles (0 .. 100 % FS)
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> G1/2 with additional front O-ring seal max. 1500 bar

<sup>2)</sup> Other seal materials on request

<sup>3)</sup> -25 °C with FPM seal, -40 °C on request

<sup>4)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1

## Model code:

**HDA 4 7 Z X - X - XXXX - XXX - 000**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

5 = Male, 3 pole + PE, EN175301-803 (DIN 43650)  
(female connector supplied)

6 = Male M12x1, 4 pole  
(female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

B = 0 .. 10 V, 3 conductor

### Pressure ranges in bar

0040; 0060; 0100; 0250; 0400; 0600

### Mechanical connection

G01 = G1/2 A, DIN 3852

G02 = G1/2 with additional front O-ring seal

G12 = G1/2 with additional front O-ring seal and cooling section

### Modification number

000 = Standard

### Note:

Special models on request.

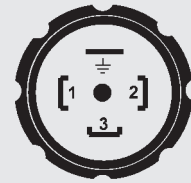
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories such as female electrical connectors can be found in the Accessories brochure.

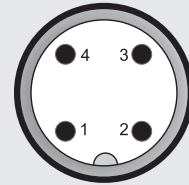
## Pin connections:

EN175301-803 (DIN 43650)



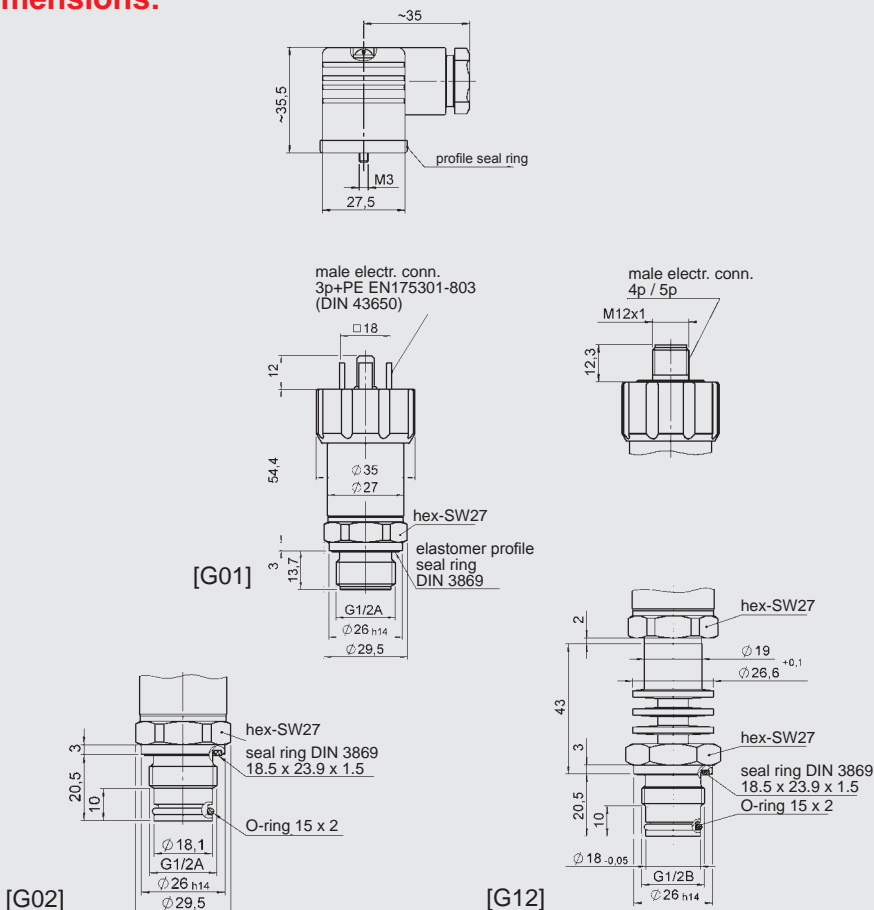
Pin	HDA 47Z5-A	HDA 47Z5-B
1	Signal+	+U <sub>B</sub>
2	Signal-	0V
3	n.c.	Signal
⊥	Housing	Housing

M12x1



Pin	HDA 47Z6-A	HDA 47Z6-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0V
4	n.c.	Signal

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

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## Electronic Pressure Transmitter HDA 4400 with Flush Membrane

### Description:

Pressure transmitter HDA 4400 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes frequently and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 4400 with flush membrane has a stainless steel measurement cell with a thin film strain gauge for relative pressure measurement in the high pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The output signals 4 .. 20 mA or 0 .. 10 V enable connection to all HYDAC measurement and control devices as well as connection to standard evaluation systems (e.g PLC controls).

### Special features:

- Pressure connection has a flush membrane
- Accuracy  $\leq 0.5\%$  FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Small, compact design

### Technical data:

Input data	
Measuring ranges	40; 60; 100; 250; 400; 600 bar
Overload pressures	80; 120; 200; 500; 800; 900 bar
Burst pressures <sup>1)</sup>	200; 300; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/2 A DIN 3852 G1/2 with addit. front O-ring seal G1/4 with addit. front O-ring seal G1/2 with add. front O-ring seal and cooling section
Pressure transfer fluid	Silicone-free oil
Torque value	45 Nm for G1/2, G1/2 A 20 Nm for G1/4
Parts in contact with medium <sup>2)</sup>	Mech. conn.: Stainless steel Seal: FPM O-ring: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{\text{max}} = (U_B - 8 \text{ V}) / 20 \text{ mA}$ [k $\Omega$ ] 0 .. 10 V, 3 conductor $R_{\text{min}} = 2 \text{ k}\Omega$
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Accuracy at min. setting (B.F.S.L)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Zero point	$\leq \pm 0.025\%$ FS / °C max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Over range	$\leq \pm 0.025\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS max.
Rise time	$\leq 1 \text{ ms}$
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensation temperature range	-25 .. +85 °C
Operating temperature range	-25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>3)</sup>	-40 .. +100 °C / -25 .. +100 °C -40 .. +150 °C / -25 .. +150 °C for G1/2 with cooling section
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>4)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 65 (for EN175301-803 (DIN 43650)) IP 67 (for M12x1, providing an IP 67 female connector is used)
Other data	
Supply voltage	8 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25 \text{ mA}$
Life expectancy	> 10 million cycles (0 .. 100 % FS)
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> G1/2 with additional front O-ring seal max. 1500 bar

<sup>2)</sup> Other seal materials on request

<sup>3)</sup> -25 °C with FPM seal, -40 °C on request

<sup>4)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1

## Model code:

**HDA 4 4 Z X - X - XXXX - XXX - 000**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650)  
(female connector supplied)

6 = Male M12x1, 4 pole  
(female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

B = 0 .. 10 V, 3 conductor

### Pressure ranges in bar

0040; 0060; 0100; 0250; 0400; 0600

### Mechanical connection

G01 = G1/2 A, DIN 3852

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

G12 = G1/2 with additional front O-ring seal and cooling section

### Modification number

000 = Standard

### Note:

#### Special models on request.

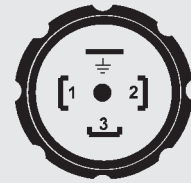
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories such as female electrical connectors can be found in the Accessories brochure.

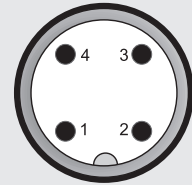
## Pin connections:

EN175301-803 (DIN 43650)



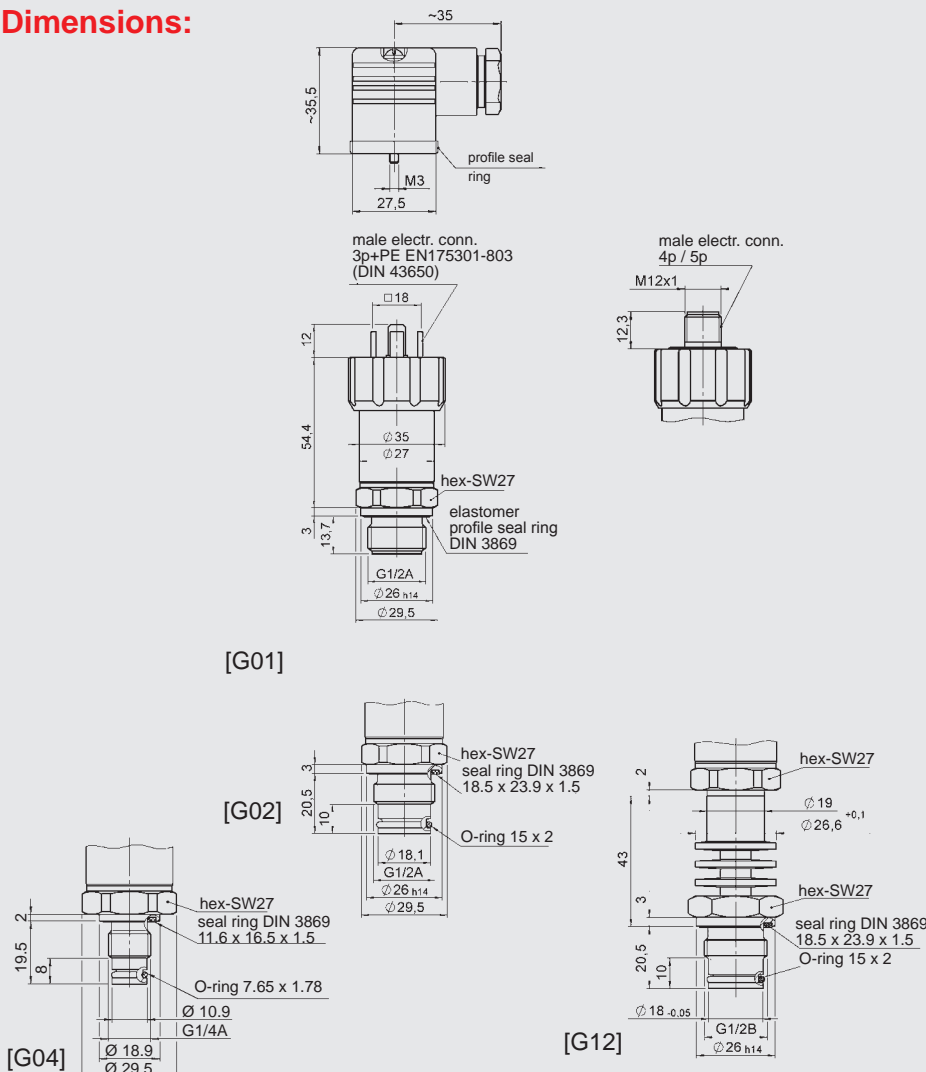
Pin	HDA 44Z5-A	HDA 44Z5-B
1	Signal+	+U <sub>B</sub>
2	Signal-	0V
3	n.c.	Signal
⊥	Housing	Housing

M12x1



Pin	HDA 44Z6-A	HDA 44Z6-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0V
4	n.c.	Signal

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Transmitter HDA 4300 with Flush Membrane

### Description:

Pressure transmitter HDA 4300 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 4300 with a flush membrane has a ceramic measurement cell with a thick film strain gauge for relative pressure measurement in the low pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The 4 .. 20 mA or 0 .. 10 V enable connection to all HYDAC measurement and control devices as well as connection to standard evaluation systems (e.g PLC controls).

### Special features:

- Pressure connection has a flush membrane
- Accuracy  $\leq 0.5$  % FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Very compact design

### Technical data:

Input data	
Measuring ranges	-1..1; -1..9; 1; 2.5; 4; 6; 10; 16; 25 bar
Overload pressures	3; 32; 3; 8; 12; 20; 32; 50; 80 bar
Burst pressures	5; 48; 5; 12; 18; 30; 48; 75; 120 bar
Mechanical connection	G1/2 A DIN 3852 G1/2 with add. front O-ring seal G1/4 with add. front O-ring seal G1/2 with add. front O-ring seal and cooling section
Pressure transfer fluid	Silicone-free oil
Torque value	45 Nm for G1/2, G1/2 A 20 Nm for G1/4
Parts in contact with medium <sup>1)</sup>	Mech. conn.: Stainless steel Seal: FPM O-ring: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 8 V) / 20 \text{ mA}$ [k $\Omega$ ] 0 .. 10 V, 3 conductor $R_{Lmin} = 2 \text{ k}\Omega$
Accuracy to DIN 16086	$\leq \pm 0.5$ % FS typ.
Max. setting	$\leq \pm 1$ % FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25$ % FS typ. $\leq \pm 0.5$ % FS max.
Temperature compensation	$\leq \pm 0.02$ % FS / °C typ.
Zero point	$\leq \pm 0.03$ % FS / °C max.
Temperature compensation	$\leq \pm 0.02$ % FS / °C typ.
Over range	$\leq \pm 0.03$ % FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5$ % FS max.
Hysteresis	$\leq \pm 0.4$ % FS max.
Repeatability	$\leq \pm 0.1$ % FS max.
Rise time	$\leq 1$ ms
Long-term drift	$\leq \pm 0.3$ % FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range	-25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +100 °C / -25 .. +100 °C -40 .. +150 °C / -25 .. +150 °C for G1/2 with cooling section
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>3)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 (for EN175301-803 (DIN 43650)) IP 67 (for M12x1, providing an IP 67 female connector is used)
Other data	
Supply voltage	8 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5$ %
Current consumption	$\leq 25$ mA
Life expectancy	> 10 million cycles (0 .. 100 % FS)
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range. B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> Other seal materials on request

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

<sup>3)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1

## Model code:

**HDA 4 3 Z X - X - XXXX - XXX - 000**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650)  
(female connector supplied)

6 = Male M12x1, 4 pole  
(female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

B = 0 .. 10 V, 3 conductor

### Pressure ranges in bar

01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025;  
0001 (-1..1); 0009 (-1..9)

### Mechanical connection

G01 = G1/2 A DIN 3852

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

G12 = G1/2 with additional front O-ring seal and cooling section

### Modification number

000 = Standard

### Note:

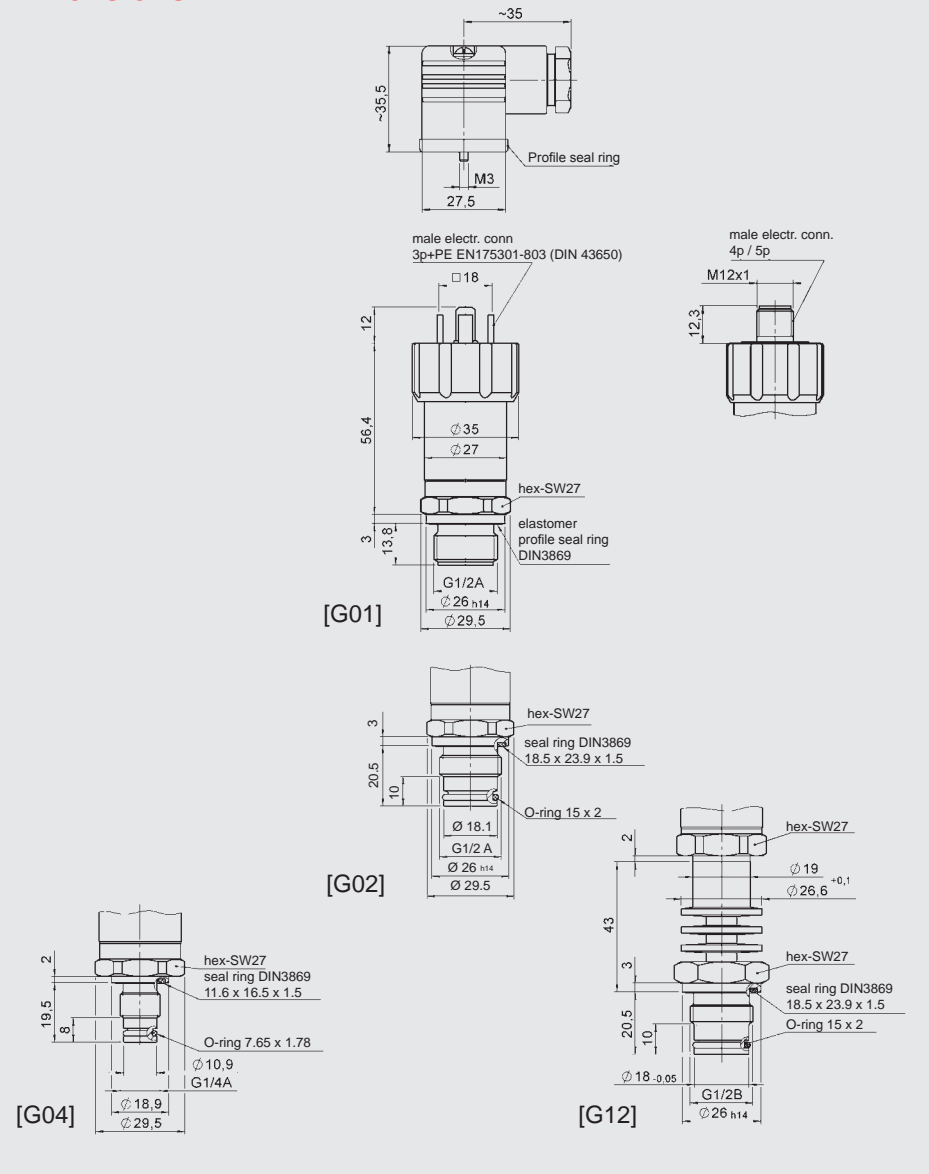
Special models on request.

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

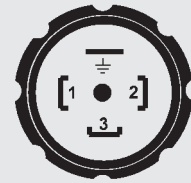
Appropriate accessories such as female electrical connectors can be found in the Accessories brochure.

## Dimensions:



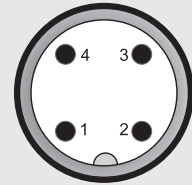
## Pin connections:

EN175301-803 (DIN 43650)



Pin	HDA 43Z5-A	HDA 43Z5-B
1	Signal+	+U <sub>B</sub>
2	Signal-	0V
3	n.c.	Signal
⊥	Housing	Housing

M12x1



Pin	HDA 43Z6-A	HDA 43Z6-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0V
4	n.c.	Signal

### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Transmitter HDA 7400 with Flush Membrane

### Description:

Pressure transmitter HDA 7400 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 7400 with flush membrane has a stainless steel measurement cell with a thin-film strain gauge for relative pressure measurement in the high pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The output signals 4 .. 20 mA or 0 .. 10 V permit connection to all HYDAC measuring and control devices, as well as connection to standard evaluation systems (e.g. PLC controls).

### Special features:

- Pressure connection has a flush membrane
- Accuracy  $\leq 0.5\%$  FS typ.
- Highly robust sensor cell
- Very compact design
- Very small temperature error
- Excellent EMC characteristics

### Technical data:

Input data	
Measuring ranges	25; 40; 60; 100; 250; 400; 600 bar
Overload pressures	50; 80; 120; 200; 500; 800; 1000 bar
Burst pressures	125; 200; 300; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852 G1/4 with additional front O-ring seal
Pressure transfer fluid	Silicone-free oil
Torque value	20 Nm
Parts in contact with fluid <sup>1)</sup>	Connection part: Stainless steel Seal: FPM O-ring: FPM
Output data	
Output signals, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 8 V) / 20 \text{ mA}$ [k $\Omega$ ] 0 .. 10 V, 3 conductor $R_{Lmin} = 2 \text{ k}\Omega$
Accuracy to DIN 16086, max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1.0\%$ FS max.
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation zero point	$\leq \pm 0.015\%$ FS / °C typ. $\leq \pm 0.025\%$ FS / °C max.
Temperature compensation over range	$\leq \pm 0.015\%$ FS / °C typ. $\leq \pm 0.025\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS max.
Rise time	$\leq 2 \text{ ms}$
Long term drift	$\leq \pm 0.3\%$ FS / year typ.
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range	-25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>3)</sup>	Certificate No.: E318391
Vibration resistance according to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 67 (when an IP 67 female connector is used)
Other data	
Supply voltage	8 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
when applied according to UL specifications	– limited energy – according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25 \text{ mA}$
Life expectancy	> 10 million cycles (0 .. 100 % FS)
Weight	~ 80 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L.** = Best Fit Straight Line

<sup>1)</sup> Other seal materials on request

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

<sup>3)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1

## Model code:

HDA 7 4 Z 6 - X XXXX - XXX - 000

### Mechanical process connection

Z = Flush membrane

### Electrical connection

6 = Male M12x1, 4 pole  
(female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

B = 0 .. 10 V, 3 conductor

### Pressure ranges in bar

0025; 0040; 0060; 0100; 0250; 0400; 0600

### Mechanical connection

G04 = G1/4 with additional front O-ring seal

G05 = G1/4 A DIN 3852

### Modification number

000 = Standard

### Notes:

Special models on request.

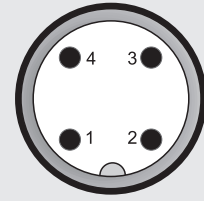
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

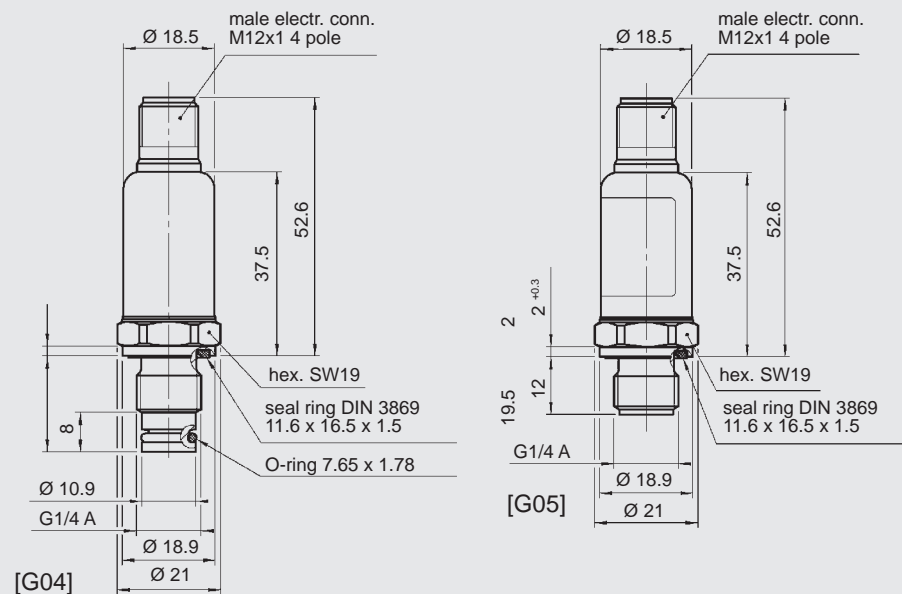
## Pin connections:

M12x1



Pin	HDA 74Z6-A	HDA 74Z6-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0 V
4	n.c.	Signal

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Pressure Switch EDS 3400 with Flush Membrane

### Description:

The electronic pressure switch EDS 3400 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes frequently and any residues could cause mixing or contamination of the media.

Like the standard model, the EDS 3400 with flush membrane has a stainless steel measurement cell with a thin film strain gauge for relative pressure measurement in the high pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

Depending on the type, the instrument can have up to 2 switching outputs and a switchable analogue output (4 .. 20 mA or 0 .. 10 V).

### Special features:

- Pressure connection has a flush membrane
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy  $\leq 1\%$  FS
- Optional analogue output selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Rotation in two planes (axes) for optimum alignment
- Measured value can be displayed in bar, psi or MPa
- Simple operation with key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions
- Option of Desina<sup>®</sup>-compliant pin configuration with diagnostic function

### Technical data:

Input data		
Measuring ranges	40; 100; 250; 400; 600 bar	
Overload pressures	80; 200; 500; 800; 900 bar	
Burst pressures <sup>1)</sup>	200; 500; 1000; 2000; 2000 bar	
Mechanical connection	G1/2 A DIN 3852 G1/2 with additional front O-ring seal G1/4 with additional front O-ring seal G1/4 A DIN 3852 G1/2 with add. front O-ring seal and cooling section	
Pressure transfer fluid	Silicone-free oil	
Torque value	45 Nm for G1/2, G1/2 A 20 Nm for G1/4	
Parts in contact with medium <sup>2)</sup>	Mech. conn.:	Stainless steel
	Seal:	FPM
	O-ring:	FPM
Output data		
Accuracy to DIN 16086,	$\leq \pm 0.5\%$ FS typ.	
Max. setting (display, analogue output)	$\leq \pm 1\%$ FS max.	
Repeatability	$\leq \pm 0.25\%$ FS max.	
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range	
Analogue output (optional)		
Output signal (selectable)	4 .. 20 mA	load resistance max. 500 $\Omega$
	0 .. 10 V	load resistance min. 1 k $\Omega$
Switch outputs		
Type	PNP transistor output	
Switching current	max. 1.2 A per output	
Switching cycles	> 100 million	
Reaction time	< 10 ms	
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year	
DESINA <sup>®</sup> diagnostic signal (Pin 2)		
Function	OK: HIGH level / not OK: LOW level	
Level	HIGH: approx. +U <sub>B</sub> / LOW: < +0.3 V	
Environmental conditions		
Compensated temperature range	-10 .. +70 °C, -10 .. +60 °C for UL spec.	
Operating temperature range	-25 .. +80 °C, -25 .. +60 °C for UL spec.	
Storage temperature range	-40 .. +80 °C	
Fluid temperature range <sup>3)</sup>	-40 .. +80 °C / -25 .. +80 °C -40 .. +150 °C / -25 .. +150 °C for G1/2 with cooling section	
CE mark	EN 61000-6-1 / 2 / 3 / 4	
UL mark <sup>4)</sup>	Certificate No. E318391	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 10$ g	
Shock resistance to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g	
Protection class to IEC 60529	IP 67	
Other data		
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950	
for use acc. to UL spec.		
Current consumption	max. 2.455 A total max. 35 mA with inactive switching output max. 55 mA with inactive switching output and analogue output	
Display	4-digit, LED, 7 segment, red, height of digits 7 mm	
Weight	~ 120 g	

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range

<sup>1)</sup> G1/2 with additional front O-ring seal max. 1500 bar

<sup>2)</sup> Other seal materials on request

<sup>3)</sup> -25 °C with FPM seal, -40 °C on request

<sup>4)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1

## Setting options:

All settings offered by the EDS 3400 are grouped in 2 easy-to-navigate menus.

In order to prevent unauthorised adjustment of the device, a programming lock can be set.

## Setting ranges for the switch outputs:

Switching point function

Meas. range in bar	Switch point in bar	Hysteresis in bar	Increment* in bar
0 .. 40	0.6 .. 40	0.2 .. 39.6	0.1
0 .. 100	1.6 .. 100	0.6 .. 99.0	0.2
0 .. 250	4.0 .. 250	1.5 .. 247.5	0.5
0 .. 400	6.0 .. 400	2.0 .. 396	1
0 .. 600	9.0 .. 600	3.0 .. 594	1

Window function

Meas. range in bar	Lower switch value in bar	Upper switch value in bar	Increment* in bar
0 .. 40	0.6 .. 39.2	0.9 .. 39.6	0.1
0 .. 100	1.6 .. 98.2	2.4 .. 99	0.2
0 .. 250	4.0 .. 245.5	6.0 .. 247.5	0.5
0 .. 400	6.0 .. 392	9.0 .. 396	1
0 .. 600	9.0 .. 589	14 .. 594	1

\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in the measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

## EDS 3400 for self diagnostics:



The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification. A diagnostic signal enables errors to be detected and an "ERROR" message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

## Model code:

EDS 3 4 Z X - X - XXXX - XXX - 000

### Mechanical process connection

Z = Flush membrane

### Electrical connection

6 = Male M12x1, 4 pole

only possible on output models "1", "2" and "3"

8 = Male M12x1, 5 pole

only possible on output model "5"

### Output

1 = 1 switching output

only in conjunction with electrical connection type "6"

2 = 2 switching outputs

only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analogue output

only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analogue output

only in conjunction with electrical connection type "8"

### Pressure ranges in bar

0040; 0100; 0250; 0400; 0600

### Mechanical connection

G01 = G1/2 A DIN 3852

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

G05 = G1/4 A DIN 3852

G12 = G1/2 with add. front O-ring seal and cooling section

### Modification number

000 = Standard

## Model code:

DESINA®-compliant or can be connected to DESINA®:



EDS 3 4 Z 8 - X - XXXX - XXX - D00

### Mechanical process connection

Z = flush membrane

### Electrical connection

8 = M12x1, 5 pole, male

### Output

1 = 1 switching output

3 = 1 switching output and 1 analogue output

### Pressure ranges in bar

0040; 0100; 0250; 0400; 0600

### Mechanical connection

G01 = G1/2 A DIN 3852

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

G05 = G1/4 A DIN 3852

G12 = G1/2 with additional front O-ring seal and cooling section

### Modification number

D00 = DESINA®-compliant pin configuration for self-diagnostics

### Note:

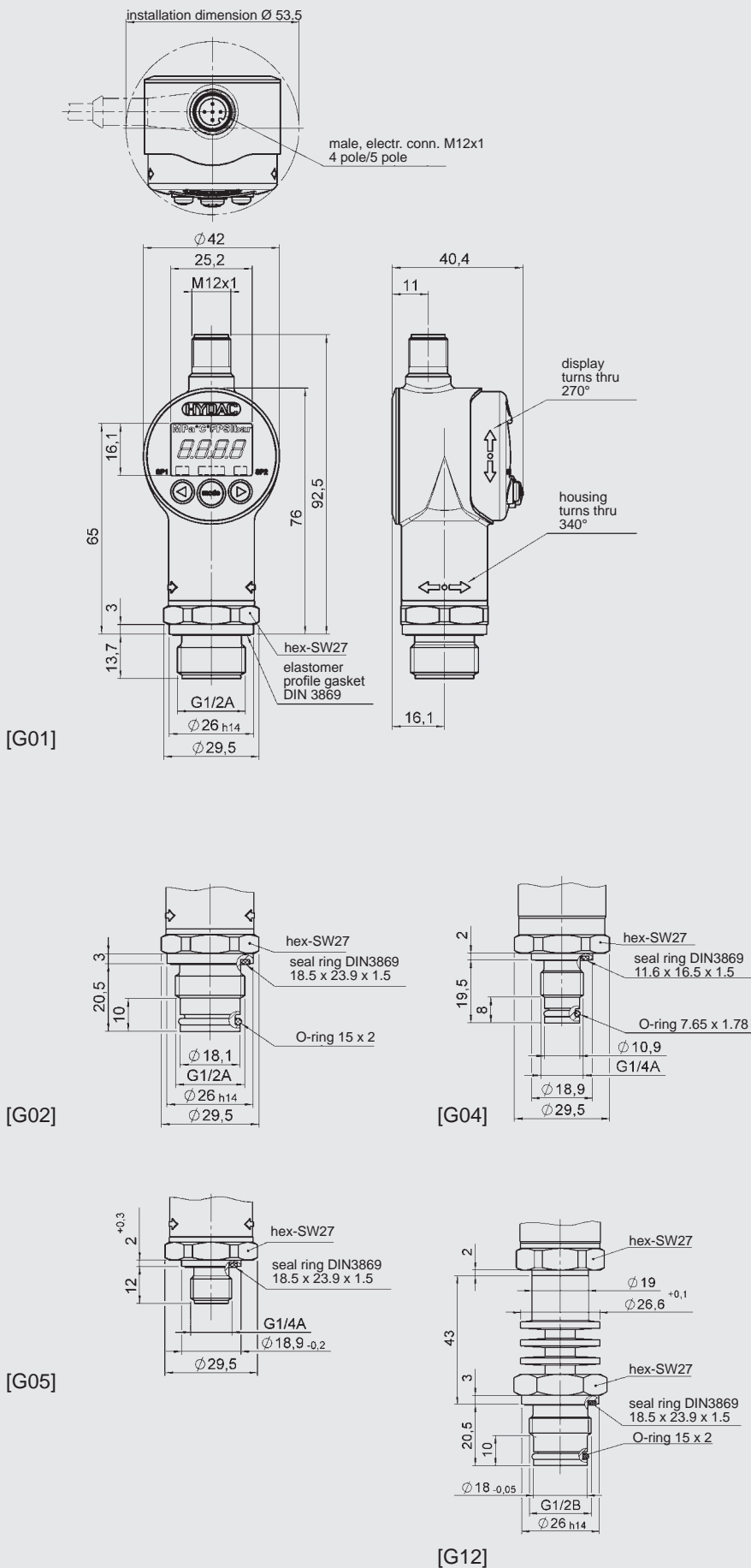
Special models on request.

For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:

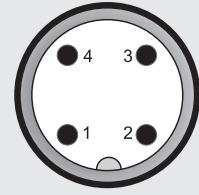


## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

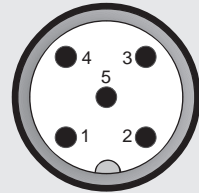
## Pin connections:

M12x1, 4 pole



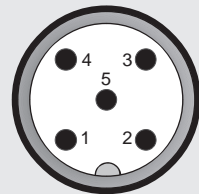
Pin	EDS 34Z6-1	EDS 34Z6-2	EDS 34Z6-3
1	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2	Analogue
3	0 V	0 V	0 V
4	SP 1	SP 1	SP 1

M12x1, 5 pole



Pin	EDS 34Z8-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

M12x1, 5 pole



Pin	EDS 34Z8-1	EDS 34Z8-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Diagnostics	Diagnostics
3	0 V	0 V
4	SP 1	SP 1
5	n.c.	Analogue

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## Electronic Pressure Switch EDS 3300 with Flush Membrane

### Description:

The electronic pressure switch EDS 3300 with a flush membrane was designed specifically for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes frequently and any residues could cause mixing or contamination of the media.

Like the standard model, the EDS 3300 with flush membrane has a ceramic measurement cell with a thick film strain gauge for relative pressure measurement in a low pressure range.

The pressure connection is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

Depending on the type, the instrument can have up to 2 switching outputs and a switchable analogue output (4 .. 20 mA or 0 .. 10 V).

### Special features:

- Pressure connection has a flush membrane
- 1 or 2 PNP transistor switching outputs, up to 1.2 A load per output
- Accuracy  $\leq 1\%$  FS
- Optional analogue output selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Rotation in two planes (axes) for optimum alignment
- Measured value can be displayed in bar, psi or MPa
- Simple operation with key programming
- Switching points and switch-back hystereses can be adjusted independently
- Many useful additional functions
- Optional Desina<sup>®</sup>-compliant pin configuration with diagnostic function

### Technical data:

Input data		
Measuring ranges	-1..1; 1; 2.5; 6; 10; 16 bar	
Overload pressures	3; 3; 8; 18; 30; 48 bar	
Burst pressures	5; 5; 15; 30; 50; 80 bar	
Mechanical connection	G1/2 A DIN 3852 G1/2 with additional front O-ring seal G1/4 with additional front O-ring seal G1/4 A DIN 3852 G1/2 with add. front O-ring seal and cooling section	
Pressure transfer fluid	Silicone-free oil	
Torque value	45 Nm for G1/2, G1/2 A 20 Nm for G1/4	
Parts in contact with medium <sup>1)</sup>	Mech. conn.:	Stainless steel
	Seal:	FPM
	O-ring:	FPM
Output data		
Accuracy to DIN 16086,	$\leq \pm 0.5\%$ FS typ.	
Max. setting (display, analogue output)	$\leq \pm 1\%$ FS max.	
Repeatability	$\leq \pm 0.25\%$ FS max.	
Temperature drift	$\leq \pm 0.025\%$ FS / °C max. zero point $\leq \pm 0.025\%$ FS / °C max. range	
Analogue output (optional)		
Output signal (selectable)	4 .. 20 mA	load resistance max. 500 $\Omega$
	0 .. 10 V	load resistance min. 1 k $\Omega$
Switch outputs		
Type	PNP transistor output	
Switching current	max. 1.2 A per output	
Switching cycles	> 100 million	
Reaction time	< 10 ms	
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year	
DESINA <sup>®</sup> diagnostic signal (Pin 2)		
Function	OK: HIGH level / not OK: LOW level	
Level	HIGH: approx. +U <sub>B</sub> / LOW: < +0.3 V	
Environmental conditions		
Compensated temperature range	-10 .. +70 °C, -10 .. +60 °C for UL spec.	
Operating temperature range	-25 .. +80 °C, -25 .. +60 °C for UL spec.	
Storage temperature range	-40 .. +80 °C	
Fluid temperature range <sup>2)</sup>	-40 .. +80 °C / -25 .. +80 °C -40 .. +150 °C / -25 .. +150 °C for G1/2 with cooling section	
CE mark	EN 61000-6-1 / 2 / 3 / 4	
UL mark <sup>3)</sup>	Certificate No. E318391	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 10$ g	
Shock resistance to DIN EN 60068-2-29 (11 ms)	$\leq 50$ g	
Protection class to IEC 60529	IP 67	
Other data		
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950	
for use acc. to UL spec.		
Current consumption	max. 2,455 A total max. 35 mA with inactive switching output max. 55 mA with inactive switching output and analogue output	
Display	4-digit, LED, 7 segment, red, height of digits 7 mm	
Weight	~ 120 g	

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> Other seal materials on request

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

<sup>3)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1

## Setting options:

All settings offered by the EDS 3300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

## Setting ranges for the switch outputs:

### Switching point function

Meas. range in bar	Switch point in bar	Hysteresis in bar	Increment* in bar
-1 .. 1	-0.97 .. 1	-0.99 .. 0.98	0.01
0 .. 1	0.016 .. 1	0.006 .. 0.99	0.002
0 .. 2.5	0.04 .. 2.5	0.015 .. 2.475	0.005
0 .. 6	0.09 .. 6	0.3 .. 5.94	0.01
0 .. 10	0.16 .. 10	0.06 .. 9.9	0.02
0 .. 16	0.25 .. 16	0.1 .. 15.8	0.05

### Window function

Meas. range in bar	Lower switch value in bar	Upper switch value in bar	Increment* in bar
-1 .. 1	-0.97 .. 0.96	-0.95 .. 0.98	0.01
0 .. 1	0.016 .. 0.982	0.024 .. 0.99	0.002
0 .. 2.5	0.04 .. 2.455	0.06 .. 2.475	0.005
0 .. 6	0.09 .. 5.89	0.14 .. 5.94	0.01
0 .. 10	0.16 .. 9.82	0.24 .. 9.9	0.02
0 .. 16	0.25 .. 15.7	0.4 .. 15.8	0.05

\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display off)
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi or MPa. The scaling can also be adapted to indicate force, weight, etc.

## EDS 3300 for self diagnostics:



The DESINA®-compliant pressure switch has been specially developed for customers in the machine tool and mechanical engineering sectors and complies with the DESINA® specification. A diagnostic signal enables errors to be detected and an "ERROR" message also appears in the display. The electrical connection is a round 5-pole M12x1 to IP 67 in accordance with DESINA® requirements.

## Model code:

EDS 3 3 Z X - X - XXXX - XXX - 000

### Mechanical process connection

Z = Flush membrane

### Electrical connection

6 = Male M12x1, 4 pole  
only possible on output models "1", "2" and "3"

8 = Male M12x1, 5 pole  
only possible on output model "5"

### Output

1 = 1 switching output  
only in conjunction with electrical connection type "6"

2 = 2 switching outputs  
only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analogue output  
only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analogue output  
only in conjunction with electrical connection type "8"

### Pressure ranges in bar

01.0; 02.5; 06.0; 0010; 0016  
0001 (-1..1)

### Mechanical connection

G01 = G1/2 A DIN 3852

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

G05 = G1/4 A DIN 3852

G12 = G1/2 with additional front O-ring seal and cooling section

### Modification number

000 = Standard

## Model code:

DESINA®-compliant or  
can be connected to DESINA®:



EDS 3 3 Z 8 - X - XXXX - XXX - D00

### Mechanical process connection

Z = Flush membrane

### Electrical connection

8 = Male M12x1, 5 pole

### Output

1 = 1 switching output

3 = 1 switching output and 1 analogue output

### Pressure ranges in bar

01.0; 02.5; 06.0; 0010; 0016  
0001 (-1 .. 1)

### Mechanical connection

G01 = G1/2 A, DIN 3852

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

G05 = G1/4A DIN 3852

G12 = G1/2 with additional front O-ring seal and cooling section

### Modification number

D00 = DESINA®-compliant pin configuration for self-diagnostics

### Note:

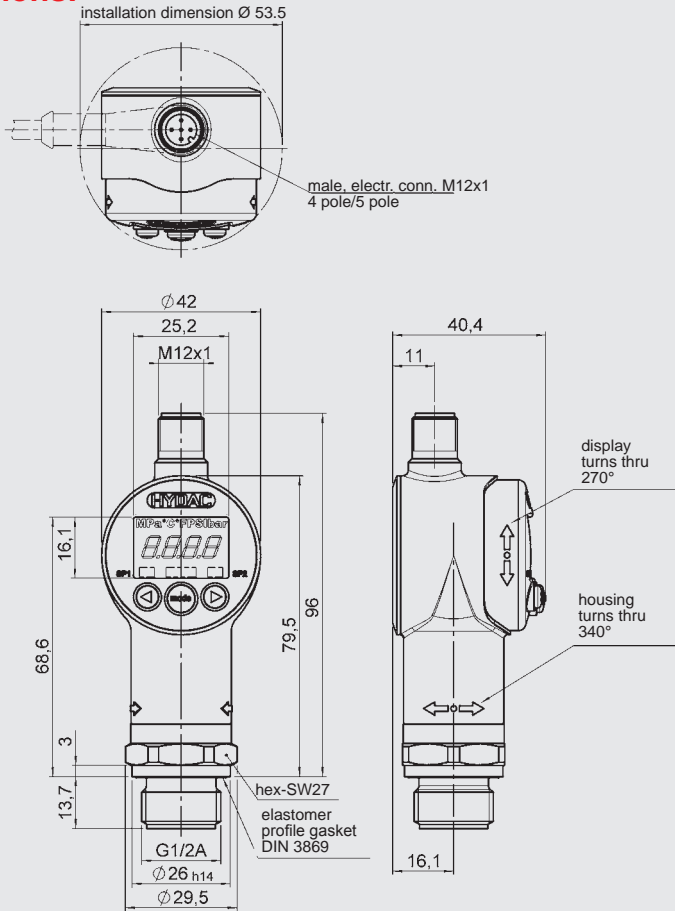
Special models on request.

For instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

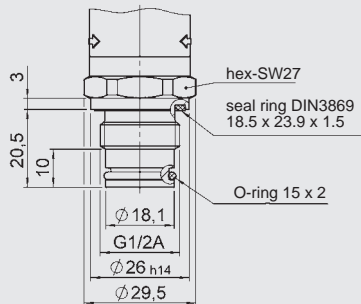
### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

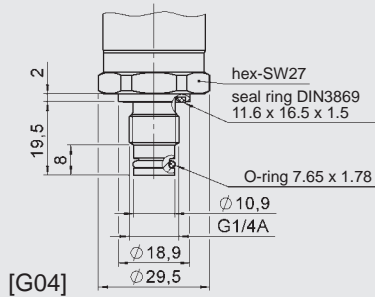
## Dimensions:



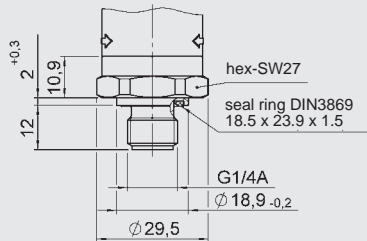
[G01]



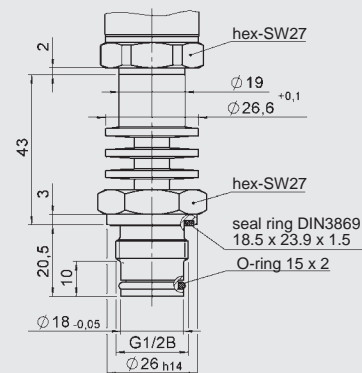
[G02]



[G04]



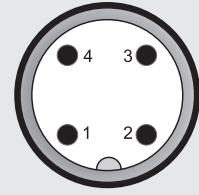
[G05]



[G12]

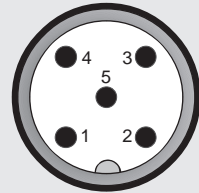
## Pin connections:

M12x1, 4 pole



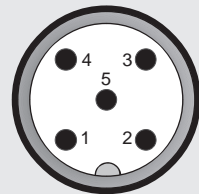
Pin	EDS 33Z6-1	EDS 33Z6-2	EDS 33Z6-3
1	+U <sub>B</sub>	+U <sub>B</sub>	+U <sub>B</sub>
2	n.c.	SP 2	Analogue
3	0 V	0 V	0 V
4	SP 1	SP 1	SP 1

M12x1, 5 pole



Pin	EDS 33Z8-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

M12x1, 5 pole



Pin	EDS 33Z8-1	EDS 33Z8-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Diagnostics	Diagnostics
3	0 V	0 V
4	SP 1	SP 1
5	n.c.	Analogue

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## ELECTRONIC TEMPERATURE TRANSMITTERS

As with the pressure transmitters, HYDAC ELECTRONIC also has temperature transmitters appropriate for every application. The transmitters are available with a variety of output signals, connectors and fluid port connection options.

Electronic temperature transmitters for general applications:

	Page
ETS 7200	97
ETS 4100	99
ETS 4500	101

Other temperature transmitters for special applications can be found in the sections "*Service Instruments*" and "*OEM Products for Large Volume Production*".





## Electronic Temperature Transmitter ETS 7200

### Description:

The ETS 7200 is an electronic temperature transmitter which, because of its compact design, is particularly suited to measuring temperature in hydraulic applications in the industrial and mobile sectors. Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range -25°C to +100°C.

The sensor has various analogue output signals as standard, e.g. 4 .. 20 mA or 0 ... 10V to enable integration into modern control systems through an M12x1 connector.

The pressure resistance up to 600 bar and excellent EMC characteristics make the ETS 7200 ideal for use in harsh conditions.

### Special features:

- Accuracy  $\leq \pm 2\%$  FS
- Ideal for OEM applications
- Very compact design
- Excellent EMC characteristics
- Long-term stability
- Standard protection class IP 67

### Technical data:

Input data	
Measuring principle	Silicon semiconductor device
Measuring range	-25 .. +100 °C
Probe length	10 mm
Probe diameter	6.7 mm
Pressure resistance	600 bar
Overload pressure	900 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 8 V) / 20 \text{ mA}$ [kΩ] 0 .. 10 V, 3 conductor $R_{Lmin} = 2 \text{ kΩ}$
Accuracy (at room temperature)	$\leq \pm 1.0\%$ FS typ. $\leq \pm 2.0\%$ FS max.
Temperature drift (environment)	$\leq \pm 0.02\%$ FS / °C
Rise time to DIN EN 60751	$t_{50}$ : 4 s $t_{90}$ : 8 s
Environmental conditions	
Ambient temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
RoHS mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	8 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
for use acc. to UL spec.	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	$\leq 25 \text{ mA}$
Weight	$\sim 50 \text{ g}$

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Model code:

ETS 7 2 4 6 - X - 010 - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

B = 0 .. 10 V, 3 conductor

### Probe length

010 = 10 mm

### Modification number

000 = Standard

### Note:

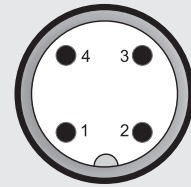
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

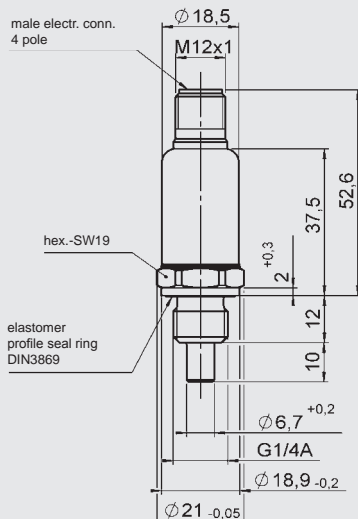
## Pin connections:

M12x1



Pin	ETS 7246-A	ETS 7246-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0 V
4	n.c.	Signal

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Temperature Transmitter ETS 4100

### Description:

The ETS 4100 is a robust electronic temperature transmitter which is particularly suited to measuring temperature in hydraulic applications in industry.

The temperature sensor, based on a PT 1000 and corresponding evaluation electronics, is capable of measuring temperatures in the range -25 °C to +100 °C.

The sensor has analogue output signals of 4 .. 20 mA and 0 .. 10 V available as standard for integration into modern control systems. The pressure resistance up to 600 bar and excellent EMC characteristics make the ETS 4100 ideal for use in harsh conditions.

### Special features:

- Accuracy  $\leq \pm 0.8$  % FS
- Ideal for industrial applications
- Robust design
- Excellent EMC characteristics
- Excellent long term stability
- Standard protection class IP 65 / IP 67

### Technical data:

Input data	
Measuring principle	PT 1000
Measuring range	-25 .. +100 °C
Probe length	6; 50; 100; 250; 350 mm
Probe diameter	4.5; 8; 8; 8; 8 mm
Pressure resistance	600 bar (probe length 6 mm) 125 bar (probe length 50 mm) 125 bar (probe length 100 mm) 125 bar (probe length 250 mm) 125 bar (probe length 350 mm)
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium <sup>1)</sup>	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 8 V) / 20 \text{ mA}$ [k $\Omega$ ] 0 .. 10 V, 3 conductor $R_{Lmin} = 2 \text{ k}\Omega$
Accuracy (at room temperature)	$\leq \pm 0.4$ % FS typ. $\leq \pm 0.8$ % FS max.
Temperature drift (environment)	$\leq \pm 0.01$ % FS / °C
Rise time to DIN EN 60751	$t_{50}$ : ~ 4 s $t_{80}$ : ~ 8 s
Environmental conditions	
Operating temperature range <sup>2)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +125 °C / -25 .. +125 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 25$ g
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for male M12x1, when an IP 67 connector is used)
Other data	
Electrical connection	M12x1, 4 pole, Binder Series 714 M18, 4 pole, EN 175301-803 (DIN 43650)
Supply voltage	8 .. 32 V DC 2 conductor 12 .. 32 V DC 3 conductor
Residual ripple of supply voltage	$\leq 5$ %
Current consumption 3 conductor	~ 25 mA
Weight	~ 200 g (probe length 6 mm) ~ 215 g (probe length 50 mm) ~ 235 g (probe length 100 mm) ~ 280 g (probe length 250 mm) ~ 315 g (probe length 350 mm)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> Other seal materials on request

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

## Model code:

ETS 4 1 4 X - X - XXX - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
- 5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650) (connector supplied)
- 6 = Male M12x1, 4 pole (connector not supplied)

### Signal

- A = 4 .. 20 mA, 2 conductor
- B = 0 .. 10 V, 3 conductor

### Probe length

- 006 = 6 mm
- 050 = 50 mm
- 100 = 100 mm
- 250 = 250 mm
- 350 = 350 mm

### Modification number

000 = Standard

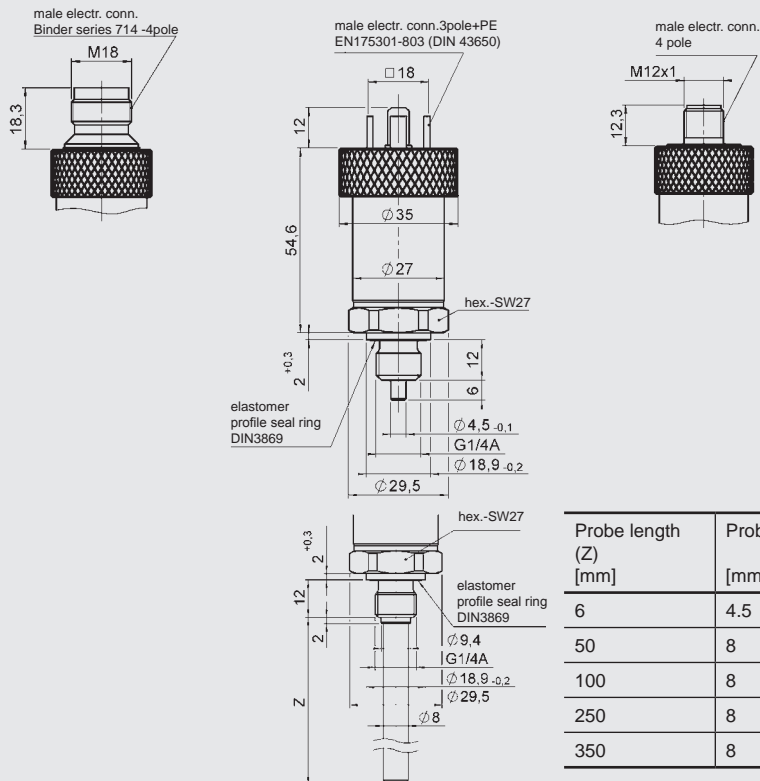
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

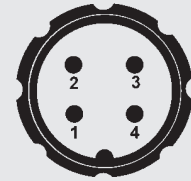
## Dimensions:



Probe length (Z) [mm]	Probe diameter [mm]
6	4.5
50	8
100	8
250	8
350	8

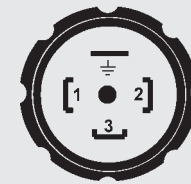
## Pin connections:

Binder series 714 M18



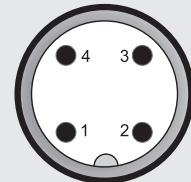
Pin	ETS 4144-A	ETS 4144-B
1	n.c.	+U <sub>B</sub>
2	Signal+	Signal
3	Signal -	0 V
4	n.c.	n.c.

EN175301-803 (DIN 43650)



Pin	ETS 4145-A	ETS 4145-B
1	Signal+	+U <sub>B</sub>
2	Signal-	0V
3	n.c.	Signal
⊥	Housing	Housing

M12x1



Pin	ETS 4146-A	ETS 4146-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0 V
4	n.c.	Signal

### Note:

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## Electronic Temperature Transmitter ETS 4500

### Description:

The ETS 4500 is a robust electronic temperature transmitter which is particularly suited to measuring temperature in hydraulic applications in industry.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range -25 to +100 °C.

The sensor has analogue output signals of 4 .. 20 mA and 0 .. 10 V available as standard for integration in modern control systems.

The pressure resistance up to 600 bar and excellent EMC characteristics make the ETS 4500 ideal for use in harsh conditions.

### Special features:

- Accuracy  $\leq \pm 2\%$  FS
- Ideal for industrial applications
- Robust design
- Excellent EMC characteristics
- Excellent long term stability
- Standard protection class IP 65 / IP 67

### Technical data:

Input data	
Measuring principle	Silicon semiconductor device
Measuring range	-25 .. +100 °C
Probe length	10.7; 50; 100; 250; 350 mm
Probe diameter	8 mm
Pressure resistance	600 bar (probe length 10.7 mm) 125 bar (probe length 50 mm) 125 bar (probe length 100 mm) 125 bar (probe length 250 mm) 125 bar (probe length 350 mm)
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium <sup>1)</sup>	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 8 V) / 20 \text{ mA}$ [k $\Omega$ ] 0 .. 10 V, 3 conductor $R_{Lmin} = 2 \text{ k}\Omega$
Accuracy (at room temperature)	$\leq \pm 1.0\%$ FS typ. $\leq \pm 2.0\%$ FS max.
Temperature drift (environment)	$\leq \pm 0.02\%$ FS / °C
Rise time to DIN EN 60751	$t_{50}$ : ~ 4 s $t_{80}$ : ~ 8 s
Environmental conditions	
Operating temperature range <sup>2)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +125 °C / -25 .. +125 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 25 \text{ g}$
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650)) IP 67 (for male M12x1 male, when an IP 67 connector is used)
Other data	
Electrical connection	M12x1, 4 pole EN 175301-803 (DIN 43650)
Supply voltage	8 .. 32 V DC 2 conductor 12 .. 32 V DC 3 conductor
Residual ripple of supply voltage	$\leq 5\%$
Current consumption 3 conductor	~ 25 mA
Weight	~ 200 g (probe length 10.7 mm) ~ 215 g (probe length 50 mm) ~ 235 g (probe length 100 mm) ~ 280 g (probe length 250 mm) ~ 315 g (probe length 350 mm)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Other seal materials on request

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

## Model code:

ETS 4 5 4 X - X - XXX - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

5 = Male, 3 pole + PE,  
EN 175301-803 (DIN 43650)  
(connector supplied)  
6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor  
B = 0 .. 10 V, 3 conductor

### Probe length

010 = 10 mm  
050 = 50 mm  
100 = 100 mm  
250 = 250 mm  
350 = 350 mm

### Modification number

000 = Standard

### Note:

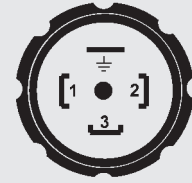
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

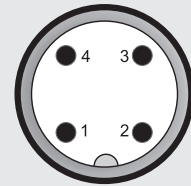
## Pin connections:

EN175301-803 (DIN 43650)



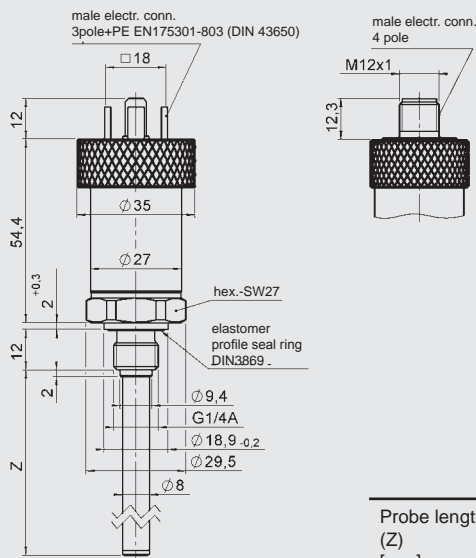
Pin	ETS 4545-A	ETS 4545-B
1	Signal+	+U <sub>B</sub>
2	Signal-	0V
3	n.c.	Signal
⊥	Housing	Housing

M12x1



Pin	ETS 4546-A	ETS 4546-B
1	Signal+	+U <sub>B</sub>
2	n.c.	n.c.
3	Signal-	0 V
4	n.c.	Signal

## Dimensions:



Probe length (Z) [mm]	Probe diameter [mm]
10.7	8
50	8
100	8
250	8
350	8

### Note:

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## ELECTRONIC TEMPERATURE SWITCHES

For measuring and monitoring the temperature of the medium, HYDAC offers a wide variety of electronic temperature switches with an integrated or separate temperature probe.

	Page
ETS 3200 Pressure-resistant for inline installation	105
ETS 3200 Pressure-resistant for inline installation, menu navigation to VDMA	107
ETS 3200 Pressure-resistant for inline installation, IO-Link	109
ETS 3200 for tank installation	111
ETS 3200 for tank installation, menu navigation to VDMA	113
ETS 3200 for tank installation, IO-Link	115
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ETS 320 Pressure-resistant for inline installation	123
ETS 380 for separate temperature probe	125
ETS 1700 for separate temperature probe	127
TFP 100 (separate temperature probe)	129

Other electronic temperature switches for special applications can be found in the sections "Sensors for Potentially Explosive Atmospheres" and "OEM Products for Large Volume Production"

Electronic Temperature Switches	ETS 3200	ETS 3800	ETS 320	ETS 380	ETS 1700	HTS 8000
						
Accuracy (max. error)	1°C	1°C	1°C	1°C	1°C	3%
Pressure resistant to 600 bar	✓		✓			
Integrated probe	✓		✓			✓
Separate probe		✓		✓	✓	
Number of switching outputs	2	2	2	2	4	2
Analogue output	✓	✓	✓	✓	✓	
Digital display	✓	✓	✓	✓	✓	
Programmable	✓	✓	✓	✓	✓	
In-Tank	✓					
Factory-set (not field-adjustable)						✓
VDMA Menu Navigation	✓	✓				
Available as individual unit	✓	✓	✓	✓	✓	
OEM product for large volume production						✓
IO Link Interface	✓	✓				
UL Approval	✓	✓				

**Note:**  
Not all feature combinations are possible. For precise information, please consult the relevant data sheet.





## Electronic Temperature Switch ETS 3200 Pressure Resistant for Inline Mounting

### Description:

The ETS 3200 is a compact electronic temperature switch with a 4-digit display.

Pressure resistant to 600 bar, this model has an integrated 18 mm temperature probe and can be screwed directly inline or into a hydraulic block.

Different output models with one or two switching outputs, optionally with an additional analogue output signal, offer a variety of application possibilities. The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit display
- Optimum alignment - display can be rotated in two planes (axes)
- Switching / switch-back points and many useful additional functions can be set using the keypad
- Display of temperature and unit of measurement in °C or °F

### Technical data:

Input data	
Measuring range	-25 .. 100 °C (-13 ... 212 °F)
Probe length	18 mm
Pressure resistance	600 bar
Mechanical connection	G1/2 A DIN 3852
Torque value	45 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Accuracy (display, analogue output)	≤ ± 1.0 °C (≤ ± 2.0 °F)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA ohmic resist. max. 500 Ω 0 .. 10 V ohmic resistance min. 1 kΩ corresponds in each case to -25 .. +100 °C
Switch outputs	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 3 s t <sub>90</sub> : 9 s
Environmental conditions	
Ambient temperature range	-25 .. +80 °C (-25 ... +60°C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
eURus-mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output for use acc. to UL spec. - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 135 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All the settings available on the ETS 3200 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

## Setting ranges of the switching points and switch-back hystereses:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-23.0 .. 100.0	1.0 .. 123.5	0.5
°F	-9 .. 212	2 .. 222	1

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-23.0 .. 97.5	-22.0 .. 98.5	0.5
°F	-9 .. 208	-7 .. 209	1

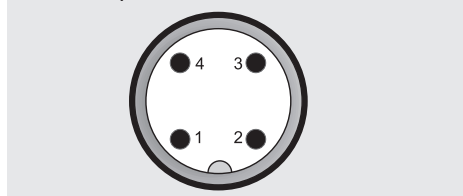
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

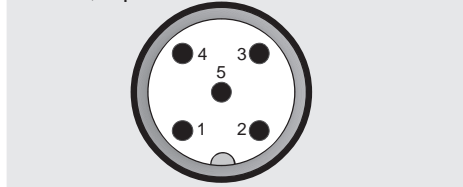
## Pin connections:

M12x1, 4 pole



Pin	ETS 3226-2	ETS 3226-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analogue
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 3228-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

## Model code:

ETS 3 2 2 X - X - 018 - 000

### Mechanical connection

2 = G1/2 A DIN 3852 (male)

### Electrical connection

6 = Male M12x1, 4 pole

only possible on output models "2" and "3"

8 = Male M12x1, 5 pole

only possible on output model "5"

### Output

2 = 2 switching outputs

only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analogue output

only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analogue output

only in conjunction with electrical connection type "8"

### Probe length in mm

018

### Modification number

000 = Standard

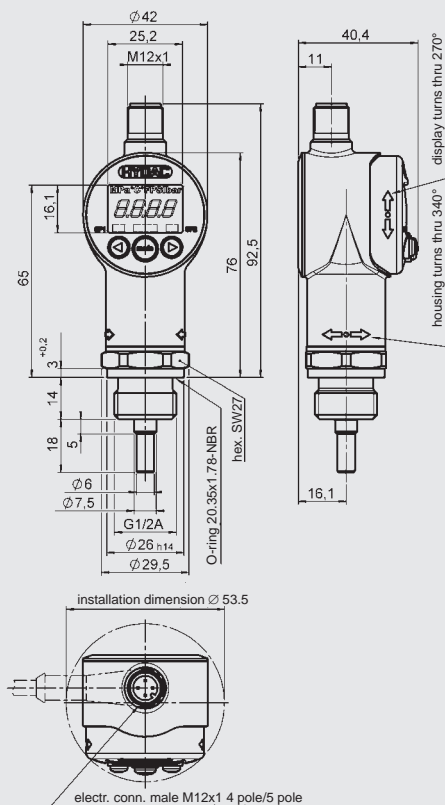
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, splash guards, etc. can be found in the Accessories brochure.

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Description:

The ETS 3200 is a compact electronic temperature switch with a 4-digit display.

Pressure resistant to 600 bar this model has an integrated 18 mm temperature probe and can be installed directly inline or on the hydraulic block.

Different output versions with one or two switching outputs, and with the possible option of an additional analogue output signal, offer a variety of application possibilities.

The switching points and the associated switch-back points can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

## Special features:

- Menu navigation according to VDMA
- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit display
- Display can be rotated in two axes for optimal alignment
- Switching / switch-back points and many useful additional functions can be set using keypad
- Display of measured value and units of measurement in °C or °F

## Electronic Temperature Switch ETS 3200 Pressure Resistant for Inline Installation with Menu Navigation to VDMA

### Technical data:

Input data	
Measuring range	-25 .. 100 °C (-13 .. 212 °F)
Sensor length	18 mm
Pressure resistance	600 bar
Hydraulic connection	G1/2 A DIN 3852
Torque value	45 Nm
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM
Output data	
Accuracy (display, analogue output)	± 1.0 °C (± 2.0 °F)
Temperature drift (environment)	± 0.015 % FS / °C max. zero point ± 0.015 % FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA load ≤ 500 Ω 0 .. 10 V load min. 1 kΩ corresp. in each case to -25 .. +100 °C
Switch outputs	
Type	PNP transistor switching output
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50%</sub> : 3 s t <sub>90%</sub> : 9 s
Environmental conditions	
Ambient temperature range	-25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100°C / -25 .. +100°C
CE mark	EN 61000-6-1 / -2 / -3 / -4
UL mark <sup>2)</sup>	Certificate No.: E318391
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC (without analogue output) 18 .. 35 V DC (with analogue output)
for use acc. to UL specifications	– limited energy – according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	≤ 2.455 A total ≤ 35 mA with inactive switching outputs ≤ 55 mA with analogue output and inactive switching outputs
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight (complete unit including probe)	~ 135 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1

## Setting options:

All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-2) for temperature switches.

The ETS 3200 can easily be adjusted via three push-buttons.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
-25 .. +100 °C	-23.8 °C	100.0 °C
-13 .. +212 °F	-11 °F	212 °F

Measuring range	Min. difference betw. RP and SP & FL and FH	Increment*
-25 .. +100 °C	1.2 °C	0.2 °C
-13 .. +212 °F	2 °F	1 °F

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

FL = temperature window lower value

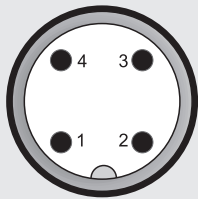
FH = temperature window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display off)

## Pin connections:

M12x1, 4 pole



Pin	ETS 3226-2	ETS 3226-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP2	Analogue
3	0 V	0 V
4	SP1	SP1

## Model code:

ETS 3 2 2 6 - X - 018 - V00

### Type

2 = With integrated temperature sensor

### Mechanical connection

2 = G1/2 A DIN 3852, (male)

### Electrical connection

6 = Male M12x1, 4 pole

### Output

2 = 2 switching outputs

3 = 1 switching output and 1 analogue output

### Probe length in mm

018

### Modification number

V00 = Menu navigation in accordance with VDMA (Standard 24574-2)

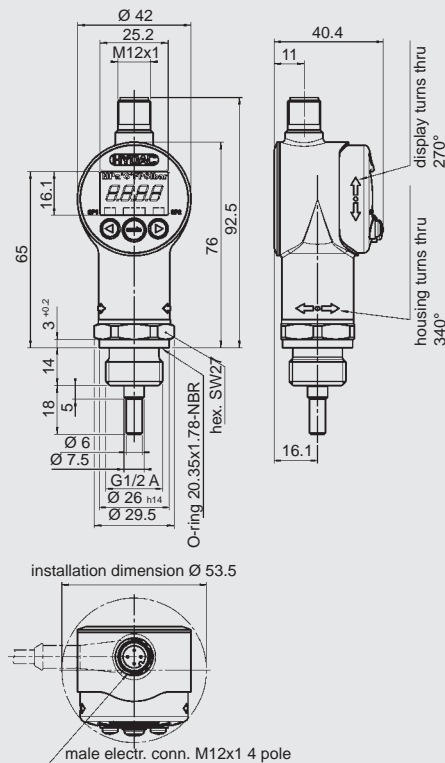
### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

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## Electronic Temperature Switch ETS 3200 – Pressure-Resistant for Inline Installation with IO-Link Interface



### Description:

The ETS 3200 with IO-Link communication interface is a compact, electronic temperature switch with 4-digit display. Pressure-resistant up to 600 bar with an integrated 18 mm temperature probe, this model can be mounted directly inline or on the hydraulic block.

The device has a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The temperature switch series ETS 3200 with communication interface IO-Link according to specification V1.1 was specially designed to connect sensors in automation systems.

Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO-Link interface
- 1 PNP transistor switching output
- Additional signal output can be configured as PNP transistor switching output or analogue output
- 4-digit display
- Display can be rotated in two axes for optimal alignment

### Technical data:

Input data	
Measuring range	-25 .. 100 °C (-13 .. 212 °F)
Sensor length	18 mm
Pressure resistance	600 bar
Hydraulic connection	G1/2 A DIN 3852
Torque value	45 Nm
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analogue output
Accuracy (display, analogue output)	≤ ± 1.0 °C (≤ ± 2.0 °F)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range
Analogue output	
Signal	selectable: 4 .. 20 mA load resist. ≤ 500 Ω 0 .. 10 V load resist. min. 1 kΩ corresp. in each case to -25 .. +100 °C
Switch outputs	
Type	PNP transistor switching output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50%</sub> : 3 s t <sub>90%</sub> : 9 s
Parameterisation	
	Via IO-Link interface, with HYDAC programming device HPG 3000 or push-buttons on the ETS 3200
Environmental conditions	
Ambient temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100°C / -25 .. +100°C
CE mark	EN 61000-6-1 / -2 / -3 / -4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC (without analogue output) 18 .. 35 V DC (with analogue output)
Current consumption	≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analogue output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight (complete unit including probe)	~ 135 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

## Setting options:

All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
-25 .. +100 °C	-23.8 °C	100.0 °C
-13 .. +212 °F	-11 °F	212 °F

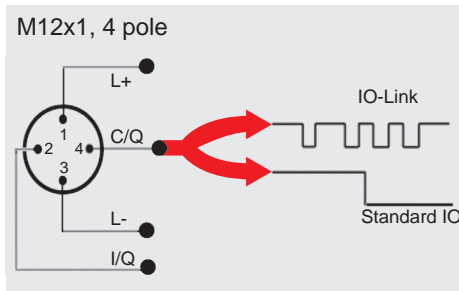
Measuring range	Min. difference betw. RP and SP & FL and FH	Increment*
-25 .. +100 °C	1.2 °C	0.2 °C
-13 .. +212 °F	2 °F	1 °F

\* All ranges given in the table are adjustable by the increments shown.  
 SP = switching point  
 RP = switch-back point  
 FL = temperature window lower value  
 FH = temperature window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display off)

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:  
<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

ETS 3 2 2 6 - L - 018 - 000

<b>Type</b>	2 = With integrated temperature sensor
<b>Mechanical connection</b>	2 = G1/2 A DIN 3852, (male)
<b>Electrical connection</b>	6 = Male M12x1, 4 pole (connector not supplied)
<b>Output</b>	L = IO Link interface
<b>Probe length in mm</b>	018
<b>Modification number</b>	000 = Standard

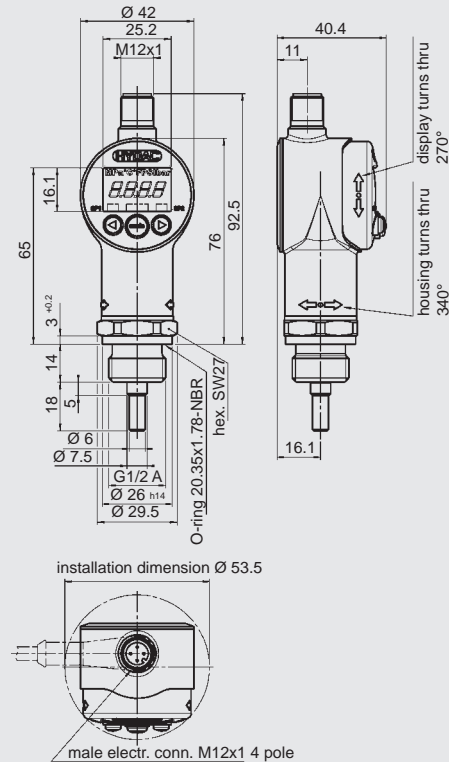
## Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Temperature Switch ETS 3200 for Tank Installation

### Description:

The ETS 3200 is a compact electronic temperature switch with digital display.

With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths.

Different output models with one or two switching outputs, optionally with an additional analogue output signal, offer a variety of application possibilities.

The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA, 0 .. 10 V)
- 4-digit display
- Optimum alignment - display can be rotated in two planes (axes)
- Switching / switch-back points and many useful additional functions can be set using the keypad.
- Display of temperature and unit of measurement in °C or °F

### Technical data:

Input data	
Measuring range	-25 .. 100 °C (-13 ... 212 °F)
Probe lengths	100; 250; 350 mm
Pressure resistance	50 bar
Mechanical connection	G1/2 A DIN 3852
Torque value	45 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Accuracy (display, analogue output)	≤ ± 1.0 °C (≤ ± 2.0 °F)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA ohmic resist. max. 500 Ω 0 .. 10 V ohmic resistance min. 1 kΩ corresponds in each case to -25 .. +100 °C
Switch outputs	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 8 s t <sub>90</sub> : 15 s
Environmental conditions	
Ambient temperature range	-25 .. +80 °C (-25 ... +60°C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
eURus-mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output for use acc. to UL spec. - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	max. 2.455 A total max. 35 mA with inactive switching outputs max. 55 mA with inactive switching outputs and analogue output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 150 g (probe length 100 mm) ~ 185 g (probe length 250 mm) ~ 210 g (probe length 350 mm)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

### Setting options:

All the settings available on the ETS 3200 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

### Setting ranges of the switching points and switch-back hystereses:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-23.0 .. 100.0	1.0 .. 123.5	0.5
°F	-9 .. 212	2 .. 222	1

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-23.0 .. 97.5	-22.0 .. 98.5	0.5
°F	-9 .. 208	-7 .. 209	1

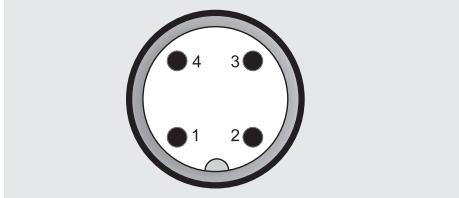
\* All ranges given in the table are adjustable by the increments shown.

### Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

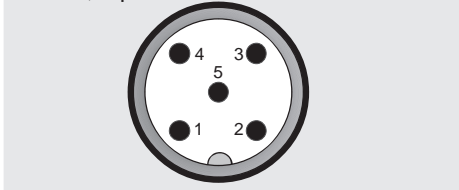
### Pin connections:

M12x1, 4 pole



Pin	ETS 3226-2	ETS 3226-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analogue
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 3228-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

### Model code:

ETS 3 2 2 X - X - XXX - 000

#### Mechanical connection

2 = G1/2 A DIN 3852 (male)

#### Electrical connection

6 = Male M12x1, 4 pole

only possible on output models "2" and "3"

8 = Male M12x1, 5 pole

only possible on output model "5"

#### Output

2 = 2 switching outputs

only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analogue output

only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analogue output

only in conjunction with electrical connection type "8"

#### Probe length in mm

100; 250; 350

#### Modification number

000 = Standard

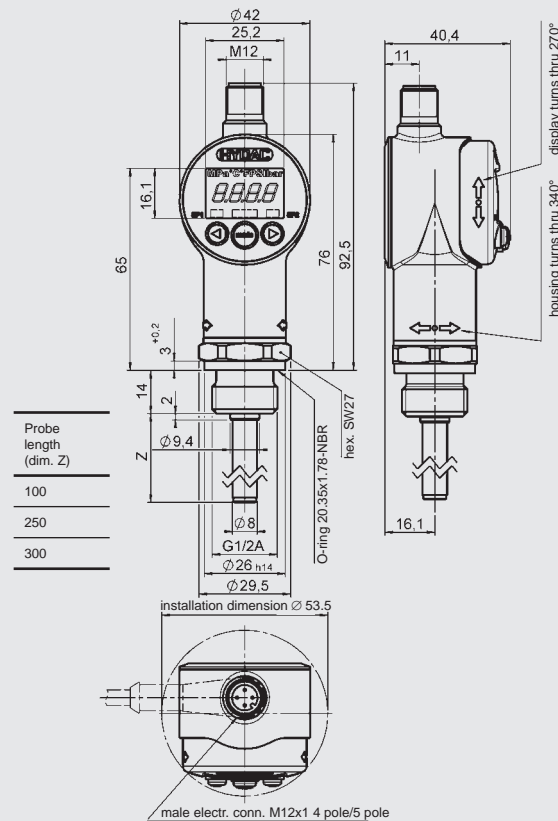
#### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

#### Accessories:

Appropriate accessories, such as electrical connectors, protective sleeves for tank mounting, splash guards, etc. can be found in the Accessories brochure.

### Dimensions:



#### Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Electronic Temperature Switch ETS 3200 for Tank Installation with Menu Navigation to VDMA

### Description:

The ETS 3200 is a compact electronic temperature switch with a 4-digit display.

With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths. Different output models with one or two switching outputs, optionally with an additional analogue output signal, offer a variety of application possibilities.

The switching points and the associated switch-back points can be adjusted very quickly and easily using the keypad. For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- Menu navigation according to VDMA
- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit display
- Display can be rotated in two axes for optimal alignment
- Switching / switch-back points and many useful additional functions can be set using keypad
- Display of measured value and unit of measurement in °C or °F

### Technical data:

Input data	
Measuring range	-25 .. 100 °C (-13 .. 212 °F)
Probe length	100; 250; 350 mm
Pressure resistance	50 bar
Hydraulic connection	G1/2 A DIN 3852
Torque value	45 Nm
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM
Output data	
Accuracy (display, analogue output)	± 1.0 °C (± 2.0 °F)
Temperature drift (environment)	± 0.015 % FS / °C max. zero point ± 0.015 % FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA load ≤ 500 Ω 0 .. 10 V load min. 1 kΩ corresp. in each case to -25 .. +100 °C
Switch outputs	
Type	PNP transistor switching output
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 8 s t <sub>90</sub> : 15 s
Environmental conditions	
Ambient temperature range	-25.. +80 °C (-25 .. +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100°C / -25 °C .. +100 °C
CE mark	EN 61000-6-1 / -2 / -3 / -4
cULus mark <sup>2)</sup>	Certificate No.: E318391
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC (without analogue output) 18 .. 35 V DC (with analogue output)
for use acc. to UL specifications	– limited energy – according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	≤ 2.455 A total ≤ 35 mA with inactive switching outputs ≤ 55 mA with analogue output and inactive switching outputs
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight (complete unit including probe)	~ 150 g (probe length 100 mm) ~ 185 g (probe length 250 mm) ~ 210 g (probe length 350 mm)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the complete measurement range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-2) for temperature switches.

The ETS 3200 can easily be adjusted via three push-buttons.

## Setting ranges for the switching outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
-25 .. +100 °C	-23.8 °C	100.0 °C
-13 .. +212 °F	-11 °F	212 °F

Measuring range	Min. difference betw. RP and SP & FL and FH	Increment*
-25 .. +100 °C	1.2 °C	0.2 °C
-13 .. +212 °F	2 °F	1 °F

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

FL = temperature window lower value

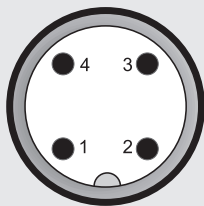
FH = temperature window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display off)

## Pin connections:

M12x1, 4 pole



Pin	ETS 3226-2	ETS 3226-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP2	Analogue
3	0 V	0 V
4	SP1	SP1

## Model code:

ETS 3 2 2 6 - X - XXX - V00

### Type

2 = With integrated temperature sensor

### Mechanical connection

2 = G1/2 A DIN 3852 (male)

### Electrical connection

6 = Male M12x1, 4 pole

### Output

2 = 2 switching outputs

3 = 1 switching output and 1 analogue output

### Probe length in mm

100; 250; 350

### Modification number

V00 = Menu navigation in accordance with VDMA (Standard 24574-2)

### Notes:

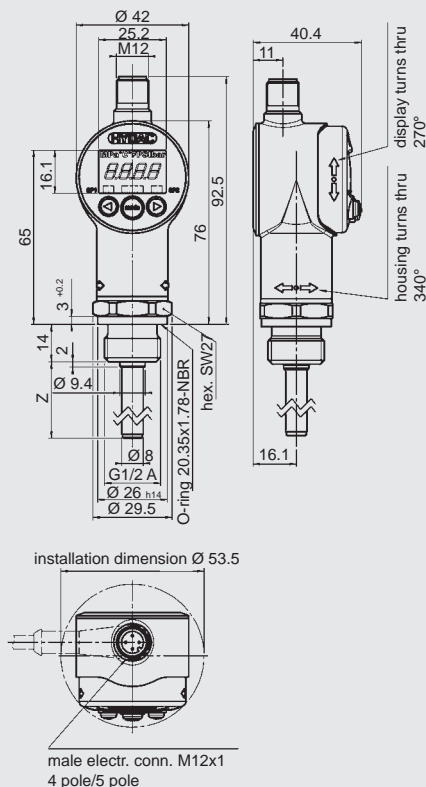
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:

Probe length (dim. Z)
100
250
300



## Note:

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## Electronic Temperature Switch ETS 3200 for Tank Installation with IO-Link Interface



### Description:

The ETS 3200 with IO-Link communication interface is a compact, electronic temperature switch with 4-digit display.

With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths.

The instrument has a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The temperature switch series ETS 3200 with communication interface IO-Link according to specification V1.1 was specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO-Link interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- 4-digit display
- Display can be rotated in two axes for optimum alignment

### Technical data:

Input data	
Measuring range	-25 .. 100 °C (-13 .. 212 °F)
Probe length	100; 250; 350 mm
Pressure resistance	50 bar
Hydraulic connection	G1/2 A DIN 3852
Torque value	45 Nm
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analogue output
Accuracy (display, analogue output)	≤ ± 1.0 °C (≤ ± 2.0 °F)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range
Analogue output	
Signal	selectable: 4 .. 20 mA load ≤ 500 Ω 0 .. 10 V ohmic resist. min. 1 kΩ corresp. in each case to -25 .. +100 °C
Switch outputs	
Type	PNP transistor switching output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 8 s t <sub>90</sub> : 15 s
Parameterisation	
	<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ETS 3200</b>
Environmental conditions	
Ambient temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100°C / -25°C .. 100 °C
CE mark	EN 61000-6-1 / -2 / -3 / -4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC (without analogue output) 18 .. 35 V DC (with analogue output)
Current consumption	≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analogue output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight (complete unit including probe)	~ 150 g (probe length 100 mm) ~ 185 g (probe length 250 mm) ~ 210 g (probe length 350 mm)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

## Setting options:

All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
-25 .. +100 °C	-23.8 °C	100.0 °C
-13 .. +212 °F	-11 °F	212 °F

Measuring range	Min. difference betw. RP and SP & FL and FH	Increment*
-25 .. +100 °C	1.2 °C	0.2 °C
-13 .. +212 °F	2 °F	1 °F

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

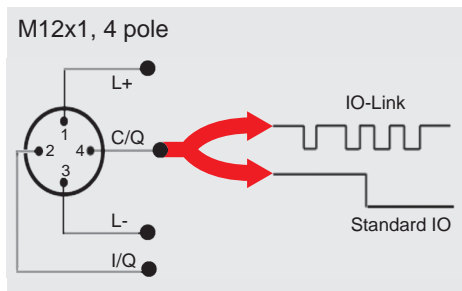
FL = temperature window lower value

FH = temperature window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display off)

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

ETS 3 2 2 6 - L - XXX - 000

### Type

2 = With integrated temperature probe

### Mechanical connection

2 = G1/2 A DIN 3852, (male)

### Electrical connection

6 = Male M12x1, 4 pole (connector not supplied)

### Output

L = IO Link interface

### Probe length in mm

100; 250; 350

### Modification number

000 = Standard

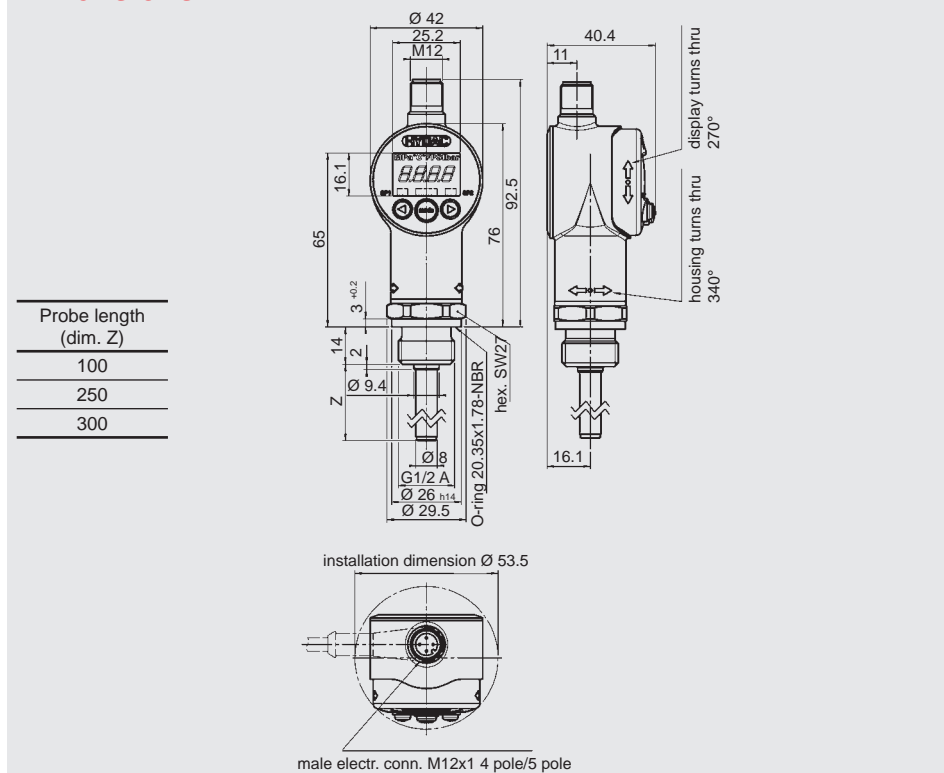
### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical adapters, splash guards, clamps for wall-mounting etc can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

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## Electronic Temperature Switch ETS 3800 for Separate Temperature Probe

### Description:

The ETS 3800 is a compact electronic temperature switch with a 4-digit display.

The version for a separate temperature probe has a measuring range of -30 ... +150°C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to evaluate commonly-available PT 100 temperature probes.

Different output versions with one or two switching outputs, and with the possible option of an additional analogue output signal, offer a variety of application possibilities.

The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit digital display
- Optimum alignment - display can be rotated in two planes (axes)
- Switching / switch-back points and many useful additional functions can be set using keypad
- Display of temperature and unit of measurement in °C or °F

### Technical data:

Input data	
Measuring range <sup>1)</sup>	-30 .. +150 °C (-22 .. 302 °F)
Connection, separate temperature probe	Female cable connection M12x1, 4 pole
Output data	
Accuracy (display, analogue output)	± 1.0 °C (+ PT100 error)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range
Analogue output (optional)	
Signal	selectable: 4 .. 20 mA      load resist. max. 500 Ω 0 .. 10 V      load resistance min. 1 kΩ corresponds in each case to -30 .. +150 °C
Switch outputs	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Environmental conditions	
Ambient temperature range	-25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output for use acc. to UL spec. - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	max. 2.455 A total max. 35 mA with inactive switch outputs max. 55 mA with inactive switch outputs and analogue output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 87 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Depending on the temperature range of the connected temperature sensor, the indication range of the ETS 3800 may be reduced.

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Setting options:

All the settings available on the ETS 3800 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

## Setting ranges of the switching points and switch-back hystereses:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-27.0 .. 150.0	1.0 .. 178.0	0.5
°F	-17 .. 302	2 .. 320	1

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-27.0 .. 146.5	-25.5 .. 148.0	0.5
°F	-17 .. 296	-14 .. 298	1

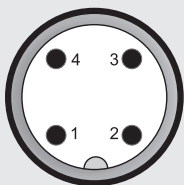
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

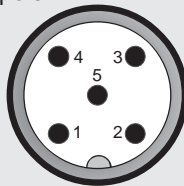
## Pin connections:

M12x1, 4 pole



Pin	ETS 3866-2	ETS 3866-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analogue
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 3868-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

## Model code:

ETS 3 8 6 X - X - 000 - 000

### Mechanical connection

6 = Female cable connection M12x1, 4 pole

### Electrical connection

6 = Male M12x1, 4 pole

only possible on output models "2" and "3"

8 = Male M12x1, 5 pole

only possible on output model "5"

### Output

2 = 2 switching outputs

only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analogue output

only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analogue output

only in conjunction with electrical connection type "8"

### Probe length in mm

000 = Separate temperature probe

### Modification number

000 = Standard

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

A male cable connector M12x1, 4 pole, to connect the separate temperature probe and a 3 m sensor cable, LIYCY 4 x 0.25 mm<sup>2</sup> are supplied with the instrument. Other accessories, such as electrical connectors, splash guards, clamps for wall-mounting, etc. can be found in the Accessories brochure.

## Separate temperature probe:

(not supplied with the instrument)

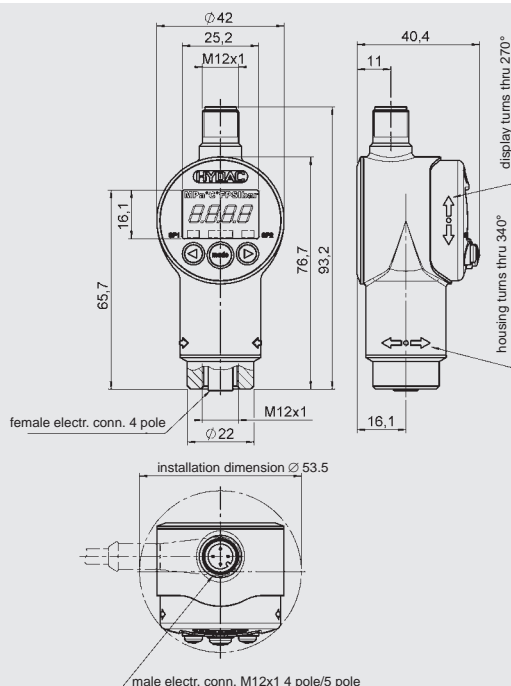
- TFP 106 - 000 with electr. conn. 4-pol. M12x1 (connector not supplied)

Part No.: 921330

- Tank installation sleeve for TFP 100

Part No.: 906170

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

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## Electronic Temperature Switch ETS 3800 for Separate Temperature Probe with Menu Navigation to VDMA

### Description:

The ETS 3800 is a compact electronic temperature switch with a 4-digit display.

The model for separate temperature probe has a measuring range of -30 .. +150°C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to use commercially available PT 100 temperature probes. Different output models with one or two switching outputs, and with the possible option of an additional analogue output signal, offer a variety of application possibilities.

The switching points and the associated switch-back points can be adjusted very quickly and easily using the keypad. For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- Menu navigation according to VDMA
- 2 switching outputs, up to 1.2 A load per output
- Optional analogue output signal selectable (4 .. 20 mA / 0 .. 10 V)
- 4-digit display
- Display can be rotated in two axes for optimal alignment
- Switching / switch-back points and many useful additional functions can be set using keypad
- Display of temperature and unit of measurement in °C or °F

### Technical data:

<b>Input data</b>	
Measuring range <sup>1)</sup>	-30 .. 150 °C (-22 .. 302 °F)
Connection, separate temperature probe	Female cable connection M12x1, 4 pole
<b>Output data</b>	
Accuracy (display, analogue output)	± 1.0 % FS ( + PT100 error)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range
<b>Analogue output (optional)</b>	
Signal	selectable: 4 .. 20 mA load ≤ 500 Ω 0 .. 10 V load min. 1 kΩ corresp. in each case to -30 .. +150 °C
<b>Switch outputs</b>	
Type	PNP transistor switching output
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
<b>Environmental conditions</b>	
Ambient temperature range	-25 .. +80 °C (-25 .. +60 °C acc. to UL spec.)
Storage temperature range	-40 .. +80 °C
CE mark	EN 61000-6-1 / -2 / -3 / -4
cULus - mark <sup>2)</sup>	Certificate No.: E318391
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
<b>Other data</b>	
Supply voltage	9 .. 35 V DC (without analogue output) 18 .. 35 V DC (with analogue output)
for use acc. to UL specifications	– limited energy – according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	≤ 2.455 A total ≤ 35 mA with inactive switching outputs ≤ 55 mA with analogue output and inactive switching outputs
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight	~ 87 g (excluding connector and probe)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Depending on the temperature range of the connected temperature sensor, the measurement range of the ETS 3800 may be reduced.

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 no. 61010-1

## Setting options:

All terms and symbols used for setting the ETS 3800 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-2) for temperature switches. The ETS 3800 can easily be adjusted via three push-buttons.

## Setting ranges for the switch outputs:

Measurement range	Lower limit of RP / FL	Upper limit of SP / FH
-30 .. +150 °C	-28.0 °C	150.0 °C
-22 .. +302 °F	-19 °F	302 °F

Measurement range	Min. difference betw. RP and SP & FL and FH	Increment*
-30 .. +150 °C	2.0 °C	0.5 °C
-22 .. +302 °F	3 °F	1 °F

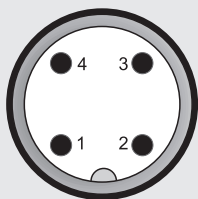
\* All ranges given in the table are adjustable by the increments shown.  
 SP = switch point  
 RP = switch-back point  
 FL = temperature window lower value  
 FH = temperature window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current temperature, peak temperature, switching point 1, switching point 2, display off)

## Pin connections:

M12x1, 4 pole



Pin	ETS 3866-2	ETS 3866-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP2	Analogue
3	0 V	0 V
4	SP1	SP1

## Model code:

ETS 3 8 6 6 - X - 000 - V00

### Type

8 = For separate temperature probe

### Mechanical connection

6 = Female cable connection M12x1, 4 pole

### Electrical connection

6 = Male M12x1, 4 pole

### Output

2 = 2 switching outputs

3 = 1 switching output and 1 analogue output

### Probe length in mm

000 = Separate temperature sensor

### Modification number

V00 = Menu navigation in accordance with VDMA (Standard 24574-2)

### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

A male cable connector M12x1, 4 pole, to connect the separate temperature probe, and a 3 m sensor cable, LIYCY 4 x 0.25 mm<sup>2</sup> are supplied with the instrument. Other accessories, such as electrical connectors, splash guards, clamps for wall-mounting, etc. can be found in the Accessories brochure.

## Separate temperature probe:

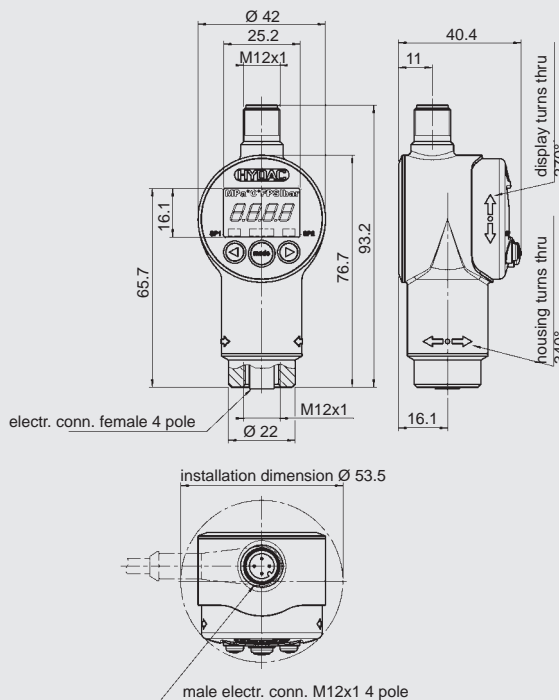
(not supplied with the instrument)

- TFP 106 - 000 with male electr. conn. 4 pole M12x1 (connector not supplied)
- Tank installation sleeve for TFP 100

Part No.: 921330

Part No.: 906170

## Dimensions:



## Note:

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## Electronic Temperature Switch ETS 3800 for Separate Temperature Probe with IO-Link Interface



### Description:

The ETS 3800 with IO-Link communication interface is a compact, electronic temperature switch with 4-digit display. The version for a separate temperature probe has a measuring range of -30 ... +150 °C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation. It is also possible, however, to evaluate commonly-available PT 100 temperature probes. The instrument has one switching output and an additional output that can be configured as either switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The temperature switch series ETS 3800 with communication interface IO-Link according to specification V1.1 was specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO-Link interface
- 1 PNP transistor switching output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- 4-digit digital display
- Optimum alignment of the display – can be rotated in two axes

### Technical data:

<b>Input data</b>	
Measuring range <sup>1)</sup>	-30 .. 150 °C (-22 .. 302 °F)
Connection, separate temperature probe	Female cable connection M12x1, 4 pole
<b>Output data</b>	
Accuracy (display, analogue output)	± 1.0 % FS ( + PT100 error)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range
<b>Analogue output (optional)</b>	
Signal	selectable: 4 .. 20 mA load resist. ≤ 500 Ω 0 .. 10 V load resist. min. 1 kΩ corresp. in each case to -30 .. +150 °C
<b>Switch outputs</b>	
Type	PNP transistor switching output
Switching current	max. 250 mA per output
Switching cycles	> 100 million
<b>Parameterisation</b>	
<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ETS 3800</b>	
<b>Environmental conditions</b>	
Ambient temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
CE mark	EN 61000-6-1 / -2 / -3 / -4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 50 g
Protection class to IEC 60529	IP 67
<b>Other data</b>	
Supply voltage	9 .. 35 V DC (without analogue output) 18 .. 35 V DC (with analogue output)
Current consumption	≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analogue output
Residual ripple of supply voltage	≤ 5 %
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight	~ 87 g (excluding connector and probe)

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to the full measuring range

<sup>1)</sup> Depending on the temperature range of the connected temperature sensor, the measurement range of the ETS 3800 may be reduced.

## Setting options:

All terms and symbols used for setting the ETS 3800 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

## Setting ranges for the switch outputs:

Measurement range	Lower limit of RP / FL	Upper limit of SP / FH
-30 .. +150 °C	-28.0 °C	150.0 °C
-22 .. +302 °F	-19 °F	302 °F

Measuring range	Min. difference betw. RP and SP & FL and FH	Increment*
-30 .. +150 °C	2.0 °C	0.5 °C
-22 .. +302 °F	3 °F	1 °F

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

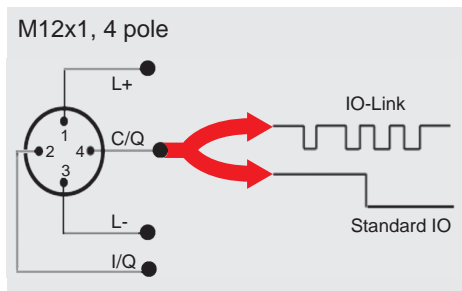
FL = temperature window lower value

FH = temperature window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## Separate temperature sensor:

(not supplied with instrument)

- TFP 106 - 000 Part No.: 921330  
with male electr. conn.  
4 pole M12x1  
(connector not supplied)
- Tank install. sleeve Part No.: 906170  
for TFP 100

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

ETS 3 8 6 6 - L - 000 - 000

### Type

8 = For separate temperature probe

### Mechanical connection

6 = Female cable connection M12x1, 4 pole

### Electrical connection

6 = Male M12x1, 4 pole  
(connector not supplied)

### Output

L = IO Link interface

### Sensor length in mm

000 = Separate temperature probe

### Modification number

000 = Standard

### Notes:

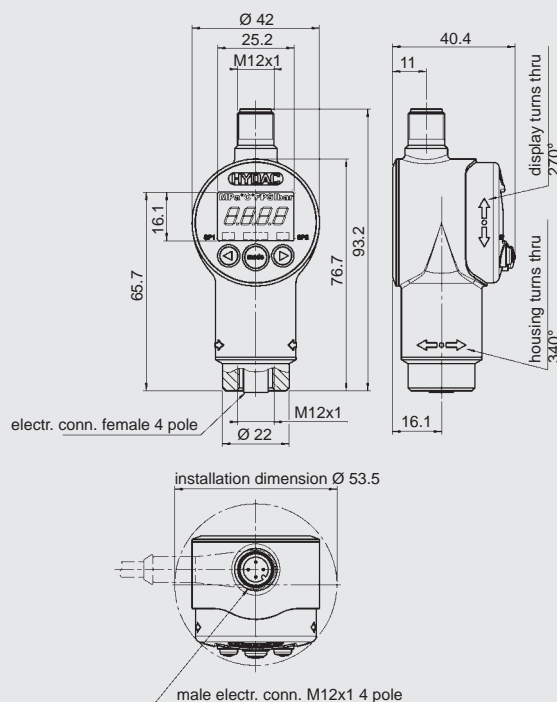
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

A male cable connector M12x1, 4 pole, to connect the separate temperature sensor and a 3 m sensor cable, LIYCY 4 x 0.25 mm<sup>2</sup> are supplied with the instrument.

Other accessories, such as electrical connectors, splash guards, clamps for wall-mounting, etc. can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Temperature Switch ETS 320 Pressure-Resistant for Inline Installation

### Description:

The ETS 320 is a compact electronic temperature switch with a 3-digit display.

Pressure-resistant to 600 bar with an integrated 18 mm temperature probe, this model can be installed directly inline or on the hydraulic block and has a measuring range of -25 .. +100 °C.

Different output models with one or two switching outputs, and with the possible option of an additional analogue output signal of 4 .. 20 mA offer a variety of application opportunities.

The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the unit has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- Compact temperature switch with integral temperature probe
- 2 transistor switching outputs, up to 1.2 A load per output
- Optional analogue output signal 4 .. 20 mA
- 3-digit display
- Switching point or window function
- Switching / switch-back points and many useful additional functions can be set using the keypad

### Technical data:

Input data	
Measuring range	-25 .. 100 °C (-13 .. 212 °F)
Probe length	18 mm
Pressure resistance	600 bar
Mechanical connection	G1/2 A DIN 3852
Torque value	45 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Accuracy (display, analogue output)	≤ ± 1.0 °C (≤ ± 2.0 °F)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range
Analogue output (optional)	
Signal	4 .. 20 mA load resistance max. 400 Ω corresponds to -25 .. +100 °C
Switch outputs	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
Rise time to DIN EN 60751	t <sub>50</sub> : 3 s t <sub>90</sub> : 9 s
Environmental conditions	
Ambient temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range <sup>1)</sup> (for the probe)	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (1 ms)	≤ 50 g
Protection class to IEC 60529	IP 65
Other data	
Supply voltage	20 .. 32 V DC
Current consumption	approx. 100 mA without switch output
Residual ripple of supply voltage	≤ 5 %
Display	3-digit, LED, 7 segment, red, height of digits 9.2 mm
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

## Setting options:

All the settings available on the ETS 320 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

## Setting ranges of the switching points and switch-back hystereses:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-22.0 .. 100.0	1.0 .. 178.0	1.0
°F	-10.0 .. 212.0	2.0 .. 320.0	2.0

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-23.0 .. 99.0	-22.0 .. 100.0	1.0
°F	-12.0 .. 210.0	-10.0 .. 212.0	2.0

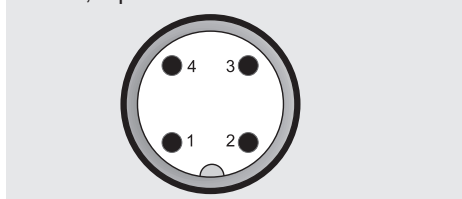
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0 .. 750 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

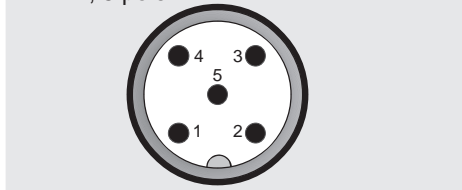
## Pin connections:

M12x1, 4 pole



Pin	ETS 326-2	ETS 326-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analogue
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 328-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

## Model code:

ETS 3 2 X - X - 100 - X00

### Mechanical connection

2 = G1/2 A DIN 3852 (male)

### Electrical connection

6 = Male M12x1, 4 pole  
only possible on output models "2" and "3"

8 = Male M12x1, 5 pole  
only possible on output model "5"

### Output

2 = 2 switching outputs  
only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analogue output  
only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analogue output  
only in conjunction with electrical connection type "8"

### Measuring range

-25 .. +100 °C (-13 .. +212 °F)

### Modification number

000 = Display in °C

400 = Display in °F

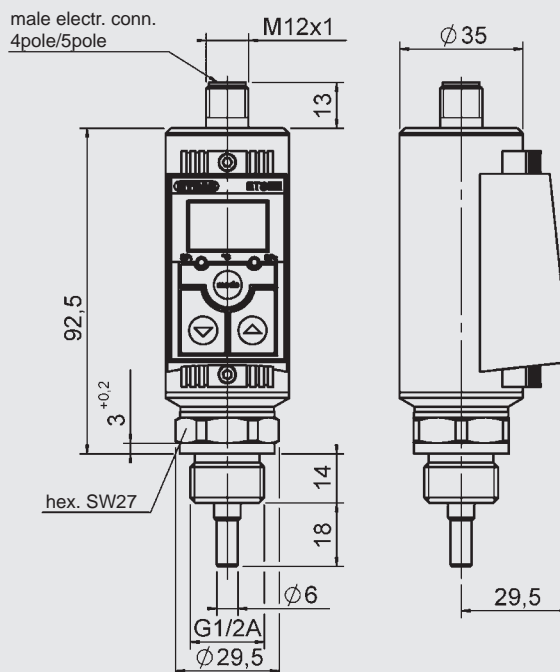
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, clamps for wall-mounting, etc. can be found in the Accessories brochure.

## Dimensions:



### Note:

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## Electronic Temperature Switch ETS 380 for Separate Temperature Probe

### Description:

The ETS 380 is a compact electronic temperature switch with a 3-digit display.

The version for a separate temperature probe has a measuring range of -30 .. +150 °C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to evaluate commonly available PT 100 temperature probes. Different output models with one or two switching outputs, and with the possible option of an additional analogue output signal of 4 .. 20 mA open up a multitude of application opportunities.

The switching points and the associated hystereses can be adjusted very quickly and easily using the keypad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function, etc.).

### Special features:

- 2 transistor switching outputs, up to 1.2 A load per output
- Optional analogue output signal 4 .. 20 mA
- 3-digit display
- Switching point or window function
- Switching / switch-back points and many useful additional functions can be set using the keypad

### Technical data:

<b>Input data</b>	
Measuring range <sup>1)</sup>	-30 .. +150 °C (-22 .. 302 °F)
Connection, separate temperature probe	Female cable connection M12x1, 4 pole
<b>Output data</b>	
Accuracy (display, analogue output)	≤ ± 1.0 °C (≤ ± 2.0 °F)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max. zero point ≤ ± 0.015 % FS / °C max. range
<b>Analogue output (optional)</b>	
Signal	4 .. 20 mA ohmic resistance max. 400 Ω corresponds to -30 .. +150 °C
<b>Switch outputs</b>	
Type	PNP transistor switching outputs
Switching current	max. 1.2 A per output
Switching cycles	> 100 million
<b>Environmental conditions</b>	
Ambient temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 10 g
Shock resistance to DIN EN 60068-2-29 (1 ms)	≤ 50 g
Protection class to IEC 60529	IP 65
<b>Other data</b>	
Supply voltage	20 .. 32 V DC
Current consumption	approx. 100 mA without switch output
Residual ripple of supply voltage	≤ 5 %
Display	3-digit, LED, 7 segment, red, height of digits 9.2 mm
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Depending on the temperature range of the connected temperature sensor, the indication range of the ETS 380 may be reduced.

## Setting options:

All the settings available on the ETS 380 are combined in 2 easy-to-navigate menus.

To prevent unauthorised adjustment of the device, a programming lock can be set.

## Setting ranges of the switching points and switch-back hystereses:

Switching point function

Unit	Switching point	Hysteresis	Increment*
°C	-27.0 .. 150.0	1.0 .. 178.0	1.0
°F	-16.0 .. 302.0	2.0 .. 320.0	2.0

Window function

Unit	Lower switch value	Upper switch value	Increment*
°C	-28.0 .. 149.0	-27.0 .. 150.0	1.0
°F	-18.0 .. 300.0	-16.0 .. 302.0	2.0

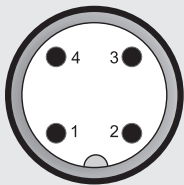
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O)
- Switch-on and switch-off delay adjustable from 0 .. 750 seconds
- Choice of display (actual temperature, peak temperature, switching point 1, switching point 2, display off)

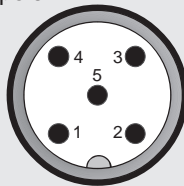
## Pin connections:

M12x1, 4 pole



Pin	ETS 386-2	ETS 386-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analogue
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ETS 388-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

## Model code:

ETS 3 8 X - X - 150 - X00

### Mechanical connection

8 = Electrical connection for separate temperature probe

### Electrical connection

- 6 = Male M12x1, 4 pole  
only possible on output models "2" and "3"
- 8 = Male M12x1, 5 pole  
only possible on output model "5"

### Output

- 2 = 2 switching outputs  
only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output  
only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analogue output  
only in conjunction with electrical connection type "8"

### Measuring range

-30 .. +150 °C (-22 .. +302 °F)

### Modification number

- 000 = Display in °C
- 400 = Display in °F

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

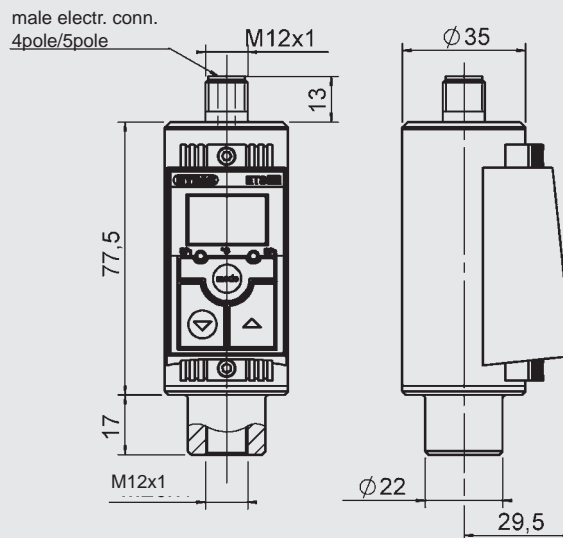
A male cable connection M12x1, 4 pole, to connect the separate temperature probe and a 3 m sensor cable, LIYCY 4 x 0.5 mm<sup>2</sup> are supplied with the instrument. Other accessories, such as electrical connectors, clamps for wall-mounting, etc. can be found in the Accessories brochure.

## Separate temperature probe:

(not supplied with the instrument)

- TFP 104 - 000 with male electr. conn. 4 pole Binder series 714 M18 Part no. 904969  
(connector not supplied)
- TFP 106 - 000 with male electr. conn. 4 pole M12x1 Part no. 921330  
(connector not supplied)
- Tank installation sleeve for TFP 100 Part no. 906170

## Dimensions:



## Note:

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## Electronic Temperature Switch ETS 1700

### Description:

The electronic temperature switch ETS 1700 is used mainly together with the temperature probe TFP 100, which was specially developed for tank mounting.

The 4-digit display can indicate the actual temperature, one of the switching points or the maximum temperature value.

The maximum temperature indicates the highest temperature which has occurred since the unit was switched on or was last reset.

The 4 switching outputs can be used to control heating and cooling processes in hydraulic systems, for example. Four switching and switch-back points which are independent of each other can be adjusted very simply via the keypad.

An analogue output (4 .. 20 mA or 0 .. 10 V) is also available for integration into monitoring systems (e.g. with PLC).

### Special features:

- 4-digit display
- Simple operation due to key programming
- 4 limit relays, switching points and switch back points can be adjusted independently
- Optional analogue output signal (4 .. 20 mA or 0 .. 10 V)
- Many useful additional functions
- Optional mounting position (sensor connection on the top/ bottom, keypad and display can be turned through 180°)

### Technical data:

<b>Input data</b>	
Measuring range <sup>1)</sup>	0 .. +100 °C, (+32 .. 212 °F)
<b>Output data</b>	
Accuracy (display, analogue output)	≤ ± 1.0 °C (≤ ± 2.0 °F)
Repeatability	≤ ± 0.25 % FS
Temperature drift (environment)	≤ ± 0.03 % FS / °C max. zero point ≤ ± 0.03 % FS / °C max. range
<b>Analogue output (optional)</b>	
Signal	selectable: 4 .. 20 mA      load resistance max. 400 Ω 0 .. 10 V      load resistance min. 2 kΩ corresponds in each case to 0 .. +100 °C
<b>Switch outputs</b>	
Type	4 relays with change-over contacts in 2 groups (common supply of each group connected)
Switching voltage	0.1 .. 250 V AC / DC
Switching current	0.009 .. 2 A per output
Switching capacity	400 VA, 50 W (for inductive load, use varistors)
Switching cycles	> 20 million at minimum load > 1 million at maximum load
<b>Environmental conditions</b>	
Ambient temperature range	-25 .. +60 °C
Storage temperature range	-40 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 5 g
Shock resistance to DIN EN 60068-2-29 (1 ms)	≤ 10 g
Protection class to IEC 60529	IP 65
<b>Other data</b>	
Supply voltage	22 .. 32 V DC
Current consumption	approx. 200 mA
Residual ripple of supply voltage	≤ 10 %
Display	4-digit, LED, 7 segment, red, height of digits 13 mm
Weight	~ 800 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

<sup>1)</sup> Depending on the temperature range of the connected temperature sensor, the indication range of the ETS 1700 may be reduced.

**FS (Full Scale)** = relative to complete measuring range

## Setting options:

The microprocessor integrated into the ETS 1700 enables many useful extra functions in addition to the switching functions, when compared with a normal mechanical temperature switch.

It is possible, for example, to activate switching delay times or to change the relay switching direction.

All settings are made via the keypad.

## Setting ranges of the switching points and switch-back hystereses:

- Switching point relays 1 to 4: 1.5 .. 100 % of the measuring range
- Switching point relays 1 to 4: 1 .. 99 % of the measuring range or alternatively
- Switch-back hystereses 1 to 4: 1.. 99 % of the measuring range

## Additional functions:

- Switching direction of the relays 1 to 4 (N/C or N/O function)
- Switch-on delay relays 1 to 4 in the range from 0.0 .. 900.0 seconds
- Switch-off delay relays 1 to 4 in the range from 0.0 .. 900.0 seconds
- Switch-back mode (alternatively switch-back point or switch-back hysteresis)
- Display of the actual temperature, a switching point or of the peak value
- Display range individually selectable in °C or °F
- Measurement unit (°C, °F) is displayed
- Analogue output (4 .. 20 mA or 0 .. 10 V)
- Programming lock

## Terminal assignment:

### Device connection

Pin	
1	+U <sub>B</sub>
2	0 V
3	Analogue output Signal +
4	Analogue output Signal - (0 V)
5	Relay 1 N/C
6	Relay 1 N/O
7	Centre relay 1 and 2
8	Relay 2 N/C
9	Relay 2 N/O
10	Relay 3 N/C
11	Relay 3 N/O
12	Centre relay 3 and 4
13	Relay 4 N/C
14	Relay 4 N/O

### Probe connection

Pin	
1	+U <sub>B</sub>
2	Signal +
3	n.c.
4	Signal -
5	0 V

## Model code:

ETS 1 7 0 X - 100 - 000

### Type of sensor

0 = For PT 100 sensors

### Display

1 = 4-digit display °C  
2 = 4-digit display °F

### Measuring range

0 .. 100 °C, (+32 .. 212 °F)

### Modification number

000 = Standard

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

PG cable glands, mounting bolts, a 5 pole female connector (Binder series 681) for connecting the separate temperature probe and a 3 m sensor cable (LIYCY 4 x 0.25 mm<sup>2</sup>) are supplied with the instrument.

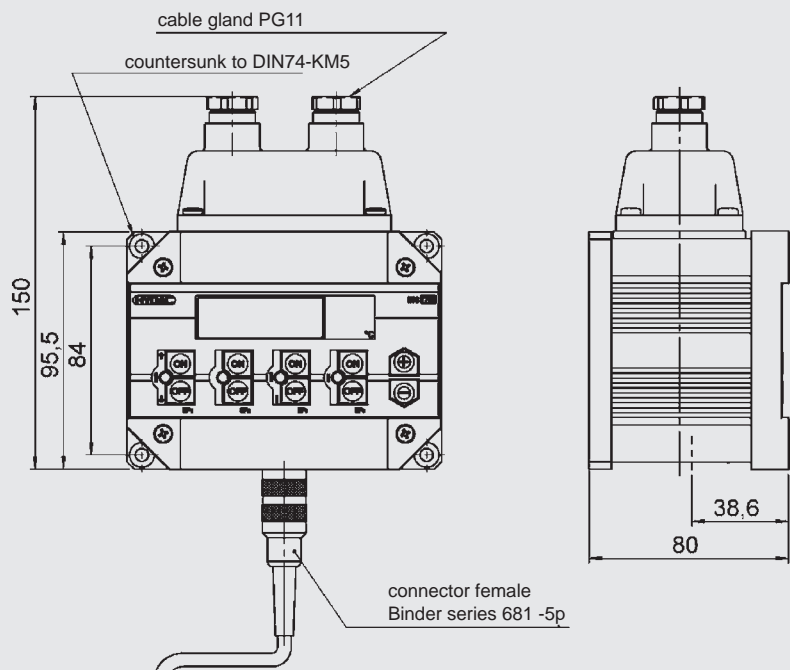
Other accessories, such as vibration mounts etc. can be found in the Accessories brochure.

## Separate temperature probe:

(not supplied with the instrument)

- TFP 104 - 000 with male electr. conn. 4 pole Binder series 714 M18 Part No.: 904696 (female connector supplied)
- TFP 106 - 000 with male electr. conn. 4 pole M12x1 Part No.: 921330 (female connector not supplied)
- Tank installation sleeve for TFP 100 Part. No.: 906170

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

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## Temperature Probe TFP 100

### Description:

The TFP 100 temperature probe was developed primarily for tank installation. The PT 100 precision resistor in 4-conductor design can be connected directly to HYDAC temperature switches ETS 3800, ETS 380 and ETS 1700.

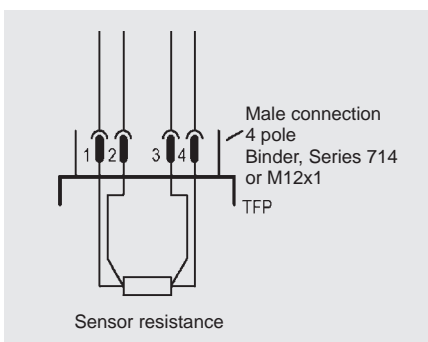
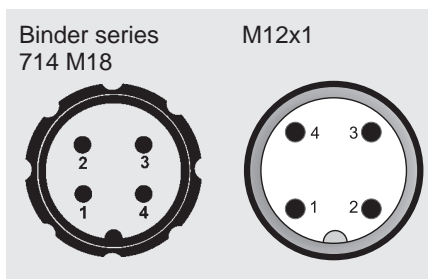
The standardised electrical connection also means that other evaluation or control systems (e.g. PLC) can easily be connected.

For adaptation to different applications and fluids, a nickel-plated brass installation sleeve which is pressure resistant up to 10 bar is available as an accessory.

### Special features:

- Measurement circuit configured as four-conductor circuit
- Simple to install
- For universal application

### Pin connections:



### Technical data:

#### Temperature probe TFP 100

Temperature range	-40 .. +125 °C (-40 .. +257 °F)
Electrical connection	Male Binder series 714 M18, 4 pole Male M12x1, 4 pole
Parts in contact with medium	Brass
CE mark	EN 61000-6-1 / 2 / 3 / 4
Sensor current	0.3 .. 1.0 mA
<b>Tank installation sleeve for TFP 100</b> (Accessory, not supplied)	
Pressure resistance	10 bar
Parts in contact with medium	CuZn39Pb3 (brass), nickel-plated

### Model code:

**TFP 10X - 000**

Separate temperature probe \_\_\_\_\_

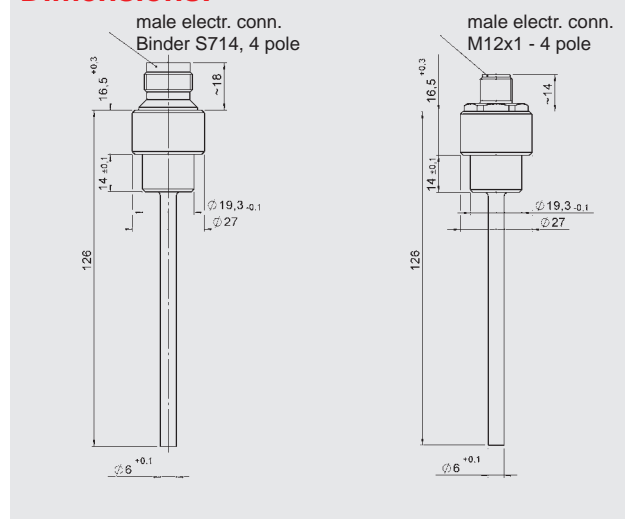
Electrical connection \_\_\_\_\_

- 4 = Male, 4 pole Binder series 714 M18m (connector supplied)
- 6 = Male, 4 pole M12x1 (connector not supplied)

Modification number \_\_\_\_\_

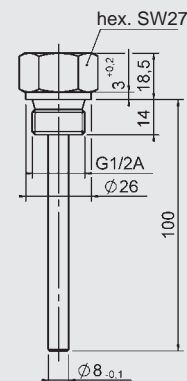
000 = Standard

### Dimensions:



### Tank installation sleeve for TFP100

(to be ordered separately)  
Part No.: 906 170



### Note:

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## SENSORS FOR DISTANCE AND POSITION

Using various measuring techniques, HYDAC offers different distance and position sensors for a wide array of mobile and stationary applications. Linear position sensors operate on the physical principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed signal, if required, and is based on elapsed time measurement.

Utilizing this non-contact and wear-free measuring technique, HYDAC offers different versions in a pressure-resistant stainless steel housing for part or full integration in hydraulic cylinders.

Linear position transducers for mobile applications:

	Page
HLT 1000-R2	131

Linear position transducers for stationary applications:

	Page
HLT 2100-R1	133
HLT 2500-F1	137
HLT 2500-L2	141

The ultrasonic distance sensor is a non-contact, highly compact sensor for measuring the distance to fluids and objects.

By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and measurement rate.

Electronic ultrasonic distance sensor:

	Page
HLS 528	145

Further distance and position sensors for special applications can be found in the Chapter "OEM Products for High Volume Production".

Sensors for distance and position	HLT 1000-R2	HLT 2100-R1	HLT 2500-F1	HLT 2500-L2	HLS 528	IES 2010 / 2015 / 2020	IWE 40	HLS 100	HLS 200
Measurement range in mm	50 to 2,500	50 to 4,000	50 to 4,000	50 to 4,000	up to 6,000				
For cylinder installation	✓	✓							
Number of switching outputs					2	2		1 (PWM)	2
Analogue output	✓	✓	✓	✓	✓		✓		
CANopen Version	✓	✓	✓	✓					
Device Net		✓	✓	✓					
Profibus		✓	✓	✓					
EtherCAT		✓	✓	✓					
SSI		✓	✓	✓					
Available as individual units	✓	✓	✓	✓	✓				
OEM product for large volume production						✓	✓	✓	✓
Enhanced functional safety	✓							✓	✓

**Note:**

Not all feature combinations are possible. For precise information, please consult the relevant data sheet.



## Linear Position Transducer HLT 1000-R2

### Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

On the basis of this non-contact and wear-free measurement system, HYDAC offers a version in pressure-resistant stainless steel housing for complete integration in hydraulic cylinders.

The different output signals (analogue/CANopen) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls). The main areas of application are in mobile hydraulics.

### Special features:

- High accuracy, e.g.  $\leq \pm 0.05\%$  FS for CANopen
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- Persuasive price / performance ratio

### Technical data:

Input data		
Measuring ranges	50 .. 2500 mm	
Measured variable	Distance, position, speed	
Mechanical connection	Cylinder-integrated	
Housing	Stainl. steel: pressure resistance 450 bar	
Output data		
Signal output	Current: 4 .. 20 mA or 20 .. 4 mA	
	Voltage: 0 .. 10 V or 10 .. 0 V	
	0.25 .. 4.75 V or 4.75 .. 0.25 V	
	CANopen	
Measuring accuracy		
	Analogue	CANopen
Resolution	12 bit min. 0.1 mm	0.1 mm
Non-linearity	$\leq \pm 0.05\%$ FS	$\leq \pm 0.05\%$ FS
Hysteresis	$\leq \pm 0.1$ mm	$\leq \pm 0.1$ mm
Repeatability	$\leq \pm 0.1$ mm	$\leq \pm 0.1$ mm
Temperature coefficient	$\leq \pm 0.01\%$ FS / °C	$\leq \pm 0.003\%$ FS / °C
Installation position and travel speed		Optional
Environmental conditions		
Operating temperature range	-40 .. +85 °C	
Relative humidity	90 %, non-condensing	
Storage temperature range	-40 .. +85 °C, dry	
Vibration resistance to		
DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g	
at 5 kHz	$\leq 15$ g	
Shock resistance to	$\leq 50$ g	
DIN EN 60068-2-2 (11 ms)		
CE mark	EN 61000-6-1 / 2 / 3 / 4	
EMC		
- Emitted interference	DIN EN 61000-6-3	
- Interference resistance	DIN EN 61000-6-2	
Housing /	Stainless steel, pressure-resistant	
Protection class to IEC 60529 <sup>1)</sup>	IP 67	
Other data		
Electrical connection <sup>1)</sup>	Flying leads Separate male panel mount connection M12x1	
Supply voltage	12 .. 30 V DC	
Current consumption without load	max. 100 mA	
Weight	Depends on length	

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.

FS (Full Scale) = relative to the complete measuring range

<sup>1)</sup> Other versions are possible.

## Model code:

Mobile **HLT 1 1 0 0 - R2 - XXX - XXX - XXXX - 000**

### Design/Geometry type

1 = Rod

### Mechanical connection

R2 = Cylinder-integrated

### Electrical connection

#### Cable output

K01 = Flying lead, length 1 m

K02 = Flying lead, length 2 m

K05 = Flying lead, length 5 m

K10 = Flying lead, length 10 m

#### Separate male panel mount connection M12x1

(4 pole for signal output analogue

5 pole for signal output CANopen)

L06 = 60 mm cable length

L18 = 180 mm cable length

L24 = 240 mm cable length

### Signal output

C01 = Analogue 4 .. 20 mA, 3 conductor

C02 = Analogue 20 .. 4 mA, 3 conductor

B01 = Analogue 0 .. 10 V

B02 = Analogue 10 .. 0 V

G01 = Analogue 0.25 .. 4.75 V

G02 = Analogue 4.75 .. 0.25 V

CAN = CANopen

### Measuring range in mm (50 to 2500 mm)

Example

0150 = 150 mm

### Modification

000 = Standard

### Notes:

Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Items supplied:

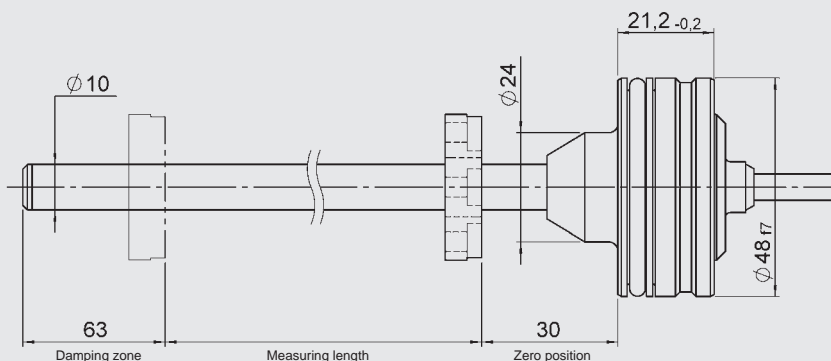
- HLT 1100-R2
- Installation instructions German/English
- HLT 1100 CD incl. case

### Accessories:

Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure.

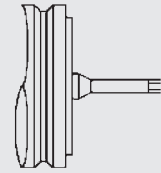
The recommended position magnet ZBL MR33, part no. 6084207, must be ordered separately.

## Dimensions:



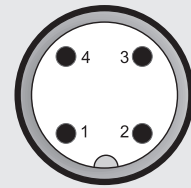
## Pin connections:

Cable outlet



Core	Analogue	CANopen
brown	+U <sub>B</sub>	+U <sub>B</sub>
white	0 V	0 V
green	Analogue	CAN_L
yellow	n.c.	CAN_H

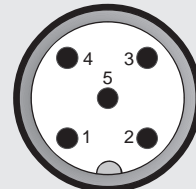
M12x1, 4 pole



Pin

1	+U <sub>B</sub>
2	n.c.
3	0 V
4	Signal

M12x1, 5 pole



Pin	Signal	Description
1	n.c.	
2	+U <sub>B</sub>	supply+
3	0 V	supply-
4	CAN_H	bus line dominant high
5	CAN_L	bus line dominant low

### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Linear Position Transducer Rod Version

### HLT 2100-R1

#### Description:

The sensor works on the principle of magnetostriction.

The measuring principle determines with high accuracy the position, distance and/or speed, and is based on elapsed time measurement.

Utilizing this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

The different output signals (analogue/digital) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls). The HLT 2100-R1 is primarily used in stationary applications as a semi-integrated solution in hydraulic cylinders.

#### Special features:

- Accuracy  $\leq \pm 0.05\%$  FS typ.
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- Persuasive price / performance ratio

#### Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Measured variable	Distance, position, speed
Mechanical connection	Threaded flange M18x1.5
Housing	Aluminium
Hydraulic tube	Stainless steel Pressure resist. 450 bar, 750 bar peak
Output data	
Signal output analogue	Current: 4 .. 20 mA or 20 ... 4 mA Voltage: 0 .. 10 V or 10 .. 0 V
Signal output digital	Profibus, CANopen, Device Net, SSI, EtherCAT
Measuring accuracy	
Resolution	max. 0.005 mm, 16 bit
Non-linearity	$\pm 0.1$ mm to 1,500 mm $\pm 0.15$ mm > 1,500 mm
Repeatability	$\leq 0.005$ mm - $\leq 0.05$ mm (length-dependent)
Temperature coefficient	< 0.004 % FS / °C (analogue) < 0.0015 % FS / °C (digital)
Installation position and travel speed	
No restrictions	
Environmental conditions	
Operating temperature range	0 .. +70 °C
Relative humidity	98 %, non-condensing
Storage temperature range	-30 .. +85 °C, dry
Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-27	$\leq 100$ g / 11 ms / half sine
CE mark	EN 61000-6-1 / 2 / 3 / 4
EMC	
- Emitted interference	DIN EN 61000-6-3
- Interference resistance	DIN EN 61000-6-2
Housing / Protection class to IEC 60529	Aluminium / IP 65 <sup>1)</sup>
Other data	
Electrical connection	
- Analogue	- Flying lead, length 1 m <sup>1)</sup> - Male M16, 6 pole - Male M16, 8 pole
- CANopen, Device Net	Female M12x1, 5 pole + male M12x1, 5 pole
- Profibus	Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole
- Synchronous Serial Interface	CONTACT male, 12 pole
- EtherCAT	2 female M12x1, 4 pole + male M8, 4 pole
Supply voltage	24 V DC $\pm 10\%$
Current consumption without load	< 250 mA
Weight	Depends on length

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.

FS (Full Scale) = relative to the complete measuring range

<sup>1)</sup> Other versions are possible.

## Model code:

Stationary **HLT 2 1 0 0 - R1 - XXX - XXX - XXXX - 000**

### Design/Geometry type

1 = Rod

### Mechanical connection

R1 = Threaded flange M18x1.5

### Electrical connection

#### Signal output analogue

K01 = Flying lead, length 1 m

M06 = Male M16, 6 pole

M08 = Male M16, 8 pole

#### Signal output CANopen, Device Net

C61 = Female M12x1, 5 pole + male M12x1, 5 pole

#### Signal output Profibus

P61 = Female M12x1, 5 pole + male M12x1, 5 pole  
+ male M8, 4 pole

#### Signal output Synchronous Serial Interface

S01 = CONTACT male, 12 pole

#### Signal output EtherCAT

E51 = 2 female M12x1, 4 pole + male M8, 4 pole

### Signal output

C01 = Analogue 4 .. 20 mA, 3 conductor

C02 = Analogue 20 .. 4 mA, 3 conductor

B01 = Analogue 0 .. 10 V

B02 = Analogue 10 .. 0 V

ETC = EtherCAT

SSI = Synchronous Serial Interface

CAN = CANopen

PRO = Profibus

DVN = Device Net

### Measuring range in mm (50 to 4000 mm)

Example

0150 = 150 mm

### Modification

000 = Standard

### Notes:

Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Items supplied:

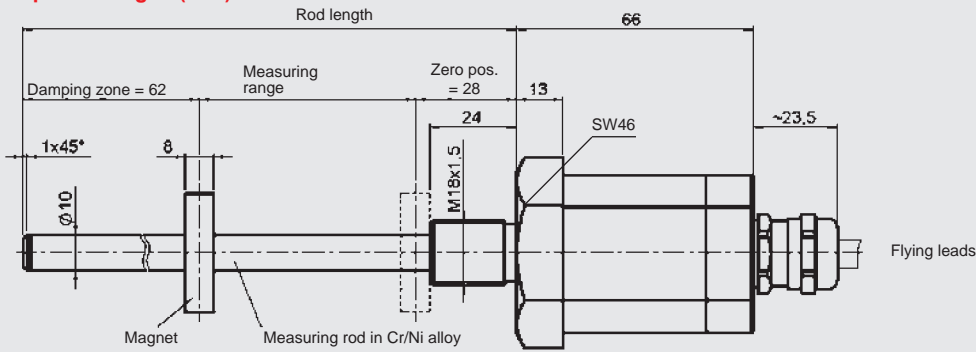
- HLT 2100-R1
- Installation instructions German/English
- HLT 2000 CD incl. case

### Accessories:

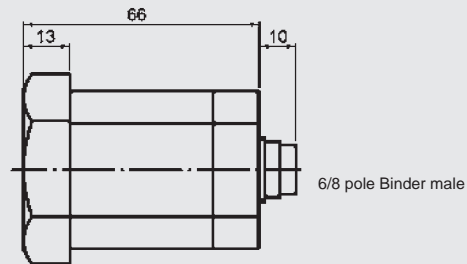
Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure. The recommended position magnet ZBL MR33, part no. 6084207, must be ordered separately.

## Dimensions:

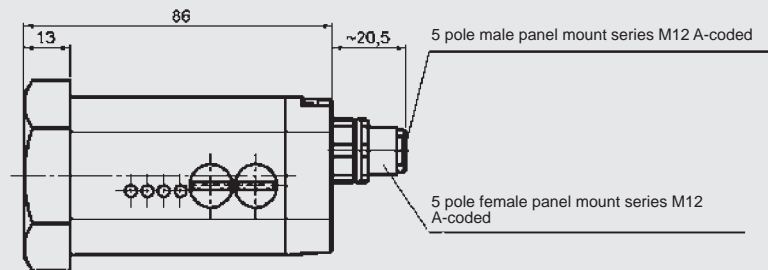
### Signal output: analogue (K01)



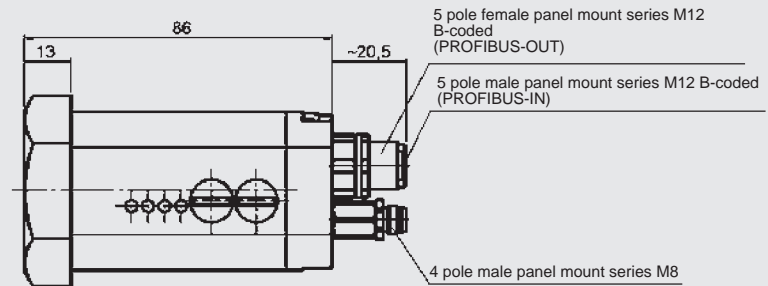
### Signal output: analogue (M06, M08)



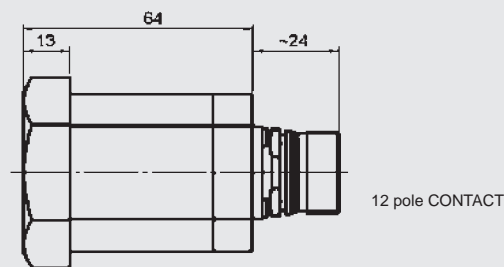
### Signal output: CANopen Device Net (C61)



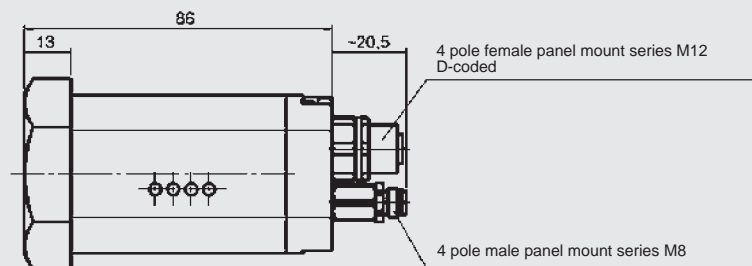
### Signal output: Profibus (P61)



### Signal output: Synchronous Serial Interface (S01):



### Signal output: EtherCAT (E51)



## Note:

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## Linear Position Transducer Flat Housing Design

### HLT 2500-F1

#### Description:

The sensor works on the principle of magnetostriction.

The measuring principle determines with a high degree of accuracy the position, distance and/or a velocity signal based on elapsed time.

Utilizing this non-contact and wear-free measuring system, HYDAC offers a flat housing version in aluminium.

The different output signals (analogue/digital) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls).

The HLT 2500-F1 is primarily used in stationary applications, especially when a semi-integrated solution in hydraulic cylinders is not possible.

#### Special features:

- Accuracy  $\leq \pm 0.05\%$  FS typ.
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- Persuasive price / performance ratio

#### Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Measured variable	Distance, position, speed
Mechanical connection	Flat housing
Housing	Aluminium
Output data	
Signal output analogue	Current: 4 .. 20 mA or 20 ... 4 mA Voltage: 0 .. 10 V or 10 .. 0 V
Signal output digital	Profibus, CANopen, Device Net, SSI, EtherCAT
Measuring accuracy	
Resolution	max. 0.005 mm, 16 bit
Non-linearity	$\pm 0.1$ mm to 1,500 mm $\pm 0.15$ mm > 1,500 mm
Repeatability	$\leq 0.005$ mm - $\leq 0.05$ mm (length-dependent)
Temperature coefficient	< 0.004 % FS / °C (analogue) < 0.0015 % FS / °C (digital)
Installation position and travel speed	
No restrictions	
Environmental conditions	
Operating temperature range	0 .. +70 °C
Relative humidity	98 %, non-condensing
Storage temperature range	-30 .. +85 °C, dry
Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-27	$\leq 100$ g / 11 ms / half sine
CE mark	EN 61000-6-1 / 2 / 3 / 4
EMC	
- Emitted interference	DIN EN 61000-6-3
- Interference resistance	DIN EN 61000-6-2
Housing / Protection class to IEC 60529	Aluminium / IP 65 <sup>1)</sup>
Other data	
Electrical connection	
- Analogue	- Flying lead, length 1 m <sup>1)</sup> - Male M16, 6 pole - Male M16, 8 pole
- CANopen, Device Net	Female M12x1, 5 pole + male M12x1, 5 pole
- Profibus	Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole
- Synchronous Serial Interface	CONTACT male, 12 pole
- EtherCAT	2 female M12x1, 4 pole + male M8, 4 pole.
Supply voltage	24 V DC $\pm 10\%$
Current consumption without load	< 250 mA
Weight	Depends on length

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.

FS (Full Scale) = relative to the complete measuring range

<sup>1)</sup> Other versions are possible.

## Model code:

Stationary **HLT 2 5 0 0 - F1 - XXX - XXX - XXXX - 000**

### Design/Geometry type

5 = Profile

### Mechanical connection

F1 = Flat housing

### Electrical connection

#### Signal output analogue

K01 = Flying lead, length 1 m

M06 = Male M16, 6 pole

M08 = Male M16, 8 pole

#### Signal output CANopen, Device Net

C61 = Female M12x1, 5 pole + male M12x1, 5 pole

#### Signal output Profibus

P61 = Female M12x1, 5 pole + male M12x1, 5 pole  
+ male M8, 4 pole

#### Signal output Synchronous Serial Interface

S01 = CONTACT male, 12 pole

#### Signal output EtherCAT

E51 = 2 female M12x1, 4 pole + male M8, 4 pole

### Signal output

C01 = Analogue 4 .. 20 mA, 3 conductor

C02 = Analogue 20 .. 4 mA, 3 conductor

B01 = Analogue 0 .. 10 V

B02 = Analogue 10 .. 0 V

ETC = EtherCAT

SSI = Synchronous Serial Interface

CAN = CANopen

PRO = Profibus

DVN = Device Net

### Measuring range in mm (50 to 4000 mm)

Example

0150 = 150 mm

### Modification

000 = Standard

### Notes:

Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Items supplied:

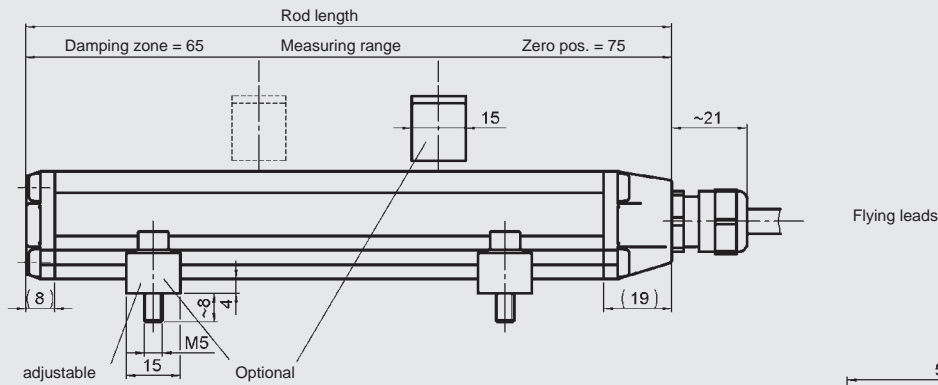
- HLT 2500-F1
- Installation instructions German/English
- HLT 2000 CD incl. case

### Accessories:

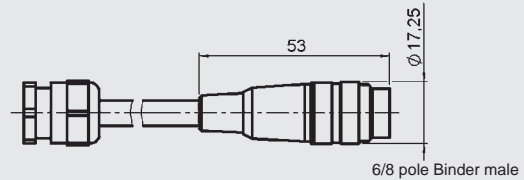
Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure. The recommended position magnet ZBL MF 38-18, part no. 6084456, must be ordered separately.

## Dimensions:

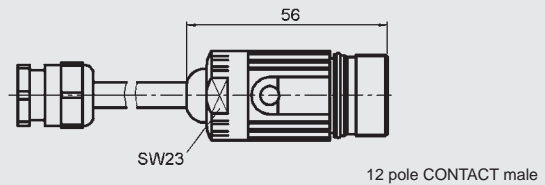
Signal output: analogue (K01)



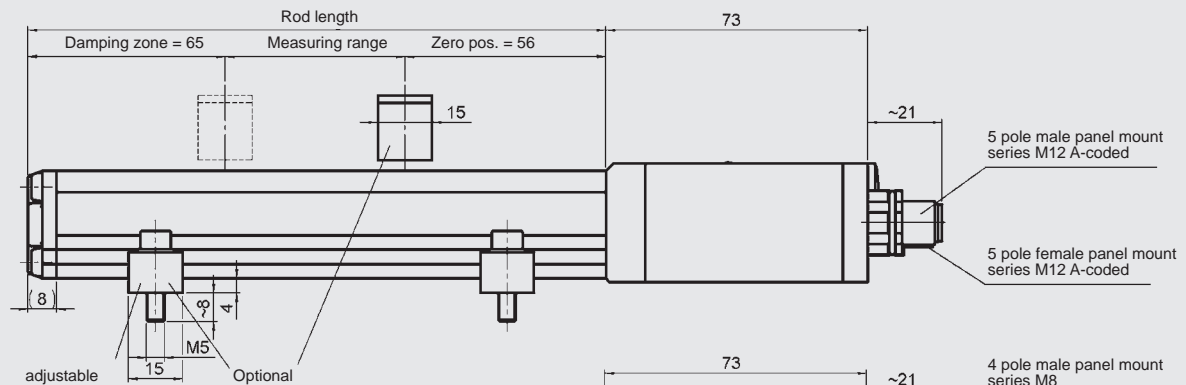
Signal output: analogue (M06, M08)



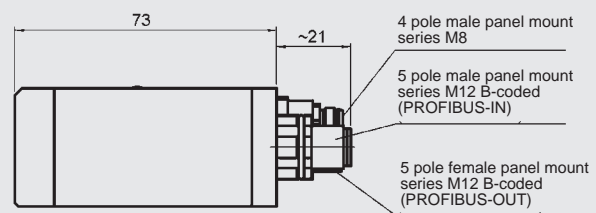
Signal output: Synchronous Serial Interface (S01):



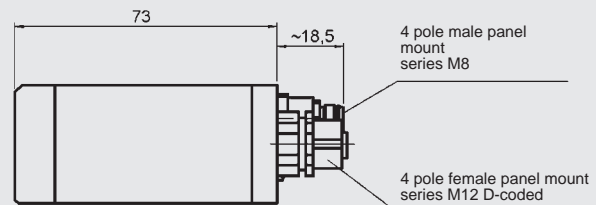
Signal output: CANopen Device Net (C61)



Signal output: Profibus (P61)



Signal output: EtherCAT (E51)



## Note:

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## Linear Position Transducer Profile Design

### HLT 2500-L2

#### Description:

The sensor works on the principle of magnetostriction.

The measuring principle determines with a high degree of accuracy the position, distance and/or a velocity signal based on elapsed time.

Utilizing this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slides or with a sliding magnet for positioning by the operator.

The different output signals (analogue/digital) facilitate the connection of all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. also to PLC controls). The HLT 2500-L2 is primarily used in stationary applications, especially when a semi-integrated solution in hydraulic cylinders is not possible.

#### Special features:

- Accuracy  $\leq \pm 0.05\%$  FS typ.
- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Contact-free and wear-free
- Persuasive price / performance ratio

#### Technical data:

Input data	
Measuring ranges	50 .. 4000 mm
Measured variable	Distance, position, speed
Mechanical connection	With magnet in position slide V
Housing	Aluminium
Output data	
Signal output analogue	Current: 4 .. 20 mA or 20 .. 4 mA Voltage: 0 .. 10 V or 10 .. 0 V
Signal output digital	Profibus, CANopen, Device Net, SSI, EtherCAT
Measuring accuracy	
Resolution	max. 0.005 mm, 16 bit
Non-linearity	$\pm 0.1$ mm to 1,500 mm $\pm 0.15$ mm > 1,500 mm
Repeatability	$\leq 0.005$ mm - $\leq 0.05$ mm (length-dependent)
Temperature coefficient	< 0.004 % FS / °C (analogue) < 0.0015 % FS / °C (digital)
Installation position and travel speed	
No restrictions	
Environmental conditions	
Operating temperature range	0 .. +70 °C
Relative humidity	98 %, non-condensing
Storage temperature range	-30 .. +85 °C, dry
Vibration resistance to DIN EN 60068-2-6 at 50 .. 2000 Hz	$\leq 10$ g
Shock resistance to DIN EN 60068-2-27	$\leq 100$ g / 11 ms / half sine
CE mark	EN 61000-6-1 / 2 / 3 / 4
EMC	
- Emitted interference	DIN EN 61000-6-3
- Interference resistance	DIN EN 61000-6-2
Housing / Protection class to IEC 60529	Aluminium / IP 65 <sup>1)</sup>
Other data	
Electrical connection	
- Analogue	- Flying lead, length 1 m <sup>1)</sup> - Male M16, 6 pole - Male M16, 8 pole
- CANopen, Device Net	Female M12x1, 5 pole + male M12x1, 5 pole
- Profibus	Female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole
- Synchronous Serial Interface	CONTACT male, 12 pole
- EtherCAT	2 female M12x1, 4 pole + male M8, 4 pole
Supply voltage	24 V DC $\pm 10\%$
Current consumption without load	< 250 mA
Weight	Depends on length

Note: Reverse polarity protection of the supply voltage and excess voltage protection are provided.

FS (Full Scale) = relative to the complete measuring range

<sup>1)</sup> Other versions are possible.

## Model code:

Stationary **HLT 2 5 0 0 - L2 - XXX - XXX - XXXX - 000**

### Design/Geometry type

5 = Profile

### Mechanical connection

L2 = With magnet in position slide V

### Electrical connection

#### Signal output analogue

K01 = Flying lead, length 1 m

M06 = Male M16, 6 pole

M08 = Male M16, 8 pole

#### Signal output CANopen, Device Net

C61 = Female M12x1, 5 pole + male M12x1, 5 pole

#### Signal output Profibus

P61 = Female M12x1, 5 pole + male M12x1, 5 pole  
+ male M8, 4 pole

#### Signal output Synchronous Serial Interface

S01 = CONTACT male, 12 pole

#### Signal output EtherCAT

E51 = 2 female M12x1, 4 pole + male M8, 4 pole

### Signal output

C01 = Analogue 4 .. 20 mA, 3 conductor

C02 = Analogue 20 .. 4 mA, 3 conductor

B01 = Analogue 0 .. 10 V

B02 = Analogue 10 .. 0 V

ETC = EtherCAT

SSI = Synchronous Serial Interface

CAN = CANopen

PRO = Profibus

DVN = Device Net

### Measuring range in mm (50 to 4000 mm)

Example

0150 = 150 mm

### Modification

000 = Standard

### Notes:

Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Items supplied:

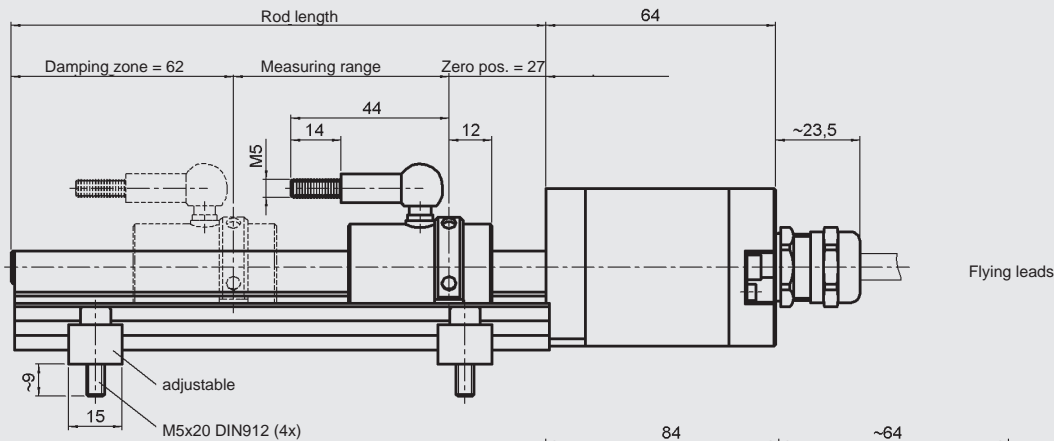
- HLT 2500-L2
- ZBL MS35-39, position magnet
- Installation instructions German/English
- HLT 2000 CD incl. case

### Accessories:

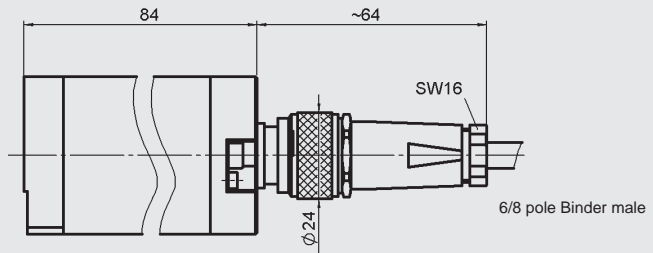
Appropriate accessories, such as position magnets and mounting material can be found in the Accessories section of the Electronics brochure.

## Dimensions:

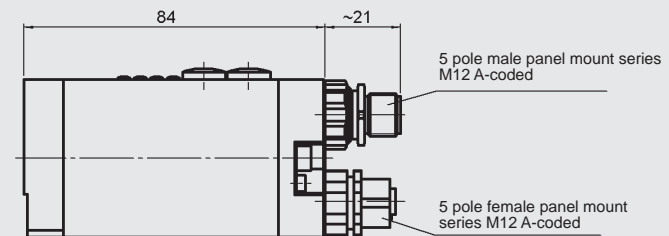
Signal output: analogue (K01)



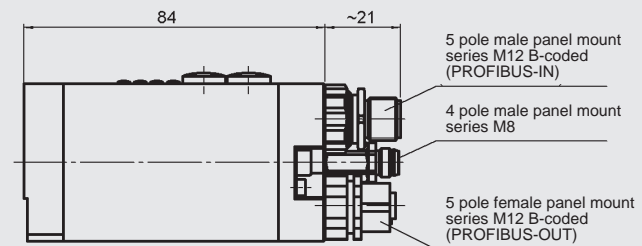
Signal output: analogue (M06, M08)



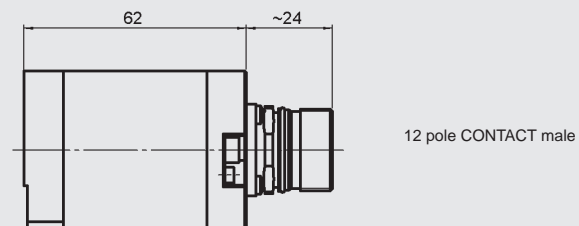
Signal output: CANopen  
Device Net (C61)



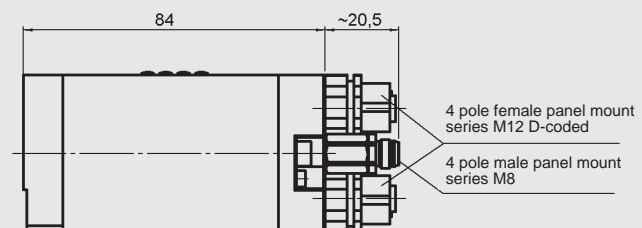
Signal output: Profibus (P61)



Signal output: Synchronous Serial  
Interface (S01):



Signal output: EtherCAT (E51)



## Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Electronic Distance Sensor HLS 528

### Description:

The distance sensor HLS 528 is a non-contact, highly compact sensor for measuring distances to fluids and objects.

By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and measurement rate.

The HLS 528 is available for measuring ranges up to 6000 mm and is available in three signal output versions (2 switching outputs; 1 analogue output, either 4 .. 20 mA or 0 .. 10 V, plus 1 or 2 switching outputs).

The sensor can be adjusted simply and conveniently using two push-buttons and a self-explanatory menu structure. A 3-digit display indicates the latest distance and 2 three-colour LEDs also show the operating condition.

### Special features:

- Contact-free distance measurement
- Measurement range up to 6000 mm
- Various signal output versions available
- Very high resolution and measurement rate
- Integrated temperature compensation
- 3-digit display to show the latest distance
- 2 three-colour LEDs to display the operating status
- Switching and switch-back points can be adjusted independently
- Selectable analogue output (optional)
- Only for use in depressurised applications

### Technical data:

Input data					
Operating range	250;	350;	1300;	3400;	6000 mm
Blind zone	0 .. 30;	0 .. 85;	0 .. 200;	0 .. 350;	0 .. 600 mm
Maximum range	350;	600;	2000;	5000;	8000 mm
Resolution	≤ 0.18 mm				
Output data					
Accuracy	≤ ± 1 % of the latest measured value				
Repeatability	± 0.15 % of the latest measured value				
Versions	2 switch outputs		1 switch outp. +1 analog. outp. / 2 switch outputs + 1 analogue output		
Analogue output (optional)					
Signal; selectable (short-circuit resistant, invertible)			4 .. 20 mA, $R_{Lmax} = 100 \Omega (U_B \leq 20 V)$ $R_{Lmax} = 500 \Omega (U_B > 20 V)$  0 .. 10 V, $R_{Lmin} = 100 k\Omega (U_B \geq 18 V)$		
Switch outputs					
Switching output (short-circuit resistant)	2 x PNP $I_{max} = 2 \times 200 \text{ mA}$		1 x PNP $I_{max} = 200 \text{ mA}$ 2 x PNP $I_{max} = 2 \times 200 \text{ mA}$		
Switching direction	N/O or N/C, adjustable				
Reaction time	50;	70;	110;	180;	240 ms
Environmental conditions					
Operating temperature	-25 °C .. +70 °C				
Storage temperature range	-40 °C .. +85 °C				
CE mark	DIN EN 60947-5-2 DIN EN 60947-5-7				
Protection class to EN 60529	IP 67				
Other data					
Supply voltage	9 .. 30 V DC without analogue output 18 .. 30 V DC with analogue output				
Time delay before availability	< 300 ms				
Residual ripple	± 10%				
No-load current consumption	≤ 80 mA				
Electrical connection	Male M12x1, 5 pole				
Housing	Brass, nickel-plated; Ultrasonic transducer with PEEK film				
Controls	2 push-buttons				
Display	3-digit, LED-display, 2 three-colour-LEDs				
Weight	150;	150;	150;	210;	270 g

Note: Reverse polarity protection of the supply voltage and short circuit protection are provided.

**Setting options:**

All the settings available on the HLS 528 are grouped in two easy-to-navigate menus. In order to prevent unauthorised adjustment of the instrument, a key-lock can be set.

**Setting ranges of the switching points and switch-back hystereses:**

Switching point function distance

Oper. scanning range	Switching point*	Hysteresis*
250 mm	30 .. 350 mm	1 .. 320 mm
350 mm	85 .. 600 mm	1 .. 515 mm
1300 mm	200 .. 999 mm 100 .. 200 cm	1 .. 999 mm 100 .. 180 cm
3400 mm	350 .. 999 mm 100 .. 500 cm	1 .. 999 mm 100 .. 465 cm
6000 mm	600 .. 999 mm 100 .. 800 cm	1 .. 999 mm 100 .. 740 cm

Window function distance

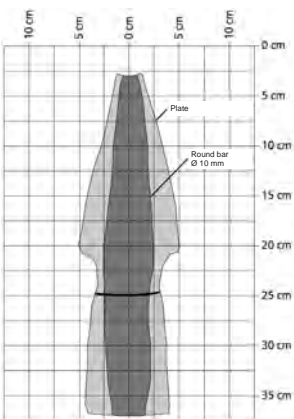
Oper. scanning range	Lower switch value*	Upper switch value*
250 mm	30 .. 348 mm	32 .. 350 mm
350 mm	85 .. 598 mm	87 .. 600 mm
1300 mm	200 .. 999 mm 100 .. 198 cm	202 .. 999 mm 100 .. 200 cm
3400 mm	350 .. 999 mm 100 .. 498 cm	352 .. 999 mm 100 .. 500 cm
6000 mm	600 .. 999 mm 100 .. 798 cm	602 .. 999 mm 100 .. 800 cm

\* The increment for all units is 1 mm or cm.

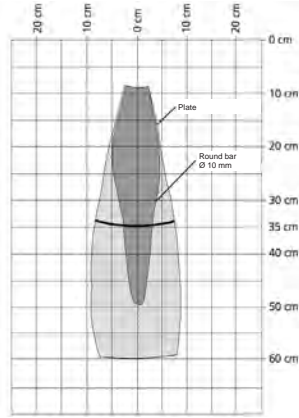
**Recording ranges (for different objects):**

The dark-grey areas specify the range in which the normal reflector (round bar) is detected safely. This is the typical working range of the sensors. The light grey areas illustrate the range in which a very large reflector, e.g. a very large plate, is still detected, provided it is aligned optimally to the sensor. Ultrasonic reflections cannot be evaluated outside the light grey area.

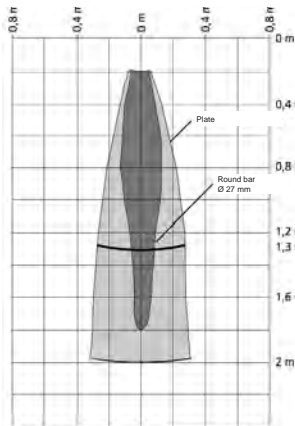
Operational scanning range 250 mm:



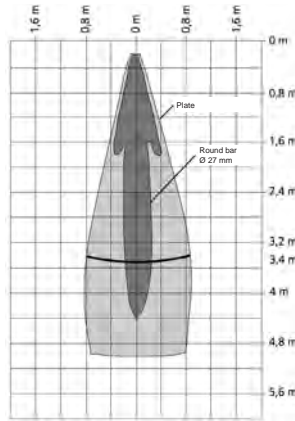
Operational scanning range 350 mm:



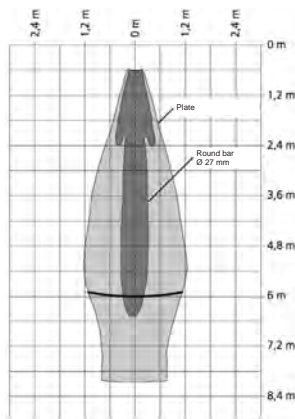
Operational scanning range 1300 mm:



Operational scanning range 3400 mm:



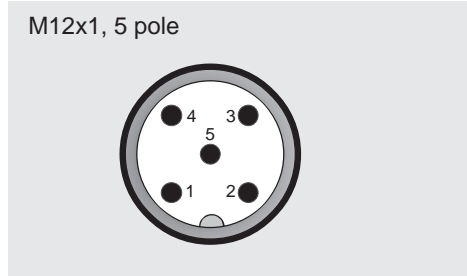
Operational scanning range 6000 mm:



**Additional functions:**

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on delay adjustable from 0 to 20 seconds
- Energy saving mode

**Pin connections:**



Pin	HLS 528-2
1	+U <sub>B</sub>
2	D1 (switching output 1)
3	-U <sub>B</sub> (0 V)
4	D2 (switching output 2)
5	Synchronisation

Pin	HLS 528-3
1	+U <sub>B</sub>
2	Analogue
3	-U <sub>B</sub> (0 V)
4	D (switching output)
5	Synchronisation

Pin	HLS 528-5
1	+U <sub>B</sub>
2	Analogue
3	-U <sub>B</sub> (0 V)
4	D2 (switching output 2)
5	D1 (switching output 1)

## Model code:

HLS 5 2 8 - X - XXXX - 000 - F

### Mechanical connection

2 = M30x1.5

### Electrical connection

8 = Male M12x1, 5 pole  
(connector not supplied)

### Output

2 = 2 switching outputs  
3 = 1 switching output and 1 analogue output  
5 = 2 switching outputs and 1 analogue output

### Operational scanning range in mm

0250; 0350; 1300, 3400, 6000

### Modification number

000 = Standard

### Type of protection, front face of sensor

F = Foil

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Note:

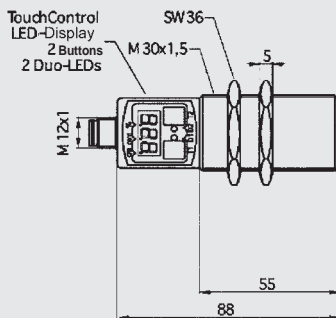
The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

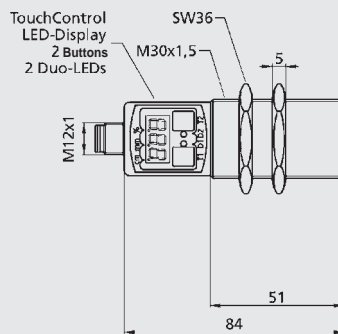
Subject to technical modifications.

## Dimensions:

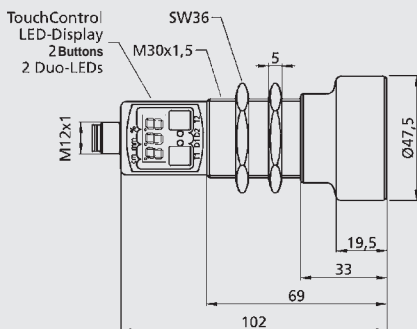
Operational scanning range:  
250 mm



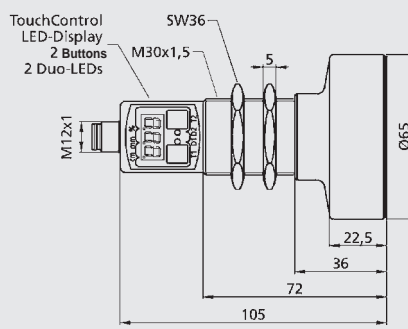
350 mm, 1300mm



Operational scanning range:  
3400 mm



6000 mm



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## ELECTRONIC LEVEL SENSORS

In industry, level sensors are used for the most diverse tasks. In the main, sensors which are based on capacitive, magnetostrictive or ultrasonic measurement are used.

HYDAC ELECTRONIC has level sensors for each of these measurement principles in its product range.

Electronic level switches for general applications:

	Page
ENS 3000 (capacitive)	149
ENS 3000 IO-Link (capacitive)	153
HNS 3000 (magnetostrictive)	155
HNS 526 (based on ultrasound)	157

Electronic level measuring transmitter for general applications:

	Page
HNT 1000 (magnetostrictive)	161



## Electronic Level Switch ENS 3000

### Description:

The ENS 3000 is an electronic level switch with integrated display. The instrument has 1, 2 or 4 switching outputs and an analogue output signal is available as an option.

In addition to the standard minimum and maximum switching signals, with the 4 switching output version it is possible to set additional warning signals to prevent problems such as tank overflow or aeration of the pump. The ENS 3000 can be used for oil as well as water. The fluid type can be selected for specific applications via the menu.

The main applications of the ENS 3000 are primarily in hydraulics, e.g. for fluid level monitoring of a tank.

The ENS 3000 is available in standard probe lengths of 250 mm, 410 mm, 520 mm and 730 mm.

The instrument is also available with or without an integrated temperature sensor.

### Special features:

- 1, 2 or 4 independent PNP transistor switching outputs
- Selectable for use with oil or water
- User-selectable switch outputs based on the measured value
- Switching and switch-back points can be adjusted independently
- Selectable analogue output (optional)
- 4-digit display
- Simple to operate due to menu-based key operation

### Technical data:

Input data	
Sensor type	Capacitive fluid level sensor
Probe lengths	250; 410; 520; 730 mm
Active zone	170; 290; 390; 590 mm
Max. speed of change in fluid level	40; 60; 80; 100 mm/s
Repeatability <sup>1)</sup>	≤ ± 2 % FS
Switching point accuracy	≤ ± 2 % FS
Temperature (optional)	
Sensor type	Semiconductor sensor
Measuring range	-25 .. +100 °C
Accuracy	± 1.5 °C
Reaction time (t <sub>90</sub> )	180 s
Output data	
Analogue output (optional)	
With 1 or 2 SP selectable	4 .. 20 mA ohmic resistance ≤ 500 Ω 0 .. 10 V ohmic resistance ≥ 1 kΩ corresponds to measuring range selected
With 4 SP (only with temperature sensor)	0 .. 10 V ohmic resistance ≥ 1 kΩ corresponds to measuring range selected
Switch outputs	
Type	PNP transistor output programmable as N/O / N/C
Assignment	On version with temperature measurement, user can select temperature or fluid level
Switching current	1 or 2 SP: max. 1.2 A per output 4 SP: max. 0.25 A per output
Switching cycles	> 100 million
Environmental conditions	
Compensated temperature range	0 .. +60 °C
Operating temperature range	0 .. +60 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range	0 .. +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 5 g
Shock resistance to DIN EN 60068-2-29 (1 ms)	≤ 25 g
Protection class to IEC 60529	IP 67
Other data	
Max. tank pressure	0.5 bar (short-term 3 bar, t < 1 min)
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
for use acc. to UL spec.	
Current consumption	max. 2.47 A total max. 90 mA with inactive switching outputs and 2 analogue outputs
Residual ripple of supply voltage	≤ 5 %
Fluids <sup>3)</sup>	Hydraulic oils (mineral based), synth. oils, fluids containing water
Parts in contact with medium	Ceramic
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 180; 220; 250; 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> Specified for calm, non-turbulent fluid,

<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No. 61010-1

<sup>3)</sup> Other fluids on request

## Setting options:

All settings available on the ENS 3000 are combined in 2 easy-to-navigate menus. To prevent unauthorised adjustment of the instrument, a programming lock can be set.

## Setting ranges of the switching points and switch-back hystereses:

### Fluid level switching point function

Probe length in cm	Meas. range in cm	Switching point in cm *	Hysteresis in cm *
25.0	17.0	0.3 .. 17.0	0.1 .. 16.8
41.0	29.0	0.5 .. 29.0	0.2 .. 28.7
52.0	39.0	0.6 .. 39.0	0.2 .. 38.6
73.0	59.0	0.9 .. 59.0	0.3 .. 58.4

The increment for all units is 0.1 cm.

### Fluid level window function

Probe length in cm	Lower switch value in cm *	Upper switch value in cm *
25.0	0.3 .. 16.7	0.4 .. 16.8
41.0	0.5 .. 28.4	0.7 .. 28.7
52.0	0.6 .. 38.3	0.9 .. 38.6
73.0	0.9 .. 57.9	1.4 .. 58.4

The increment for all units is 0.1 cm.

### Fluid level offset function

Probe length in cm	Meas. range in cm *	Offset in cm *
25.0	17.0	0 .. 68.0
41.0	29.0	0 .. 116.0
52.0	39.0	0 .. 156.0
73.0	59.0	0 .. 177.0

The increment for all units is 0.1 cm.

### Temperature switching point function

Unit	Meas. range	Switching point	Hysteresis
°C	-25 .. +100	-23.0 .. +100.0	1.0 .. 123.5

The increment for all units is 0.5 °C.

### Temperature window function

Unit	Lower switch value	Upper switch value
°C	-23.5 .. +97.5	-22.0 .. +98.5

The increment for all units is 0.5 °C.

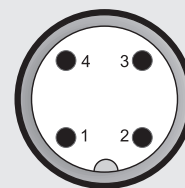
\* All ranges given in the table are adjustable by the increments shown.

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to fluid level or temperature, as required
- Switch-on and switch-off delay adjustable from 0.00 .. 9999 seconds
- Display can be adjusted (actual fluid level, actual temperature, peak values, switching point 1, 2, 3, 4 or display off)
- Analogue output can be assigned to fluid level or temperature as required (depending on model)

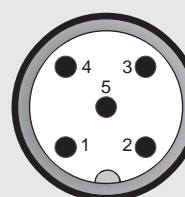
## Pin connections:

M12x1, 4 pole



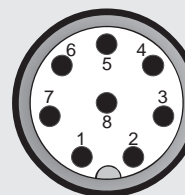
Pin	ENS 3X16-2	ENS 3X16-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analogue
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	ENS 3X18-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

M12x1, 8 pole



Pin	ENS 3X1P-8
1	+U <sub>B</sub>
2	SP 2
3	0 V
4	SP 1
5	SP 3
6	SP 4
7	Analogue fluid level
8	Analogue temperature

## Model code:

ENS 3 X 1 X - X - XXXX - 000 - K

### Temperature sensor

- 1 = With temperature sensor
- 2 = Without temperature sensor

### Mechanical connection

- 1 = 22 mm collar to fit cutting ring coupling G22L

### Electrical connection

- 6 = Male M12x1, 4 pole only possible on output models "2" and "3"
- 8 = Male M12x1, 5 pole only possible on output model "5"
- P = Male M12x1, 8 pole only possible on output model "8"

### Output

- 2 = 2 switching outputs only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8"
- 8 = 4 switching outputs and 2 analogue outputs only in conjunction with electrical connection type "P"

### Probe length (physical) in mm

0250; 0410; 0520; 0730

### Modification number

000 = Standard

### Probe material

K = Ceramic

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, splash guards, etc. can be found in the Accessories brochure.

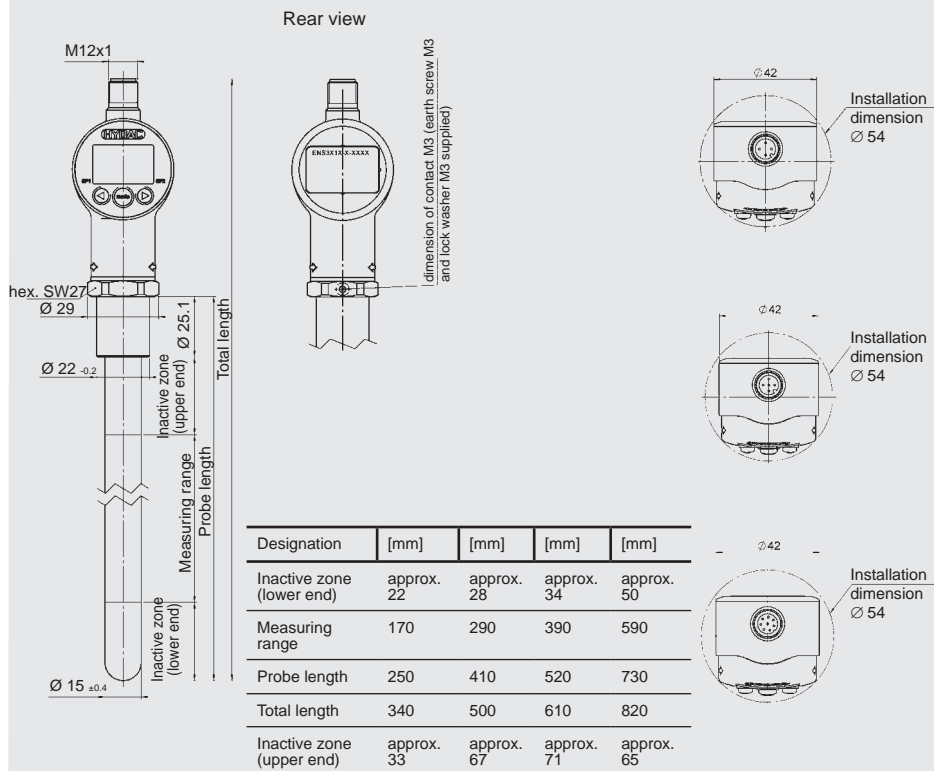
## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

## Dimensions:



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## Electronic Level Switch ENS 3000 with IO-Link Interface



### Description:

The ENS 3000 with IO-Link communication interface is an electronic level switch with integrated display. The instrument has a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V). The ENS 3000 can be used not only for oil but also for water and is available with or without temperature sensor.

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The level switch series ENS 3000 with communication interface IO-Link according to specification V1.1 has been specially designed to connect sensors in automation systems. Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

### Special features:

- IO-Link interface
- 1 PNP transistor output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- Selectable for use with oil or water
- 4-digit display
- Display rotates in two axes for optimal alignment

### Technical data:

<b>Input data</b>	
Sensor type	Capacitive level sensor
Probe length	250; 410; 520; 730 mm
Measuring range	170; 290; 390; 590 mm
Max. speed of change in the fluid level	40; 60; 80; 100 mm/s
Repeatability <sup>1)</sup>	≤ ± 2 % FS
Switching point accuracy	≤ ± 2 % FS
<b>Temperature (optional)</b>	
Sensor type	Semi-conductor sensor
Measuring range	-25 .. +100 °C
Accuracy	± 1.5 °C
Reaction time (t <sub>90</sub> )	180 s
<b>Output data</b>	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analogue output
<b>Analogue output</b>	
Signal	selectable: 4 .. 20 mA load resistance max. 500 Ω 0 .. 10 V load resist. min. 1 kΩ corresponds to measuring range selected
<b>Switch outputs</b>	
Type	PNP transistor switching output
Assignment	On version with temperature measurement user-selectable temperature or fluid level
Switching current	max. 250 mA per output
Switching cycles	> 100 million
<b>Parameterisation</b>	
<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push buttons on the ENS 3000</b>	
<b>Environmental conditions</b>	
Compensated temperature range	0 .. +60 °C
Operating temperature range	0 .. +60 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range	0 .. +60 °C
CE-mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance according to DIN EN 60068-2-6 (0 .. 500 Hz)	≤ 5 g
Shock resistance according to DIN EN 60068-2-29 (11 ms)	≤ 25 g
Protection class to IEC 60529	IP 67
<b>Other data</b>	
Max. tank pressure	0.5 bar (short-term 3 bar, t < 1 min)
Supply voltage	9 .. 35 V DC without analogue output 18 .. 35 V DC with analogue output
Current consumption	≤ 0.590 A with active switching outputs ≤ 90 mA with inactive switching outputs ≤ 110 mA with inactive switching output and analogue output
Residual ripple of supply voltage	≤ 5 %
Fluids <sup>2)</sup>	Hydraulic oils (mineral based), synth. oils, fluids containing water
Parts in contact with medium	Ceramic
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight	180 .. 300 g, dependent on the probe length

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Specified for calm, non-turbulent fluid

<sup>2)</sup> Other fluids on request

## Setting options:

All terms and symbols used for setting the ENS 3000 as well as the menu structure comply with the specifications in the VDMA Standard for level switches.

## Setting ranges for the switch outputs:

Measuring range/ probe length in cm	Lower limit of RP / FL in cm	Upper limit of SP / FH in cm
17.0 / 25.0	0.2 / 0.3	17.0 / 16.8
29.0 / 41.0	0.3 / 0.5	29.0 / 28.7
39.0 / 52.0	0.4 / 0.6	39.0 / 38.6
59.0 / 73.0	0.6 / 0.9	59.0 / 58.4

Measuring range in cm	Min. difference betw. RP & SP and FL & FH in cm	Increment* in cm
17.0 / 25.0	0.1 / 0.1	0.1
29.0 / 41.0	0.2 / 0.2	0.1
39.0 / 52.0	0.2 / 0.3	0.1
59.0 / 73.0	0.3 / 0.5	0.1

\* All ranges given in the table are adjustable by the increments shown.

SP = switch point

RP = switch-back point

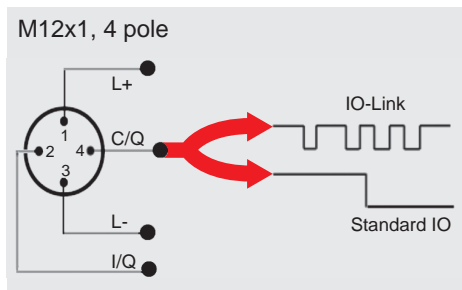
FL = level window lower value

FH = level window upper value

## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to the fluid level or temperature
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Optional analogue output signal to 4 .. 20 mA or 0 .. 10 V
- Analogue output can be assigned to fluid level or temperature as required (depending on version)

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

ENS 3 X 1 6 - L - XXXX - 000 - K

### Temperature sensor

- 1 = With temperature sensor
- 2 = Without temperature sensor

### Mechanical connection

- 1 = Collar Ø 22

### Electrical connection

- 6 = Male M12x1, 4 pole (connector not supplied)

### Output

- L = IO-Link interface

### Probe length, physical

0250; 0410; 0520; 0730 mm

### Modification number

000 = Standard

### Probe material

K = Ceramic

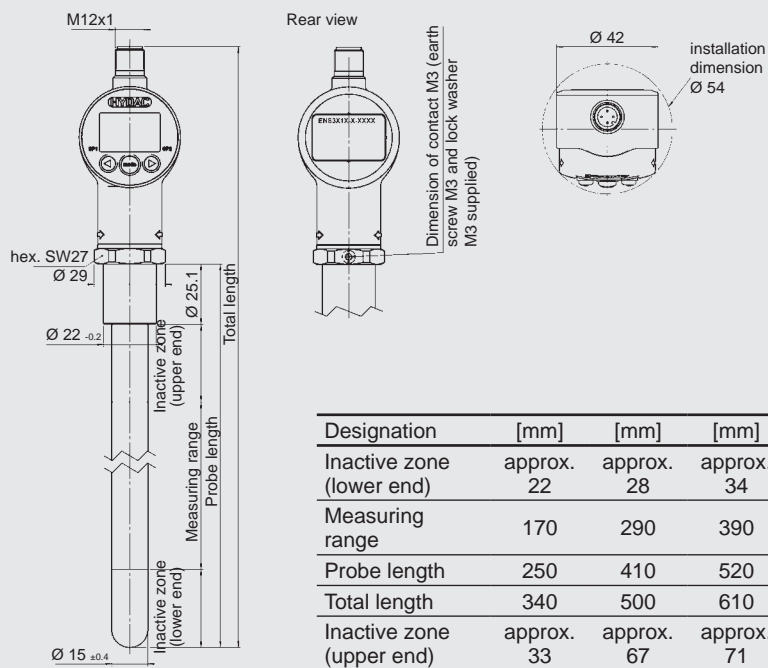
### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical connection adaptors, splash guards, etc. can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Level Switch HNS 3000

### Description:

The HNS 3000 is an electronic level switch with integrated display. The float-based sensor for high-precision analogue monitoring of the fluid level has 1, 2 or 4 switching outputs and an analogue output signal is available as an option.

In addition to the conventional minimum and maximum switching signal, with the 4 output version it is possible to set additional warning signals to prevent problems such as tank overflow or aeration of the pump.

The main applications of this HNS 3000 are primarily in hydraulics, e.g. for fluid level monitoring of a tank.

The sensor is available in probe lengths from 250 to 2500 mm. The instrument is also available with or without temperature sensor.

Depending on the application, several different floats are available, e.g. stainless steel for aggressive media or plastic.

### Special features:

- 1, 2 or 4 independent PNP transistor switching outputs
- User-selectable switch outputs based on the measured value
- Switching and switch-back points can be adjusted independently
- Selectable analogue output available as an option
- 4-digit display
- Various types of float available

### Technical data:

<b>Input data</b>	
Sensor type	Magnetostrictive
Measuring ranges	178; 208; 298; 338; 448; 658 mm
Probe length <sup>1)</sup>	250; 280; 370; 410; 520; 730 mm
Max. speed of change in fluid level	Optional
Repeatability <sup>2)</sup>	≤ ± 1 % FS
Switching point accuracy	≤ ± 1 % FS
<b>Temperature (optional)</b>	
Sensor type	Semi-conductor sensor
Measuring range	-25 °C .. +100 °C
Accuracy	± 1.5 °C
Reaction time (t <sub>90</sub> )	< 100 s
<b>Output data</b>	
<b>Analogue output (optional)</b>	
With 1 or 2 SP selectable	4 .. 20 mA load resistance ≤ 500 Ω 0 .. 10 V load resistance ≥ 1 kΩ corresponds to measurement range selected
With 4 SP (only with temperature sensor)	0 .. 10 V load resistance ≥ 1kΩ corresponds to measurement range selected
<b>Switch outputs</b>	
Type	PNP transistor output programmable as N/O / N/C
Assignment	On version with temperature measurement user-selectable temperature or fluid level
Switching current	1 or 2 SP: max. 1.2 A per output 4 SP: max. 0.25 A per output
Switching cycles	> 100 million
<b>Environmental conditions</b>	
Max. tank pressure	3 bar (short-term 10 bar, t < 1 min)
Operating temperature range	-40 .. +85°C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-40 .. +120 °C
CE-mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6	7.5 mm (5 .. 8.2 Hz) 2.0 g (8.2 .. 150 Hz)
Shock resistance to DIN EN 60068-2-27	20 g (11ms)
Protection class to IEC 60529	IP67
<b>Other data</b>	
Supply voltage (U <sub>s</sub> )	9 .. 35 V DC (without analogue output) 18 .. 35 V DC (with analogue output)
Current consumption (without output)	≤ 150 mA
Residual ripple of supply voltage	≤ 250 mV
Fluids	Hydraulic oils, cooling lubricants
Parts in contact with medium	Stainless steel (1.4301 / 1.4571)
Float	PP (polypropylene); 0.6 kg/dm <sup>3</sup>
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight (dependent on the probe length)	~ 1000 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

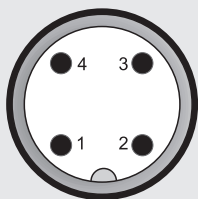
**FS (Full Scale)** = relative to the complete measuring range

<sup>1)</sup> Other probe lengths on request

<sup>2)</sup> Specified for calm, non-turbulent fluid

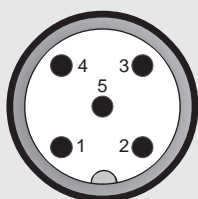
## Pin connections:

M12x1, 4 pole



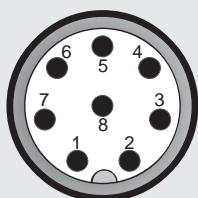
Pin	HNS 3X26-2	HNS 3X26-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	SP 2	Analogue
3	0 V	0 V
4	SP 1	SP 1

M12x1, 5 pole



Pin	HNS 3X28-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

M12x1, 8 pole



Pin	HNS 3X2P-8
1	+U <sub>B</sub>
2	SP 2
3	0 V
4	SP 1
5	SP 3
6	SP 4
7	Analogue level
8	Analogue temperature

## Model code:

HNS 3 X X X - X - XXXX - 000

### Temperature sensor

- 1 = With temperature sensor
- 2 = Without temperature sensor

### Mechanical connection

- 2 = G3/4 A DIN 3852 (male)

### Electrical connection

- 6 = Male M12x1, 4 pole  
only for output models "2" and "3"
- 8 = Male M12x1, 5 pole  
possible only for output model "5"
- P = Male M12x1, 8 pole  
only for output model "8"

### Output

- 2 = 2 switching outputs  
only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output  
only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analogue output  
only in conjunction with electrical connection code type "8"
- 8 = 4 switching outputs and 2 analogue outputs  
only in conjunction with electrical connection type "P"

### Probe length (physical) in mm

0250; 0280; 0370; 0410; 0520; 0730

### Modification number

000 = Standard

### Notes:

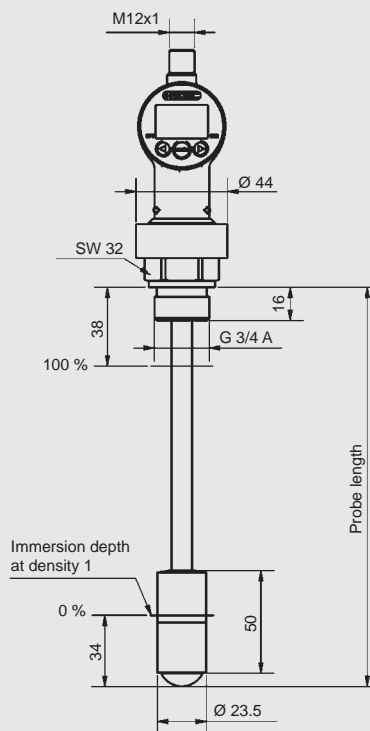
Special models on request.

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, splash guards, etc. can be found in the Accessories brochure.

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

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## Electronic Level Switch HNS 526

### Description:

The level switch HNS 526 is a non-contact, highly compact sensor for fluid level measurement in stationary applications.

By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and measurement rate.

The HNS 526 is available for measurement ranges up to 6400 mm and is obtainable in different signal output variants (2 switching outputs; 1 switching output and 1 analogue output, either 4 .. 20 mA or 0 .. 10 V).

The sensor can be adjusted simply and conveniently via two push-buttons and a self-explanatory menu structure according to VDMA.

The actual fluid level can be displayed in a 3-digit digital display either in absolute value or in percent (selectable); 2 three-colour LEDs also indicate the operating status.

### Special features:

- Non-contact distance measurement
- Measurement range up to 6400 mm
- Various signal output versions available
- Very high resolution and measurement rate
- Integrated temperature compensation
- 3-digit digital display to show the actual distance
- 2 three-colour LEDs to display the operating status
- Switching and switch-back points can be adjusted independently
- Selectable analogue output (optional)
- Only for use in depressurised applications
- Must be installed vertically to the fluid surface

### Technical data:

Input data	
Operating range	280; 480; 1600; 4000; 6400 mm
Blind zone	0 .. 30; 0 .. 85; 0 .. 200; 0 .. 350; 0 .. 600 mm
Maximum range	350; 600; 2000; 5000; 8000 mm
Resolution	≤ 0.18 mm
Output data	
Accuracy	≤ ± 1 % of the actual measured value
Repeatability	± 0.15 % of the actual measured value
Analogue output (optional)	
Signal (short-circuit resistant)	selectable: 4 .. 20 mA, $R_{Lmax} = 100 \Omega (U_B \leq 20 V)$ $R_{Lmax} = 500 \Omega (U_B > 20 V)$ 0 .. 10 V, $R_{Lmin} = 100 k\Omega (U_B \geq 20 V)$
Switch outputs	
Type	PNP transistor output (short-circuit resistant)
Switching current	max. 200 mA per switching output
Switching direction	N/O or N/C, adjustable
Switching cycles	> 100 million
Reaction time	32; 64; 92; 172; 240 ms
Environmental conditions	
Operating temperature	-25 °C .. +70 °C
Storage temperature range	-40 °C .. +85 °C
CE mark	DIN EN 60947-5-2 DIN EN 60947-5-7
Vibration resistance to DIN EN 60068-2-6 (10 .. 55 Hz)	≤ 2 g
Shock resistance to DIN EN 60068-2-27 (11 ms)	≤ 30 g
Protection class to EN 60529	IP 67
Other data	
Supply voltage	9 .. 30 V DC without analogue output 20 .. 30 V DC with analogue output
Time delay before availability	< 300 ms
Residual ripple	± 10%
No-load current consumption	≤ 80 mA
Electrical connection	Male M12x1, 4 pole
Housing	Brass, nickel-plated; Ultrasonic transducer with PEEK film
Controls	2 push-buttons
Display	3-digit, LED-display, 2 three-colour-LEDs
Weight	150; 150; 150; 210; 270 g

Note: Reverse polarity protection of the supply voltage and short circuit protection are provided.

## Setting options:

All the terms and symbols used for setting the HNS 526 as well as the menu structure comply with the specifications of the German Engineering Federation Standard (VDMA 24574-4) for level switches.

In order to prevent unauthorised adjustment of the device, a key-lock can be set.

## Setting ranges of the switching points or switch-back points:

Switching point function distance and window function distance

Oper. scanning range	SP1, SP2, FH1, FH2 *	RP1, RP2, FL1, FL2*
280 mm	2 .. 32 cm 2 .. 13 inch	1 .. 31 cm 1 .. 12 inch
480 mm	2 .. 59 cm 2 .. 23 inch	1 .. 58 cm 1 .. 22 inch
1600 mm	2 .. 180 cm 2 .. 71 inch	1 .. 179 cm 1 .. 70 inch
4000 mm	2 .. 465 cm 2 .. 183 inch	1 .. 464 cm 1 .. 182 inch
6400 mm	2 .. 740 cm 2 .. 291 inch	1 .. 739 cm 1 .. 290 inch

Switching point function:

SP1, SP2 = switching points 1 or 2  
RP1, RP2 = switch-back points 1 or 2

Window function.

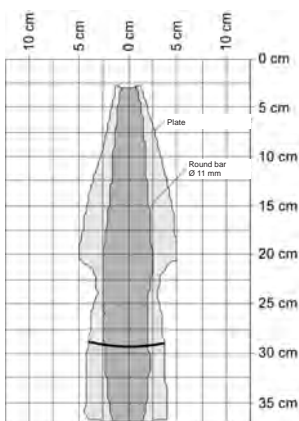
FH1, FH2 = upper switch values 1 or 2  
FL1, FL2 = lower switch values 1 or 2

\* The increment for all devices is 1 cm or 1 inch.

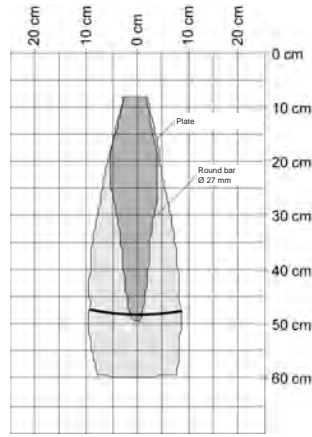
## Recording ranges (for different objects):

The grey areas show the detection range for a very large reflector, e.g. a fluid surface, providing the sensor is ideally positioned. Outside the grey area, it is not possible to evaluate the ultrasonic reflections.

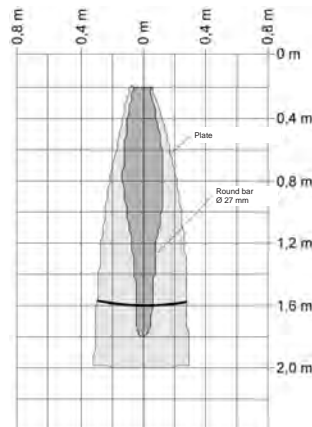
Operational scanning range 280 mm:



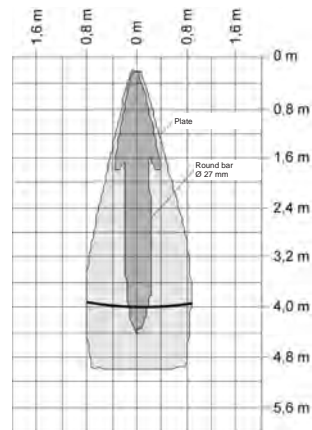
Operational scanning range 480 mm:



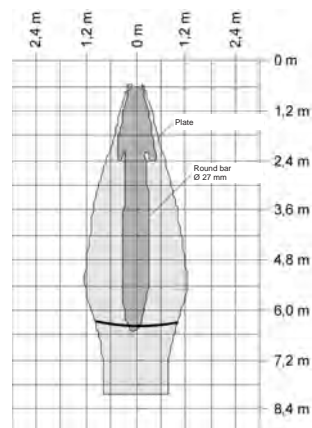
Operational scanning range 1600 mm:



Operational scanning range 4000 mm:



Operational scanning range 6400 mm:

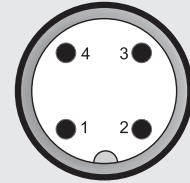


## Additional functions:

- Switching mode of the switching outputs adjustable (switching point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on delay adjustable from 0 to 20 seconds
- Energy saving mode

## Pin connections:

M12x4, 4 pole



Pin	HNS 526-2	HNS 526-3
1	+UB	+UB
2	SP2	I/U
3	0 V	0 V
4	SP1	SP1

## Model code:

HNS 5 2 6 - X - XXXX - 000 - F

### Mechanical connection

2 = M30x1.5

### Electrical connection

6 = Male M12x1, 4 pole  
(connector not supplied)

### Output

2 = 2 switching outputs

3 = 1 switching output and 1 analogue output

### Operational scanning range in mm

0280; 0480; 1600, 4000, 6400

### Modification number

000 = Standard

### Design, front face of sensor

F = Foil

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Note:

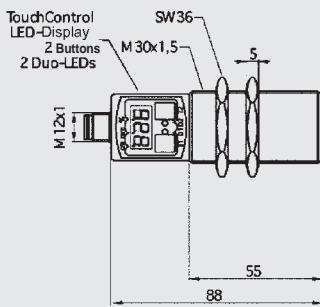
The information in this brochure relates to the operating conditions and applications described.

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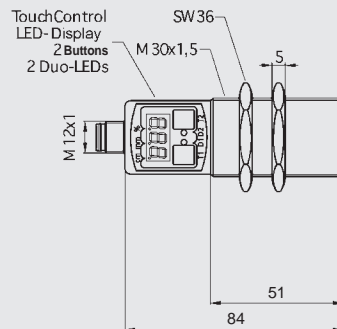
Subject to technical modifications.

## Dimensions:

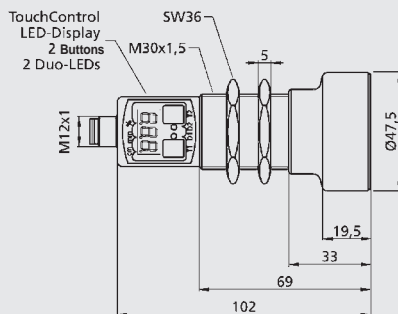
Operational scanning range:  
280 mm



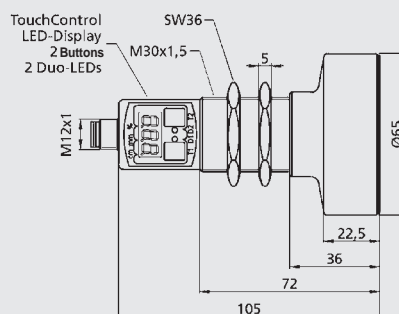
480 mm, 1600 mm



Operational scanning range:  
4000 mm



6400 mm



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## Electronic Level Transmitter HNT 1000

### Description:

The level transmitter HNT 1000 is a float-based sensor for highly accurate analogue recording of fluid levels.

The sensor is available in probe lengths from 250 to 2500 mm. HYDAC offers the HNT 1000 in a pressure-resistant stainless steel housing for in-tank installation.

Depending on the application, a variety of different floats are available, e.g. stainless steel for aggressive media or plastic.

The output signals enable connection to all HYDAC ELECTRONIC GMBH measurement and control devices as well as connection to standard evaluation systems (e.g. PLC controls).

### Special features:

- Probe lengths from 200 to 2500 mm
- Process connection: G3/4 A threaded connection
- High degree of accuracy
- Very robust housing
- Highly resistant to shock and vibration
- Excellent EMC characteristics
- Various float variants available

### Technical data:

Input data	
Sensor type	magnetostrictive
Measuring ranges	178; 208; 298; 338; 448; 658 mm
Probe length <sup>1)</sup>	250; 280; 370; 410; 520; 730 mm
Max. speed of change in fluid level	No orientation restrictions
Output data	
Output signal	4 .. 20 mA load ≤ 500 Ω 0 .. 10 V load ≥ 1 kΩ
Accuracy to DIN 16086 <sup>2)</sup>	≤ ± 1 % FS
Non-linearity at max. setting to DIN 16086	≤ ± 1 % FS
Repeatability	≤ ± 1 % FS
Hysteresis	≤ ± 1 % FS
Rise time	≤ 30 ms
Environmental conditions	
Max. tank pressure	3 bar (short-term 10 bar, t < 1 min)
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-40 .. +120 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6	7.5 mm (5 .. 8.2 Hz) 2.0 g (8.2 .. 150 Hz)
Shock resistance to DIN EN 60068-2-27	20 g (11ms)
Protection class to IEC 60529	IP67
Other data	
Supply voltage (U <sub>B</sub> )	9 .. 36 V DC
Current consumption (without output)	≤ 100 mA
Residual ripple of supply voltage	≤ 250 mV
Fluids	Hydraulic oils, cooling lubricants
Parts in contact with medium	Stainless steel (1.4301 / 1.4571)
Float	PP (polypropylene); 0.6 kg/dm <sup>3</sup>
Weight (dependent on probe and cable lengths)	~ 1000 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

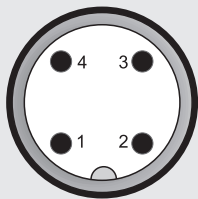
**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Other probe lengths on request

<sup>2)</sup> Specified for calm, non-turbulent fluid

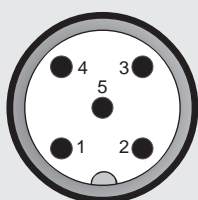
## Pin connections:

M12x1, 4 pole



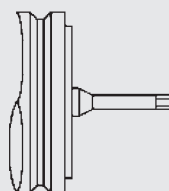
Pin	HNT 1226
1	+U <sub>B</sub>
2	n.c.
3	0 V
4	Signal

M12x1, 5 pole



Pin	HNT 1228
1	+U <sub>B</sub>
2	n.c.
3	0 V
4	Signal
5	n.c.

Cable outlet



Core	HNT 1221
brown	+U <sub>B</sub>
white	0 V
green	Signal
yellow	n.c.

## Model code:

HNT 1 2 2 X - X - XXXX - 000

### Temperature sensor

2 = Without temperature sensor

### Mechanical connection

2 = G 3/4 A DIN 3852 (male)

### Electrical connection

1 = Flying lead, 2 m

6 = Male M12x1, 4 pole

8 = Male M12x1, 5 pole

### Output

B = 0 .. 10 V, 3 conductor

C = 4 .. 20 mA, 3 conductor

### Probe length (physical) in mm

0250; 0280; 0370; 0410; 0520; 0730

### Modification number

000 = Standard

### Notes:

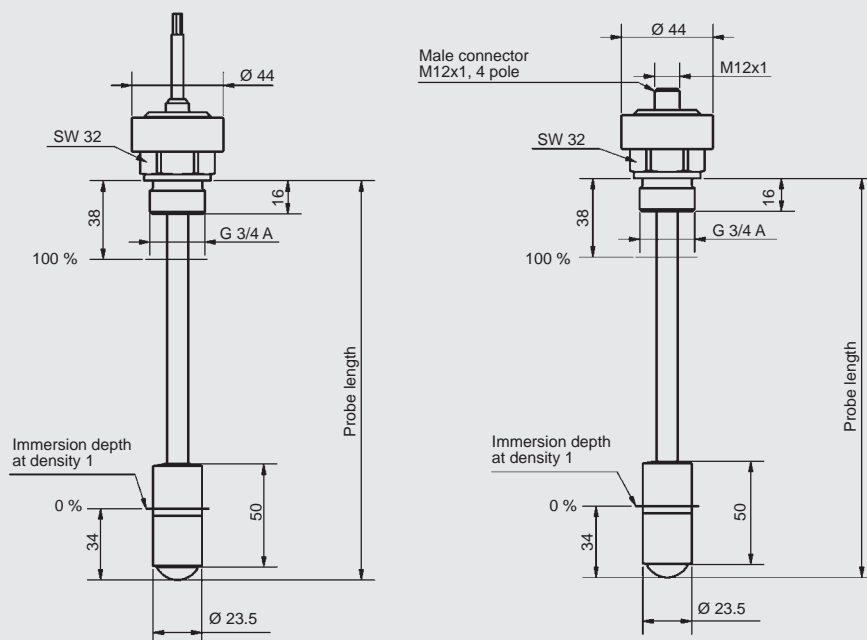
Special models on request.

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories section of the Electronics brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

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## FLOW RATE TRANSMITTERS FLOW SWITCHES

To measure the flow rate in machines and systems HYDAC ELECTRONIC offers various flow rate transmitters and flow switches.

The flow rate transmitter of the EVS 3000 series operates according to the turbine principle (measuring the rpm of an impeller rotating in the fluid flow). Depending on the model, additional connection ports are available for pressure and/or temperature transmitters.

The HYDAC flow switches and transmitters in the HFS 2000 and HFT 2000 series are based on the variable area float principle. The test medium deflects a spring-loaded float in the direction of the flow, depending on the flow rate. A reed contact is attached to the outside of the instrument. When the magnet inside the float reaches the preset position, the reed contact will switch.







Electronic flow rate transmitters for general applications:

	Page
EVS 3110	165
EVS 3100	167

Electromechanical flow switches and transmitters for general applications:

	Page
HFS 2100	169
HFS 2500	173
HFT 2100	177
HFT 2500	181

Further flow rate transmitters for special applications can be found in the section "*Service Instruments*".

Flow rate sensors, flow switches	EVS 3110 	EVS 3100 	HFS 2100 	HFS 2500 	HFT 2100 	HFT 2500 
Accuracy (max. error)	2	2	10	5	10	3
Pressure-resistant	✓	✓	✓	✓	✓	✓
Water-based media	✓			✓		✓
Oil / viscous fluids		✓	✓		✓	
Direction of flow optional	✓	✓				
Installation position optional	✓	✓	✓	✓	✓	✓
Max. number of switching contacts			2	2		
Analogue output	✓	✓			✓	✓
Display			✓	✓		
ATEX Intrinsically safe			✓	✓		

**Note:**  
Not all feature combinations are possible. For precise information, please consult the relevant data sheet.



## Electronic Flow Rate Transmitter EVS 3110 for Water-Based Fluids

### Description:

The flow rate transmitters in the EVS 3110 series (stainless steel series) are specially designed for use in hydraulic and other fluid technology systems.

They operate according to the turbine principle, i.e. the speed of an impeller turning in the fluid flow is measured and converted into a 4 ... 20 mA analogue signal.

On the EVS 3110 stainless steel range, the impeller has a carbide bearing and the resulting increased robustness also makes it suitable for use in pulsating, dynamic applications.

Two further G1/4 threaded holes in the turbine housing allow additional devices to be connected, e.g. temperature and pressure transmitters.

### Special features:

- Suitable for pressures up to 400 bar
- Viscosities of 1 .. 100 cSt
- Output signal 4 .. 20 mA
- Additional connection of temperature and / or pressure transmitters possible

### Technical data:

#### Input data

Measuring ranges<sup>1)</sup> and operating pressure

EVS 311X-A-0020	1.2 .. 20.0 l/min	400 bar
EVS 311X-A-0060	6.0 .. 60.0 l/min	400 bar
EVS 311X-A-0300	15.0 .. 300.0 l/min	400 bar
EVS 311X-A-0600	40.0 .. 600.0 l/min	400 bar

Additional connection options 2 x G1/4 female threads for pressure and/or temperature sensors

#### Output data

Output signal, permitted load resistance 4 .. 20 mA, 2 conductor  
 $R_{Lmax} = (U_B - 10 V) / 20 mA [k\Omega]$

Accuracy ≤ 2 % of the actual value

#### Environmental conditions

Compensated temperature range	-20 .. +70 °C
Operating temperature range	-20 .. +70 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-20 .. +90 °C

CE mark EN 61000-6-1 / 2 / 3 / 4

Protection class to IEC 60529 IP 65 (Binder 714 M18)  
 IP 67 (M12x1, when an IP 67 connector is used)

#### Other data

Housing material	Stainless steel
Test medium <sup>2)</sup>	Water-based fluids
Viscosity range	1 .. 100 cSt
Calibration viscosity	5 cSt
Supply voltage	10 .. 32 V DC
Residual ripple of supply voltage	≤ 5 %
Weight	~ 1790 g ( 1.2 .. 20.0 l/min) ~ 2100 g ( 6.0 .. 60.0 l/min) ~ 3320 g (15.0 .. 300.0 l/min) ~ 3500 g (40.0 .. 600.0 l/min)

Note: <sup>1)</sup> Other measuring ranges on request

<sup>2)</sup> Other fluids on request

## Model code:

EVS 3 1 1 X - A - XXXX - 000

### Housing material

1 = Stainless steel

### Electrical connection

4 = Male 4 pole Binder series 714 M18  
(connector not supplied)

6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Measuring range

0020 = 1.2 .. 20 l/min

0060 = 6.0 .. 60 l/min

0300 = 15.0 .. 300 l/min

0600 = 40.0 .. 600 l/min

### Modification number

000 = Standard

### Note:

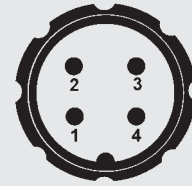
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Pin connections:

Binder series 714 M18



Pin EVS 3114-A

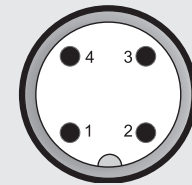
1 reserved

2 Signal +

3 Signal -

4 reserved

M12x1



Pin EVS 3116-A

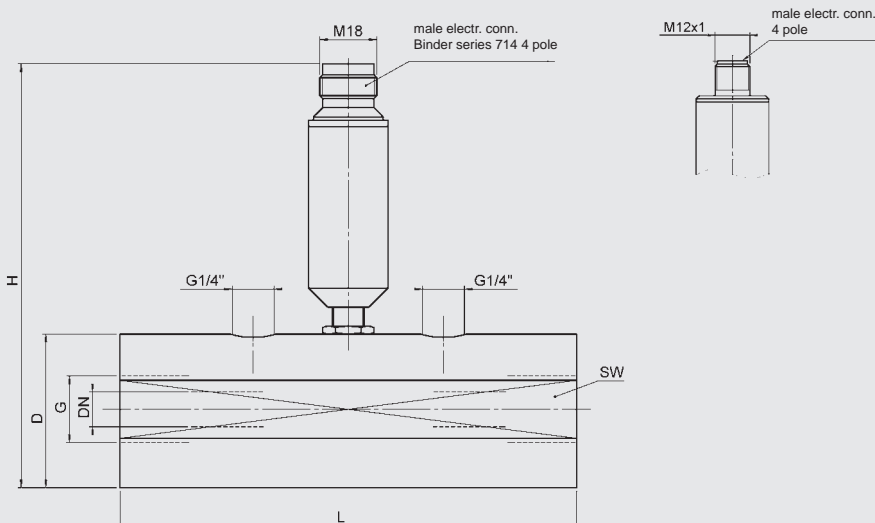
1 Signal +

2 reserved

3 Signal -

4 reserved

## Dimensions:



Model	Meas. range [l/min]	L [mm]	H [mm]	D / SW [mm]	G	Torque value [Nm]	DN [mm]
EVS 311X-A-0020	1.2 .. 20	117	135	47 / 46	G $\frac{1}{4}$ "	60	7
EVS 311X-A-0060	6 .. 60	144	135	48.5 / 46	G $\frac{1}{2}$ "	130	11
EVS 311X-A-0300	15 .. 300	155	150	63.5 / 60	G1 $\frac{1}{4}$ "	500	22
EVS 311X-A-0600	40 .. 600	181	150	63.5 / 60	G1 $\frac{1}{2}$ "	600	30

### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electronic Flow Rate Transmitter EVS 3100 for Oils / Viscous Fluids

### Description:

The flow rate transmitters of the EVS 3100 series (aluminium series) are specially designed for use in hydraulic and other fluid technology systems. They operate according to the turbine principle, i.e. the speed of an impeller turning in the fluid flow is measured and converted into a 4 ... 20 mA analogue signal.

Two further G1/4 threaded holes in the turbine housing allow additional units to be connected, e.g. temperature and pressure transmitters.

### Special features:

- Pressure resistant to 400 bar (depending on model)
- Viscosities of 1 .. 100 cSt
- Output signal 4 .. 20 mA
- Additional connection of temperature and / or pressure transmitters possible

### Technical data:

#### Input data

Measuring ranges<sup>1)</sup> and operating pressure

EVS 310X-A-0020	1.2 .. 20.0 l/min	400 bar
EVS 310X-A-0060	6.0 .. 60.0 l/min	400 bar
EVS 310X-A-0300	15.0 .. 300.0 l/min	400 bar
EVS 310X-A-0600	40.0 .. 600.0 l/min	315 bar
Additional connection options	2 x G1/4 female threads for pressure and/or temperature sensors	

#### Output data

Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 10 V) / 20 mA [k\Omega]$
Accuracy	≤ 2 % of the actual value

#### Environmental conditions

Compensated temperature range	-20 .. +70 °C
Operating temperature range	-20 .. +70 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-20 .. +90 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to IEC 60529	IP 65 (Binder 714 M18) IP 67 (M12x1, when an IP 67 connector is used)

#### Other data

Housing material	Aluminium
Measuring medium <sup>2)</sup>	Hydraulic oils
Viscosity range	1 .. 100 cSt
Calibration viscosity	30 cSt
Supply voltage	10 .. 32 V DC
Residual ripple of supply voltage	≤ 5 %
Weight	~ 730 g ( 1.2 .. 20.0 l/min) ~ 860 g ( 6.0 .. 60.0 l/min) ~ 1410 g (15.0 .. 300.0 l/min) ~ 1530 g (40.0 .. 600.0 l/min)

Note: <sup>1)</sup> Other measuring ranges on request  
<sup>2)</sup> Other fluids on request

## Model code:

EVS 3 1 0 X - A - XXXX - 000

### Housing material

0 = Aluminium

### Electrical connection

4 = Male 4 pole Binder series 714 M18  
(connector not supplied)

6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Measuring range

0020 = 1.2 .. 20 l/min

0060 = 6.0 .. 60 l/min

0300 = 15.0 .. 300 l/min

0600 = 40.0 .. 600 l/min

### Modification number

000 = Standard

### Note:

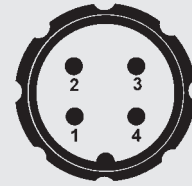
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Pin connections:

Binder series 714 M18



Pin EVS 3104-A

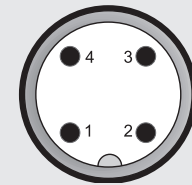
1 reserved

2 Signal +

3 Signal -

4 reserved

M12x1



Pin EVS 3106-A

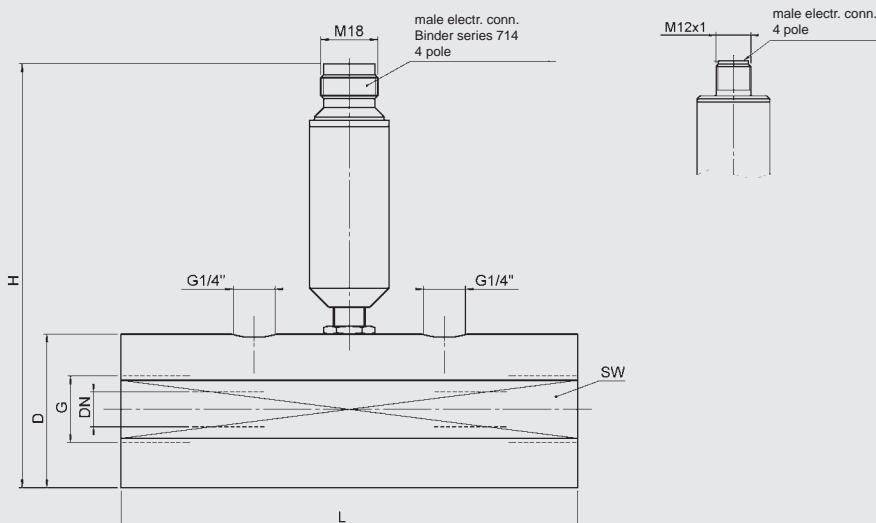
1 Signal +

2 reserved

3 Signal -

4 reserved

## Dimensions:



Model	Meas. range [l/min]	L [mm]	H [mm]	D / SW [mm]	G	Torque value [Nm]	DN [mm]
EVS 310X-A-0020	1.2 .. 20	117	135	47 / 46	G 1/4"	60	7
EVS 310X-A-0060	6 .. 60	144	135	48.5 / 46	G 1/2"	130	11
EVS 310X-A-0300	15 .. 300	155	150	63.5 / 60	G 1 1/4"	500	22
EVS 310X-A-0600	40 .. 600	181	150	63.5 / 60	G 1 1/2"	600	30

### Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## Electro-mechanical Flow Switch HFS 2100 for Oils / Viscous Fluids

### Description:

The HYDAC flow switches of the HFS 2100 series are based on a variable area float principle and are position-independent. The test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A reed contact is fitted to the outside of the device and is therefore separate from the flow circuit. When the magnet inside the float reaches the preset position, the reed contact will switch.

To protect it from external influences, the switch is encapsulated in a casing designed to allow steplessly variable adjustment.

The instruments are designed to be capable of monitoring threshold values reliably, even when the viscosity fluctuates. The kinematic viscosity may vary between 30 and 600 cSt.

The main areas of application are:

- Central lubrication systems
- Oil circuit lubrication systems
- Transformers
- Cooling systems and circuits
- Lubrication circuits
- Hydraulic systems
- Pumps
- Welding machines and laser systems
- Chemical industry
- Research & development

### Medium:

- Oils / viscous fluids

### Special features:

- Accuracy  $\leq \pm 10\%$  FS
- Viscosity compensation from 30 .. 600 cSt
- Any mounting position
- High level of functional reliability
- High level of switching accuracy
- Stepless switch point setting by user
- High pressure resistance
- Threaded connection
- ATEX version also available for potentially explosive areas.

### Technical data:

#### Input data

Switching ranges [l/min]	Size 1	Size 2
	0.5 .. 1.6	0.5 .. 1.5
	0.8 .. 3.0	1 .. 4
	2.0 .. 7.0	2 .. 8
		3 .. 10
		5 .. 15
		8 .. 24
		10 .. 30
		15 .. 45
		20 .. 60
		30 .. 90
		35 .. 110

Operating pressure		
Brass version	300 bar	250 bar
Stainless steel version	350 bar	300 bar
Pressure drop [bar]	0.02 .. 0.2	0.02 .. 0.4
Mechanical connection	See dimensions	
Parts in contact with medium		
Brass version	Stainl. st. 1.4571; FPM <sup>1)</sup> ; Brass, (nickel-pl.); Brass; Hard ferrite	
Stainless steel version	Stainl. st. 1.4571; FPM <sup>1)</sup> ; Hard ferrite	

#### Output data

Switching outputs <sup>2)</sup>	1 or 2 reed contacts Change-over or N/O type	
Accuracy <sup>3)</sup>	$\leq \pm 10\%$ FS	
Repeatability	2 % FS max.	

#### Switching capacity

Change-over contact <sup>4)</sup>	max.	max.
Male connection EN175301-803 (DIN 43650)	250 V / 1.5 A / 50 VA	250 V / 1.5 A / 50 VA
Male connection M12x1	125 V / 1.5 A / 50 VA	250 V / 1.5 A / 50 VA
N/O contact	max.	max.
Male connection EN175301-803 (DIN 43650)	230 V / 3 A / 60 VA	250 V / 3 A / 100 VA
Male connection M12x1	125 V / 3 A / 60 VA	250 V / 3 A / 100 VA

#### Environmental conditions

Operating temperature range	-20 .. +70 °C
Fluid temperature range	
Male connection EN175301-803 (DIN 43650)	-20 .. +120 °C (optional -20 .. +160 °C)
Male connection M12x1	-20 .. +85 °C
Viscosity range	30 .. 600 cSt
CE mark	Directive 2006 / 95 / EC Directive 2004 / 108 / EC
Protection class to IEC 60529	IP 65

#### Other data

Housing material	Brass (nickel-pl.) or stainl. steel 1.4571
Electrical connection	Male connection EN175301-803 (DIN 43650) Male connection M12x1

Note: **FS (Full Scale)** = relative to the complete measuring range

<sup>1)</sup> Other seal materials available on request

<sup>2)</sup> The contact opens / switches when the flow falls below the pre-set switching point.

<sup>3)</sup> 3% possible when calibrated to a certain viscosity

<sup>4)</sup> Minimum load 3 VA

## Model code:

HFS 2 1 X X - XX - XXXX-XXXX - 7 - X - X - 000

### Measuring principle

2 = Variable area float

### Measuring medium

1 = Oils / viscous fluids

### Mechanical connection

4) 5)

1 = 1/4 "

2 = 3/8 "

3 = 1/2 "

4 = 3/4 "

5 = 1 "

### Electrical connection

5 = Male EN175301-803 (DIN 43650)

3 pole + PE, (connector supplied)

6 = Male M12x1, 4-pole (connector not supplied)

### Switching contacts

1S = 1 N/O contact

2S = 2 N/O contacts

1W = 1 Change-over contact

2W = 2 Change-over contacts

### Switching ranges in l/min

#### Oil 10 % -Size 1-

00.5-01.6; 00.8-03.0; 02.0-07.0

#### Oil 10 % -Size 2-

00.5-01.5; 0001-0004; 0002-0008; 0003-0010; 0005-0015; 0008-0024; 0010-0030; 0015-0045; 0020-0060; 0030-0090; 0035-0110

### Accuracy

7 =  $\pm 10.0$  % FS

### Housing material

B = Brass, nickel-plated

S = Stainless steel

### Mechanical indicator

0 = Without indicator

1 = With indicator

### Modification number

000 = Standard

4) Mechanical connection options depend on housing type (see Dimensions)

5) Other models available on request.

6) When the model with 2 switching contacts is selected, the second contact is fitted on the side of the instrument, at 90° to the first contact.

### Note:

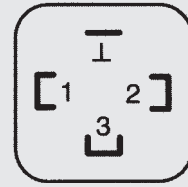
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

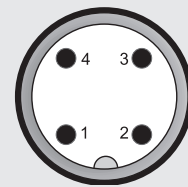
## Pin connections:

EN175301-803 (DIN 43650)



Pin	HFS 21X5-XS	HFS 21X5-XW
1	Centre	Centre
2	N/O contact	N/C contact
3	n.c.	N/O contact
⊥	Housing	Housing

M12x1



Pin	HFS 21X6-XS	HFS 21X6-XW
1	Centre	Centre
2	n.c.	N/C contact
3	n.c.	n.c.
4	N/O contact	N/O contact

## Notes on installation:

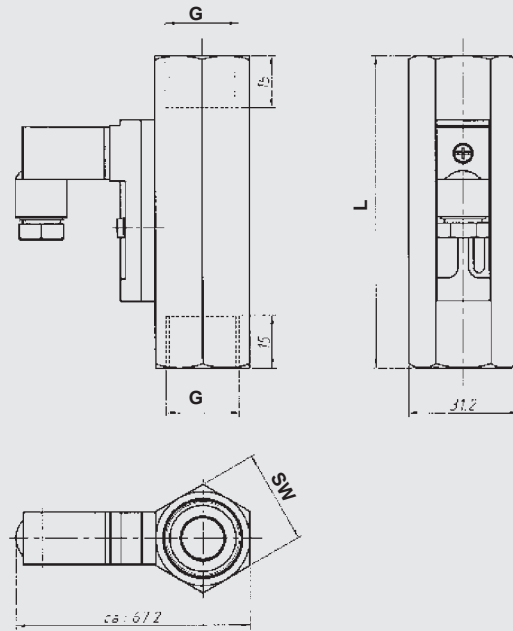
- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!

## Dimensions without indicator:

### OIL -Size 1- without indicator

Type [l/min]	Installation dimensions [mm]				Weight (approx.) [g]
	DN	SW	G	L	
0.5 .. 1.6	8	24	1/4"	98	400
	10	24	3/8"	108	450
	15	27	1/2" <sup>*)</sup>	90	350
0.8 .. 3.0	15	27	1/2"	90	350
2.0 .. 7.0					

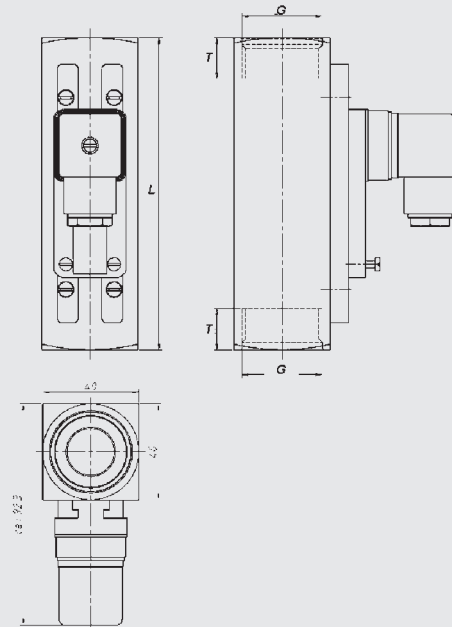
<sup>\*)</sup> Standard



### OIL -Size 2- without indicator

Type [l/min]	Installation dimensions [mm]					Weight (approx.) [g]
	DN	SW	G	L	T	
0.5 .. 1.5	8	34	1/4"	152	10	1500
	15	34	1/2"	152	14	1425
1 .. 4	20	34	3/4"	152	15	1340
	25	40	1" <sup>*)</sup>	130	17	1160
2 .. 8	15	34	1/2"	152	14	1425
3 .. 10						
5 .. 15						
8 .. 24	25	40	1" <sup>*)</sup>	130	17	1160
10 .. 30	20	34	3/4"	152	15	1340
15 .. 45						
20 .. 60						
30 .. 90	25	40	1"	130	17	1160
35 .. 110						

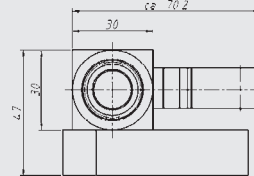
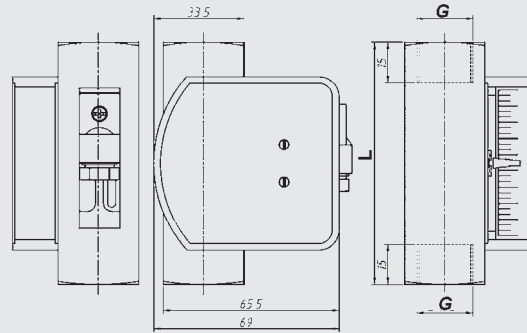
<sup>\*)</sup> Standard



## Dimensions with indicator:

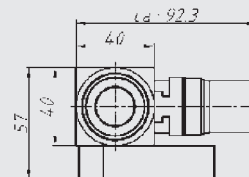
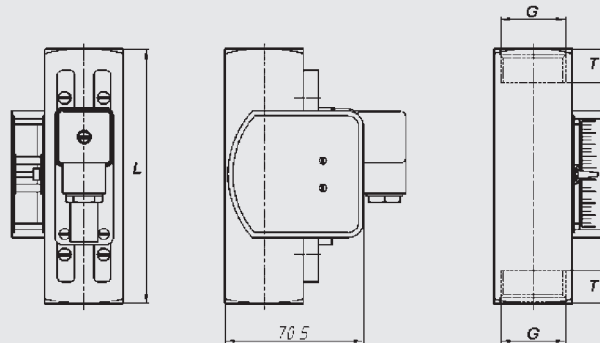
### OIL -Size 1- with indicator

Type [l/min]	Installation dimensions [mm]				Weight (approx.) [g]
	DN	SW	G	L	
0.5 .. 1.6	15	30	1/2"	90	570
0.8 .. 3.0					
2.0 .. 7.0					



### OIL -Size 2- with indicator

Type [l/min]	Installation dimensions [mm]					Weight (approx.) [g]
	DN	SW	G	L	T	
0.5 .. 1.5	8	34	1/4"	152	10	1590
	15	34	1/2"	152	14	1515
1 .. 4	20	34	3/4"	152	15	1430
	25	40	1" *)	130	17	1250
2 .. 8	15	34	1/2"	152	14	1515
3 .. 10						
5 .. 15						
8 .. 24	20	34	3/4"	152	15	1430
10 .. 30	25	40	1" *)	130	17	1250
15 .. 45	25	40	1"	130	17	1250
20 .. 60						
30 .. 90						
35 .. 110	25	40	1"	130	17	1250

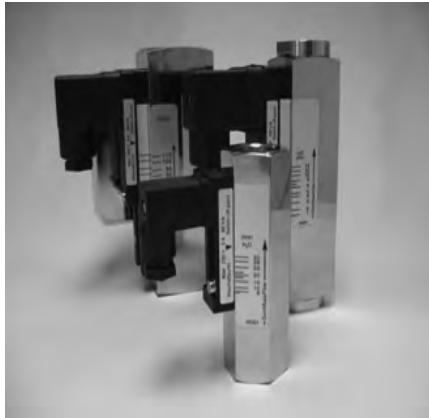


\*) Standard

## Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications and operating conditions not described, please contact the relevant technical department.  
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## Electro-Mechanical Flow Switch HFS 2500 for Water or Water-Based Media

### Description:

The HYDAC Flow Switch in the series HFS 2500 is based on the variable area float principle. The test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A reed contact is fitted to the outside of the instrument and is therefore separate from the flow circuit. When the magnet inside the float reaches the pre-set position, the reed contact will switch. To protect it from external influences, the switch is encapsulated in a casing designed to allow steplessly variable adjustment.

The instruments in the HFS 2500 series are available in two versions, with 5% accuracy and with 10% accuracy. Areas of application are to monitor flow rate in fluids (water / water-based) in the following areas, amongst others:

- Cooling systems and circuits
- Hydraulic systems
- Pumps
- Welding machines and laser systems
- Medical technology
- Pharmaceutical industry
- Chemical industry
- Research & development

### Fluid:

- Water / water-based media

### Special features:

- Accuracy  $\leq \pm 5\%$  or  $\leq \pm 10\%$  FS
- Any mounting position
- High level of function reliability
- High level of switching accuracy
- Stepless switch point setting by user
- High pressure resistance
- Threaded connection
- ATEX version also available for potentially explosive atmospheres

Note: FS (Full Scale) = relative to complete measuring range

1) Other seal materials available on request

2) The contact opens / switches when the flow falls below the pre-set switching point.

3) Minimum load 3 VA

### Technical data:

Input data				
Switching ranges [l/min]	5 % accuracy		10 % accuracy	
			Size 1	Size 2
0.2 .. 4.0	8 .. 90	0.005..0.06	0.02 .. 0.2	10 .. 30
0.6 .. 5.0	5 .. 110	0.04 .. 0.13	0.2 .. 0.6	15 .. 45
0.5 .. 8.0	10 .. 150	0.1 .. 0.6	0.4 .. 1.8	20 .. 60
1 .. 14	35 .. 220	0.2 .. 1.2	0.8 .. 3.2	30 .. 90
1 .. 28	35 .. 250	0.4 .. 2.0	2 .. 7	60 .. 150
2 .. 40		0.5 .. 3.0	3 .. 13	
4 .. 55		1.0 .. 5.0	4 .. 20	
1 .. 70			8 .. 30	
Operating pressure				
Brass version	200 bar	300 bar	300 bar	250 bar
Stainless steel version	300 bar	350 bar	350 bar	300 bar
Pressure drop [bar]	0.02 .. 0.8	0.02 .. 0.2	0.02 .. 0.3	0.02 .. 0.4
Mechanical connection	See dimensions			
Parts in contact with medium				
Brass version	Stainless steel 1.4571; NBR <sup>1)</sup> ; Brass; nickel-plated; Brass; Hard ferrite			
Stainless steel version	Stainless steel 1.4571; FPM <sup>1)</sup> ; Hard ferrite			
Output data				
Switching outputs <sup>2)</sup>	1 or 2 reed contacts Change-over or N/O type <sup>2)</sup>			
Accuracy	$\leq \pm 5\%$ or $\leq \pm 10\%$ FS			
Repeatability	2 % FS max.			
Switching capacity				
Change-over contact <sup>3)</sup>	max.	max.	max.	max.
Male connection	- 250 V	- 200 V	- 250 V	- 250 V
EN175301-803 (DIN 43650)	- 1.5 A	- 1 A	- 1.5 A	- 1.5 A
	- 50 VA	- 20 VA	- 50 VA	- 50 VA
Male connection M12x1	max.	max.	max.	max.
	- 250 V	- 125 V	- 125 V	- 250 V
	- 1.5 A	- 1 A	- 1.5 A	- 1.5 A
	- 50 VA	- 20 VA	- 50 VA	- 50 VA
N/O contact	max.	max.	max.	max.
Male connection	- 250 V	- 200 V	- 230 V	- 250 V
EN175301-803 (DIN 43650)	- 3 A	- 1 A	- 3 A	- 3 A
	- 100 VA	- 20 VA	- 60 VA	- 100 VA
Male connection M12x1	max.	max.	max.	max.
	- 250 V	- 125 V	- 125 V	- 250 V
	- 3 A	- 1 A	- 3 A	- 3 A
	- 100 VA	- 20 VA	- 60 VA	- 100 VA
Environmental Conditions				
Operating temperature range	-20 .. + 70 °C			
Fluid temperature range				
Male connection				
EN175301-803 (DIN 43650)	-20 .. +100 °C (optional -20 .. +160 °C)			
Male connection M12x1	-20 .. +85 °C			
CE mark				
Directive 2006 / 95 / EC Directive 2004 / 108 / EC				
Protection class to IEC 60529	IP 65			
Other data				
Housing material	Brass (nickel-plated) or stainless steel 1.4571			
Electrical connection	Male connection EN175301-803 (DIN 43650) Male connection M12x1			

## Model code:

HFS 2 5 X X - XX - XXXX-XXXX - X - X - X - 000

### Measuring principle

2 = Variable area float

### Test medium

5 = Water or water-based

### Mechanical connection

4)5)

1 = 1/4 "

2 = 3/8 "

3 = 1/2 "

4 = 3/4 "

5 = 1 "

6 = 1 1/4 "

7 = 1 1/2 "

### Electrical connection

5 = Male EN175301-803

(DIN 43650)

3 pole + PE

(connector supplied)

6 = Male M12x1, 4-pole

(connector not supplied)

### Switching contacts

1S = 1 N/O contact

2S = 2 N/O contacts

1W = 1 Change-over contact

2W = 2 Change-over contacts

### Switching ranges in l/min

Water 5 %

00.2-04.0; 00.6-05.0; 00.5-08.0;

01.0-0014; 01.0-0028; 02.0-0040; 04.0-0055;

01.0-0070; 08.0-0090; 0005-0110; 0010-0150;

0035-0220; 0035-0250;

### Water 10 % - Size 1 - (only available without mech. indicator)

.005-0.06; 0.04-0.13; 00.1-00.6; 00.2-01.2;

00.4-02.0; 00.5-03.0; 01.0-05.0

### Water 10 % - Size 2 -

0.02-00.2; 00.2-00.6; 00.4-01.8; 00.8-03.2;

02.0-07.0; 03.0-0013; 04.0-0020; 08.0-0030

### Water 10 % - Size 3 -

0010-0030; 0015-0045; 0020-0060;

0030-0090; 0060-0150

### Accuracy

6 =  $\leq \pm 5.0$  % FS

7 =  $\leq \pm 10.0$  % FS

### Housing material

B = Brass (nickel-plated)

S = Stainless steel

### Mechanical indicator

0 = Without indicator

1 = With indicator

### Modification number

000 = Standard

4) Mechanical connection options depend on housing type (see Dimensions)

5) Other models available on request.

6) When the model with 2 switching contacts is selected, the second contact is fitted on the side of the instrument at 90° to the first contact.

### Note:

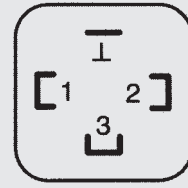
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

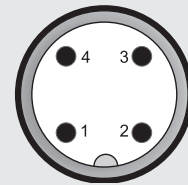
## Pin connections:

EN175301-803 (DIN 43650)



Pin	HFS 25X5-XS	HFS 25X5-XW
1	Centre	Centre
2	N/O contact	N/C contact
3	n.c.	N/O contact
⊥	Housing	Housing

M12x1



Pin	HFS 25X6-XS	HFS 25X6-XW
1	Centre	Centre
2	n.c.	N/C contact
3	n.c.	n.c.
4	N/O contact	N/O contact

## Notes on installation:

- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!

## Dimensions without indicator:

Type [l/min]	Installation dimensions [mm]							Weight (approx.) [g]
	SW	D	B	G	DN	T	L	

### Water 5 % Accuracy

0.2 .. 4.0	27	30	86	1/4" 3/8" 1/2"	8 10 15	14	130	850
0.6 .. 5.0								
0.5 .. 8.0								
1 .. 14								
1 .. 28	27	30	86	1/2" 3/4"	15 20	14 16	148 174	900
2 .. 40								
4 .. 55								
1 .. 70	34 40	40 40	96 96	3/4" 1"	20 25	18 19	152 156	1400 1100
8 .. 90								
5 .. 110								
10 .. 150	50	50	101	1 1/4"	32	21	200	2750
35 .. 220	50	50	106	1 1/4"	32	21	200	3000
35 .. 250	60	50	107	1 1/2"	40	24	200	3800

### Water 10 % Accuracy - Size 1-

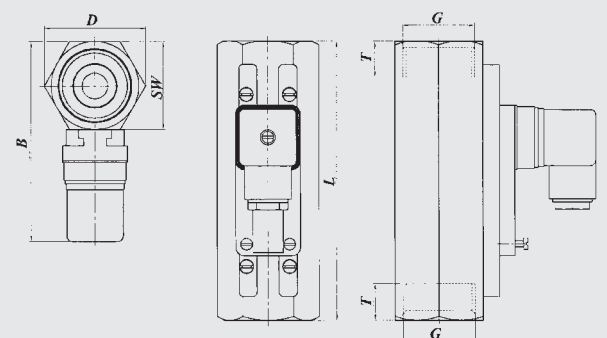
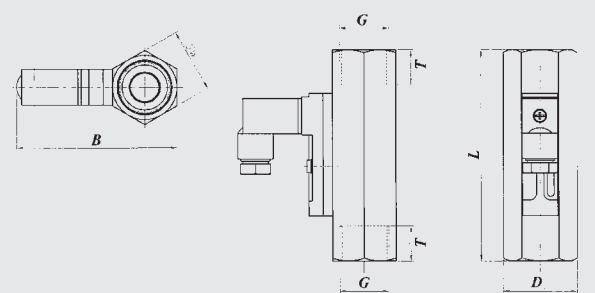
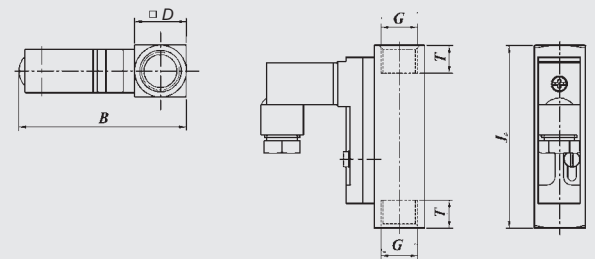
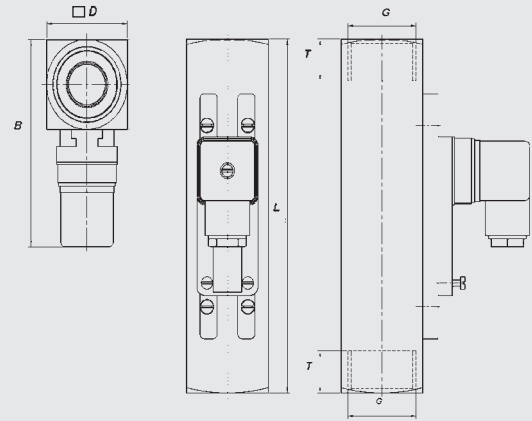
0.005..0.06	17	18	56	1/4"	8	10	65	140
0.04..0.13								
0.1..0.6								
0.2..1.2								
0.4..2.0								
0.5..3.0								
1.0..5.0								

### Water 10 % Accuracy - Size 2 -

0.02 .. 0.2	27	31	67	1/2 "	15	15	90	350
0.2 .. 0.6								
0.4 .. 1.8								
0.8 .. 3.2								
2.0 .. 7.0								
3.0 .. 13.0								
4.0 .. 20.0								
8.0 .. 30.0								

### Water 10 % Accuracy - Size 3 -

10 .. 30	41	47	93	3/4 " 1" *)	20 25	21 17	152 130	1200 1050
15 .. 45								
20 .. 60								
30 .. 90								
60 .. 150	41	47	93	1"	25	17	130	1050



\*) Standard

## Dimensions with indicator:

Type [l/min]	Installation dimensions [mm]							Weight (approx.) [g]
	SW	D	B	G	DN	T	L	

### Water 5 % Accuracy

0.2 .. 4.0	27	30	86	1/4" 3/8" 1/2"	8 10 15	14	130	940
0.6 .. 5.0								
0.5 .. 8.0								
1 .. 14								
1 .. 28	27	30	86	1/2" 3/4"	15 20	14 16	148 174	990
2 .. 40								
4 .. 55								
1 .. 70	34	40	96	3/4" 1"	20 25	18 19	152 156	1490 1190
8 .. 90								
5 .. 110	50	50	101	1 1/4"	32	21	200	2840
10 .. 150								
35 .. 220								
35 .. 250	60	50	107	1 1/2"	40	24	200	3890

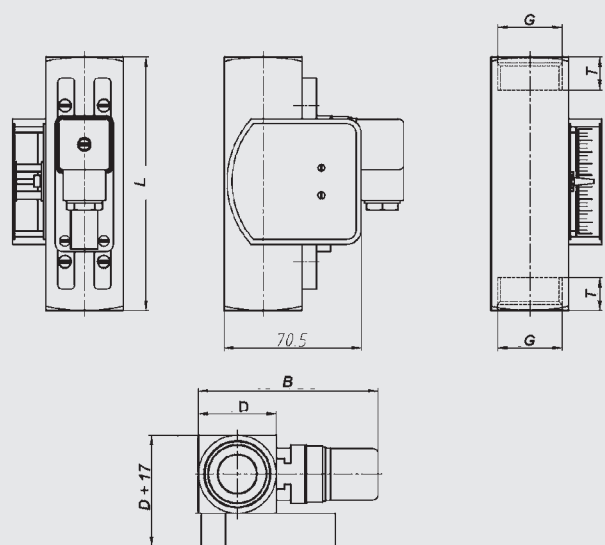
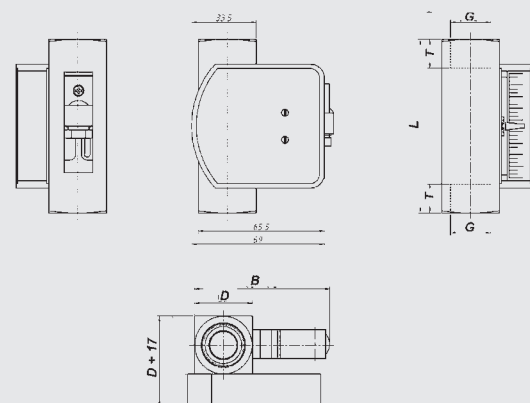
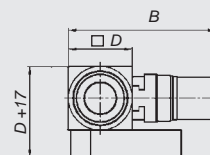
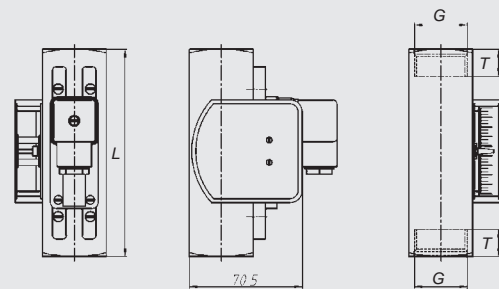
### Water 10 % Accuracy - Size 2-

0.02 .. 0.2	30	30	70	1/2"	15	15	90	570
0.2 .. 0.6								
0.4 .. 1.8								
0.8 .. 3.2								
2.0 .. 7.0								
3.0 .. 13.0								
4.0 .. 20.0								
8.0 .. 30.0								

### Water 10 % Accuracy - Size 3 -

10 .. 30	41	47	93	3/4" 1" *)	20 25	21 17	152 130	1430 1250
15 .. 45								
20 .. 60								
30 .. 90								
60 .. 150	41	47	93	1"	25	17	130	1250

\*) Standard



## Note:

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For applications or operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

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## Electronic Flow Transmitter HFT 2100 for Oils / Viscous Fluids

### Description:

The HFT 2100 series of HYDAC flow transmitters is based on the variable area float principle.

Irrespective of the installation position, the test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate.

A Hall sensor which detects the position of the float, is fitted to the outside of the instrument and is therefore separate to the flow circuit.

In proportion to the deflection of the float, the sensor produces an analogue signal which corresponds to the particular measuring range.

The device is calibrated for vertical installation and for an upwards flow direction. The transmitter is designed to give reliable measurements within its accuracy range, even with changes in viscosity. The kinematic viscosity may vary between 30 and 600 cSt.

The areas of application include:

- Central lubrication systems
- Oil circuit lubrication systems
- Transformers
- Cooling systems and circuits
- Lubrication circuits
- Hydraulic systems
- Pumps
- Welding machines and laser systems
- Chemical industry
- Research & development

### Medium:

- Oils / viscous fluids

### Special features:

- Accuracy  $\leq \pm 10\%$  FS
- Viscosity compensation from 30 .. 600 cSt
- Any mounting position
- High level of functional reliability
- High pressure resistance
- Threaded connection

### Technical data:

#### Input data

Measuring ranges [l/min]	Size 1	Size 2
	0.5 .. 1.6	0.5 .. 1.5
	0.8 .. 3.0	1 .. 4
	2.0 .. 7.0	2 .. 8
		3 .. 10
		5 .. 15
		8 .. 24
		10 .. 30
		15 .. 45
		20 .. 60
		30 .. 90
		35 .. 110

Operating pressure		
Brass version	300 bar	250 bar
Stainless steel version	350 bar	300 bar
Pressure drop [bar]	0.02 .. 0.2	0.02 .. 0.4
Mechanical connection	See dimensions	
Parts in contact with medium		
Brass version	Stainl. st. 1.4571; FPM <sup>1)</sup> ; Brass, nickel-plated; Brass; Hard ferrite	
Stainless steel version	Stainl. st. 1.4571; FPM <sup>1)</sup> ; Hard ferrite	

#### Output data

Output signal	4 .. 20 mA, 3 conductor
	0 .. 10 V, 3 conductor
Accuracy <sup>2)</sup>	$\leq \pm 10\%$ FS
Repeatability	1 % FS max.

#### Environmental conditions

Operating temperature range	-20 .. +70 °C
Fluid temperature range	-20 .. +70 °C
Viscosity range	30 .. 600 cSt
CE mark	Directive 2004 / 108 / EC
Protection class to IEC 60529	IP 67

#### Other data

Supply voltage	18 .. 30 V
Power consumption	< 1 W
Electrical connection	Male connection M12x1
Housing material	
Measuring body	Brass (nickel-plated) or st. steel 1.4571
Transmitter	Brass (nickel-plated)

Note: **FS (Full Scale)** = relative to the complete measuring range

<sup>1)</sup> Other seal materials available on request

<sup>2)</sup> 3 % possible with calibration to a certain viscosity

## Model code:

HFT 2 1 X 6 - X - XXXX-XXXX - 7 - X - 0 - 000

### Measuring principle

2 = Variable area float

### Measuring medium

1 = Oils / viscous fluids

### Mechanical connection

2) 3)

1 = 1/4 "

2 = 3/8 "

3 = 1/2 "

4 = 3/4 "

5 = 1 "

### Electrical connection

6 = Male M12x1, 4 pole  
(connector not supplied)

### Output signal

B = 0 .. 10 V, 3 conductor

C = 4 .. 20 mA, 3 conductor

### Measuring ranges in l/min <sup>3)</sup>

#### Oil 10 % - Size 1 -

00.5-01.6; 00.8-03.0; 02.0-07.0

#### Oil 10 % -Size 2-

00.5-01.5; 0001-0004; 0002-0008; 0003-0010;  
0005-0015; 0008-0024; 0010-0030; 0015-0045;  
0020-0060; 0030-0090; 0035-0110

### Accuracy

7 =  $\leq \pm 10.0$  % FS

### Housing material

B = Brass, nickel-plated

S = Stainless steel

### Mechanical indicator

0 = Without indicator

### Modification number

000 = Standard

2) Mechanical connection options depend on housing type  
(see Dimensions)

3) Other models available on request.

### Note:

Special models on request.

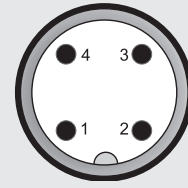
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Pin connections:

M12x1



Pin	HFT 21X6-C	HFT 21X6-B
1	+U <sub>B</sub>	+U <sub>B</sub>
2	reserved	reserved
3	GND	GND
4	4 .. 20 mA	0 .. 10 V

## Notes on installation:

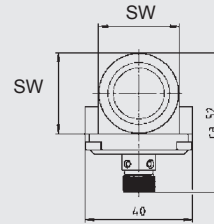
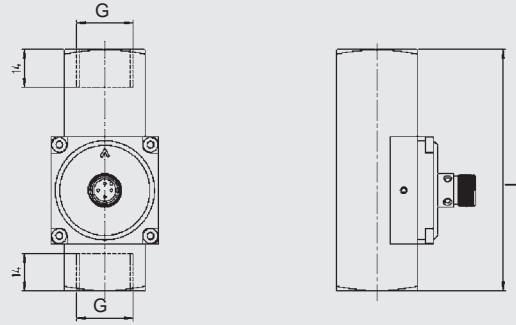
- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!

## Dimensions:

### Size 1

Type [l/min]	Installation dimensions [mm]				Weight (approx.) [g]
	DN	SW	G	L	
0.5 .. 1.6	8	24	1/4"	98	610
	10	24	3/8"	119	660
	15	30	1/2" <sup>*)</sup>	90	560
0.8 .. 3.0	15	30	1/2"	90	560
2.0 .. 7.0					

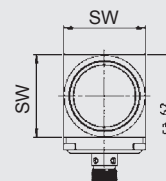
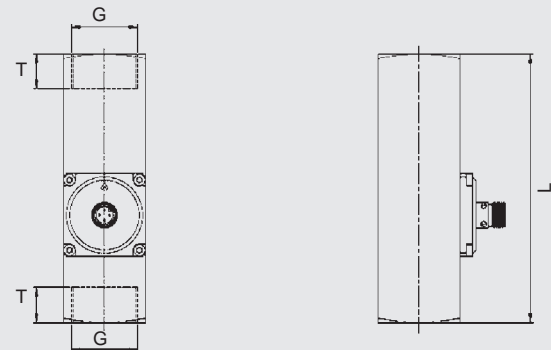
<sup>\*)</sup> Standard



### Size 2

Type [l/min]	Installation dimensions [mm]					Weight (approx.) [g]
	DN	SW	G	L	T	
0.5 .. 1.5	8	34	1/4"	152	10	1510
	15	34	1/2"	152	14	1435
1 .. 4	20	34	3/4"	152	15	1350
	25	40	1" <sup>*)</sup>	130	17	1170
2 .. 8	15	34	1/2"	152	14	1435
3 .. 10						
5 .. 15						
8 .. 24	25	40	1" <sup>*)</sup>	130	17	1170
10 .. 30	20	34	3/4"	152	15	1350
15 .. 45						
20 .. 60	25	40	1"	130	17	1170
30 .. 90						
35 .. 110						

<sup>\*)</sup> Standard



## Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications and operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

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## Electronic Flow Transmitter HFT 2500 for water / water-based media

### Description:

The HFT 2500 series of HYDAC flow transmitters is based on the variable area float principle and is position-independent.

The test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate but irrespective of the installation position. A Hall sensor is fitted to the outside of the device and is therefore also outside the flow circuit. It determines the position of the float.

The sensor emits an analogue signal proportional to the deflection of the float which corresponds to the relevant measurement range.

The device is calibrated for vertical installation and for a flow direction from bottom to top.

Areas of application are to monitor flow rate in fluids (water / water-based) in the following areas, amongst others:

- Cooling systems and circuits
- Hydraulic systems
- Pumps
- Welding machines and laser systems
- Medical technology
- Pharmaceutical industry
- Chemical industry
- Research & development

### Medium:

- Water or water-based media

### Special features:

- Accuracy  $\leq \pm 3\%$  FS
- Any mounting position
- High level of functional reliability
- High pressure resistance
- Threaded connection

### Technical data:

Input data					
Measuring ranges [l/min]	Size 1	Size 2	Size 3	Size 4	
0.005..0.06		0.02 .. 0.2	10 .. 30	0.2 .. 4.0	8 .. 90
0.04 .. 0.13		0.2 .. 0.6	15 .. 45	0.6 .. 5.0	5 .. 110
0.1 .. 0.6		0.4 .. 1.8	20 .. 60	0.5 .. 8.0	10 .. 150
0.2 .. 1.2		0.8 .. 3.2	30 .. 90	1 .. 14	35 .. 220
0.4 .. 2.0		2 .. 7	60 .. 150	1 .. 28	35 .. 250
0.5 .. 3.0		3 .. 13		2 .. 40	
1.0 .. 5.0		4 .. 20		4 .. 55	
		8 .. 30		1 .. 70	
Operating pressure					
Brass version	300 bar	300 bar	250 bar	200 bar	
Stainless steel version	350 bar	350 bar	300 bar	300 bar	
Pressure drop [bar]	0.02 .. 0.2	0.02 .. 0.3	0.02 .. 0.4	0.02 .. 0.8	
Mechanical connection	See dimensions				
Parts in contact with medium					
Brass version	Stainl. steel 1.4571; NBR <sup>1)</sup> ; Brass (nickel-pl.); Brass; Hard ferrite				
Stainless steel version	Stainless steel 1.4571; FPM <sup>1)</sup> ; Hard ferrite				
Output data					
Output signal	4 .. 20 mA, 3-conductor 0 .. 10 V, 3-conductor				
Accuracy	$\leq \pm 3\%$ FS				
Repeatability	1 % FS				
Environmental conditions					
Operating temperature range	-20 .. +70 °C				
Fluid temperature range	-20 .. +70 °C				
CE mark	Directive 2004 / 108 / EC				
Protection class to IEC 60529	IP 67				
Other data					
Supply voltage	18 .. 30 V DC				
Power consumption	< 1 W				
Housing material					
Measuring body	Brass (nickel-plated) or stainless steel 1.4571				
Transmitter	Brass (nickel-plated)				
Electrical connection	Male connection M12x1				

Note: FS (Full Scale) = relative to the complete measuring range  
1) Other seal materials available on request

## Model code:

HFT 2 5 X 6 – X – XXXX–XXXX – 5 – X – 0 – 000

### Measuring principle

2 = Variable area float

### Test medium

5 = Water /  
water-based

### Mechanical connection<sup>2)</sup>

1 = 1/4 "  
2 = 3/8 "  
3 = 1/2 "  
4 = 3/4 "  
5 = 1 "  
6 = 1 1/4 "  
7 = 1 1/2 "

### Electrical connection

6 = Male M12x1, 4 pole  
(connector not supplied)

### Output signal

B = 0 .. 10 V, 3 conductor  
C = 4 .. 20 mA, 3 conductor

### Measuring ranges in l/min

#### Size 1

.005-0.06; 0.04-0.13; 0.1-0.6; 0.2-0.12; 0.4-0.20;  
0.5-0.30; 0.1-0.50

#### Size 2

0.02-0.2; 0.2-0.6; 0.4-1.8; 0.8-3.2; 0.2-0.70;  
0.3-0.13; 0.4-0.20; 0.8-0.30

#### Size 3

0.010-0.030; 0.015-0.045; 0.020-0.060; 0.030-0.090; 0.060-0.150

#### Size 4

0.2-0.40; 0.6-0.50; 0.5-0.80; 0.1-0.014; 0.1-0.028;  
0.2-0.040; 0.4-0.055;  
0.1-0.070; 0.8-0.090; 0.005-0.110; 0.010-0.150;  
0.035-0.220; 0.035-0.250

### Accuracy

5 =  $\leq \pm 3.0\%$  FS

### Housing material

B = Brass (nickel-plated)  
S = Stainless steel

### Mechanical indicator

0 = Without indicator

### Modification number

000 = Standard

2) Mechanical connection options depend on housing type  
(see Dimensions)

### Note:

Special models on request.

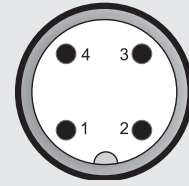
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Pin connections:

M12x1



Pin	HFT 25X6-C	HFT 25X6-B
1	+U <sub>B</sub>	+U <sub>B</sub>
2	reserved	reserved
3	GND	GND
4	4 ..20 mA	0 ..10 V

## Notes on installation:

- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!

## Dimensions:

Type [l/min]	Installation dimensions							Weight (approx.) [g]
	[mm]							
	SW	D	B	G	DN	T	L	

### Size 1

0.005..0.06	17	18	39	1/4"	8	10	65	210
0.04..0.13								
0.1..0.6								
0.2..1.2								
0.4..2.0								
0.5..3.0								
1.0..5.0								

### Size 2

0.02 .. 0.2	30	30	62	1/2 "	15	14	90	560
0.2 .. 0.6								
0.4 .. 1.8								
0.8 .. 3.2								
2.0 .. 7.0								
3.0 .. 13.0								
4.0 .. 20.0								
8.0 .. 30.0								

### Size 3

10 .. 30	34 40	40	62	3/4 " 1" *)	20 25	15 17	152 130	1200 1050
15 .. 45								
20 .. 60								
30 .. 90								
60 .. 150	40	40	62	1"	25	17	130	1050

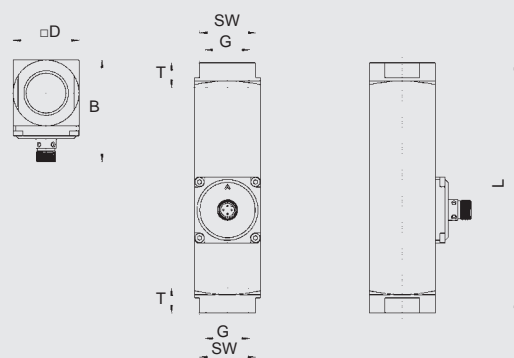
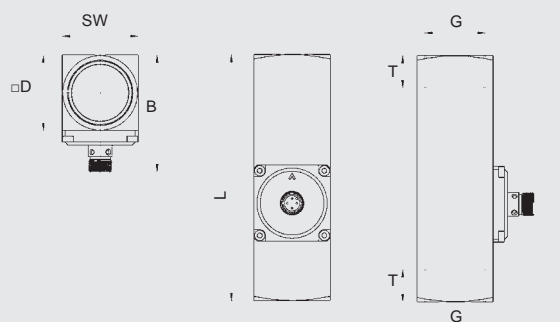
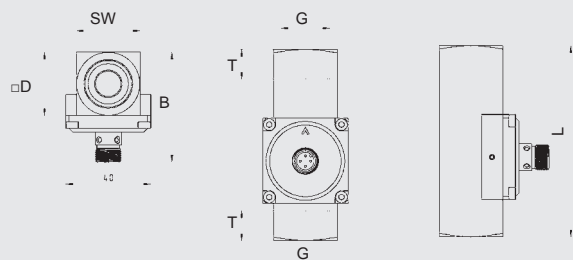
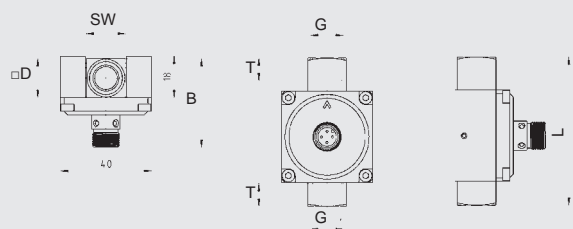
### Size 4

0.2 .. 4.0	27	40	52	1/4" 3/8" 1/2"	8 10 15	14	131	900
0.6 .. 5.0								
0.5 .. 8.0								
1 .. 14								
1 .. 28	27 32	40	52	1/2" 3/4"	15 20	14 16	146 174	950
2 .. 40								
4 .. 55	34 40	40 40	62 62	3/4" 1"	20 25	18 19	152 156	1420 1120
1 .. 70								
8 .. 90								
5 .. 110	50	50	72	1 1/4"	32	21	200	2770
10 .. 150								
35 .. 220								
35 .. 250	60	50	72	1 1/2"	40	24	200	3820

\*) Standard

### Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.



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## SPEED SENSORS

The contact-free speed sensors of the HSS series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

Speed sensors for general applications:

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## Electronic Speed Sensor HSS 110

### Description:

The contact-free speed sensors of the HSS 110 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 6K9K, the devices can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with small module and high resolution, especially in vehicles and mobile machines with electrical and hydraulic drives.

### Special features:

- 1-channel Hall differential sensor
- Different signal outputs available
- Extremely compact design
- Wide frequency range
- Alignment required on installation
- Large air gap

### Technical data:

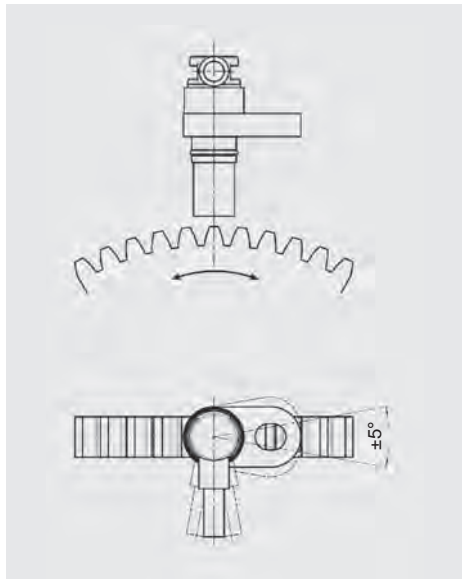
Input data	
Frequency range	NPN: 0.1 .. 20,000 Hz PWM: 1.0 .. 5,000 Hz
Probe length	18.4 mm
Probe diameter	10.2 / 9.4 mm
Max. pressure on sensing surface	25 bar, static
Air gap / installation distance	Module 1: 0.2 .. 0.8 mm Module 1.25: 0.2 .. 1.4 mm Module 1.5: 0.2 .. 1.8 mm Module 2: 0.2 .. 2.4 mm Module 3: 0.2 .. 2.9 mm
Mechanical connection	Flange, single, asymmetrical, cable outlet 90°
Type of installation	Dependent on direction (with asymmetrical flange)
Torque value	max. 8 Nm
Housing material	Brass
Seal	FPM
Output data	
Variants	1-channel frequency or 1-channel frequency / direction of rotation (PWM)
Types	1 NPN frequency output or 1 PWM output, 4 .. 20 mA
Switching capacity / current rating	NPN: ≤ 40 mA PWM: ≤ 200 mA
Direction of rotation	Flange on left, gear turns to right, for duration of PWM signal pulse
Signal level	LOW: ≤ 0.6 V / 4 .. 9 mA PWM HIGH: +U <sub>B</sub> / 12 .. 17 mA PWM
Environmental conditions	
Operating temperature range	-40 .. +140 °C
Media resistance of housing	Salt water; various hydraulic oils; diesel oils; cleaning agent; salt spray
CE mark	DIN EN 60947-5-2
Vibration resistance to EN 60068-2-64	0.05 g <sup>2</sup> / Hz, 20 .. 2,000 Hz
Shock resistance to EN 60068-2-27	100 g, 6 ms, 3x in each direction
Protection class to IEC 60529 to ISO 20653	IP 67 IP 6K9K
Other data	
Electrical connection	Flying leads, 3-core, cable length 1 m
Supply voltage	NPN: 12.5 .. 32 V DC PWM: 4.5 .. 20 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 30 mA at 30 V DC
Average life expectancy	200,000 h (MTTF)
Weight	~ 50 g

Note: Reverse polarity protection of the supply voltage and short circuit protection (max. 50 mA) are provided.

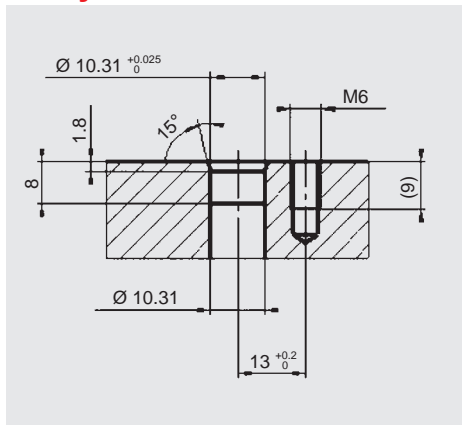
## Pin connections:

Core	HSS 110-1	HSS 110-4
red	+U <sub>B</sub>	+U <sub>B</sub>
black	0 V	PWM
blue	Frequency	

## Mounting position tolerance:



## Specification for installation cavity:



## Model code:

HSS 1 1 0 - X - 018 - 000

### Signal type

- 1 = Output 1: Frequency
- 4 = Output 1: Frequency and direction of rotation PWM

### Probe length

018 = 18.4 mm

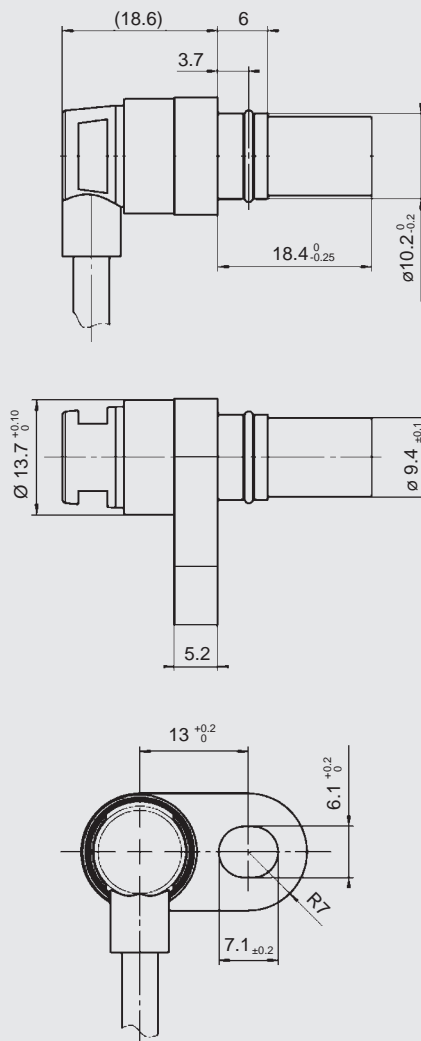
### Modification number

000 = Standard

### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Dimensions:



## Note:

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Subject to technical modifications.

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## Electronic Speed Sensor HSS 120

### Description:

The contact-free speed sensors of the HSS 120 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

The instruments are available for different insertion depths. For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 69K, the instruments can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with a small module and high resolution, especially in vehicles and mobile machines with hydraulic drives.

### Special features:

- 2-channel Hall differential sensor
- Wide frequency range
- Alignment required when installing
- Large air gap

### Technical data:

Input data	
Frequency range	0.1 .. 20,000 Hz
Probe length	30; 35; 45 mm
probe diameter	15 / 12 mm
Max. pressure on sensing surface	15 bar, dynamic
Air gap / installation distance	<b>Probe length: 30 mm</b> <b>35 / 45 mm</b> Module 1: 0.2 .. 1.0 mm    0.2 .. 1.3 mm Module 1.25: 0.2 .. 1.5 mm    0.2 .. 1.8 mm Module 1.5: 0.2 .. 1.7 mm    0.2 .. 2.0 mm Module 2: 0.2 .. 2.2 mm    0.2 .. 2.5 mm Module 2.5: 0.2 .. 3.2 mm    0.2 .. 3.5 mm
Mechanical connection	Flange, single, asymmetrical, cable outlet 90° (30 mm) / axial (35, 45 mm)
Type of installation	Dependent on direction (with asymmetrical flange)
Torque value	10 Nm
Housing material	Brass
Seal	FPM
Output data	
Variant	2-channel speed (90° / 270° phase shift for module 2)
Type	2 NPN frequency outputs
Switching capacity	≤ 50 mA ≥ 10 kΩ ohmic load ≤ 2.2 nF capacitive load
Direction of rotation	Flange on left, gear turns to right: channel A lagging; channel B leading
Signal level	LOW: ≤ 0.5 V HIGH: +U <sub>B</sub>
Environmental conditions	
Operating temperature range	-40 .. +140 °C (-40 .. +160 °C for max. 500 operating hours)
Media resistance of housing	Salt water; various hydraulic oils; diesel oils; cleaning agent; salt spray
CE mark	DIN EN 60947-5-2
Vibration resistance to EN 60068-2-64	30 g, 10 .. 500 Hz, 100 min in each direction
Shock resistance to EN 60068-2-27 / -29	50 g, 11 ms, 3x in each direction 100 g, 6 ms, 3x in each direction
Protection class to IEC 60529 to ISO 20653	IP 67 IP 69K
Other data	
Electrical connection	Flying leads, 4-core, cable length 1 m
Supply voltage	7 .. 30 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 30 mA at 30 V DC
Average life expectancy	200,000 h (MTTF)
Weight	~ 80 g

Note: Reverse polarity protection of the supply voltage and short circuit protection (max. 50 mA) are provided

## Pin connections:

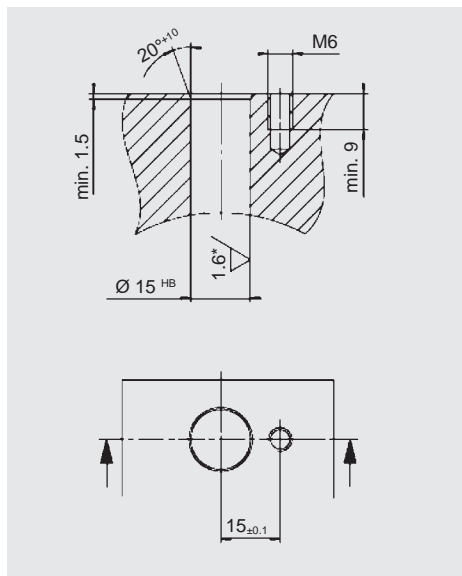
Core	HSS 120-2
brown	+U <sub>B</sub>
blue	Frequency 1 (A)
black	0 V
white	Frequency 2 (B)

## Adjustment angle for other modules:

It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor through the angle indicated in the table below.

-20°	Module 1	
-15°	Module 1.25	
-10°	Module 1.5	
± 0°	Module 2	± 0°
	Module 2.5	+15°

## Specification for installation cavity:



\* For sealing function RA 1.6, otherwise 3.2

## Model code:

HSS 1 2 0 - 2 - XXX - 000

### Signal technology

2 = Outputs 1 and 2: Frequency (90° phase shift)

### Probe length

030 = 30 mm

035 = 35 mm

045 = 45 mm

### Modification number

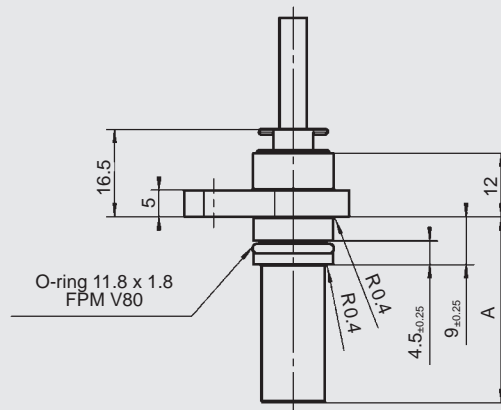
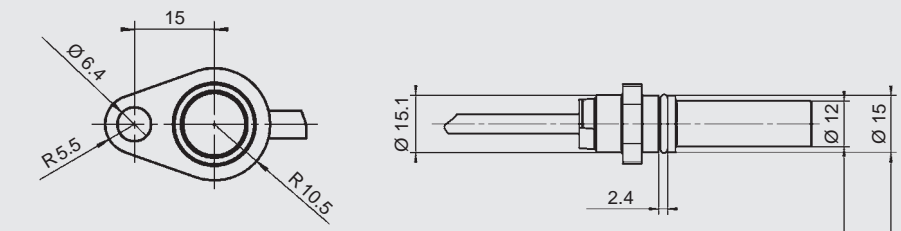
000 = Standard

### Notes:

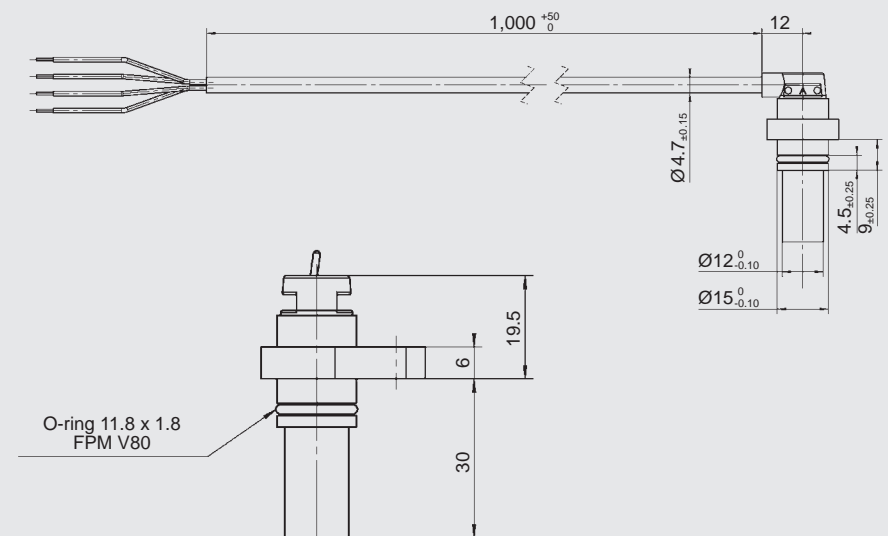
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Dimensions:

Probe length (A): 35 mm, 45 mm



Probe length: 30 mm



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## Electronic Speed Sensor HSS 130

### Description:

The contact-free speed sensors of the HSS 130 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

The instruments are available in different insertion depths. For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 69K, the devices can be used in almost any application and any mounting position.

These devices are mainly used for detection of speed and rotation direction on rotary sensors, also under extreme environmental conditions.

### Special features:

- 2-channel Hall differential sensor
- Single-core seal
- Very high EMC resistance
- Large air gap

### Technical data:

Input data	
Frequency range	0.1 .. 20,000 Hz
Probe length	16; 32 mm
probe diameter	18 mm
Max. pressure on sensing surface	10 bar, dynamic
Air gap / installation distance	Module 1: 0.2 .. 1.3 mm Module 1.25: 0.2 .. 1.8 mm Module 1.5: 0.2 .. 2.0 mm Module 2: 0.2 .. 2.5 mm Module 2.5: 0.2 .. 3.5 mm
Mechanical connection	Double flange, asymmetrical, cable outlet at 90°
Type of installation	Dependent on direction (with asymmetrical flange)
Torque value	10 Nm
Housing material	Brass / plastic (PA6 GF30)
Seal	FPM
Output data	
Variants	2-channel speed (90° phase shift) or 2-channel speed / direction of rotation
Types	2 NPN frequency outputs or 1 NPN frequency output + 1 NPN direction of rotation output
Switching capacity	≤ 500 mA
Direction of rotation	Cable outlet at 90°, gear rotation to right: channel A leading; channel B lagging or rotational direction signal (right: HIGH / left: LOW)
Signal level	LOW: ≤ 2 V HIGH: ≥ U <sub>B</sub> - 2 V
Environmental conditions	
Operating temperature range	-40 .. +125 °C
Media resistance of housing	Saltwater, various hydraulic oils
CE mark	DIN EN 60947-5-2
Vibration resistance to EN 60068-2-36	5 .. 57 Hz (1.5 mm p-p) 57 .. 2000 Hz (10 g)
Shock resistance to EN 60068-2-27	15 g, 11 ms, in each direction 25 g, 6 ms, in each direction
Protection class to IEC 60529 to ISO 20653	IP 67 IP 6K9K
Other data	
Electrical connection	Flying leads, 4-core, 43 cm cable length
Supply voltage	8 .. 32 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 33 mA at 24 V, both outputs LOW < 23 mA at 24 V, both outputs HIGH
Average life expectancy	120,000 h (MTTF)
Weight	~ 110 g

Note: Reverse polarity protection of the supply voltage and short circuit protection are provided.

## Pin connections:

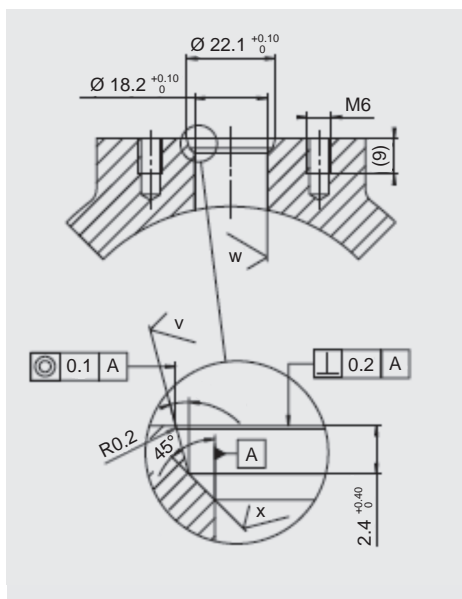
Core	HSS 130-2	HSS 130-3
brown	+U <sub>B</sub>	+U <sub>B</sub>
blue	0 V	0 V
black	Frequency 1	Frequency
white	Frequency 2	Direction of rotation

## Adjustment angle for other modules:

It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor through the angle indicated in the table below.

-12°	Module 1	
- 9°	Module 1.25	
- 7°	Module 1.5	
- 3°	Module 1.75	
± 0°	Module 2	± 0°
	Module 2.25	+ 4°
	Module 2.5	+ 8°
	Module 2.75	+13°
	Module 3	+17°

## Specification for installation cavity:



- General tolerances for chipping processes: ISO 2768-mH
- Tolerance: ISO 8015
- Surface quality: ISO 1302

## Model code:

**HSS 1 3 0 - X - XXX - 000**

### Signal technology

- 2 = Outputs 1 and 2: Frequency (90° phase shift)
- 3 = Output 1: Frequency  
Output 2: Direction of rotation

### Probe length

- 016 = 16 mm
- 032 = 32 mm

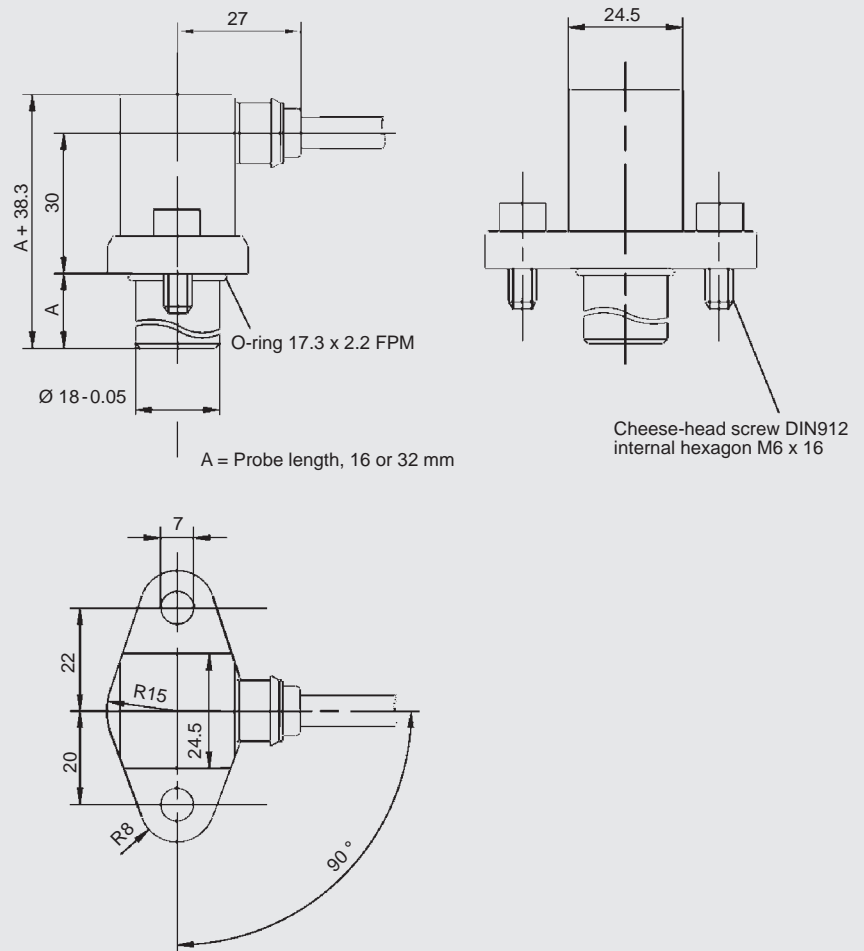
### Modification number

- 000 = Standard

### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Dimensions:



### Note:

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## Electronic Speed Sensor HSS 210

### Description:

The contact-free speed sensors of the HSS 210 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 67, the instruments can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with a small module and high resolution, especially in vehicles and mobile machines with hydraulic drives.

### Special features:

- 2-channel Hall differential sensor
- Wide frequency range
- Alignment required when installing
- Large air gap
- Simple installation

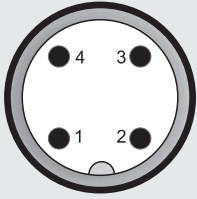
### Technical data:

Input data	
Frequency range	0.1 .. 20,000 Hz
Installation depth	0 .. 50 mm adjustable
Max. pressure on sensing surface	5 bar, static / dynamic
Air gap / installation distance	Module 1: 0.2 .. 1.0 mm Module 1.25: 0.2 .. 1.5 mm Module 1.5: 0.2 .. 1.7 mm Module 2: 0.2 .. 2.2 mm Module 2.5: 0.2 .. 3.2 mm
Mechanical connection	
Mechanical connection	Screw-in thread M12x1
Type of installation	Dependent on direction
Torque value	13 Nm
Housing material	Brass
Output data	
Variants	2-channel speed (90° phase shift) or 2-channel speed / direction of rotation
Types	2 push-pull frequency outputs or 1 push-pull frequency output + 1 push-pull direction of rotation output
Switching capacity	≤ 50 mA
Direction of rotation	Marking on housing in direction of rotation, gear rotation to right: channel A leading; channel B lagging or direction of rotation signal (right: HIGH / left: LOW)
Signal level	LOW: ≤ 2 V HIGH: ≥ U <sub>B</sub> - 2 V
Environmental conditions	
Operating temperature range	-40 .. +125 °C
Media resistance of housing	Oils: HETG; HEES, HFD; HVL; HLP
CE mark	DIN EN 60947-5-2
Vibration resistance to EN 60068-2-64	0.05 g <sup>2</sup> /Hz, 20 .. 2,000 Hz
Shock resistance to EN 60068-2-27	30 g, 11 ms
Protection class to IEC 60529	IP 67 (when an IP 67 female connector is used)
Other data	
Electrical connection	Male M12x1, 4 pole
Supply voltage	8 .. 30 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 30 mA at 30 V DC
Average life expectancy	200,000 h (MTTF)
Weight	~ 40 g

Note: Reverse polarity protection of the supply voltage and short circuit protection are provided.

## Pin connections:

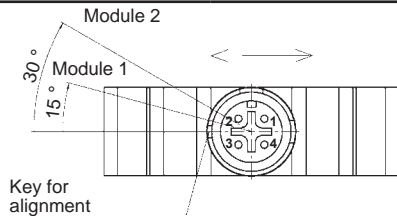
M12x1, 4 pole



Pin	HSS 210-2	HSS 210-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Frequency 1 (A)	Frequency
3	0 V	0 V
4	Frequency 2 (B)	Direction of rotation

## Adjustment angle for other modules:

It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor through the angle indicated in the table below.



Module 1	+15°
Module 1.25	+18°
Module 1.5	+23°
Module 2	+30°
Module 2.5	+38°

## Model code:

HSS 2 1 0 - X - 050 - 000

### Signal technology

- 2 = Outputs 1 and 2: Frequency (90° phase shift)
- 3 = Output 1: Frequency  
Output 2: Direction of rotation

### Installation depth

050 = 50 mm max.

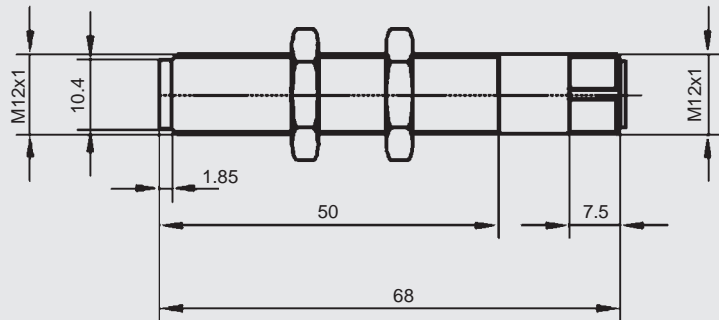
### Modification number

000 = Standard

### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Dimensions:



## Note:

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## Electronic Speed Sensor HSS 220

### Description:

The contact-free speed sensors of the HSS 220 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 68, the instruments can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with a small module and high resolution, especially in rail vehicles and mobile machines.

### Special features:

- 2-channel Hall differential sensor
- Wide frequency range
- Alignment required when installing
- Large air gap
- Simple installation

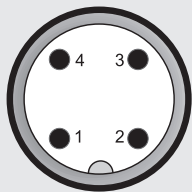
### Technical data:

<b>Input data</b>	
Frequency range	0.1 .. 20,000 Hz
Installation depth	0 .. 46 mm adjustable
Max. pressure on sensing surface	10 bar, static
Air gap / installation distance	Module 1: 0.2 .. 1.3 mm Module 1.25: 0.2 .. 1.8 mm Module 1.5: 0.2 .. 2.0 mm Module 2: 0.2 .. 2.5 mm Module 2.5: 0.2 .. 3.5 mm
Mechanical connection	Screw-in thread M18x1
Type of installation	Dependent on direction
Torque value	12 Nm
Housing material	X12CrNiS18 8
<b>Output data</b>	
Variants	2-channel speed (90° phase shift) or 2-channel speed / direction of rotation
Types	2 NPN frequency outputs or 1 NPN frequency output + 1 NPN direction of rotation output
Switching capacity	≤ 50 mA (36 V, 125 °C, 50 % duty cycle) ≤ 500 mA (24 V, 25 °C, 50 % duty cycle)
Direction of rotation	Marking on housing at 90° to rotational direction, gear rotation to right: channel A leading, channel B lagging or direction of rotation signal (right: HIGH / left: LOW)
Signal level	LOW: ≤ 2 V HIGH: ≥ +U <sub>B</sub> - 2 V
<b>Environmental conditions</b>	
Operating temperature range	-40 .. +125 °C
Media resistance of housing	Saltwater, various hydraulic oils
CE mark	DIN EN 60947-5-2
Vibration resistance to EN 60068-2-6	15 g / 1 .. 2000 Hz
Shock resistance to EN 60068-2-27	30 g, 11 ms
Protection class to IEC 60529	IP 68 (when female connector is fitted)
<b>Other data</b>	
Electrical connection	Male M12x1, 4 pole
Supply voltage	8 .. 32 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 33 mA at 24 V, both outputs LOW < 23 mA at 24 V, both outputs HIGH
Average life expectancy	200,000 h (MTTF)
Weight	~ 80 g

Note: Reverse polarity protection of the supply voltage and short circuit protection are provided.

## Pin connections:

M12x1, 4 pole



Pin	HSS 220-2	HSS 220-3
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Frequency 2	Direction of rotation
3	0 V	0 V
4	Frequency 1	Frequency

## Adjustment angle for other modules:

It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor through the angle indicated in the table below.



-12°	Module 1	
- 9°	Module 1.25	
- 7°	Module 1.5	
- 3°	Module 1.75	
± 0°	Module 2	± 0°
	Module 2.25	+ 4°
	Module 2.5	+ 8°
	Module 2.75	+13°
	Module 3	+17°

## Model code:

HSS 2 2 0 - X - 046 - 000

### Signal technology

- 2 = Outputs 1 and 2: Frequency (90° phase shift)  
 3 = Output 1: Frequency  
 Output 2: Direction of rotation

### Installation depth

046 = 46 mm max.

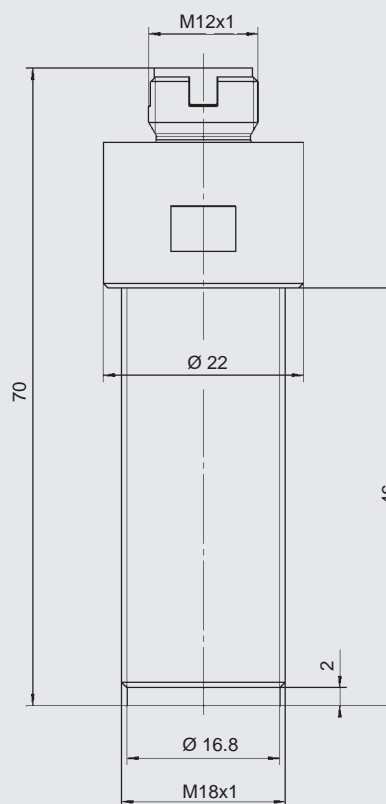
### Modification number

000 = Standard

### Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Dimensions:



### Note:

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## ELECTRONIC PRESSURE TRANSMITTERS AND LINEAR POSITION TRANSDUCERS FOR APPLICATIONS WITH INCREASED FUNCTIONAL SAFETY

"Failsafe" is the keyword for vehicle designers of mobile machinery. No single error is allowed to cause a breakdown or malfunction of part or all of the system in safety-critical applications.

For use in safety-critical applications, these pressure transmitters are certified for Performance Level "d" (PLd) according to DIN EN ISO 13849. The linear position transducers PLd comply with DIN EN 13849-1 and also with the comparable safety level SIL 2 in accordance with the standard applicable worldwide for electronic products IEC 61508.

Pressure transmitters for applications with increased functional safety

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Linear position transducer for applications with increased functional safety

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Further sensors for applications with increased functional safety can be found in the Chapter "*OEM Products for High Volume Production*".



## Electronic Pressure Transmitter HDA 4700 for Applications with Increased Functional Safety

Functional Safety  
PL d



### Description:

This version of the pressure transmitter series HDA 4700 has been specially developed for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to PL d - Cat 3 (in accordance with ISO 13849).

The pressure transmitters are designed with two channels. Each channel consists of a sensor element and evaluation electronics. As a result, the pressure transmitter develops two separate and independent output signals in proportion to the pressure.

The safety function is tested by evaluating and comparing the two analogue output signals in a higher-level system.

The main areas of application are as sensor elements in mobile, safety-oriented systems such as load torque displays or load torque limitation in truck-mounted cranes or working platforms.

### Special features:

- Two-channel, redundant pressure measurement
- Two separate, independent output signals
- Accuracy  $\leq \pm 0.25\%$  FS typ.
- Highly robust sensor cell
- Outstanding performance in terms of temperature effect and EMC
- Small, compact design
- PL d, Cat. 3 certification

### Technical data:

Input data				
Measuring ranges signal 1 in bar	25	40	60	100
Measuring ranges signal 2 in bar	25 / 40	40 / 60	60 / 100	100 / 160
	160	250	400	600
	160 / 250	250 / 400	400 / 600	600 / 1000
Overload pressures in bar	80	80	120	200
	320	500	800	1200
Burst pressures in bar	200	200	300	500
	800	1250	2000	2000
Mechanical connection (Torque value)	G $\frac{1}{4}$ A DIN 3852 with 0.5 mm orifice (20 Nm)			
Parts in contact with medium <sup>1)</sup>	Mech. conn.: Stainl. steel (2 x thin-film strain gauge) Seal: FPM			
Output data				
Output signal 1 <sup>2)</sup>	4 .. 20 mA, 3 conductor			
Output signal 2 <sup>2)</sup>	4 .. 20 mA, 3 conductor			
Accuracy to DIN 16086	$\leq \pm 0.25\%$ FS typ.			
Max. setting	$\leq \pm 0.5\%$ FS max.			
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.			
Temperature compensation	$\leq \pm 0.008\%$ / °C typ.			
Zero point	$\leq \pm 0.015\%$ / °C max.			
Temperature compensation	$\leq \pm 0.008\%$ / °C typ.			
Over range	$\leq \pm 0.015\%$ / °C max.			
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.			
Hysteresis	$\leq \pm 0.1\%$ FS max.			
Repeatability	$\leq \pm 0.05\%$ FS.			
Rise time	$\leq 2$ ms			
Long term stability	$\leq \pm 0.1\%$ FS typ. / year			
Environmental conditions				
Compensated temperature range	-25 .. +85 °C			
Operating temperature range (fail safe) <sup>3)</sup>	-40 .. +85 °C / -25 .. +85 °C			
Storage temperature range	-40 .. +85 °C			
Fluid temperature range <sup>3)</sup>	-40 .. +85 °C / -25 .. +85 °C			
CE mark	EN 61000-6-1 / 2 / 3 / 4			
Vibration resistance according to DIN EN 60068-2-6 at 5 .. 2000 Hz	$\leq 20$ g			
Protection class to IEC 60529 to ISO 20653	IP 67 (when female connector is fitted) IP 69K (when female connector is fitted)			
Other data				
Electrical connection	M12x1, 4 pole; DT04, 4 pole			
Supply voltage	7 .. 35 V DC (max. load resistance 250 $\Omega$ ) 12 .. 35 V DC (max. load resistance 500 $\Omega$ )			
Life expectancy	> 10 million load cycles (0 .. 100 %)			
Weight	~ 180 g			
Safety-related data				
Performance level				
Based on	DIN EN ISO 13849-1:2008			
PL	d			
Architecture	Category 3			

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided  
FS (Full Scale) = relative to the complete measuring range

<sup>1)</sup> Other seal materials on request

<sup>2)</sup> Other output signals on request

<sup>3)</sup> -25 °C with FPM seal, -40 °C on request

## Model code:

HDA 4 7 4 X - C C - XXXX - XXXX - Pd- 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

6 = Male M12x1, 4 pole  
(connector not supplied)

V = Male Deutsch DT04, 4 pole  
(connector not supplied)

### Signal 1

C = 4 .. 20 mA, 3 conductor

### Signal 2

C = 4 .. 20 mA, 3 conductor

### Pressure ranges for Signal 1 in bar

#### (max. oper. pressure)

0025; 0040; 0060; 0100; 0160; 0250; 0400; 0600

### Pressure ranges for Signal 2 in bar

0025; 0040; 0060; 0100; 0160; 0250; 0400; 0600; 1000

Press. range for signal 2 = Pressure range for signal 1  
or max. 1 pressure level higher

### Functional safety

Pd = PL d – Cat 3 according to DIN EN 13849-1

### Modification number

000 = Standard

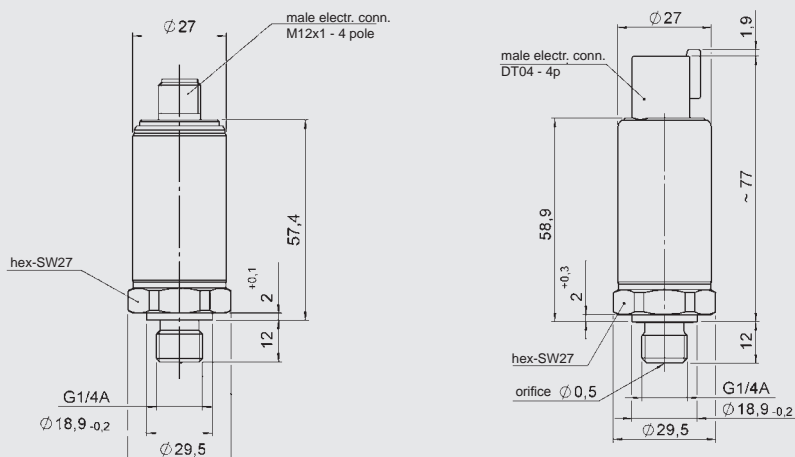
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

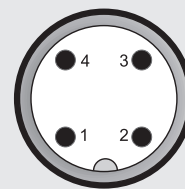
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:



## Pin connections:

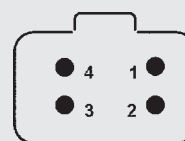
M12x1



Pin HDA 4746-CC

1	+U <sub>B</sub>
2	Signal 2
3	0 V
4	Signal 1

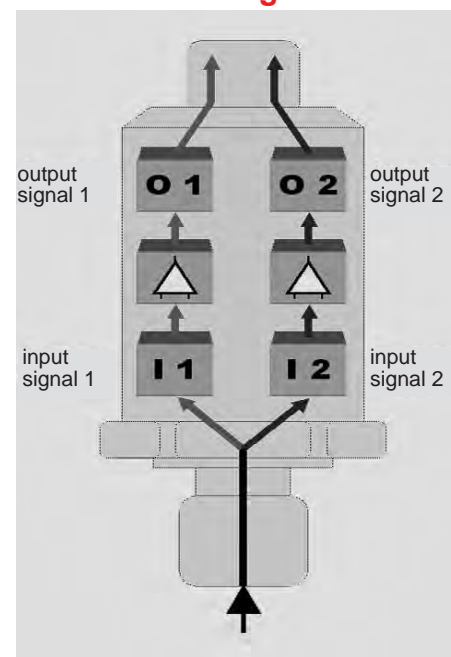
DT04



Pin HDA 474V-CC

1	+U <sub>B</sub>
2	0 V
3	Signal 2
4	Signal 1

## Block circuit diagram:

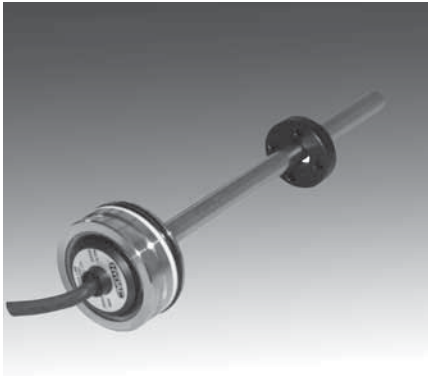


### Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Linear Position Transducer HLT 1100-R2 for Applications with Increased Functional Safety

**Functional Safety**  
PL d  
SIL 2



### Description:

This version of the linear position sensor series HLT 1100 has been specially developed for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to SIL 2 (IEC 61508) or PL d (ISO 13849).

The sensor works on the principle of magnetostriction.

This measuring principle determines with high-precision the position, the distance and/or the velocity and is based on elapsed time measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers this version in a pressure-resistant stainless steel housing for full integration in hydraulic cylinders.

### Special features:

- Very robust housing
- High resistance to shock and vibration
- Excellent EMC characteristics
- Non-contact and wear-free
- SIL 2 / PL d certification

### Technical data:

<b>Input data</b>	
Measuring ranges	200 .. 2500 mm
Measured variable	Distance
Pressure resistance	450 bar
Peak pressure	630 bar
Parts in contact with medium	Stainless steel (1.4301 / 1.4571)
<b>Output data</b>	
Output signal	4 .. 20 mA, CANopen
Resolution	12 bit
Load resistance to GND	200 .. 500 Ohm
Accuracy to DIN 16086	≤ ± 0.5 % FS
Repeatability	≤ ± 0.1 % FS
Hysteresis	≤ ± 0.1 % FS
Non-linearity	≤ ± 0.1 % FS
Dynamics	≤ 30 ms (10 .. 90 %)
<b>Environmental conditions</b>	
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +100 °C
Media temperature range	-40 .. +120 °C
Protection class to IEC 60529	IP67
Vibration resistance to DIN EN 60068-2-6	7.5 mm (5 .. 8.2 Hz) 2.0 g (8.2 .. 150 Hz)
Shock resistance to DIN EN 60068-2-27	20 g (11ms)
CE mark	EN 61000-6-1 / 2 / 3 / 4
<b>Other data</b>	
Supply voltage (V <sub>in</sub> ) nominal	9 ... 36 VDC
Residual ripple of supply voltage	≤ 250 mV
Current consumption (without output)	≤ 100 mA
Electrical connection	PUR cable, 3-core; flying leads Separate panel mount connection M12x1
Measurement principle	magnetostrictive
Installation position and travel speed	No restrictions
Weight (dependent on measurement and cable lengths)	~ 1000 g
<b>Safety-related data</b>	
<b>Performance level</b>	
Based on	DIN EN ISO 13849-1:2008
PL	d
Architecture	Category 2
<b>Safety Integrity Level</b>	
Based on	DIN EN 61508:2002
SIL	2

Note: Reverse polarity protection of the supply voltage, excess voltage and short circuit protection are provided.  
FS (Full Scale) = relative to the full measuring range

## Model code:

Mobile **HLT 1 1 0 0 - R2 - XXX - XXX - XXXX - S2PD - 000**

**Design/  
Geometry type**  
1 = Rod

**Mechanical connection**  
R2 = Cylinder-integrated

**Electrical connection**  
Cable output  
K01 = Flying lead, length 1 m  
K02 = Flying lead, length 2 m  
K05 = Flying lead, length 5 m  
K10 = Flying lead, length 10 m

Separate panel mount connection M12x1  
(4 pole for signal output analogue  
5 pole for signal output CANopen)  
L06 = 60 mm cable length  
L18 = 180 mm cable length  
L24 = 240 mm cable length

**Signal output**  
C01 = Analogue 4 .. 20 mA, 3 conductor  
CAN = CANopen

**Measuring range in mm** (200 to 2500 mm)  
Example  
0250 = 250 mm

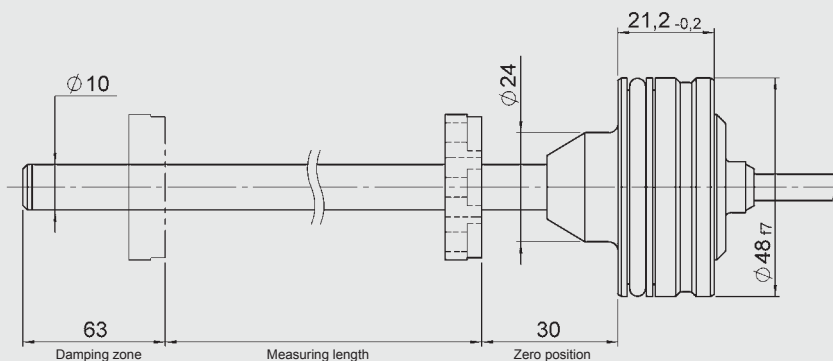
**Functional safety**  
S2PD = SIL 2 acc. to IEC 61508  
and PLd – Cat 2 acc. to DIN EN 13849-1

**Modification**  
000 = Standard

**Notes:**  
Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

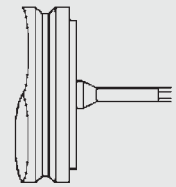
**Accessories:**  
Appropriate accessories, such as position magnets, etc. can be found in the Accessories section of the Electronics brochure.  
The recommended position magnet ZBL MR33, part no. 6084207, must be ordered separately.

## Dimensions:



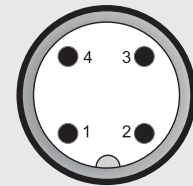
## Pin connections:

Cable outlet



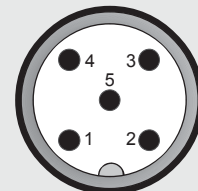
Core	Analogue	CANopen
brown	+U <sub>B</sub>	+U <sub>B</sub>
white	0 V	0 V
green	Analogue	CAN_L
yellow	n.c.	CAN_H

M12x1, 4 pole



Pin	Signal
1	+U <sub>B</sub>
2	n.c.
3	0 V
4	Signal

M12x1, 5 pole



Pin	Signal	Description
1	n.c.	
2	+U <sub>B</sub>	supply+
3	0 V	supply-
4	CAN_H	bus line dominant high
5	CAN_L	bus line dominant low

## Note:

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## SENSORS FOR POTENTIALLY EXPLOSIVE ATMOSPHERES

Sensors for Potentially Explosive Locations:

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For several years HYDAC ELECTRONIC has been systematically stepping up the expansion of its range of sensors for potentially explosive locations. The sensors for potentially explosive locations can be supplied with a variety of output signals, connectors and fluid port connection options. This versatility, combined with certification to ATEX, CSA and IECEx, ensures worldwide acceptance of our products.

Further sensors for potentially explosive locations can be found in the section "OEM Products for Large Volume Production".

Sensors for potentially explosive atmospheres	HDA 4700	HDA 4400	HDA 4300	HDA 4100	EDS 4400	EDS 4300	EDS 4100	ETS 4500	HFS 2500	HFS 2100
										
Pressure	✓	✓	✓	✓	✓	✓	✓			
Temperature								✓		
Flow rate									✓	✓
Available as individual units	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
OEM product for large volume production					✓	✓	✓			
Flush membrane	✓	✓	✓							
ATEX-Intrinsically safe	✓	✓	✓	✓	✓	✓	✓		✓	✓
Flush membrane ATEX-Intrinsically safe	✓	✓	✓							
CSA Intrinsically safe	✓		✓	✓						
IECEx Intrinsically safe	✓	✓	✓	✓						
Flush membrane IECEx Intrinsically safe	✓	✓	✓							
ATEX, IECEx, CSA, flameproof enclosure	✓				✓			✓		
Flush membrane ATEX, IECEx, CSA, flameproof enclosure	✓									

**Note:**  
Not all feature combinations are possible. For precise information, please consult the relevant data sheet.



## Electronic Pressure Transmitter HDA 4700 ATEX, CSA, IECEx Flameproof Enclosure



### Description:

The HDA 4700 electronic pressure transmitter series with flameproof enclosure has triple approval according to ATEX, CSA and IECEx which ensures the instrument is universally suitable for use in potentially explosive environments around the world.

Each instrument is certified by the three approvals organizations and is labelled accordingly. Therefore there is no longer any need to stock multiple devices with separate individual approvals.

As with the industrial version of the HDA 4700, those with triple approval have a proven, fully-welded stainless steel measurement cell with thin film strain gauge without internal seals.

The main areas of application are in mining and the oil & gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in areas with high levels of dust contamination.

### Protection types and applications:

cCSAus Explosion Proof - Seal Not Required

- Class I Group A, B, C, D, T6, T5
- Class II Group E, F, G
- Class III
- Type 4

### ATEX Flame Proof

- I M2 Ex d I Mb
- II 2G Ex d IIC T6, T5 Gb
- II 2D Ex tb IIIC T110 .. 130 °C Db

### IECEx Flame Proof

- Ex d I Mb
- Ex d IIC T6, T5 Gb
- Ex tb IIIC T110 .. 130 °C Db

### Special features:

- Accuracy  $\leq \pm 0.25$  % FS typ.
- Certificates:  
ATEX KEMA 10ATEX0100 X  
CSA MC 224264  
IECEx KEM 10.0053X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	6; 16; 40; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	15; 32; 80; 120; 200; 500; 800; 1000; 1600 bar
Burst pressures	100; 200; 200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>1)2)</sup> (torque value)	G1/2 A DIN 3852 (40 Nm) G1/4 A DIN 3852 (20 Nm)
Parts in contact with medium	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
	Seal: FPM
Conduit and housing material	1.4404; 1.4435 (316L)
Output data	
Output signal, permitted load resistance <sup>3)</sup>	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 8 V) / 20 \text{ mA}$ [kΩ]
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.25$ % FS typ. $\leq \pm 0.5$ % FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15$ % FS typ. $\leq \pm 0.25$ % FS max.
Temperature compensation	$\leq \pm 0.008$ % FS / °C typ.
Zero point	$\leq \pm 0.015$ % FS / °C max.
Temperature compensation Over range	$\leq \pm 0.008$ % FS / °C typ. $\leq \pm 0.015$ % FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3$ % FS max.
Hysteresis	$\leq \pm 0.1$ % FS max.
Repeatability	$\leq \pm 0.05$ % FS
Rise time	$\leq 1.5$ ms
Long-term drift	$\leq \pm 0.1$ % FS typ. / year
Environmental conditions	
Compensated temperature range	T5, T130 °C: -25 .. +80 °C T6, T110 °C: -25 .. +60 °C
Operating temperature range <sup>4)</sup>	T5, T130 °C: -40 .. +80 °C / -20 .. +80 °C T6, T110 °C: -40 .. +60 °C / -20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>4)</sup>	T5, T130 °C: -40 .. +80 °C / -20 .. +80 °C T6, T110 °C: -40 .. +60 °C / -20 .. +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 1 / 31
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529 to ISO 20653	IP 65 (Vented Gauge) IP 69K (Sealed Gauge)
Other data	
Voltage supply	8 .. 30 V DC
Residual ripple of supply voltage	$\leq 5$ %
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa

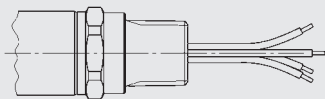
<sup>2)</sup> Other mechanical connections on request

<sup>3)</sup> Other output signals on request

<sup>4)</sup> -20 °C with FPM seal, -40 °C on request

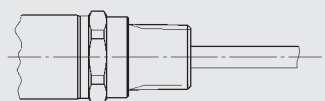
## Pin connections:

Conduit (single cores)



Core	HDA 47X9-A
red	Signal +
black	Signal -
green-yellow	Housing

Conduit (flying leads)



Core	HDA 47XG-A
white	Signal +
brown	Signal -
green	n.c.
yellow	n.c.

## Areas of application:

<b>Approvals</b>	cCSAus: Explosion Proof - Seal not required ATEX: Flame Proof IECEX: Flame Proof
<b>Certificate</b>	ATEX KEMA 10ATEX100X CSA MC 224264 IECEX KEM 10.0053X
<b>Applications / Protection types</b>	cCSAus: Class I Group A, B, C, D, T6; T5 Class II Group E, F, G Class III Type 4  ATEX: I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 130 °C Db  IECEX: Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 130 °C Db

## Model code:

**HDA 4 7 X X - A - XXXX - D X - 000 (2m)**

### Mechanical connection

- 2 = G1/2 DIN 3852  
(only for "1000 bar" press. range)
- 4 = G1/4 A DIN 3852

### Electrical connection

- 9 = 1/2-14 NPT Conduit (male thread), single cores
- G = 1/2-14 NPT Conduit (male thread), flying leads

### Signal

- A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

- 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600  
(only in conjunction with mechanical connection type "4")
- 1000  
(only in conjunction with mechanical connection type "2")

### Approval

- D = CSA Explosion Proof - Seal not required  
ATEX Flame Proof  
IECEX Flame Proof

### Type of measurement cell

- S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar
- V = Vented Gauge (vented to atmosphere) ≤ 16 bar

### Modification number

- 000 = Standard

### Cable length in m

- Standard = 2 m

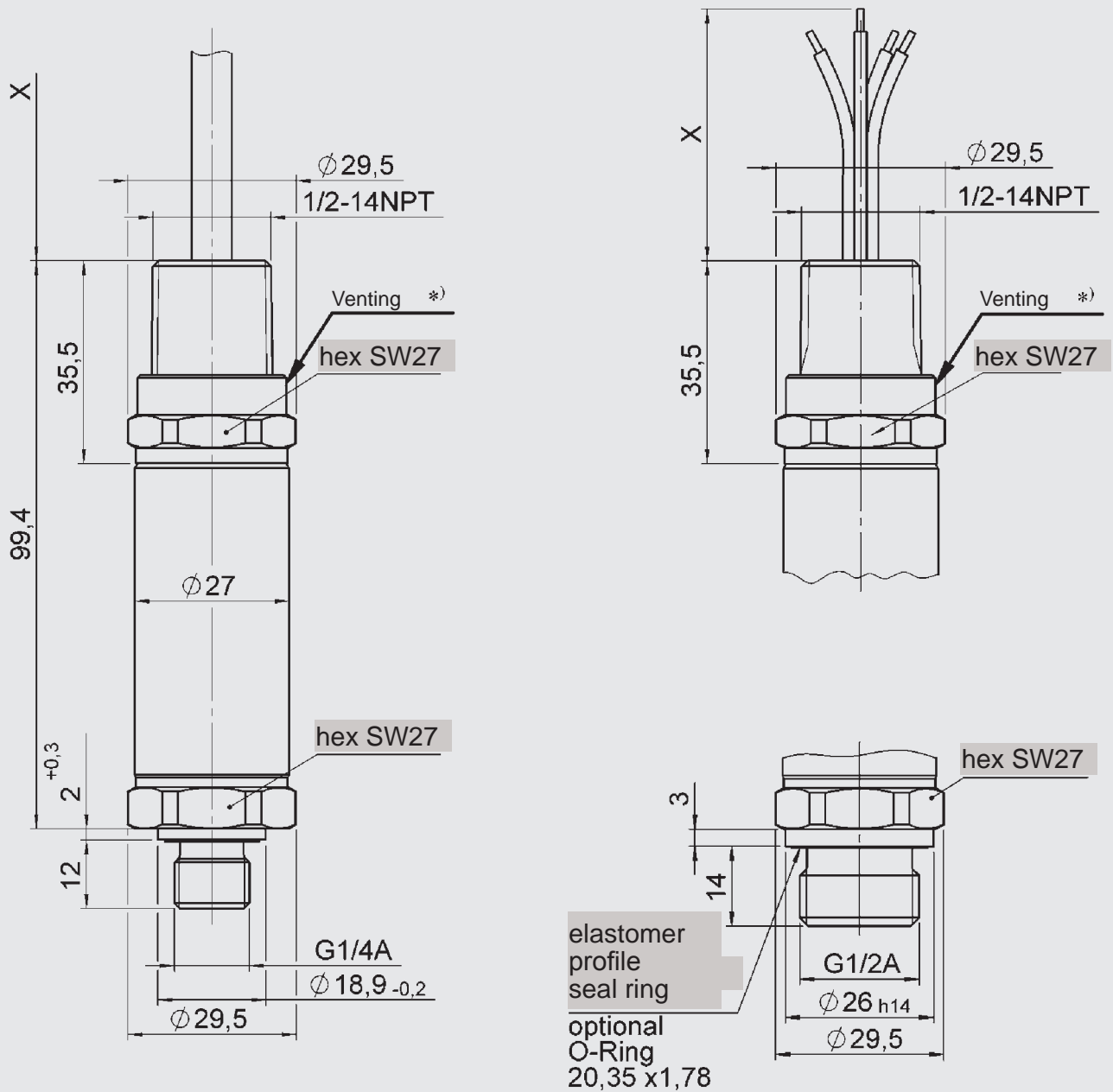
## Notes:

Special models on request. On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:



\*) optional, depending on gauge type "Sealed Gauge" / "Vented Gauge"

## Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications or operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

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## Electronic Pressure Switch EDS 4400 Programmable ATEX, CSA, IECEx Flameproof Enclosure



### Description:

The programmable electronic pressure switch EDS 4400 with flameproof enclosure has triple approval according to ATEX, CSA and IECEx which ensures the instrument is universally suitable for use in potentially explosive environments around the world.

Each instrument is certified by the three approval organizations and is labelled accordingly. Therefore there is no longer any need to stock multiple devices with separate individual approvals.

As with the industrial version of the EDS 4400, those with triple approval have a proven, fully-welded stainless steel measurement cell with thin film strain gauge without internal seals.

The instrument is programmed conveniently and simply using the HPG 3000 HYDAC programming unit.

The main areas of application are in mining and the oil & gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in areas with high dust loads.

### Protection types and applications:

**cCSAus** Explosion Proof - Seal Not Required

- Class I Group A, B, C, D, T6, T5
- Class II Group E, F, G
- Class III
- Type 4

### ATEX Flame Proof

- I M2 Ex d I Mb
- II 2G Ex d IIC T6, T5 Gb
- II 2D Ex tb IIIC T110 .. 130 °C Db

### IECEx Flame Proof

- Ex d I Mb
- Ex d IIC T6, T5 Gb
- Ex tb IIIC T110 .. 130 °C Db

### Special features:

- Accuracy  $\leq \pm 1.0$  % FS
- Certificates:  
ATEX KEMA 10ATEX100 X  
CSA MC 224264  
IECEx KEM 10.0053X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	6; 16; 40; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	15; 32; 80; 120; 200; 500; 800; 1000; 1600 bar
Burst pressure	100; 200; 200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>1)</sup> (torque value)	G1/2 A DIN 3852 (40 Nm) G1/4 A DIN 3852 (20 Nm)
Parts in contact with medium	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
	Seal: FPM
Conduit and housing material	1.4404; 1.4435 (316L)
Output data	
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5$ % FS typ. $\leq \pm 1.0$ % FS max.
Repeatability	$\leq \pm 0.1$ % FS max.
Temperature drift	$\leq \pm 0.03$ % FS / °C max. zero point $\leq \pm 0.03$ % FS / °C max. range
Switch output <sup>2)</sup>	1 or 2 PNP transistor switch outputs
Output load	max. 1.2 A on version with 1 switch output max. 1 A each on version with 2 switch outputs
Switch points / hysteresis / N/C or N/O function	user-programmable with HYDAC Programming Unit HPG 3000
Rising switch point and falling switch point delay	8 .. 2000 ms; User-programmable with HYDAC Programming Unit HPG 3000
Long-term drift	$\leq \pm 0.3$ % FS typ. / year
Environmental conditions	
Compensated temperature range	T5, T130 °C: -25 .. +80 °C T6, T110 °C: -25 .. +60 °C
Operating temperature range <sup>3)</sup>	T5, T130 °C: -40 .. +80 °C/-20 .. +80 °C T6, T110 °C: -40 .. +60 °C/-20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>3)</sup>	T5, T130 °C: -40 .. +80 °C/-20 .. +80 °C T6, T110 °C: -40 .. +60 °C/-20 .. +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 1 / 31
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529 to ISO 20653	IP 65 (Vented Gauge) IP 69K (Sealed Gauge)
Other data	
Voltage supply	12 .. 30 V DC
Current consumption	~ 25 mA (plus switching current)
Residual ripple of supply voltage	$\leq 5$ %
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Other mechanical connection options available on request

<sup>2)</sup> NPN switching outputs upon request

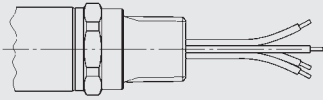
<sup>3)</sup> -20 °C with FPM seal, -40 °C on request

## Setting ranges for the switch outputs:

- Switch point or upper switch value  
5% .. 100% of the measurement range
- Hysteresis or lower switch value  
1% .. 96% of the measurement range

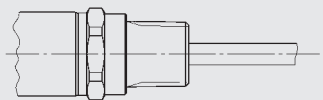
## Pin connections:

Conduit (single cores)



Core	EDS 44x9*-1P	EDS 44x9*-2P
red	+UB	+UB
white	Switch output 1	Switch output 1
brown	-----	Switch output 2
black	0 V	0 V
green	SDA <sup>1)</sup>	SDA <sup>1)</sup>

Conduit (flying leads)



Core	EDS 44xG*-1P	EDS 44xG*-2P
white	Switch output 1	Switch output 1
brown	n.c.	Switch output 2
green	SDA <sup>1)</sup>	SDA <sup>1)</sup>
yellow	0 V	0 V
grey	+UB	+UB

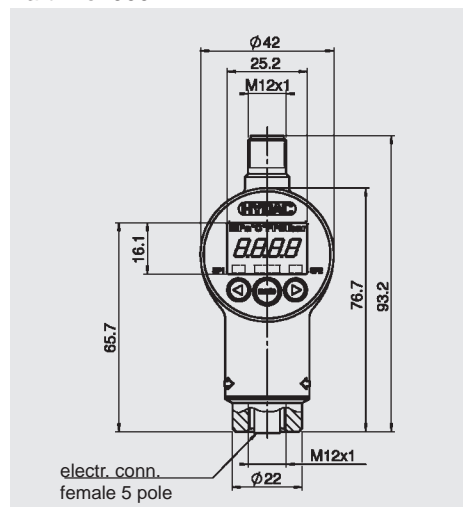
1) Programming line

## Programming Unit:

(must be ordered separately)

### HPG 3000 – 000

Portable Programming Unit  
Part. No. 909 422



The pressure switch can be connected to the HPG 3000 very simply by using the **UVM 3000 Connection Adapter** (see Accessories Brochure).

### CAUTION!

The HPG 3000 Programming Unit may only be used outside the potentially explosive area.

## Areas of application:

<b>Approvals</b>	cCSAus: Explosion Proof - Seal not required ATEX: Flame Proof IECEX: Flame Proof
<b>Certificate</b>	ATEX KEMA 10ATEX100X CSA MC 224264 IECEX KEM 10.0053X
<b>Applications / Protection types</b>	cCSAus: Class I Group A, B, C, D, T6; T5 Class II Group E, F, G Class III Type 4  ATEX: I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 130 °C Db  IECEX: Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 130 °C Db

## Model code:

**EDS 4 4 X X – XXXX – X P – D X – 000 (2m)**

### Mechanical connection

- 2 = G1/2 DIN 3852  
(only for "1000 bar" press. range)
- 4 = G1/4 A DIN 3852

### Electrical connection

- 9 = 1/2-14 NPT Conduit (male thread),  
single cores
- G = 1/2-14 NPT Conduit (male thread),  
flying leads

### Pressure ranges in bar

- 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600  
(only in conjunction with mech. connection type "4")
- 1000  
(only in conjunction with mech. connection type "2")

### Number of switch outputs

- 1 = 1 switch output
- 2 = 2 switch outputs

### Output type

- P = Programmable

### Approval

- D = CSA Explosion Proof - Seal not required  
ATEX Flame Proof  
IECEX Flame Proof

### Type of measurement cell

- S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar
- V = Vented Gauge (vented to atmosphere) ≤ 16 bar

### Modification number

- 000 = Standard

### Cable length in m

- Standard = 2 m

### Notes:

Special models on request.

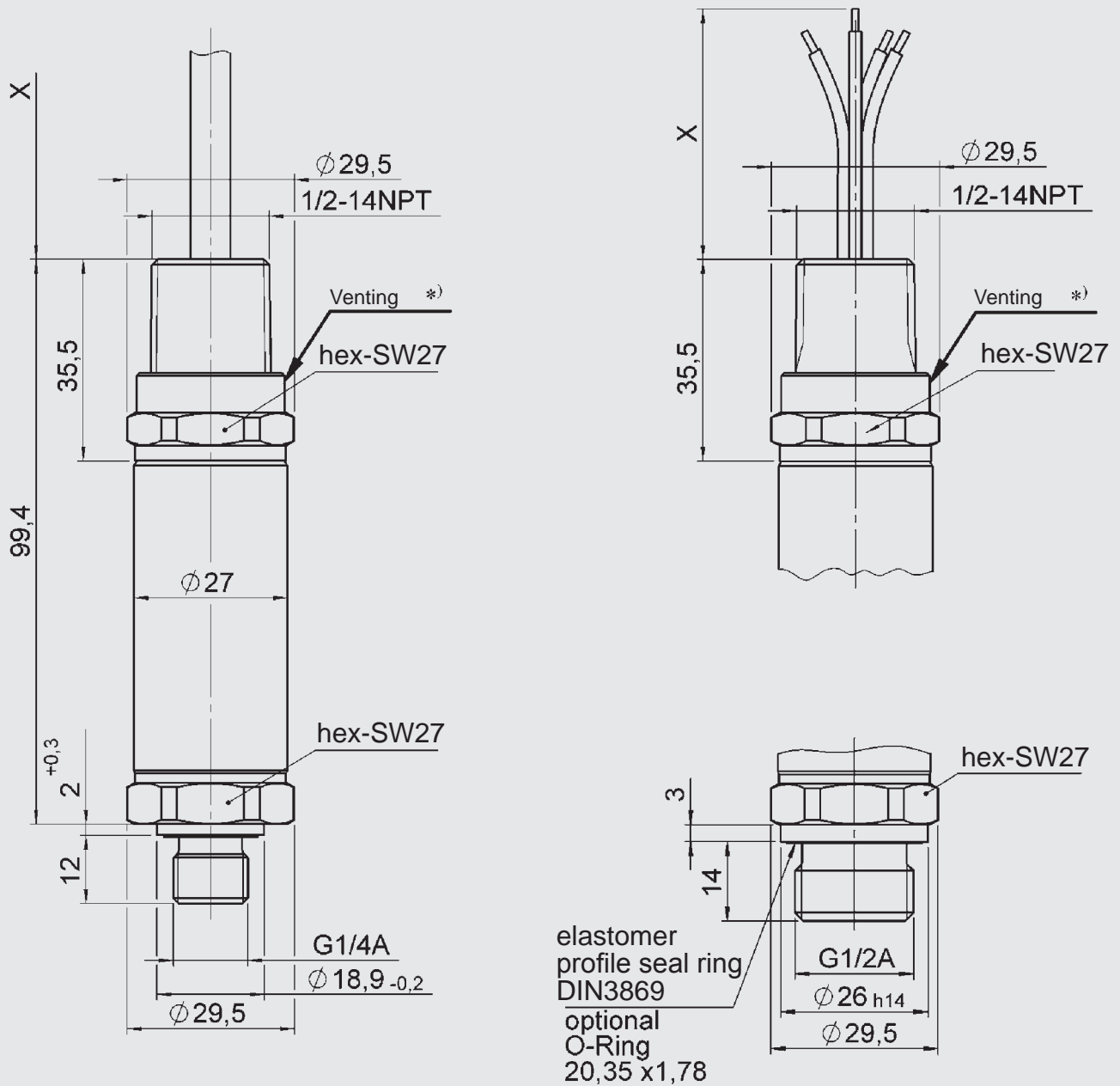
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.



## Dimensions:



\*) optional, depending on gauge type "Sealed Gauge" / "Vented Gauge"

## Note:

The information in this brochure relates to the operating conditions and applications described.  
 For applications or operating conditions not described, please contact the relevant technical department.  
 Subject to technical modifications.

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## Electronic Temperature Transmitter ETS 4500 ATEX, CSA, IECEx Flameproof Enclosure



### Description:

The electronic temperature transmitter series ETS 4500 with flameproof enclosure has triple approval according to ATEX, CSA and IECEx which ensures that the device is universally suitable for use in potentially explosive environments around the world.

Each device is certified by the three approval organizations and is labelled accordingly. Therefore it is no longer necessary to stock multiple devices with separate individual approvals.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range -25 to +100 °C.

Its main applications are in mining and the oil and gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in areas with high dust loads.

### Protection types and applications:

cCSAus Explosion Proof - Seal Not Required

- Class I Group A, B, C, D, T6, T5
- Class II Group E, F, G
- Class III
- Type 4

### ATEX Flame Proof

- I M2 Ex d I Mb
- II 2G Ex d IIC T6, T5 Gb
- II 2D Ex tb IIIC T110 .. 130 °C Db

### IECEx Flame Proof

- Ex d I Mb
- Ex d IIC T6, T5 Gb
- Ex tb IIIC T110 .. 130 °C Db

### Special features:

- Accuracy  $\leq \pm 1.5\%$  FS typ.
- Certificates:
  - ATEX KEMA 10ATEX100 X
  - CSA MC 224264
  - IECEx KEM 10.0053X
- Robust design
- Pressure resistant to 600 bar (depending on model)
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring principle	Silicon semiconductor device
Measuring range	-25 .. +100 °C
Probe length	10.7; 100; 250; 350 mm
Pressure resistance	600 bar (probe length 10.7 mm) 125 bar (probe length 100 mm) 125 bar (probe length 250 mm) 125 bar (probe length 350 mm)
Mechanical connection (torque value)	G1/4 A DIN 3852 (20 Nm)
Parts in contact with medium	Stainless steel: 1.4571; 1.4301 (316Ti); 304 Seal: FPM
Conduit and housing material	1.4404; 1.4435 (316L)
Output data	
Output signal <sup>1)</sup>	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 8 V) / 20 \text{ mA} [k\Omega]$
Accuracy	$\leq \pm 1.5\%$ FS typ. $\leq \pm 3.0\%$ FS max.
Rise time to DIN EN 60751	$t_{50} \sim 10 \text{ s}$ $t_{90} \sim 15 \text{ s}$
Environmental conditions	
Operating temperature range <sup>2)</sup>	T5, T130 °C: -40 .. +80 °C/-20 .. +80 °C T6, T110 °C: -40 .. +60 °C/-20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	T5, T130 °C: -40 .. +80 °C/-20 .. +80 °C T6, T110 °C: -40 .. +60 °C/-20 .. +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 1 / 31
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to ISO 20653	IP 69K
Other data	
Voltage supply	8 .. 30 V DC
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	$\sim 280 \text{ g}$ (probe length 10.7 mm) $\sim 315 \text{ g}$ (probe length 100 mm) $\sim 350 \text{ g}$ (probe length 250 mm) $\sim 385 \text{ g}$ (probe length 350 mm)

Note: Reverse polarity protection of the supply voltage, excess voltage and override short circuit protection are provided.

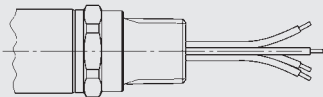
FS (Full Scale) = relative to the complete measuring range

<sup>1)</sup> Other output signals on request

<sup>2)</sup> -20 °C with FPM seal, -40 °C on request

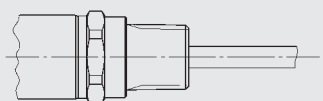
## Pin connections:

Conduit (single cores)



Core	ETS 4549-A
red	Signal +
black	Signal -
green-yellow	Housing

Conduit (flying leads)



Core	ETS 454G-A
white	Signal +
brown	Signal -
green	n.c.
yellow	n.c.

## Areas of application:

<b>Approvals</b>	cCSAus: Explosion Proof - Seal not required ATEX: Flame Proof IECEX: Flame Proof
<b>Certificate</b>	ATEX KEMA 10ATEX100X CSA MC 224264 IECEX KEM 10.0053X
<b>Applications / Protection types</b>	cCSAus: Class I Group A, B, C, D, T6; T5 Class II Group E, F, G Class III Type 4  ATEX: I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 130 °C Db  IECEX: Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 130 °C Db

## Model code:

**ETS 4 5 4 X - A - D - XXX - 000 (2m)**

### Mechanical connection

4 = G1/4 A DIN 3852

### Electrical connection

9 = 1/2-14 NPT Conduit (male thread), single cores

G = 1/2-14 NPT Conduit (male thread), flying leads

### Signal

A = 4 .. 20 mA, 2 conductor

### Approval

D = CSA Explosion Proof - Seal not required  
ATEX Flame Proof  
IECEX Flame Proof

### Probe length

010 = 10.7 mm

100 = 100 mm

250 = 250 mm

350 = 350 mm

### Modification number

000 = Standard

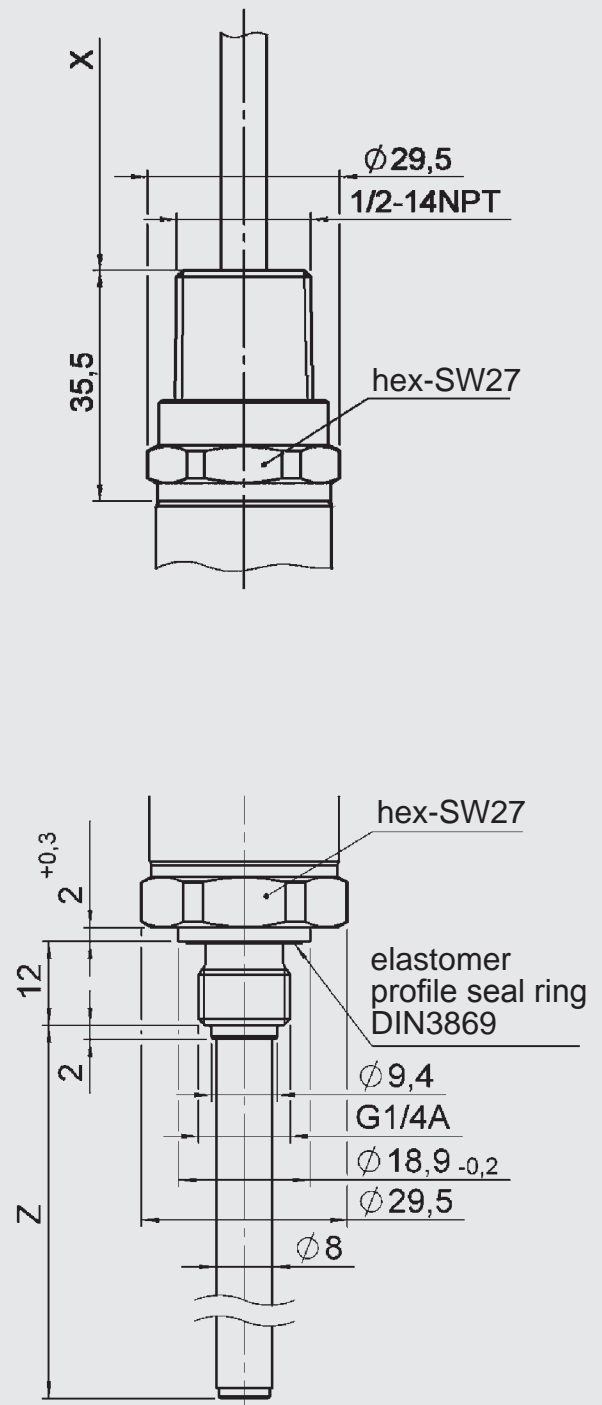
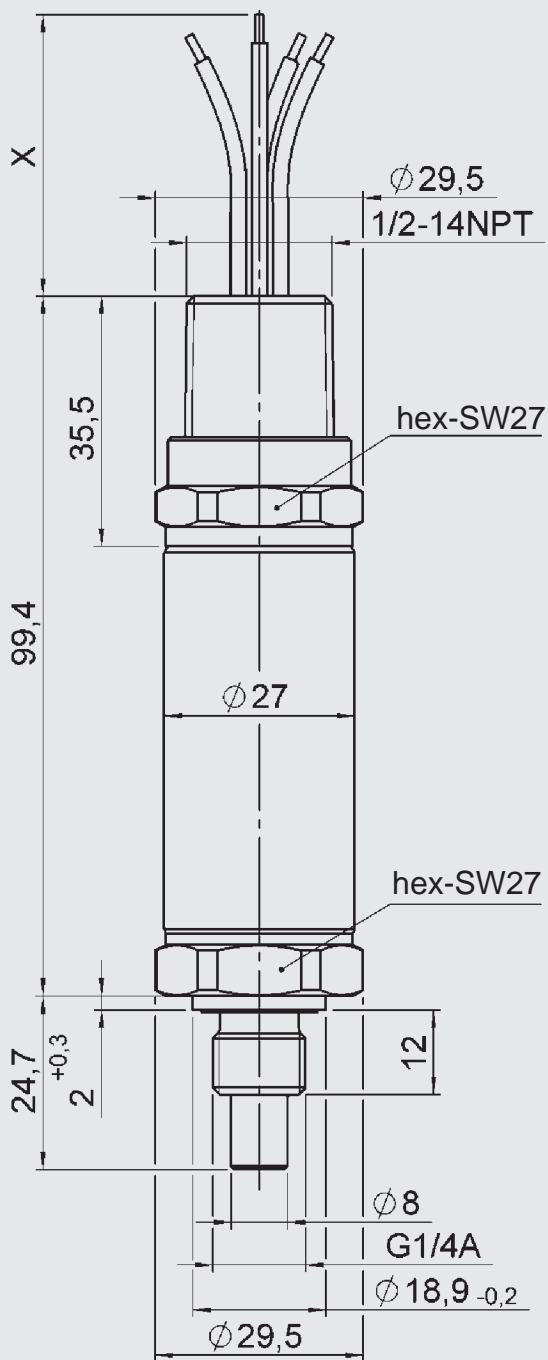
### Cable length in m

Standard = 2 m

### Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications and operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

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Internet: [www.hydac.com](http://www.hydac.com)





## Electronic Pressure Transmitter HDA 4700 ATEX Intrinsically Safe ATEX Dustproof Enclosure ATEX Non-sparking



### Description:

The pressure transmitter HDA 4700 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4700 in ATEX version has a stainless steel measurement cell with thin-film strain gauge.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

### Protection types and applications:

I M1 Ex ia I Ma

II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 3G Ex nA IIC T6,T5,T4 Gc  
II 3G Ex ic IIC T6,T5,T4 Gc

II 1D Ex ia IIIC T85°C Da  
II 1D Ex ta IIIC T80/90/100°C Da  
T<sub>500</sub> T90/T100/T110°C Da

II 2D Ex tb IIIC T80/90/100°C Db  
II 3D Ex tc IIIC T80/T90/T100°C Dc  
II 3D Ex ic IIIC T80/T90/T100°C Dc

### Special features:

- Accuracy  $\leq \pm 0.25$  % FS typ.
- Certificates:  
KEMA 05ATEX1016 X  
KEMA 05ATEX1021
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	-1 .. 9; 6; 16; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	20; 15; 32; 120; 200; 500; 800; 1000; 1600 bar
Burst pressures	100; 100; 200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>1)</sup>	G1/4 A DIN 3852 G1/2 DIN 3852
Torque value	20 Nm
Parts in contact with medium	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
	Seal: FPM
Output data	
Output signal permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 V) / 20 mA [k\Omega]$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.25$ % FS typ. $\leq \pm 0.5$ % FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15$ % FS typ. $\leq \pm 0.3$ % FS max.
Temperature compensation	$\leq \pm 0.008$ % FS / °C typ.
Zero point	$\leq \pm 0.015$ % FS / °C max.
Temperature compensation Over range	$\leq \pm 0.008$ % FS / °C typ. $\leq \pm 0.015$ % FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3$ % FS max.
Hysteresis	$\leq \pm 0.1$ % FS max.
Repeatability	$\leq \pm 0.05$ % FS
Rise time	$\leq 1.5$ ms
Long-term drift	$\leq \pm 0.1$ % FS typ. / year
Environmental conditions	
Compensated temperature range	-20 .. +85 °C
Operating temperature range <sup>2)</sup>	-40 .. +60 °C / -20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +60 °C / -20 ... +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 31 EN 50303
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1 male when an IP 67 connector is used)
Relevant data for Ex applications	
Supply voltage	Ex ia, ic: $U_i = 12 .. 28$ V Ex nA, ta, tb, tc: 12 .. 28 V
Max. input current	$i_i = 100$ mA
Max. input power	$P_i = 1$ W max. power consumption $\leq 1$ W
Connection capacitance of the sensor	$C_i = \leq 22$ nF
Inductance of the sensor	$L_i = 0$ mH
Insulation voltage <sup>3)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2
Other data	
Residual ripple of supply voltage	$\leq 5$ %
Life expectancy	$> 10$ million cycles 0 .. 100 % FS
Weight	$\sim 150$ g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa

<sup>2)</sup> -20 °C with FPM seal, -40 °C on request

<sup>3)</sup> 500 V AC on request

## Areas of application:

Code No. for use in Model code	1			9	A	C
Protection type	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85°C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6 Gc	II 1D Ex ta IIIC T80°C T <sub>500</sub> T90°C Da II 2D Ex tb IIIC T80°C Db	II 3G Ex ic IIC T6 Gc II 3D Ex ic IIIC T80°C Dc
Certificate	KEMA 05ATEX1016 X / KEMA 05ATEX1021					
Zones / Categories	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier	Group II Category 2G Gases Protection class: intrinsically safe ia with barrier	Group II Category 3G Gases Protection class: Non-sparking nA	Group III Category 1D, 2D Conductive dust Protection class: Dustproof enclosure	Group II, III Category 3G, 3D Gases/conductive dust Protection class: Intrinsically safe ic with barrier
Electrical Connection (see model code)	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ta IIIC T80/90/100°C Da T<sub>500</sub>T90/T100/T110°C Da, II 2D Ex tb IIIC T80/90/100°C Db and II 3D Ex tc IIIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

## Pin connections:

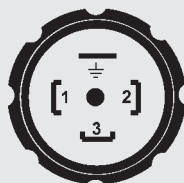
Binder series 714 M18



Pin HDA 47X4-A

1	n.c.
2	Signal +
3	Signal -
4	n.c.

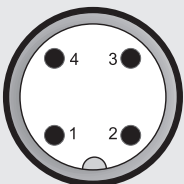
EN175301-803 (DIN 43650)



Pin HDA 47X5-A

1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1



Pin HDA 47X6-A

1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

HDA 4 7 X X - A - XXXX - ANX - 000

### Mechanical connection

- 2 = G1/2 DIN 3852  
(only for "1000 bar" press. range)
- 4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male, 4 pole Binder series 714 M18  
(connector not supplied)
- 5 = Male, 3 pole + PE, EN175301-803  
(DIN 43650)  
(connector supplied)
- 6 = Male, M12x1, 4 pole  
(connector not supplied)

### Signal

- A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

- 0009 (-1..9); 0006; 0016; 0060; 0100; 0250; 0400; 0600
- 1000 (only in conjunction with mechanical connection code "2")

### Approval

- A = ATEX

### Insulation voltage

- N = 50 V AC

### Protection types and applications (code)

- 1 = I M1 Ex ia I Ma  
II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 1D Ex ia IIIC T85 °C Da
- 9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*
- A = II 1D Ex ta IIIC T80 °C T<sub>500</sub>T90 °C Da (only in conjunction with electr. connection "6")\*
- C = II 3G Ex ic IIC T6 Gc  
II 3D Ex ic IIIC T80 °C Dc

### Modification number

- 000 = Standard

### Notes:

- \* For design and electrical connection see device dimensions

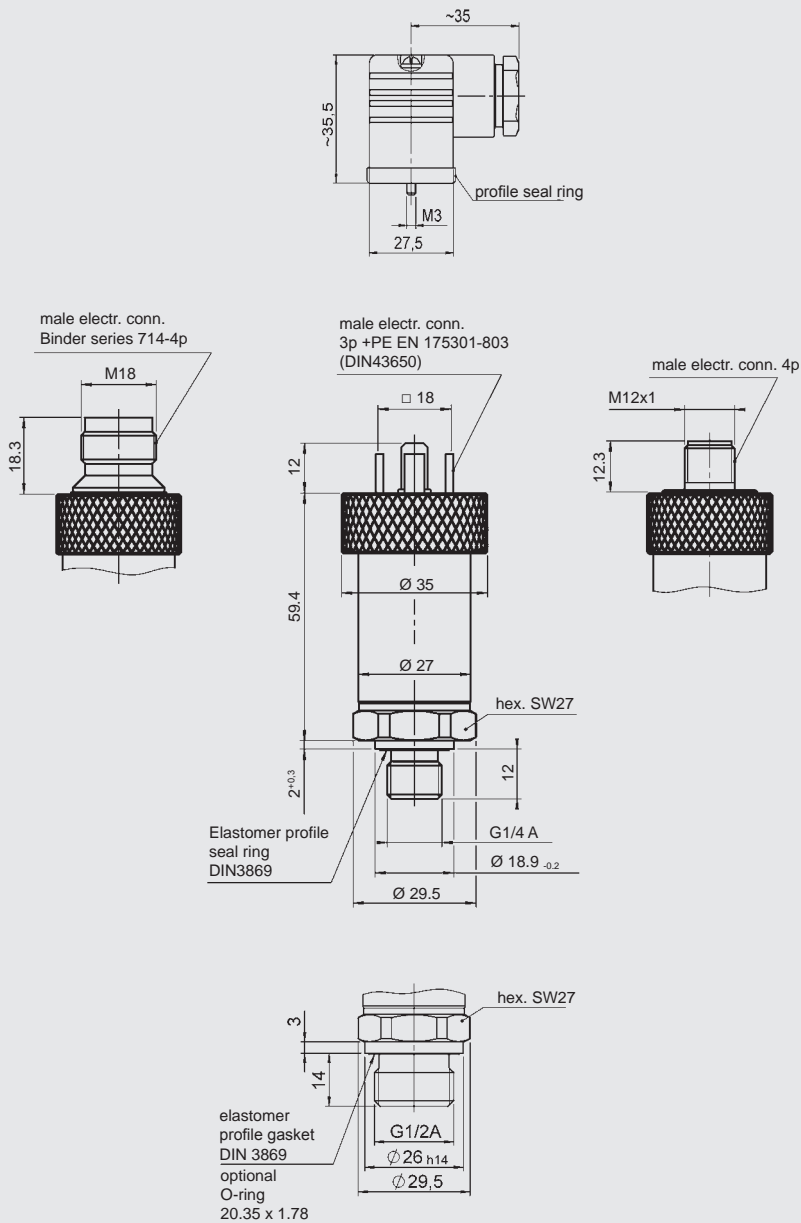
### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

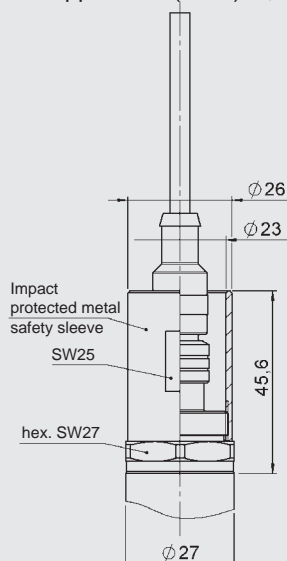


## Dimensions:

Protection types and applications (code): 1, C



Protection ratings and areas of application (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4400 ATEX Intrinsically Safe ATEX Dustproof Enclosure ATEX Non-sparking



### Description:

The pressure transmitter HDA 4400 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4400 in ATEX version has a stainless steel measurement cell with thin-film strain gauge.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

### Protection types and applications:

I M1 Ex ia I Ma

II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 3G Ex nA IIC T6,T5,T4 Gc  
II 3G Ex ic IIC T6,T5,T4 Gc

II 1D Ex ia IIIC T85 °C Da  
II 1D Ex ta IIIC T80/90/100 °C Da  
T<sub>500</sub> T90/T100/T110 °C Da

II 2D Ex tb IIIC T80/90/100 °C Db  
II 3D Ex tc IIIC T80/T90/T100 °C Dc  
II 3D Ex ic IIIC T80/T90/T100 °C Dc

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Certificates:  
KEMA 05ATEX1016 X  
KEMA 05ATEX1021
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data		
Measuring ranges <sup>1)</sup>	16; 60; 100; 250; 400; 600; 1000 bar	
Overload pressures	32; 120; 200; 500; 800; 1000; 1600 bar	
Burst pressures	200; 300; 500; 1000; 2000; 2000; 3000 bar	
Mechanical connection <sup>1)</sup>	G1/4 A DIN 3852 G1/2 DIN 3852	
Torque value	20 Nm	
Parts in contact with medium	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301	
	Seal: FPM	
Output data		
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 V) / 20 \text{ mA} [\text{k}\Omega]$	
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.	
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.	
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.	
Zero point	$\leq \pm 0.025\%$ FS / °C max.	
Temperature compensation Over range	$\leq \pm 0.015\%$ FS / °C typ. $\leq \pm 0.025\%$ FS / °C max.	
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.	
Hysteresis	$\leq \pm 0.4\%$ FS max.	
Repeatability	$\leq \pm 0.1\%$ FS	
Rise time	$\leq 1.5 \text{ ms}$	
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year	
Environmental conditions		
Compensated temperature range	-20 .. +85 °C	
Operating temperature range	-20 .. +60 °C	
Storage temperature range	-40 .. +100 °C	
Fluid temperature range <sup>2)</sup>	-40 .. +60 °C / -20° .. +60 °C	
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 31 EN 50303	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$	
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1 when an IP 67 connector is used)	
Relevant data for Ex applications		
	Ex ia, ic	Ex nA, ta, tb, tc
Supply voltage	U <sub>i</sub> = 12 .. 28 V	12 .. 28 V
Max. input current	I <sub>i</sub> = 100 mA	
Max. input power	P <sub>i</sub> = 1 W	max. power consumption $\leq 1 \text{ W}$
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22 \text{ nF}$	
Inductance of the sensor	L <sub>i</sub> = 0 mH	
Insulation voltage <sup>3)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Other data		
Residual ripple of supply voltage	$\leq 5\%$	
Life expectancy	$> 10$ million cycles 0 .. 100 % FS	
Weight	$\sim 150 \text{ g}$	

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa

<sup>2)</sup> -20 °C with FPM seal, -40 °C on request

<sup>3)</sup> 500 V AC on request

## Areas of application:

Code No. for use in Model code	1			9	A	C
Protection type	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85°C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6 Gc	II 1D Ex ta IIIC T80°C T <sub>500</sub> T90°C Da II 2D Ex tb IIIC T80°C Db	II 3G Ex ic IIC T6 Gc II 3D Ex ic IIIC T80°C Dc
Certificate	KEMA 05ATEX1016 X / KEMA 05ATEX1021					
Zones / Categories	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier	Group II Category 2G Gases Protection class: intrinsically safe ia with barrier	Group II Category 3G Gases Protection class: Non-sparking nA	Group III Category 1D, 2D Conductive dust Protection class: Dustproof enclosure	Group II, III Category 3G, 3D Gases/conductive dust Protection class: Intrinsically safe ic with barrier
Electrical Connection (see model code)	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ta IIIC T80/90/100° C Da T<sub>500</sub>T90/T100/T110°C Da, II 2D Ex tb IIIC T80/90/100°C Db and II 3D Ex tc IIIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

## Pin connections:

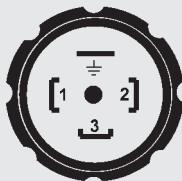
Binder series 714 M18



Pin HDA 44X4-A

1	n.c.
2	Signal +
3	Signal -
4	n.c.

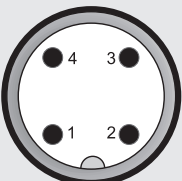
EN175301-803 (DIN 43650)



Pin HDA 44X5-A

1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1



Pin HDA 44X6-A

1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

HDA 4 4 X X - A - XXXX - ANX - 000

### Mechanical connection

- 2 = G1/2 DIN 3852  
(only for "1000 bar" press. range)
- 4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male 4 pole Binder series 714 M18  
(connector not supplied)
- 5 = Male 3 pole + PE, EN175301-803  
(DIN 43650)  
(connector supplied)
- 6 = Male M12x1, 4 pole  
(connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0016; 0060; 0100; 0250; 0400; 0600  
1000 (only in conjunction with mechanical connection code "2")

### Approval

A = ATEX

### Insulation voltage

N = 50 V AC

### Protection type and applications (code)

- 1 = I M1 Ex ia I Ma  
II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 1D Ex ia IIIC T85 °C Da
- 9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. conn. "6")\*
- A = II 1D Ex ta IIIC T80 °C T<sub>500</sub>T90 °C Da (only in conjunction with electr. conn. "6")\*
- C = II 3G Ex ic IIC T6 Gc  
II 3D Ex ic IIIC T80 °C Dc

### Modification number

000 = Standard

### Notes:

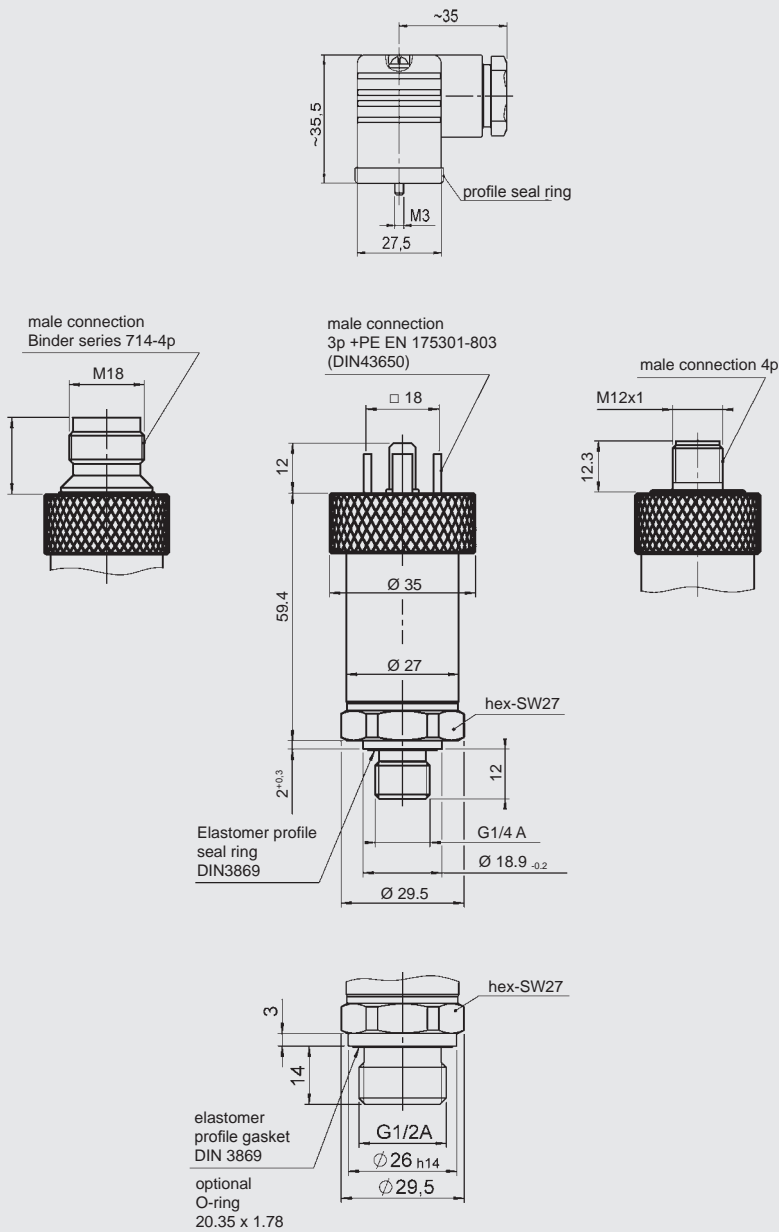
\* For design and electrical connection see device dimensions

### Accessories:

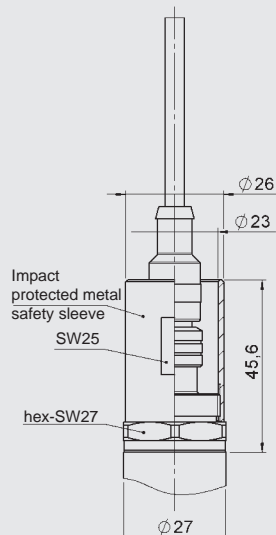
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:

Protection types and applications (code): 1, C



Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection, e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4300 ATEX Intrinsically Safe ATEX Dustproof Enclosure ATEX Non-sparking



### Description:

The pressure transmitter HDA 4300 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the ATEX version HDA 4300 has a ceramic measurement cell with thick-film strain gauge.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

### Protection types and applications:

I M1 Ex ia I Ma

II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 3G Ex nA IIC T6, T5, T4 Gc  
II 3G Ex ic IIC T6, T5, T4 Gc

II 1D Ex ia IIIC T85 °C Da  
II 1D Ex ta IIIC T80/90/100 °C Da  
T<sub>500</sub> T90/T100/T110 °C Da

II 2D Ex tb IIIC T80/90/100 °C Db  
II 3D Ex tc IIIC T80/T90/T100 °C Dc  
II 3D Ex ic IIIC T80/T90/T100 °C Dc

### Special features:

- Accuracy  $\leq \pm 0.5$  % FS typ.
- Certificates:  
KEMA 05ATEX1016 X  
KEMA 05ATEX1021
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data		
Measuring ranges	-1 .. 1; 1; 2.5; 4; 6; 10; 16; 25; 40 bar	
Overload pressures	3; 3; 8; 12; 20; 32; 50; 80; 120 bar	
Burst pressures	5; 5; 12; 18; 30; 48; 75; 120; 180 bar	
Mechanical connection	G1/4 A DIN 3852	
Torque value	20 Nm	
Parts in contact with medium	Sensor: Ceramic Mech. connection: 1.4301 Seal: FPM / EPDM	
Output data		
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 \text{ V}) / 20 \text{ mA}$ [kΩ]	
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5$ % FS typ. $\leq \pm 1$ % FS max.	
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25$ % FS typ. $\leq \pm 0.5$ % FS max.	
Temperature compensation	$\leq \pm 0.02$ % FS / °C typ.	
Zero point	$\leq \pm 0.03$ % FS / °C max.	
Temperature compensation Over range	$\leq \pm 0.02$ % FS / °C typ. $\leq \pm 0.03$ % FS / °C max.	
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5$ % FS max.	
Hysteresis	$\leq \pm 0.4$ % FS max.	
Repeatability	$\leq \pm 0.1$ % FS	
Rise time	$\leq 1.5$ ms	
Long-term drift	$\leq \pm 0.3$ % FS typ. / year	
Environmental conditions		
Compensated temperature range	-20 .. +85 °C	
Operating temperature range	-20 .. +60 °C	
Storage temperature range	-40 .. +100 °C	
Fluid temperature range <sup>1)</sup>	-40 °C .. +60 °C / -20 °C .. +60 °C	
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 31 EN 50303	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g	
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1, when an IP 67 connector is used)	
Relevant data for Ex applications		
Supply voltage	U <sub>i</sub> = 12 .. 28 V	Ex na, ta, tb, tc 12 .. 28 V
Max. input current	I <sub>i</sub> = 100 mA	
Max. input power	P <sub>i</sub> = 1 W	max. power consumption $\leq 1$ W
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22$ nF	
Inductance of the sensor	L <sub>i</sub> = 0 mH	
Insulation voltage <sup>2)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Other data		
Residual ripple of supply voltage	$\leq 5$ %	
Life expectancy	> 10 million cycles 0 .. 100 % FS	
Weight	~ 180 g	

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -20 °C with FPM or EPDM seal, -40 °C on request

<sup>2)</sup> 500 V AC on request

## Areas of application:

Code No. for use in Model code	1		9		A	C
<b>Protection type</b>	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85°C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6 Gc	II 1D Ex ta IIIC T80°C T <sub>500</sub> T90°C Da II 2D Ex tb IIIC T80°C Db	II 3G Ex ic IIC T6 Gc II 3D Ex ic IIIC T80°C Dc
<b>Certificate</b>	KEMA 05ATEX1016 X / KEMA 05ATEX1021					
<b>Zones / Categories</b>	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier	Group II Category 2G Gases Protection class: intrinsically safe ia with barrier	Group II Category 3G Gases Protection class: Non-sparking nA	Group III Category 1D, 2D Conductive dust Protection class: Dustproof enclosure	Group II, III Category 3G, 3D Gases/conductive dust Protection class: Intrinsically safe ic with barrier
<b>Electrical Connection (see model code)</b>	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ta IIIC T80/90/100 °C Da T<sub>500</sub>T90/T100/T110 °C Da, II 2D Ex tb IIIC T80/90/100 °C Db and II 3D Ex tc IIIC T80/90/100 °C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

## Pin connections:

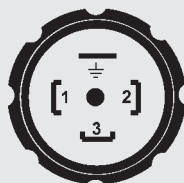
Binder series 714 M18



Pin HDA 4344-A

1	n.c.
2	Signal +
3	Signal -
4	n.c.

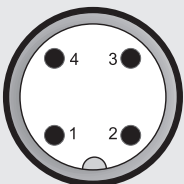
EN175301-803 (DIN 43650)



Pin HDA 4345-A

1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1



Pin HDA 4346-A

1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

**HDA 4 3 4 X - A - XXXX - ANX - 000 - X 1**

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male, 4 pole Binder series 714 M18 (connector not supplied)
- 5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
- 6 = Male, M12x1, 4 pole (connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0001(-1..1); 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

### Approval

A = ATEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

- 1 = I M1 Ex ia I Ma  
II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 1D Ex ia IIIC T85°C Da
- 9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. conn. "6")\*
- A = II 1D Ex ta IIIC T80°C T<sub>500</sub>T90°C Da (only in conjunction with electr. conn. "6")\*  
II 2D Ex tb IIIC T80°C Db
- C = II 3G Ex ic IIC T6 Gc  
II 3D Ex ic IIIC T80°C Dc

### Modification number

000 = Standard

### Seal material (in contact with fluid)

- F = FPM seal (e.g.: for hydraulic oils)
- E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

### Notes:

\* For design and electrical connection see device dimensions

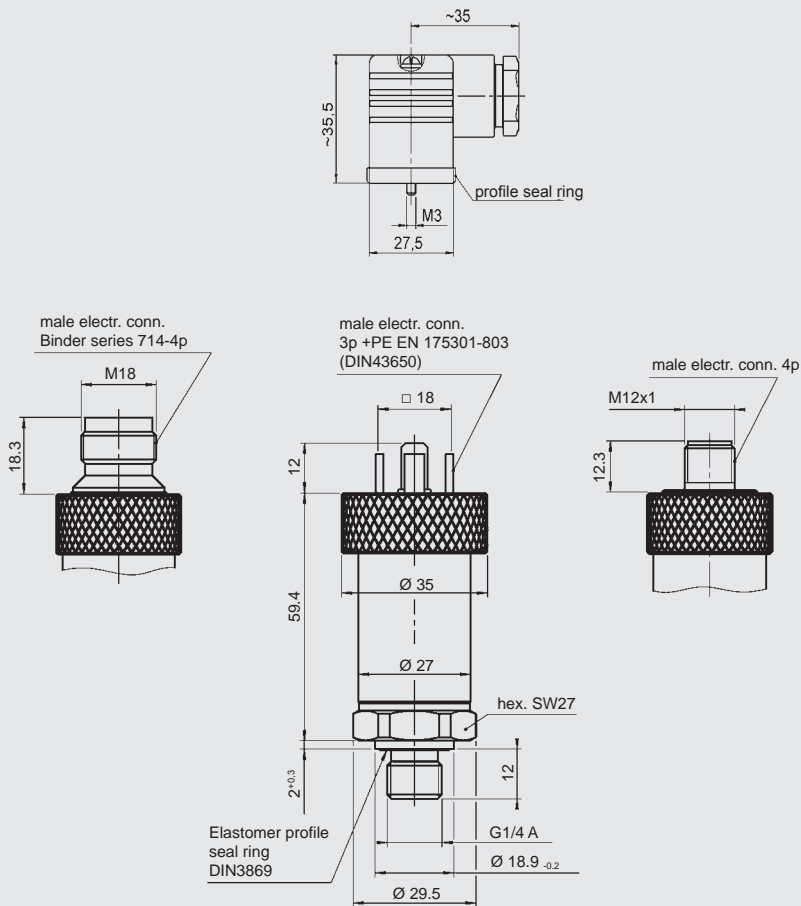
### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

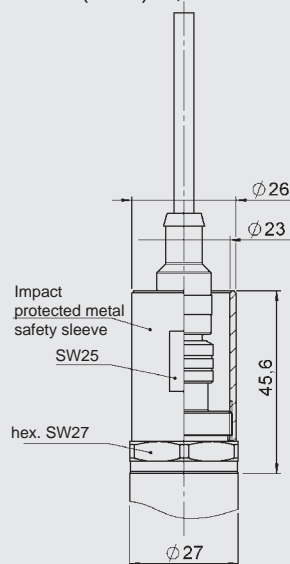


## Dimensions:

Protection types and applications (code): 1, C



Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4100 ATEX Intrinsically Safe ATEX Dustproof housing ATEX Non-sparking



### Description:

The pressure transmitter HDA 4100 in ATEX version has been specially developed for use in potentially explosive atmospheres for absolute measurement in the low pressure range and is based on the HDA 4000 series.

As with the industry model, the ATEX version HDA 4100 has a ceramic measurement cell with thick-film strain gauge.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

### Protection types and applications:

I M1 Ex ia I Ma

II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 3G Ex nA IIC T6, T5, T4 Gc  
II 3G Ex ic IIC T6, T5, T4 Gc

II 1D Ex ia IIIC T85 °C Da  
II 1D Ex ta IIIC T80/90/100 °C Da  
T<sub>500</sub> T90/T100/T110 °C Da

II 2D Ex tb IIIC T80/90/100 °C Db  
II 3D Ex tc IIIC T80/T90/T100 °C Dc  
II 3D Ex ic IIIC T80/T90/T100 °C Dc

### Special features:

- Accuracy  $\leq \pm 0.5$  % FS typ.
- Certificates:  
KEMA 05ATEX1016 X  
KEMA 05ATEX1021
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	1; 2.5 bar
Overload pressures	3; 8 bar
Burst pressures	5; 12 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Sensor: Ceramic Mech. connection: 1.4301 Seal: FPM / EPDM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 V) / 20 \text{ mA} [\text{k}\Omega]$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5$ % FS typ. $\leq \pm 1$ % FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25$ % FS typ. $\leq \pm 0.5$ % FS max.
Temperature compensation	$\leq \pm 0.02$ % FS / °C typ.
Zero point	$\leq \pm 0.03$ % FS / °C max.
Temperature compensation Over range	$\leq \pm 0.02$ % FS / °C typ. $\leq \pm 0.03$ % FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5$ % FS max.
Hysteresis	$\leq \pm 0.4$ % FS max.
Repeatability	$\leq \pm 0.1$ % FS
Rise time	$\leq 1.5$ ms
Long-term drift	$\leq \pm 0.3$ % FS typ. / year
Environmental conditions	
Compensated temperature range	-20 .. +85 °C
Operating temperature range	-20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 °C .. +60 °C / -20 °C .. +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 31 EN 50303
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1, when an IP 67 connector is used)
Relevant data for Ex applications	
Supply voltage	U <sub>i</sub> = 12 .. 28 V
Max. input current	I <sub>i</sub> = 100 mA
Max. input power	P <sub>i</sub> = 1 W
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22$ nF
Inductance of the sensor	L <sub>i</sub> = 0 mH
Insulation voltage <sup>2)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2
Other data	
Residual ripple of supply voltage	$\leq 5$ %
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -20 °C with FPM or EPDM seal, -40 °C on request

<sup>2)</sup> 500 V AC on request

## Areas of application:

Code No. for use in Model code	1		9	A	C	
Protection type	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85°C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6 Gc	II 1D Ex ta IIIC T80°C T <sub>500</sub> T90°C Da II 2D Ex tb IIIC T80°C Db	II 3G Ex ic IIC T6 Gc II 3D Ex ic IIIC T80°C Dc
Certificate	KEMA 05ATEX1016 X / KEMA 05ATEX1021					
Zones / Categories	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier	Group II Category 2G Gases Protection class: intrinsically safe ia with barrier	Group II Category 3G Gases Protection class: Non-sparking nA	Group III Category 1D, 2D Conductive dust Protection class: Dustproof enclosure	Group II, III Category 3G, 3D Gases/conductive dust Protection class: Intrinsically safe ic with barrier
Electrical Connection (see model code)	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ta IIIC T80/90/100° C Da T<sub>500</sub>T90/T100/T110°C Da, II 2D Ex tb IIIC T80/90/100°C Db and II 3D Ex tc IIIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

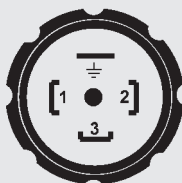
## Pin connections:

Binder series 714 M18



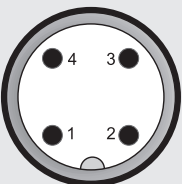
Pin	HDA 4144-A
1	n.c.
2	Signal +
3	Signal -
4	n.c.

EN175301-803 (DIN 43650)



Pin	HDA 4145-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1



Pin	HDA 4146-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

**HDA 4 1 4 X - A - XXXX - A N X - 000 - X 1**

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

4 = Male, 4 pole Binder series 714 M18 (connector not supplied)

5 = Male, 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)

6 = Male, M12x1, 4 pole (connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

01.0; 02.5

### Approval

A = ATEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = I M1 Ex ia I Ma  
II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 1D Ex ia IIIC T85 °C Da

9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. connection "6") \*

A = II 1D Ex ta IIIC T80 °C T<sub>500</sub>T90 °C Da (only in conjunction with electr. connection "6")\*  
II 2D Ex tb IIIC T80 °C Db

C = II 3G Ex ic IIC T6 Gc  
II 3D Ex ic IIIC T80 °C Dc

### Modification number

000 = Standard

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

### Notes:

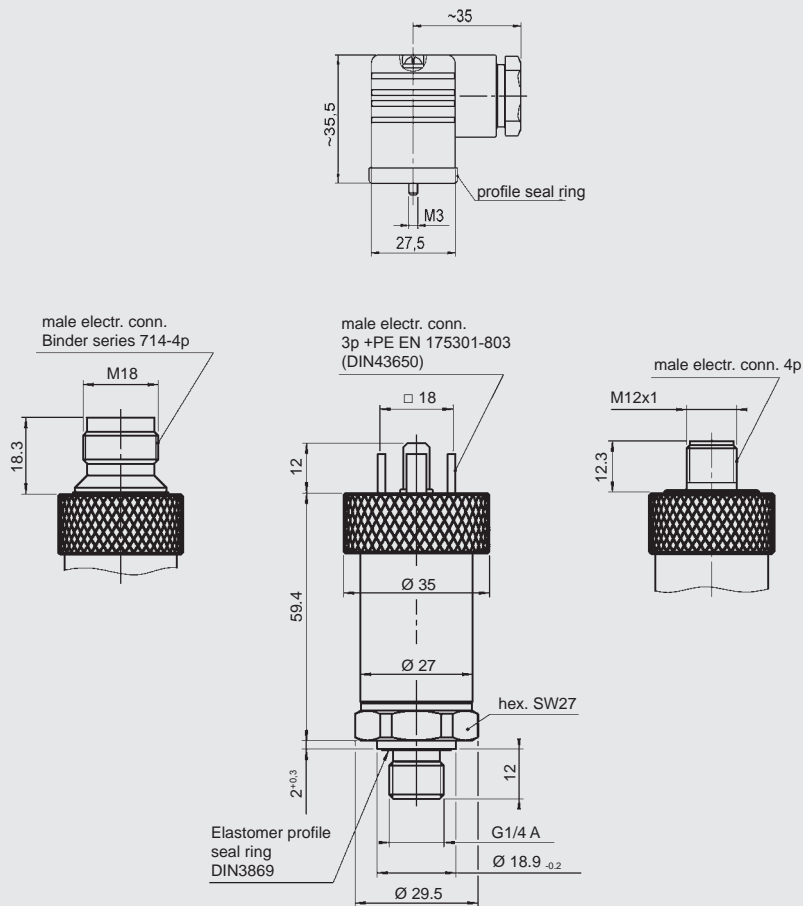
\* For design and electrical connection see device dimensions

### Accessories:

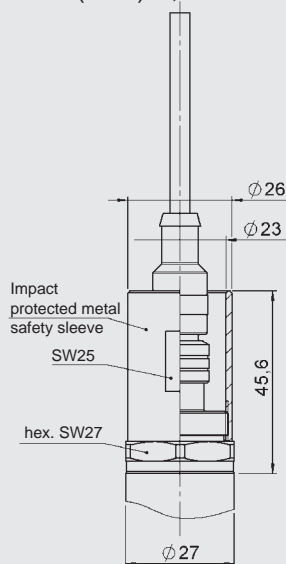
Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

## Dimensions:

Protection types and applications (code): 1, C



Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.





## Electronic Pressure Switch EDS 4400 Programmable ATEX Intrinsically Safe



### Description:

The programmable pressure switch EDS 4400 in ATEX version has been specially developed for use in potentially explosive atmospheres, and is based on the EDS 4000 series.

The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are user-programmable in conjunction with the HYDAC Programming Unit HPG 3000.

As with the industry model, the programmable EDS 4400 in ATEX version has a stainless steel measurement cell with thin-film strain gauge for measuring relative pressure in the high pressure range.

With approval for the following

### Protection types and applications:

I M1	Ex ia I
II 1G	Ex ia IIC T4, T5, T6
II 1/2G	Ex ia IIC T4, T5, T6
II 2G	Ex ia IIC T4, T5, T6
II 1 D	Ex iaD 20 T100°C

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available upon request.

### Special features:

- Switching point and switch-back point are user-programmable
- Accuracy  $\leq \pm 1\%$  FS
- Certificates:  
DEKRA EXAM BVS 07 ATEX E 041 X
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data		
Measuring ranges	60; 100; 250; 400; 600 bar	
Overload pressures	120; 200; 500; 800; 1000 bar	
Burst pressure	300; 500; 1000; 2000; 2000 bar	
Mechanical connection	G1/4 A DIN 3852	
Torque value	20 Nm	
Parts in contact with medium	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301	
Seal:	FPM	
Output data		
Switch output	1 x PNP N/C or N/O	
Output load	during operation: $I_{max} \leq 34$ mA	
Switching points	user-programmable with HYDAC Programming Unit HPG 3000	
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.	
Repeatability (at 25 °C)	$\leq \pm 0.1\%$ FS max.	
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range	
Rising switch point and falling switch point delay	8 ms to 2000 ms; user-programmable with HYDAC Programming Unit HPG 3000	
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year	
Environmental conditions		
Storage temperature range	-40 .. +100 °C	
Fluid temperature range	-20 .. +60 °C / +70 °C / +85 °C	
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 61241-0 / 11 EN 50303	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g	
Protection class to IEC 60529	IP 67 (M12x1, when an IP 67 connector is used)	
Relevant data for Ex applications		
	<b>I M1</b> <b>II 1G, 1/2G, 2G</b>	<b>II 1 D</b>
Supply voltage	14 .. 28 V DC	
Compensated temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Operating temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Max. ambient temperature $T_a$	T6: +60 °C T5, T4: +70 °C	T100: +70 °C
Max. input current	100 mA	93 mA
Max. input power	0.7 W	0.65 W
Max. internal capacitance	33 nF	33 nF
Max. internal inductance	0 mH	0 mH
Insulation voltage <sup>1)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Approved intrinsic safety barriers	Pepperl & Fuchs: Telematic Ex STOCK:	Z 787 MTL 7087
Other data		
Residual ripple of supply voltage	$\leq 5\%$	
Life expectancy	> 10 million cycles 0 .. 100 % FS	
Weight	~ 150 g	

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided. **FS** (Full Scale) = relative to the complete measuring range  
<sup>1)</sup> 500 V AC on request

## Setting options:

In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

## Setting ranges for the switch outputs:

Measuring range in bar	Increment in bar
0 .. 60	0.1
0 .. 100	0.2
0 .. 250	0.5
0 .. 400	1
0 .. 600	1

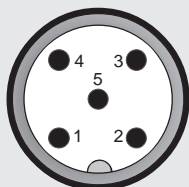
The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay ToF1/ToF2	8	2040

The increment for all instruments is 8 ms.

## Pin connections:

M12x1, 5 pole



Pin	Process connection	HPG connection
1	+U <sub>B</sub>	+U <sub>B</sub>
2	0 V	Comport 1 *
3	0 V	0 V
4	Out 1	n.c.
5	0 V	Comport 2 *

\* Comport = programming connection

## Areas of application:

Code No. for use in Model code	1	2	3	8
<b>Protection Type</b>	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC / II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
<b>Certificate</b>	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X
<b>Zones / Categories</b>	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 0  T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0 T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20 T100: T <sub>a</sub> = 70 °C
<b>Electrical Connection</b>	8	8	8	8

Instruments for other Protection types and applications are available on request. Please contact our technical sales department for more information.

## Model code:

EDS 4 4 4 8 - XXXX - P - A N X - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

8 = Male M12x1, 5 pole  
(connector not supplied)

### Pressure ranges in bar

0060; 0100; 0250; 0400; 0600

### Switching output

P = Programmable

### Approval

A = ATEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = I M1 Ex ia I

2 = II 1G Ex ia IIC T4, T5, T6

3 = II 2G Ex ia IIC T4, T5, T6 / II 1/2G Ex ia IIC T4, T5, T6

8 = II 1D Ex iaD 20 T100 °C

### Modification number

000 = Standard

## Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.



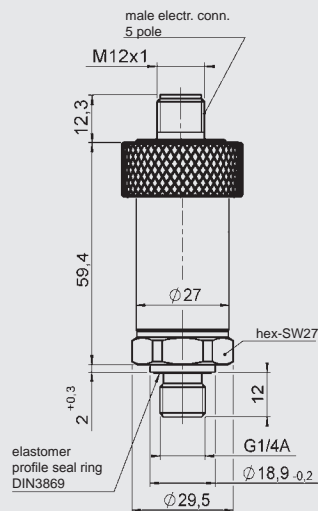
## Safety instructions:

- These units must only be programmed outside the potentially explosive location.
- When operating in potentially explosive locations, the programming cables may only be connected to the 0 V outside of the potentially explosive area.
- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit through the switching output.
- The dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that measured fluids in contact with the pressure switch are compatible with the materials used.

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Dimensions:

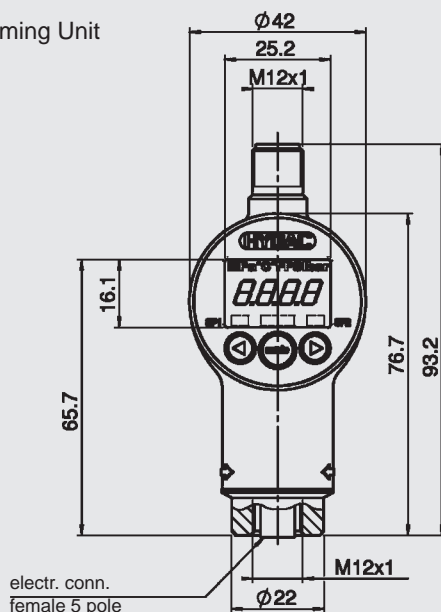


## Programming Unit:

(must be ordered separately)

### HPG 3000 – 000

Portable Programming Unit  
Part. No. 909 422



## Caution:

The HPG 3000 Programming Unit may only be used outside the potentially explosive area.

**HYDAC ELECTRONIC GMBH**  
Hauptstraße 27, D-66128 Saarbrücken  
Telephone +49 (0)6897 509-01  
Fax +49 (0)6897 509-1726  
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Internet: [www.hydac.com](http://www.hydac.com)





## Electronic Pressure Switch EDS 4300 Programmable ATEX Intrinsically Safe



### Description:

The programmable pressure switch EDS 4300 in ATEX version was specially developed for use in potentially explosive atmospheres and is based on the EDS 4000 series.

The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are user-programmable in conjunction with the HYDAC Programming Unit HPG 3000.

As with the industry model, the programmable EDS 4300 in ATEX version has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range.

With approval for the following

### Protection types and applications:

I M1	Ex ia I
II 1G	Ex ia IIC T4, T5, T6
II 1/2G	Ex ia IIC T4, T5, T6
II 2G	Ex ia IIC T4, T5, T6
II 1 D	Ex iaD 20 T100 °C

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available on request.

### Special features:

- Switching point and switch-back point user-programmable
- Accuracy  $\leq \pm 1\%$  FS
- Certificates:  
DEKRA EXAM BVS 07 ATEX E 041 X
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	1; 2.5; 4; 6; 10; 16; 25; 40 bar
Overload pressures	3; 8; 12; 20; 32; 50; 80; 120 bar
Burst pressures	5; 12; 18; 30; 48; 75; 120; 180 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Sensor: Ceramic Mech. connection: 1.4301 Seal: FPM / EPDM

Output data	
Switch output	1 x PNP N/C or N/O
Output load	during operation: $I_{max} \leq 34$ mA
Switching points	user-programmable with HYDAC Programming Unit HPG 3000
Accuracy to DIN 16086,	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Repeatability (at 25 °C)	$\leq \pm 0.1\%$ FS max.
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Rising switch point and falling switch point delay	8 ms to 2000 ms; user-programmable with HYDAC Programming Unit HPG 3000
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year

Environmental conditions	
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-20 .. +60 °C / +70 °C / +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 61241-0 / 11 EN 50303
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 67 (M12x1, when an IP 67 connector is used)

### Relevant data for Ex applications

	I M1 II 1G, 1/2G, 2G	II 1 D
Supply voltage	14 .. 28 V DC	
Compensated temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Operating temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Max. ambient temperature $T_a$	T6: +60 °C T5, T4: +70 °C	T100: +70 °C
Max. input current	100 mA	93 mA
Max. input power	0.7 W	0.65 W
Max. internal capacitance	33 nF	33 nF
Max. internal inductance	0 mH	0 mH
Insulation voltage <sup>1)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Approved intrinsic safety barriers	Pepperl & Fuchs: Telematic Ex STOCK:	Z 787 MTL 7087

Other data	
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided. FS (Full Scale) = relative to the full measuring range  
<sup>1)</sup> 500 V AC on request

## Setting options:

In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

## Setting ranges for the switch outputs:

Measuring range in bar	Increment in bar
0 .. 1	0.002
0 .. 2.5	0.005
0 .. 4	0.01
0 .. 6	0.01
0 .. 10	0.02
0 .. 16	0.05
0 .. 25	0.1
0 .. 40	0.1

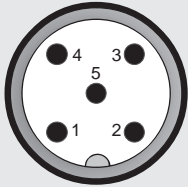
The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay ToF1/ToF2	8	2040

The increment for all instruments is 8 ms.

## Pin connections:

M12x1, 5 pole



Pin	Process connection	HPG connection
1	+U <sub>B</sub>	+U <sub>B</sub>
2	0 V	Comport 1 *
3	0 V	0 V
4	Out 1	n.c.
5	0 V	Comport 2 *

\* Comport = programming connection

## Areas of application:

Code No. for use in Model code	1	2	3	8
<b>Protection Type</b>	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
<b>Certificate</b>	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X
<b>Zones / Categories</b>	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 0  T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0  T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20  T100: T <sub>a</sub> = 70 °C
<b>Electrical Connection</b>	8	8	8	8

Instruments for other Protection types and applications are available on request. Please contact our technical sales department for more information.

## Model code:

EDS 4 3 4 8 - XXXX - P - A N X - 000 - X 1

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

8 = Male M12x1, 5 pole  
(connector not supplied)

### Pressure ranges in bar

01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

### Switching output

P = Programmable

### Approval

A = ATEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = I M1 Ex ia I

2 = II 1G Ex ia IIC T4, T5, T6

3 = II 2G Ex ia IIC T4, T5, T6 / II 1/2G Ex ia IIC T4, T5, T6

8 = II 1D Ex iaD 20 T100 °C

### Modification number

000 = Standard

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

## Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

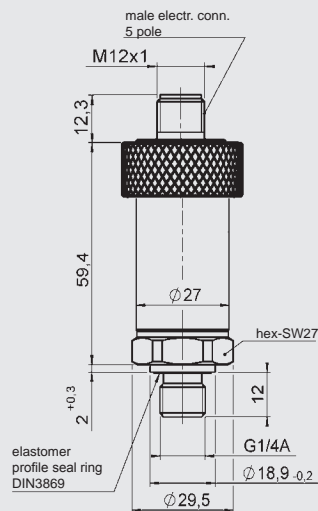
## Safety instructions:

- These units must only be programmed outside the potentially explosive location.
- When operating in potentially explosive locations, the programming cables may only be connected to the 0 V outside of the potentially explosive area.
- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit through the switching output.
- Dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that measured fluids in contact with the pressure switch are compatible with the materials used.

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Dimensions:

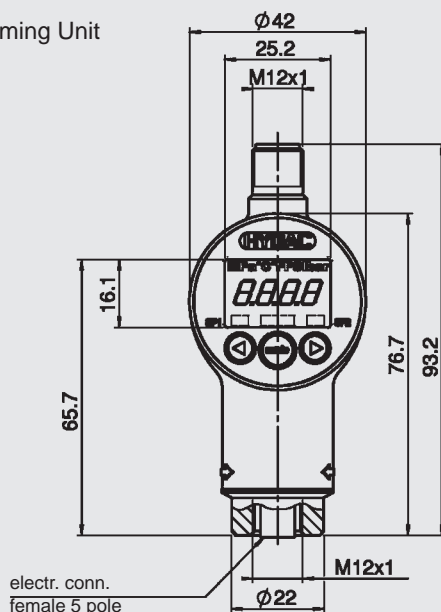


## Programming Unit:

(must be ordered separately)

### HPG 3000 – 000

Portable Programming Unit  
Part. No. 909 422



## Caution:

The HPG 3000 Programming Unit may only be used outside the potentially explosive area.

**HYDAC ELECTRONIC GMBH**  
Hauptstraße 27, D-66128 Saarbrücken  
Telephone +49 (0)6897 509-01  
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E-mail: [electronic@hydac.com](mailto:electronic@hydac.com)  
Internet: [www.hydac.com](http://www.hydac.com)





## Electronic Pressure Switch EDS 4100 Programmable ATEX Intrinsicly Safe



### Description:

The programmable pressure switch EDS 4100 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the EDS 4000 series.

The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are user-programmable in conjunction with the HYDAC Programming Unit HPG 3000.

As with the industry model, the programmable EDS 4100 in ATEX version has a ceramic measurement cell with thick-film strain gauge for measuring absolute pressure in the low pressure range.

With approval for the following

### Protection types and applications:

I M1	Ex ia I
II 1G	Ex ia IIC T4, T5, T6
II 1/2G	Ex ia IIC T4, T5, T6
II 2G	Ex ia IIC T4, T5, T6
II 1 D	Ex iaD 20 T100 °C

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available on request.

### Special features:

- Switching point and switch-back point user-programmable
- Accuracy  $\leq \pm 1\%$  FS
- Certificates:  
DEKRA EXAM BVS 07 ATEX E 041 X
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data		
Measuring ranges	1; 2.5 bar	
Overload pressures	3; 8 bar	
Burst pressures	5; 12 bar	
Mechanical connection	G1/4 A DIN 3852	
Torque value	20 Nm	
Parts in contact with medium	Sensor:	Ceramic
	Mech. connection:	1.4301
	Seal:	FPM / EPDM

Output data	
Switch output	1 x PNP N/C or N/O
Output load	during operation: $I_{max} \leq 34$ mA
Switching points	user-programmable with HYDAC Programming Unit HPG 3000
Accuracy to DIN 16086,	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Repeatability (at 25 °C)	$\leq \pm 0.1\%$ FS max.
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Rising switch point and falling switch point delay	8 ms to 2000 ms; user-programmable with HYDAC Programming Unit HPG 3000
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year

Environmental conditions	
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-20 .. +60 °C / +70 °C / +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 61241-0 / 11 EN 50303
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 67 (M12x1, when an IP 67 connector is used)

	Relevant data for Ex applications	
	I M1 II 1G, 1/2G, 2G	II 1 D
Supply voltage	14 .. 28 V DC	
Compensated temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Operating temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Max. ambient temperature $T_a$	T6: +60 °C T5, T4: +70 °C	T100: +70 °C
Max. input current	100 mA	93 mA
Max. input power	0.7 W	0.65 W
Max. internal capacitance	33 nF	33 nF
Max. internal inductance	0 mH	0 mH
Insulation voltage <sup>1)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Approved intrinsic safety barriers	Pepperl & Fuchs: Telematic Ex STOCK:	Z 787 MTL 7087

Other data	
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range  
<sup>1)</sup> 500 V AC on request

## Setting options:

In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

## Setting ranges for the switch outputs:

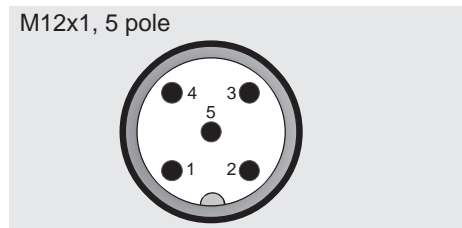
Measuring range in bar	Increment in bar
0 .. 1	0.002
0 .. 2.5	0.005

The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay ToF1/ToF2	8	2040

The increment for all instruments is 8 ms.

## Pin connections:



Pin	Process connection	HPG connection
1	+U <sub>B</sub>	+U <sub>B</sub>
2	0 V	Comport 1 *
3	0 V	0 V
4	Out 1	n.c.
5	0 V	Comport 2 *

\* Comport = programming connection

## Areas of application:

Code No. for use in Model code	1	2	3	8
<b>Protection Type</b>	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
<b>Certificate</b>	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X
<b>Zones / Categories</b>	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 0  T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0  T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20  T100: T <sub>a</sub> = 70 °C
<b>Electrical Connection</b>	8	8	8	8

Instruments for other Protection types and applications are available on request. Please contact our technical sales department for more information.

## Model code:

EDS 4 1 4 8 - XXXX - P - A N X - 000 - X 1

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

8 = Male M12x1, 5 pole  
(connector not supplied)

### Pressure ranges in bar

01.0; 02.5

### Switching output

P = Programmable

### Approval

A = ATEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = I M1 Ex ia I  
2 = II 1G Ex ia IIC T4, T5, T6  
3 = II 2G Ex ia IIC T4, T5, T6 / II 1/2G Ex ia IIC T4, T5, T6  
8 = II 1D Ex iaD 20 T100 °C

### Modification number

000 = Standard

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)  
E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.



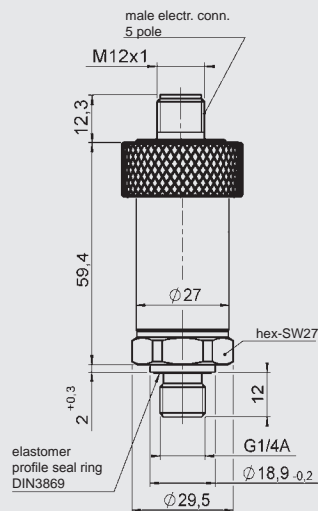
## Safety instructions:

- These units must only be programmed outside the potentially explosive location.
- When operating in potentially explosive locations, the programming cables may only be connected to the 0 V outside of the potentially explosive area.
- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit through the switching output.
- Dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that measured fluids in contact with the pressure switch are compatible with the materials used.

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Dimensions:

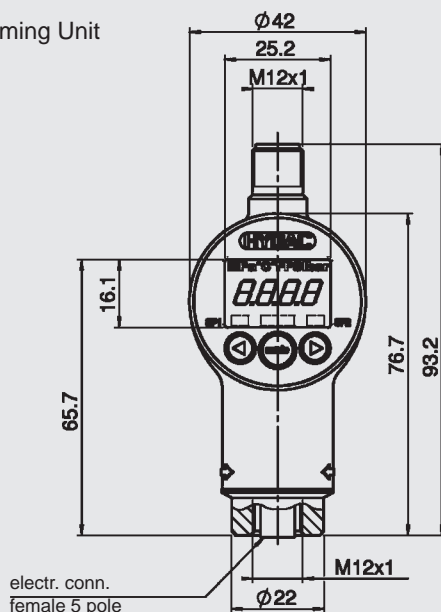


## Programming Unit:

(must be ordered separately)

### HPG 3000 – 000

Portable Programming Unit  
Part. No. 909 422



## Caution:

The HPG 3000 Programming Unit may only be used outside the potentially explosive area.

**HYDAC ELECTRONIC GMBH**  
Hauptstraße 27, D-66128 Saarbrücken  
Telephone +49 (0)6897 509-01  
Fax +49 (0)6897 509-1726  
E-mail: [electronic@hydac.com](mailto:electronic@hydac.com)  
Internet: [www.hydac.com](http://www.hydac.com)





## Electronic Pressure Transmitter HDA 4700 CSA Intrinsically safe CSA Non Incendive



### Description:

The pressure transmitter HDA 4700 in **CSA** version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4700 in **CSA** version has a stainless steel measurement cell with thin-film strain gauge.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

*Intrinsically safe:*

- Class I Div. 1 Group A, B, C, D T6 [C, US]
- Class I Zone 0 AEx ia IIC T6 [US]
- Ex ia IIC T6 [C]

- Class I, II, III Div. 1 Group A, B, C, D, E, F, G T6 [C, US]

*Non incendive:*

- Class I Div. 2 Group A, B, C, D T4A [C, US]
- Class I Zone 2 AEx nL IIC T4 [US]
- Class I Zone 2 Ex nL IIC T4 [C]

- Class I, II, III Div. 2 Group A, B, C, D, F, G T4A [C, US]
- Class I Zone 2 AEx nA II T4 [US]
- Class I Zone 2 Ex nA II T4 [C]

### Special features:

- Accuracy  $\leq \pm 0.25\%$  FS typ.
- Certificate: CSA 1760344
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:


#### Input data

Measuring ranges <sup>1)2)</sup>	-1 .. 9; 16; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	20; 32; 120; 200; 500; 800; 1000; 1600 bar
Burst pressures	200; 200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>2)</sup>	G1/4 A DIN 3852 G1/2 DIN 3852
Torque value	20 Nm; 40 Nm
Parts in contact with medium	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
Seal:	FPM

#### Output data

Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 V) / 20 \text{ mA} \text{ [k}\Omega\text{]}$
Accuracy to DIN 16086	$\leq \pm 0.25\%$ FS typ.
Max. setting	$\leq \pm 0.5\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.
Temperature compensation	$\leq \pm 0.008\%$ FS / °C typ.
Zero point	$\leq \pm 0.015\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.008\%$ FS / °C typ. $\leq \pm 0.015\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.1\%$ FS max.
Repeatability	$\leq \pm 0.05\%$ FS
Rise time	$\leq 1.5 \text{ ms}$
Long-term drift	$\leq \pm 0.1\%$ FS typ. / year

#### Environmental conditions

Compensated temperature range	Intrinsically safe: -20 .. +60 °C
	Non incendive: -20 .. +85 °C
Operating temperature range <sup>3)</sup>	Intrinsically safe: -40 .. +60 °C / -20 .. +60 °C
	Non incendive: -40 .. +85 °C / -20 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>3)</sup>	Intrinsically safe: -40 .. +60 °C / -20 .. +60 °C
	Non incendive: -40 .. +85 °C / -20 .. +85 °C
 mark	Certificate No.: CSA 1760344
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529 / NEMA (depending on the electr. connection)	Min. IP 65 Min. NEMA 4

#### Relevant data for Ex applications

Supply voltage	12 .. 28 V DC
Max. input current	100 mA
Max. input power	up to 28 V: 1 W
Connection capacitance of the sensor	$\leq 22 \text{ nF}$
Inductance of the sensor	0 mH
Insulation voltage <sup>4)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2

#### Other data

Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L. = Best Fit Straight Line**

<sup>1)</sup> psi pressure ranges on request

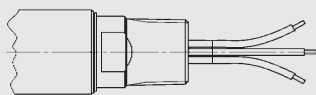
<sup>2)</sup> 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa.

<sup>3)</sup> -20 °C with FPM seal, -40 °C on request

<sup>4)</sup> 500 V AC on request

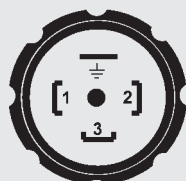
## Pin connections:

Conduit (single cores)



Core	HDA 47X9-A
green	Signal +
white	Signal -
green-yellow	Housing

EN175301-803 (DIN 43650)



Pin	HDA 47X5-A	HDA 47XA-A
1	Signal +	Signal +
2	Signal -	Signal -
3	n.c.	n.c.
⊥	Housing	Housing

## Areas of application:

Group	1	2	3	4
<b>Protection Type</b>	Intrinsically safe Gases and dusts	Intrinsically safe Gases	Non incandive (with field cabling) Gases	Non incandive Gases and dusts
<b>Certificate</b>	CSA 1760344			
<b>Zones / Categories</b>	Intrinsically safe - Class I, II, III - Division 1 - Group A, B, C, D, E, F, G T6	Intrinsically safe Ex ia IIC T6 - Class I - Zone 0 - AEx ia IIC T6  - Class I - Division I - Group A, B, C, D T6	Non incandive - Class I - Division 2 - Group A, B, C, D T4A  - Class I - Zone 2 - AEx nL IIC T4  - Class I - Zone 2 - Ex nL IIC T4	Non incandive - Class I, II, III - Division 2 - Group A, B, C, D, F, G T4A  - Class I - Zone 2 - Ex nA II T4  - Class I - Zone 2 - AEx nA II T4 IP 6x
<b>Electrical Connection</b>	9, A	5, 9, A	5, 9, A	9
<b>Code for Model Code</b>	A	B		C

## Model code:

**HDA 4 7 X X - A - XXXX - C N X - 000 (2m)**

### Mechanical connection

- 2 = G1/2 DIN 3852  
(only for pressure range "1000 bar")
- 4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 5 = Male, 3 pole + PE,  
EN175301-803 (DIN 43650)  
(connector supplied)
- 9 = Conduit connection thread  
(1/2-14 NPT, male)
- A = Male, EN175301-803  
(DIN 43650), 3 pole + PE  
(1/2" conduit female thread)

### Signal

- A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

- 0009 (-1..9); 0016; 0060; 0100; 0250; 0400; 0600
- 1000 (only in conjunction with mechanical connection code "2")

### Approval

- C = CSA

### Insulation voltage

- N = 50 V AC

### Protection types and applications (code)

- A = Group 1
- B = Group 2 and 3
- C = Group 4

### Modification number

- 000 = Standard

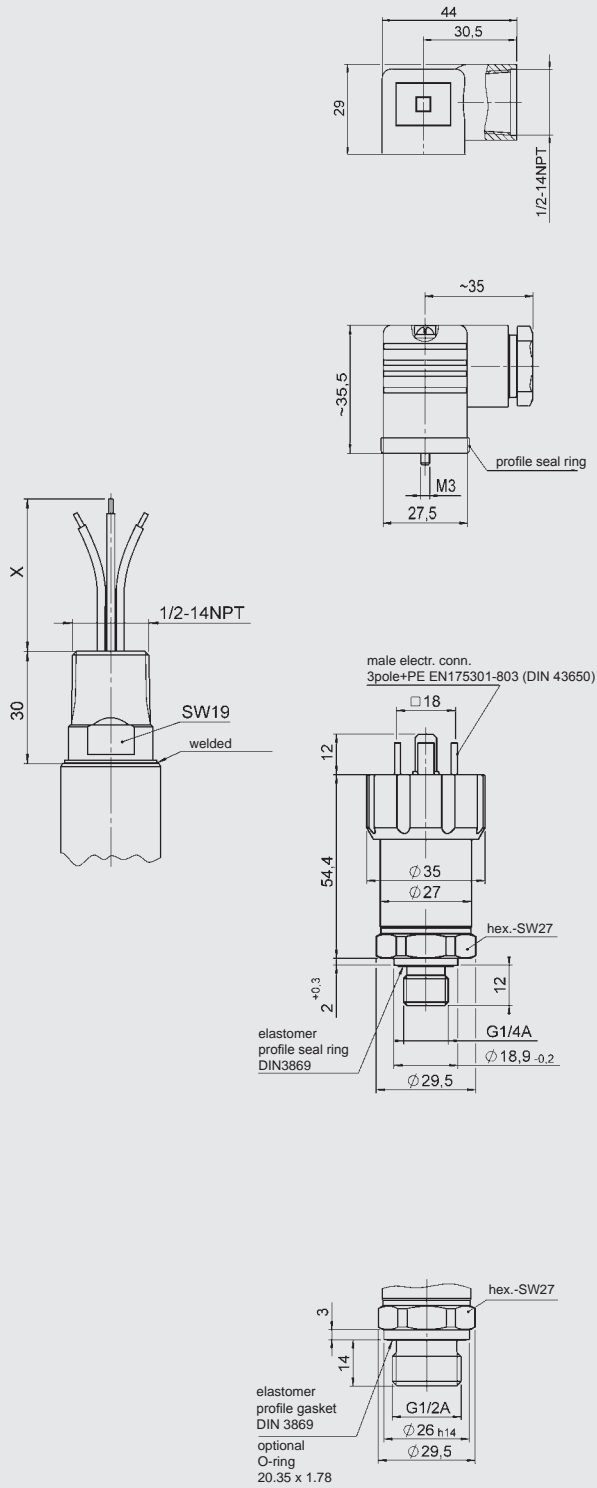
### Cable length in m (only for electr. connection type 9)

- Standard = 2 m

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4400 CSA Intrinsically safe CSA Non Incendive



### Description:

The pressure transmitter HDA 4400 in **CSA** version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4400 in **CSA** version has a stainless steel measurement cell with thin-film strain gauge.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

*Intrinsically safe:*

- Class I Div. 1 Group A, B, C, D T6 [C, US]
- Class I Zone 0 AEx ia IIC T6 [US]
- Ex ia IIC T6 [C]

- Class I, II, III Div. 1 Group A, B, C, D, E, F, G T6 [C, US]

*Non incendive:*


- Class I Div. 2 Group A, B, C, D T4 [C, US]
- Class I Zone 2 AEx nL IIC T4 [US]
- Class I Zone 2 Ex nL IIC T4 [C]

- Class I, II, III Div. 2 Group A, B, C, D, F, G T4 [C, US]
- Class I Zone 2 AEx nA II T4 [US]
- Class I Zone 2 Ex nA II T4 [C]

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Certificate: CSA 1760344
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	16; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	32; 120; 200; 500; 800; 900; 1600 bar
Burst pressures	200; 300; 500; 1000; 2000; 3000 bar
Mechanical connection <sup>1)</sup>	G1/2 A DIN 3852 G1/4 A DIN 3852
Torque value	45 Nm; 20 Nm
Parts in contact with medium <sup>2)</sup>	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
	Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 V) / 20 mA [k\Omega]$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation Zero point	$\leq \pm 0.015\%$ FS / °C typ. $\leq \pm 0.025\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.015\%$ FS / °C typ. $\leq \pm 0.025\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 1.5 ms$
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	Intrinsically safe: -20 .. +60 °C Non incendive: -20 .. +85 °C
Operating temperature range	Intrinsically safe: -20 .. +60 °C Non incendive: -20 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>3)</sup>	Intrinsically safe: -40 .. +60 °C / -20 .. +60 °C Non incendive: -40 .. +85 °C / -20 .. +85 °C
 mark	Certificate No.: CSA 1760344
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 g$
Protection class to IEC 60529 / NEMA (depending on the electr. connection)	Min. IP 65 Min. NEMA 4
Relevant data for Ex applications	
Supply voltage	12 .. 28 V DC
Max. input current	100 mA
Max. input power	up to 28 V: 1 W
Connection capacitance of the sensor	$\leq 22 nF$
Inductance of the sensor	0 mH
Insulation voltage <sup>4)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2
Other data	
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided.

**FS** (Full Scale) = relative to complete measuring range, **B.F.S.L.** = Best Fit Straight Line

<sup>1)</sup> 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa

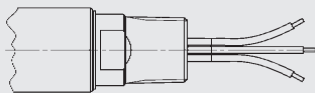
<sup>2)</sup> Other seal materials available on request

<sup>3)</sup> -20 °C with FPM seal, -40 °C on request

<sup>4)</sup> 500 V AC on request

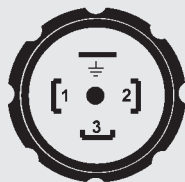
## Pin connections:

Conduit (single cores)



Core	HDA 44X9-A
green	Signal +
white	Signal -
green-yellow	Housing

EN175301-803 (DIN 43650)



Pin	HDA 44X5-A	HDA 44XA-A
1	Signal +	Signal +
2	Signal -	Signal -
3	n.c.	n.c.
⊥	Housing	Housing

## Areas of application:

Group	1	2	3	4
<b>Protection Type</b>	Intrinsically safe Gases and dusts	Intrinsically safe Gases	Non incandive (with field cabling) Gases	Non incandive Gases and dusts
<b>Certificate</b>	CSA 1760344			
<b>Zones / Categories</b>	Intrinsically safe - Class I, II, III - Division 1 - Group A, B, C, D, E, F, G T6	Intrinsically safe Ex ia IIC T6 - Class I - Zone 0 - AEx ia IIC T6  - Class I - Division I - Group A, B, C, D T6	Non incandive - Class I - Division 2 - Group A, B, C, D T4A  - Class I - Zone 2 - AEx nL IIC T4  - Class I - Zone 2 - Ex nL IIC T4	Non incandive - Class I, II, III - Division 2 - Group A, B, C, D, F, G T4A  - Class I - Zone 2 - Ex nA II T4  - Class I - Zone 2 - AEx nA II T4 IP 6x
<b>Electrical Connection</b>	9, A	5, 9, A	5, 9, A	9
<b>Code for Model Code</b>	A	B		C

## Model code:

**HDA 4 4 X X - A - XXXX - C N X - 000 (2m)**

### Mechanical connection

- 2 = G1/2 DIN 3852  
(only for pressure range "1000 bar")
- 4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 5 = Male, 3 pole + PE,  
EN175301-803 (DIN 43650)  
(connector supplied)
- 9 = Conduit connection thread  
(1/2-14 NPT, male)
- A = Male, EN175301-803  
(DIN 43650), 3 pole + PE  
(1/2" conduit female thread)

### Signal

- A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

- 0016; 0060; 0100; 0250; 0400; 0600
- 1000 (only in conjunction with mechanical connection code "2")

### Approval

- C = CSA

### Insulation voltage

- N = 50 V AC

### Protection types and applications (code)

- A = Group 1
- B = Group 2 and 3
- C = Group 4

### Modification number

- 000 = Standard

### Cable length in m (only for electr. connection code 9)

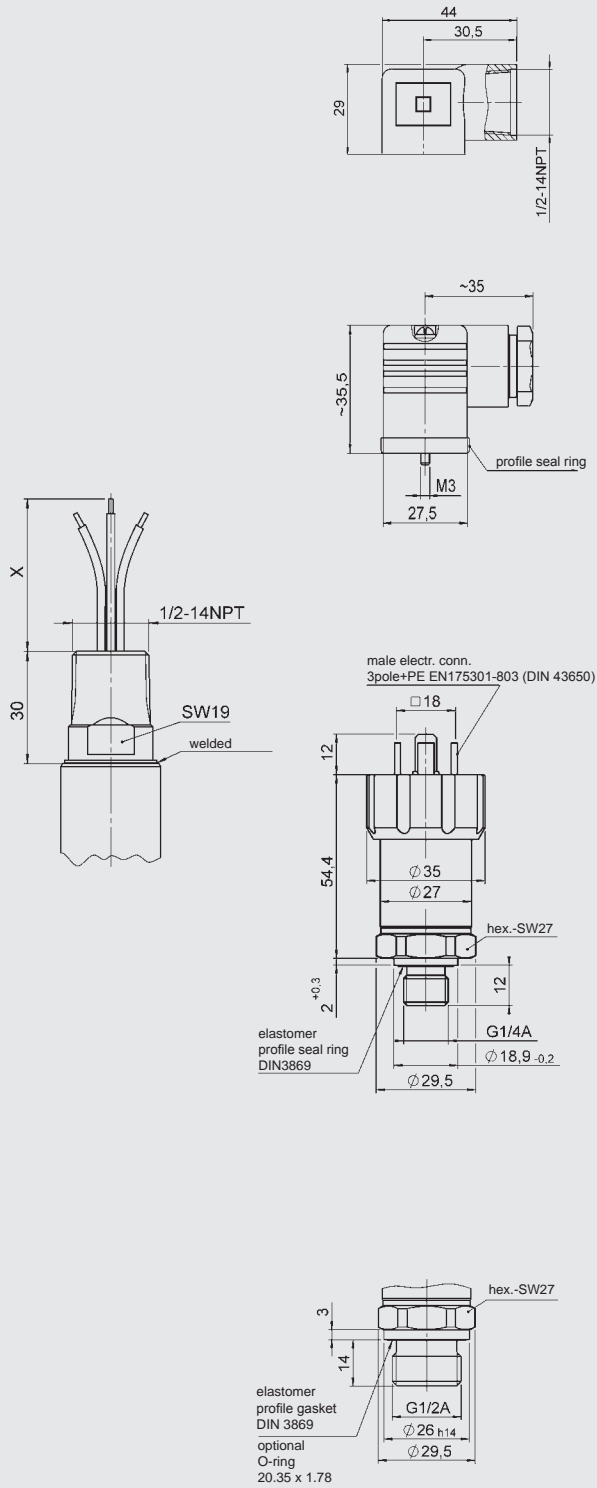
- Standard = 2 m

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.



## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4300 CSA Intrinsically safe CSA Non Incendive



### Description:

The pressure transmitter HDA 4300 in **CSA** version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4300 in **CSA** version has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

#### Intrinsically safe:

- Class I Div. 1 Group A, B, C, D T6 [C, US]
- Class I Zone 0 AEx ia IIC T6 [US]
- Ex ia IIC T6 [C]

- Class I, II, III  
Div. 1

Group A, B, C, D, E, F, G T6 [C, US]

#### Non incendive:

- Class I Div. 2 Group A, B, C, D T4A [C, US]
- Class I Zone 2 AEx nL IIC T4 [US]
- Class I Zone 2 Ex nL IIC T4 [C]


- Class I, II, III  
Div. 2

Group A, B, C, D, F, G T4A [C, US]  
Class I Zone 2 AEx nA II T4 [US]  
Class I Zone 2 Ex nA II T4 [C]

### Special features:

- Accuracy  $\leq \pm 0.5$  % FS typ.
- Certificate: CSA 1760344
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	-1 .. 1; 1; 2.5; 4; 6; 10; 16; 25; 40 bar
Overload pressures	3; 3; 8; 12; 20; 32; 50; 80; 120 bar
Burst pressures	5; 5; 12; 18; 30; 48; 75; 120; 180 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Sensor: Ceramic Al2O3 Mech. conn.: 1.4301 Seal: FPM / EPDM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 \text{ V}) / 20 \text{ mA [k}\Omega\text{]}$
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5$ % FS typ. $\leq \pm 1.0$ % FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25$ % FS typ. $\leq \pm 0.5$ % FS max.
Temperature compensation	$\leq \pm 0.02$ % FS / °C typ.
Zero point	$\leq \pm 0.03$ % FS / °C max.
Temperature compensation Over range	$\leq \pm 0.02$ % FS / °C typ. $\leq \pm 0.03$ % FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5$ % FS max.
Hysteresis	$\leq \pm 0.4$ % FS max.
Repeatability	$\leq \pm 0.1$ % FS
Rise time	$\leq 1.5$ ms
Long-term drift	$\leq \pm 0.3$ % FS typ. / year
Environmental conditions	
Compensated temperature range	Intrinsically safe: -20 .. +60 °C Non incendive: -20 .. +85 °C
Operating temperature range	Intrinsically safe: -20 .. +60 °C Non incendive: -20 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	Intrinsically safe: -40 .. +60 °C / -20 .. +60 °C Non incendive: -40 .. +85 °C / -20 .. +85 °C
 mark	Certificate No.: CSA 1760344
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529 / NEMA (depending on the electr. connection)	Min. IP 65 Min. NEMA 4
Relevant data for Ex applications	
Supply voltage	12 .. 28 V DC
Max. input current	100 mA
Max. input power	up to 28 V: 1 W
Connection capacitance of the sensor	$\leq 22$ nF
Inductance of the sensor	0 mH
Insulation voltage <sup>3)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2
Other data	
Residual ripple of supply voltage	$\leq 5$ %
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L.** = Best Fit Straight Line

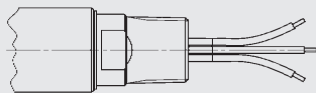
<sup>1)</sup> psi pressure ranges on request

<sup>2)</sup> -20 °C with FPM or EPDM seal, -40° on request

<sup>3)</sup> 500 V AC on request

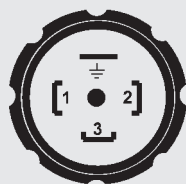
## Pin connections:

Conduit (single cores)



Core	HDA 43X9-A
green	Signal +
white	Signal -
green-yellow	Housing

EN175301-803 (DIN 43650)



Pin	HDA 43X5-A	HDA 43XA-A
1	Signal +	Signal +
2	Signal -	Signal -
3	n.c.	n.c.
⊥	Housing	Housing

## Areas of application:

Group	1	2	3	4
<b>Protection Type</b>	Intrinsically safe Gases and dusts	Intrinsically safe Gases	Non incandive (with field cabling) Gases	Non incandive Gases and dusts
<b>Certificate</b>	CSA 1760344			
<b>Zones / Categories</b>	Intrinsically safe - Class I, II, III - Division 1 - Group A, B, C, D, E, F, G T6	Intrinsically safe Ex ia IIC T6 - Class I - Zone 0 - AEx ia IIC T6  - Class I - Division I - Group A, B, C, D T6	Non incandive - Class I - Division 2 - Group A, B, C, D T4A  - Class I - Zone 2 - AEx nL IIC T4  - Class I - Zone 2 - Ex nL IIC T4	Non incandive - Class I, II, III - Division 2 - Group A, B, C, D, F, G T4A  - Class I - Zone 2 - Ex nA II T4  - Class I - Zone 2 - AEx nA II T4 IP 6x
<b>Electrical Connection</b>	9, A	5, 9, A	5, 9, A	9
<b>Code for Model Code</b>	A	B		C

## Model code:

**HDA 4 3 4 X - A - XXXX - CNX - 000 - X 1 (2m)**

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

5 = Male, 3 pole+ PE, EN175301-803 (DIN 43650)

(connector supplied)

9 = Conduit connection thread (1/2-14 NPT, male)

A = Male, EN175301-803 (DIN 43650), 3 pole + PE (1/2" conduit female thread)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0001(-1..1); 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

### Approval

C = CSA

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

A = Group 1

B = Group 2 and 3

C = Group 4

### Modification number

000 = Standard

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

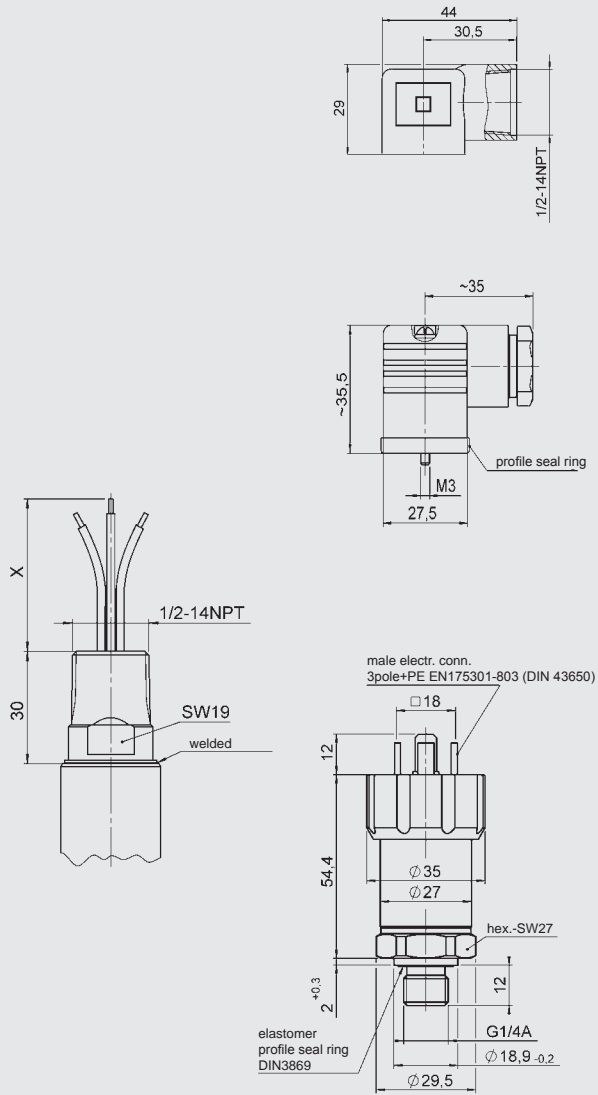
### Cable length in m (only for electr. connection type 9)

Standard = 2 m

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4100 CSA Intrinsically safe CSA Non Incendive



### Description:

The pressure transmitter HDA 4100 in CSA version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4100 in CSA version has a ceramic measurement cell with thick-film strain gauge for measuring absolute pressure in the low pressure range.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

*Intrinsically safe:*

- Class I Div. 1 Group A, B, C, D T6 [C, US]
- Class I Zone 0 AEx ia IIC T6 [US]
- Ex ia IIC T6 [C]

- Class I, II, III  
Div. 1

- Group A, B, C, D, E, F, G T6 [C, US]

*Non incendive:*

- Class I Div. 2 Group A, B, C, D T4A [C, US]
- Class I Zone 2 AEx nL IIC T4 [US]
- Class I Zone 2 Ex nL IIC T4 [C]

- Class I, II, III  
Div. 2

- Group A, B, C, D, F, G T4A [C, US]
- Class I Zone 2 AEx nA II T4 [US]
- Class I Zone 2 Ex nA II T4 [C]

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Certificate: CSA 1760344
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	1; 2.5 bar
Overload pressures	3; 8 bar
Burst pressures	5; 12 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Sensor: Ceramic Al2O3 Mech. conn.: 1.4301 Seal: FPM / EPDM
Output data	
Output signal, permitted load resistance	4 ..20 mA, 2 conductor $R_{Lmax} = (U_B - 12 V) / 20 \text{ mA} [k\Omega]$
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1.0\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation	$\leq \pm 0.02\%$ FS / °C typ.
Zero point	$\leq \pm 0.03\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.02\%$ FS / °C typ. $\leq \pm 0.03\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 1.5 \text{ ms}$
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	Intrinsically safe: -20 .. +60 °C Non incendive: -20 .. +85 °C
Operating temperature range	Intrinsically safe: -20 .. +60 °C Non incendive: -20 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	Intrinsically safe: -40 .. +60 °C / -20 .. +60 °C Non incendive: -40 .. +85 °C / -20 .. +85 °C
mark	Certificate No.: CSA 1760344
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529 / NEMA (depending on the electr. connection)	Min. IP 65 Min. NEMA 4
Relevant data for Ex applications	
Supply voltage	12 .. 28 V DC
Max. input current	100 mA
Max. input power	up to 28 V: 1 W
Connection capacitance of the sensor	$\leq 22 \text{ nF}$
Inductance of the sensor	0 mH
Insulation voltage <sup>3)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2
Other data	
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L.** = Best Fit Straight Line

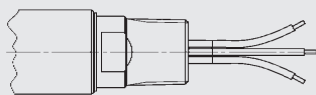
<sup>1)</sup> psi pressure ranges on request

<sup>2)</sup> -20°C with FPM or EPDM seal, -40° on request

<sup>3)</sup> 500 V AC on request

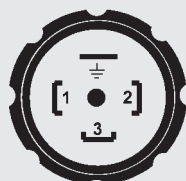
## Pin connections:

Conduit (single cores)



Core	HDA 41X9-A
green	Signal +
white	Signal -
green-yellow	Housing

EN175301-803 (DIN 43650)



Pin	HDA 41X5-A	HDA 41XA-A
1	Signal +	Signal +
2	Signal -	Signal -
3	n.c.	n.c.
⊥	Housing	Housing

## Areas of application:

Group	1	2	3	4
<b>Protection Type</b>	Intrinsically safe Gases and dusts	Intrinsically safe Gases	Non incandive (with field cabling) Gases	Non incandive Gases and dusts
<b>Certificate</b>	CSA 1760344			
<b>Zones / Categories</b>	Intrinsically safe - Class I, II, III - Division 1 - Group A, B, C, D, E, F, G T6	Intrinsically safe Ex ia IIC T6 - Class I - Zone 0 - AEx ia IIC T6  - Class I - Division I - Group A, B, C, D T6	Non incandive - Class I - Division 2 - Group A, B, C, D T4A  - Class I - Zone 2 - AEx nL IIC T4  - Class I - Zone 2 - Ex nL IIC T4	Non incandive - Class I, II, III - Division 2 - Group A, B, C, D, F, G T4A  - Class I - Zone 2 - Ex nA II T4  - Class I - Zone 2 - AEx nA II T4 IP 6x
<b>Electrical Connection</b>	9, A	5, 9, A	5, 9, A	9
<b>Code for Model Code</b>	A	B		C

## Model code:

**HDA 4 1 4 X - A - XXXX - C N X - 000 - X 1 (2m)**

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

5 = Male, 3 pole+ PE,  
EN175301-803 (DIN 43650)  
(connector supplied)

9 = Conduit connection thread  
(1/2-14 NPT, male)

A = Male EN175301-803  
(DIN 43650), 3 pole + PE  
(1/2" conduit female thread)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

01.0; 02.5

### Approval

C = CSA

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

A = Group 1

B = Group 2 and 3

C = Group 4

### Modification number

000 = Standard

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

### Cable length in m (only for electr. connection type 9)

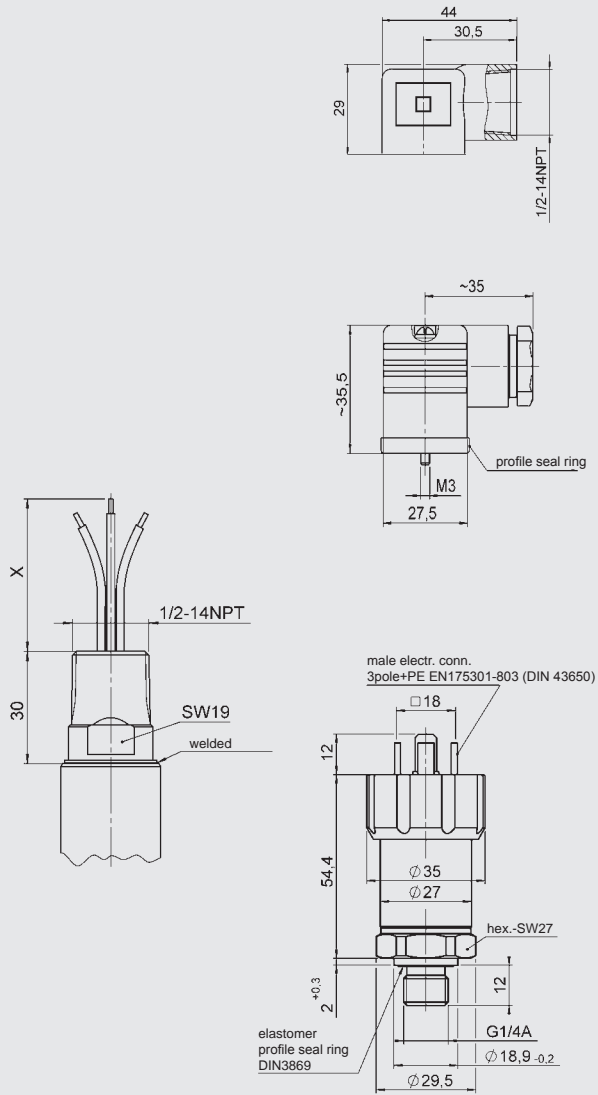
Standard = 2 m

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.



## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4700 IECEX Intrinsically Safe IECEX Dustproof Enclosure IECEX Non-sparking



### Description:

The pressure transmitter HDA 4700 IECEX Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version of the HDA 4700, devices with IECEX Intrinsically Safe approval have a field-proven, all-welded stainless steel measurement cell with thin film strain gauge without internal seal.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust loads, e.g. in mills.

### Protection types and applications:

Ex ia I Ma

Ex ia IIC T6 Ga

Ex ia IIC T6 Ga/Gb

Ex ia IIC T6 Gb

Ex nA IIC T6, T5, T4 Gc

Ex ic IIC T6, T5, T4 Gc

Ex ta IIIC T80/90/100 °C Da  
T<sub>500</sub> 90/100/110 °C Da

Ex tb IIIC T80/90/100 °C Db

Ex tc IIIC T80/90/100 °C Dc

Ex ic IIIC T80/90/100 °C Dc

Ex ia IIIC T85 °C Da

### Special features:

- Accuracy  $\leq \pm 0.25\%$  FS typ.
- Certificate: IECEX TSA 09.0041X / IECEX KEM 08.0014X
- Output signal 4 .. 20 mA
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	-1 .. 9; 6; 16; 40; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	20; 15; 32; 80; 120; 200; 500; 800; 1000; 1600 bar
Burst pressure	100; 100; 200; 200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>1)</sup> (torque value)	G1/4 A DIN 3852 (20 Nm) G1/2 DIN 3852 (40 Nm)
Parts in contact with medium	Stainl. steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301 Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor R <sub>Lmax</sub> = (U <sub>B</sub> - 12 V) / 20 mA [kΩ]
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.3\%$ FS max.
Temperature compensation Zero point	$\leq \pm 0.008\%$ FS / °C typ. $\leq \pm 0.015\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.008\%$ FS / °C typ. $\leq \pm 0.015\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.1\%$ FS max.
Repeatability	$\leq \pm 0.05\%$ FS
Rise time	$\leq 1.5$ ms
Long-term drift	$\leq \pm 0.1\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-20 .. +85 °C
Operating temperature range <sup>2)</sup>	-40 .. +60 °C / -20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +60 °C / -20 .. +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4; EN 60079-0 / 11 / 26 / 36
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 (for male EN175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1 male, when an IP 67 female connector is used)
Relevant data for Ex applications	
Supply voltage	U <sub>i</sub> = 12 .. 28 V
Max. input current	i <sub>i</sub> = 100 mA
Max. input power	P <sub>i</sub> = 1 W
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22$ nF
Inductance of the sensor	L <sub>i</sub> = 0 mH
Insulation voltage <sup>3)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2
Other data	
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa

<sup>2)</sup> -20 °C with FPM seal, -40 °C on request

<sup>3)</sup> 500 V AC on request

## Areas of application:

Protection types and applications			Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb	Ex ia IIC T6 Gb	Ex nA IIC T6 Gc	Ex ta IIIC T80 °C T <sub>500</sub> T90 °C Da Ex tb IIIC T80 °C Db	Ex ic IIC T6 Gc Ex ic IIIC T80 °C Dc	Ex ia IIIC T85 °C Da
Zones / Categories			Equipment protection level Ma Mining Protection class: intrinsically safe ia with barrier	Equipment protection level Ga, Gb Gases Protection class: intrinsically safe ia with barrier	Equipment protection level Gb Gases Protection class: intrinsically safe ia with barrier	Equipment protection level Gc Gases Protection class: non-sparking nA	Equipment protection level Da, Db Conductive dust Protection class: Dustproof enclosure	Equipment protection level Gc, Dc Gases/conductive dust Protection class: Intrinsically safe ic with barrier	Equipment protection level Da Conductive dust Protection class: intrinsically safe ia with barrier
Electrical connection			4, 5, 6	4, 5, 6	4, 5, 6	6	6	4, 5, 6	4, 5, 6
Code for use in Model code	IECEX	IECEX Australia							
1	✓	✓	✓	✓	✓				
9	✓					✓			
A	✓						✓		
C	✓							✓	
D	✓		✓	✓	✓				✓

Certificate numbers: IECEX TSA 09.0041X, IECEX KEM 08.0014X

Devices in the ignition protection class "Dustproof enclosure" for the protection types Ex ta IIIC T80/90/100 °C Da T500T90/T100/T110°C Da, Ex tb IIIC T80/90/100 °C Db and Ex tc IIIC T80/90/100 °C Dc are available with flying leads on request. Devices in the ignition protection class "non-sparking" for protection type Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

## Model code:

**HDA 4 7 X X - A - XXXX - I N X - 000**

### Mechanical connection

- 2 = G1/2 DIN 3852  
(only for "1000 bar" pressure range)
- 4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 4 = Male 4 pole Binder series 714 M18 (connector not supplied)
- 5 = Male 3 pole + PE, EN175301-803 (DIN 43650) (connector supplied)
- 6 = Male M12x1, 4 pole (connector not supplied)

### Signal

- A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0009 (-1..9); 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600;  
1000 (only in conjunction with mechanical connection type "2")

### Approval

- I = IECEX

### Insulation voltage

- N = 50 V AC

### Protection types and applications (code)

- 1 = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb
- 9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*
- A = Ex ta IIIC T80 °C T<sub>500</sub> T90 °C Da (only in conjunction with electr. connection "6")\*  
Ex tb IIIC T80 °C Db
- C = Ex ic IIC T6 Gc  
Ex ic IIIC T80 °C Dc
- D = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex ia IIIC T85 °C Da

### Modification number

- 000 = Standard

### Notes:

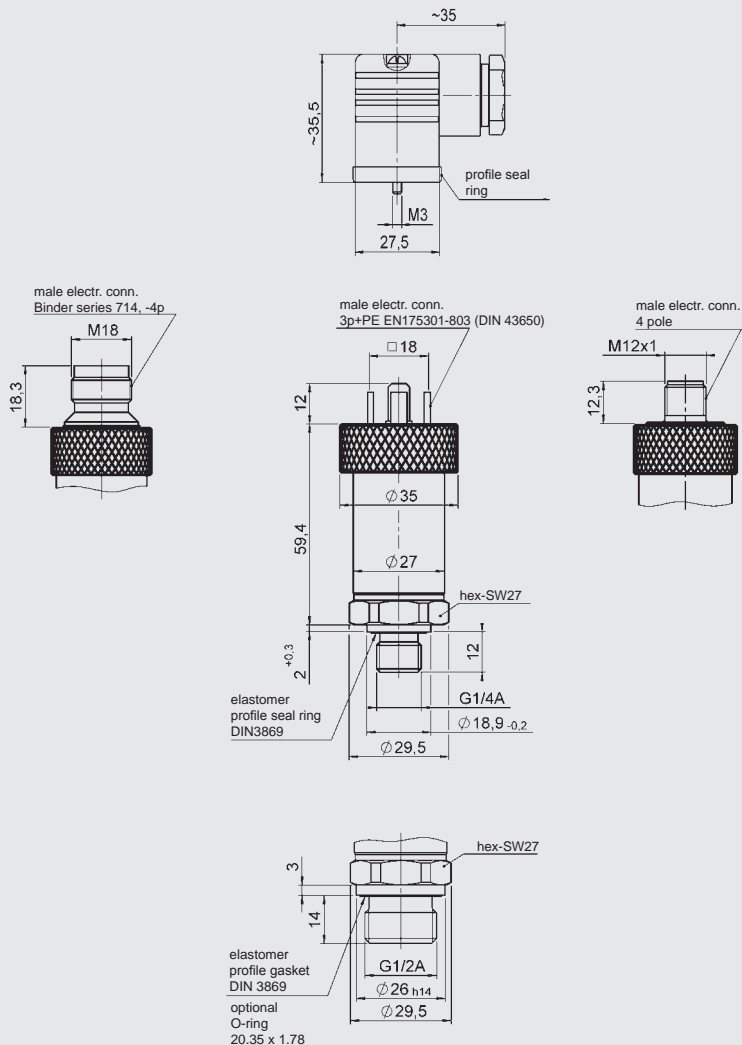
\* For design and electrical connection see Dimensions

### Accessories:

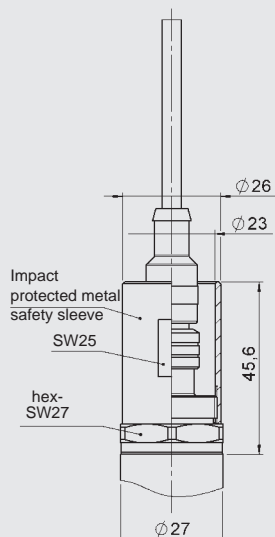
Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

## Dimensions:

Protection types and applications: (code): 1, C, D



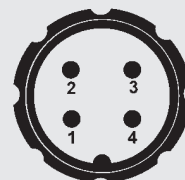
Protection types and applications: (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection, e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243

## Pin connections:

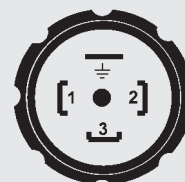
Binder series 714 M18



Pin HDA 47x4-A

1	n.c.
2	Signal +
3	Signal -
4	n.c.

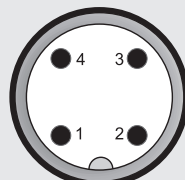
EN175301-803 (DIN 43650)



Pin HDA 47x5-A

1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1



Pin HDA 47x6-A

1	Signal +
2	n.c.
3	Signal -
4	n.c.

**Note:**

The information in this brochure relates to the operating conditions and applications described.  
For applications and operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.



## Electronic Pressure Transmitter HDA 4400 IECEX Intrinsically Safe IECEX Dustproof Enclosure IECEX Non-sparking



### Description:

The pressure transmitter HDA 4400 IECEx Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version of the HDA 4400, devices with IECEx Intrinsically Safe approval have a field-proven, all-welded stainless steel measurement cell with thin film strain gauge without internal seal.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust loads, e.g. in mills.

### Protection types and applications:

Ex ia I Ma

Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex nA IIC T6, T5, T4 Gc  
Ex ic IIC T6, T5, T4 Gc

Ex ta IIIC T80/90/100 °C Da  
T<sub>500</sub> 90/100/110 °C Da

Ex tb IIIC T80/90/100 °C Db  
Ex tc IIIC T80/90/100 °C Dc  
Ex ic IIIC T80/90/100 °C Dc  
Ex ia IIIC T85 °C Da

### Special features:

- Accuracy:  $\leq \pm 0.5$  % FS typ.
- Certificate: IECEx TSA 09.0041X / IECEx KEM 08.0014X
- Output signal 4 .. 20 mA
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	16; 60; 100; 250; 400; 600; 1000 bar
Overload ranges	32; 120; 200; 500; 800; 1000; 1600 bar
Burst pressure	200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>1)</sup> (Torque value)	G1/2 DIN 3852 (45 Nm) G1/4 A DIN 3852 (20 Nm)
Parts in contact with medium	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301 Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor R <sub>Lmax</sub> = (U <sub>B</sub> - 12 V) / 20 mA [kΩ]
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5$ % FS typ. $\leq \pm 1.0$ % FS max.
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.25$ % FS typ. $\leq \pm 0.5$ % FS max.
Temperature compensation Zero point	$\leq \pm 0.015$ % FS / °C typ. $\leq \pm 0.025$ % FS / °C max.
Temperature compensation Over range	$\leq \pm 0.015$ % FS / °C typ. $\leq \pm 0.025$ % FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3$ % FS max.
Hysteresis	$\leq \pm 0.4$ % FS max.
Repeatability	$\leq \pm 0.25$ % FS
Rise time	$\leq 1.5$ ms
Long term drift	$\leq \pm 0.3$ % FS typ. / year
Environmental conditions	
Compensated temperature range	-20 .. +85 °C
Operating temperature range	-20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +60 °C / -20 .. +60 °C
CE-mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 36
Vibration resistance to DIN EN 60068-2-6 at 10 ..500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 (for male EN 175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1 male, when an IP 67 female connector is used)
Relevant data for Ex applications	
Supply voltage	U <sub>i</sub> = 12 .. 28 V
Max. input current	I <sub>i</sub> = 100 mA
Max. input power	P <sub>i</sub> = 1 W
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22$ nF
Inductance of the sensor	L <sub>i</sub> = 0 mH
Insulation voltage <sup>3)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2
Other data	
Residual ripple of supply voltage	$\leq 5$ %
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa

<sup>2)</sup> -20 °C with FPM seal, -40 °C on request

<sup>3)</sup> 500 V AC on request

## Areas of application:

Protection types and applications	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb	Ex ia IIC T6 Gb	Ex nA IIC T6 Gc	Ex ta IIIC T80 °C T <sub>500</sub> T90 °C Da Ex tb IIIC T80 °C Db	Ex ic IIC T6 Gc Ex ic IIIC T80 °C Dc	Ex ia IIIC T85 °C Da
<b>Zones / Categories</b>	Equipment protection level Ma Mining Protection class: intrinsically safe ia with barrier	Equipment protection level Ga, Ga/Gb Gases Protection class: intrinsically safe ia with barrier	Equipment protection level Gb Gases Protection class: intrinsically safe ia with barrier	Equipment protection level Gc Gases Protection class: non-sparking nA	Equipment protection level Da, Db Conductive dust Protection class: Dustproof enclosure	Equipment protection level Gc, Dc Gases/conductive dust Protection class: Intrinsically safe ic with barrier	Equipment protection level Da Conductive dust Protection class: intrinsically safe ia with barrier
<b>Electrical connection</b>	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4, 5, 6	4, 5, 6
<b>Code for use in Model code</b>	IECEX	IECEX Australia					
1	✓	✓	✓				
9	✓			✓			
A	✓				✓		
C	✓					✓	
D	✓		✓				✓

Certificate numbers: IECEx TSA 09.0041X, IECEx KEM 08.0014X

Devices in the ignition protection class "Dustproof enclosure" for the protection types Ex ta IIIC T80/90/100 °C Da T500T90/T100/T110°C Da, Ex tb IIIC T80/90/100 °C Db and Ex tc IIIC T80/90/100 °C Dc are available with flying leads on request. Devices in the ignition protection class "non-sparking" for protection types Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

## Model code:

**HDA 4 4 X X – A – XXXX – I N X – 000**

### Mechanical connection

- 2 = G1/2 DIN 3852 (only for "1000 bar" pressure range)
- 4 = G1/4 A DIN 3852

### Electrical connection

- 4 = Male 4 pole Binder series 714 M18 (connector not supplied)
- 5 = Male 3 pole + PE, EN 175301-803 (DIN 43650) (connector supplied)
- 6 = Male M12x1, 4 pole (connector not supplied)

### Signal

- A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

- 0016; 0060; 0100; 0250; 0400; 0600
- 1000 (only in conjunction with mechanical connection type "2")

### Approval

- I = IECEx

### Insulation voltage

- N = 50 V AC

### Protection types and applications (code)

- 1 = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb
- 9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*
- A = Ex ta IIIC T80 °C T<sub>500</sub>T90 °C Da (only in conjunction with electr. connection "6")\*  
Ex tb IIIC T80 °C Db
- C = Ex ic IIC T6 Gc  
Ex ic IIIC T80 °C Dc
- D = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex ia IIIC T85 °C Da

### Modification number

- 000 = Standard

### Notes:

\*For design and electrical connection see Dimensions

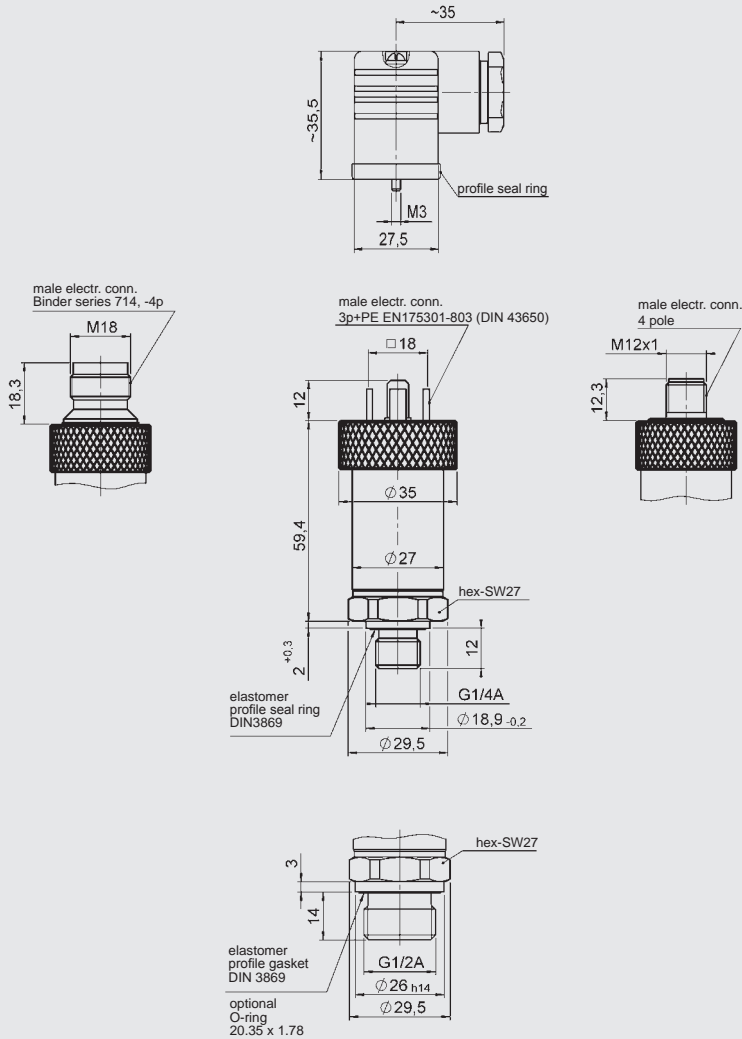
### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

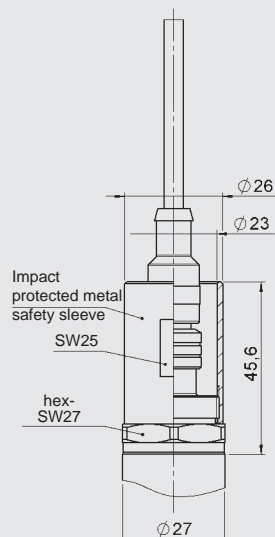


## Dimensions:

Protection types and applications: (code): 1, C, D



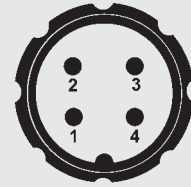
Protection types and applications: (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection, e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243

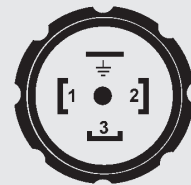
## Pin connections:

Binder series 714 M18



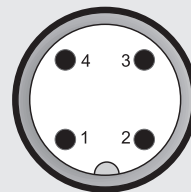
Pin	HDA 44x4-A
1	n.c.
2	Signal +
3	Signal -
4	n.c.

EN 175301-803 (DIN 43650)



Pin	HDA 44x5-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1, 4 pole



Pin	HDA 44x6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

**Note:**

The information in this brochure relates to the operating conditions and applications described.  
For applications and operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.



## Electronic Pressure Transmitter HDA 4300 IECEX Intrinsically Safe IECEX Dustproof Enclosure IECEX Non-sparking



### Description:

The pressure transmitter HDA 4300 in IECEx Intrinsically Safe version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version, the HDA 4300 with IECEx Intrinsically Safe approval has the field-proven ceramic measuring cell with thick-film strain gauge.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

### Protection types and applications:

Ex ia I Ma

Ex ia IIC T6 Ga

Ex ia IIC T6 Ga/Gb

Ex ia IIC T6 Gb

Ex nA IIC T6, T5, T4 Gc

Ex ic IIC T6, T5, T4 Gc

Ex ta IIIC T80/90/100°C Da  
T<sub>500</sub> 90/100/110°C Da

Ex tb IIIC T80/90/100°C Db

Ex tc IIIC T80/90/100°C Dc

Ex ic IIIC T80/90/100°C Dc

Ex ia IIIC T85°C Da

### Special features:

- Accuracy:  $\leq \pm 0.5$  % FS typ.
- Certificate:  
IECEX TSA 09.0041X /  
IECEX KEM 08.0014X
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data		
Measuring ranges	-1 .. 1; 1; 2.5; 4; 6; 10; 16; 25; 40 bar	
Overload pressures	3; 3; 8; 12; 20; 32; 50; 80; 120 bar	
Burst pressures	5; 5; 12; 18; 30; 48; 75; 120; 180 bar	
Mechanical connection	G1/4 A DIN 3852	
Torque value	20 Nm	
Parts in contact with medium	Sensor: Ceramic Mech. connection: 1.4301 Seal: FPM / EPDM	
Output data		
Output signal, permitted load resistance	4 .. 20 mA, 2-conductor $R_{Lmax} = (U_B - 12 \text{ V}) / 20 \text{ mA}$ [kΩ]	
Accuracy to DIN 16086, max. setting	$\leq \pm 0.5$ % FS typ. $\leq \pm 1.0$ % FS max.	
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.25$ % FS typ. $\leq \pm 0.5$ % FS max.	
Temperature compensation	$\leq \pm 0.02$ % FS / °C typ.	
Zero point	$\leq \pm 0.03$ % FS / °C max.	
Temperature compensation	$\leq \pm 0.02$ % FS / °C typ.	
Over range	$\leq \pm 0.03$ % FS / °C max.	
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5$ % FS max.	
Hysteresis	$\leq \pm 0.4$ % FS max.	
Repeatability	$\leq \pm 0.1$ % FS	
Rise time	$\leq 1.5$ ms	
Long term drift	$\leq \pm 0.3$ % FS typ. / year	
Environmental conditions		
Compensated temperature range	-20 .. +85 °C	
Operating temperature range	-20 .. +60 °C	
Storage temperature range	-40 .. +100 °C	
Fluid temperature range <sup>1)</sup>	-40 .. +60 °C / -20 .. +60 °C	
CE - mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 36	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g	
Protection class to IEC 60529	IP 65 (for male EN 175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1 male, when an IP 67 female connector is used)	
Relevant data for Ex applications		
Supply voltage	U <sub>i</sub> = 12 .. 28 V	Ex nA, ta, tb, tc 12 .. 28 V
Max. input current	I <sub>i</sub> = 100 mA	
Max. input power	P <sub>i</sub> = 1 W	max. power consumption $\leq 1$ W
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22$ nF	
Inductance of the sensor	L <sub>i</sub> = 0 mH	
Insulation voltage <sup>2)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Other data		
Residual ripple of supply voltage	$\leq 5$ %	
Life expectancy	> 10 million cycles 0 .. 100 % FS	
Weight	~ 180 g	

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -20 °C with FPM or EPDM seal, -40 °C on request

<sup>2)</sup> 500 V AC on request

## Areas of application:

Protection types and applications			Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb	Ex ia IIC T6 Gb	Ex nA IIC T6 Gc	Ex ta IIIC T80°C T <sub>500</sub> T90°C Da Ex tb IIIC T80°C Db	Ex ic IIC T6 Gc Ex ic IIIC T80°C Dc	Ex ia IIIC T85° C Da
Zones / Categories			Equipment level standard Ma Mining Protection class: intrinsically safe ia with barrier	Equipment level standard Ga, Ga/Gb Gases Protection class: intrinsically safe ia with barrier	Equipment level standard Gb Gases Protection class: intrinsically safe ia with barrier	Equipment level standard Gc Gases Protection class: non-sparking nA	Equipment level standard Da, Db Conductive dust Protection class: Dustproof enclosure	Equipment level standard Gc, Dc Gases/conductive dust Protection class: Intrinsically safe ic with barrier	Equipment level standard Da Conductive dust Protection class: intrinsically safe ia with barrier
Electrical connection			4, 5, 6	4, 5, 6	4, 5, 6	6	6	4, 5, 6	4, 5, 6
Code (see model code)	IECEX	IECEX Australia							
1	✓	✓	✓	✓	✓				
9	✓					✓			
A	✓						✓		
C	✓							✓	
D	✓		✓	✓	✓				✓

Certificate numbers: IECEX TSA 09.0041X, IECEX KEM 08.0014X

Devices in the ignition protection class "Dustproof enclosure" for the protection types Ex ta IIIC T80/90/100° C Da T500T90/T100/T110°C Da, Ex tb IIIC T80/90/100°C Db and Ex tc IIIC T80/90/100°C Dc are available with flying leads on request. Devices in the ignition protection class "non-sparking" for protection type Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

## Model code:

**HDA 4 3 4 X – A – XXXX – I N X – 000 – X 1**

### Mechanical connection

4 = G1/4 A DIN 3852

### Electrical connection

4 = Male, 4 pole Binder series 714 M18 (connector not supplied)

5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650) (connector supplied)

6 = Male, M12x1, 4 pole (connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0001 (-1..1); 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

### Approval

I = IECEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb

9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*

A = Ex ta IIIC T80°C T<sub>500</sub> T90°C Da (only in conjunction with electr. connection "6")\*  
Ex tb IIIC T80°C Db

C = Ex ic IIC T6 Gc  
Ex ic IIIC T80°C Dc

D = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex ia IIIC T85°C Da

### Modification number

000 = Standard

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

### Notes:

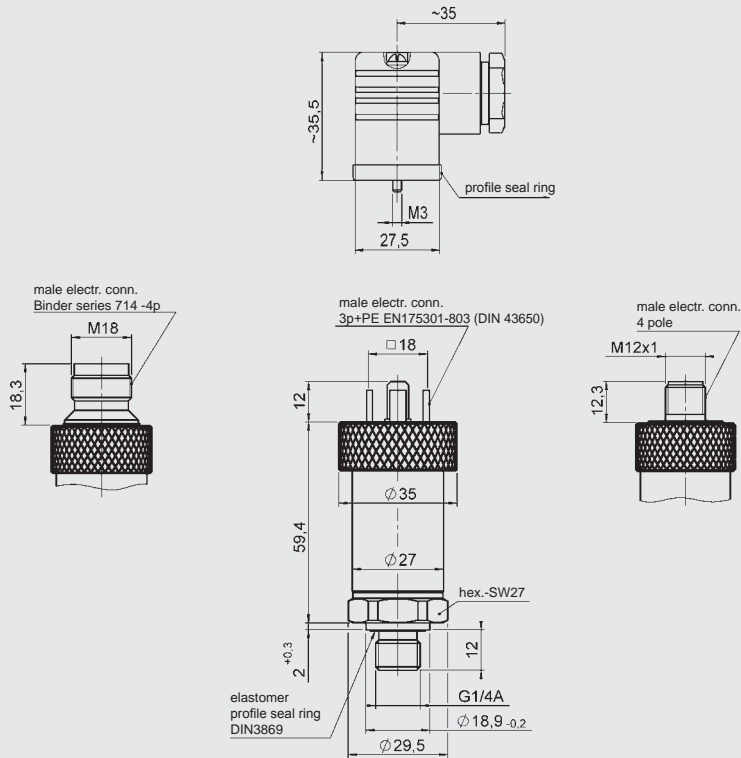
\* For design and electrical connection see device dimensions

### Accessories:

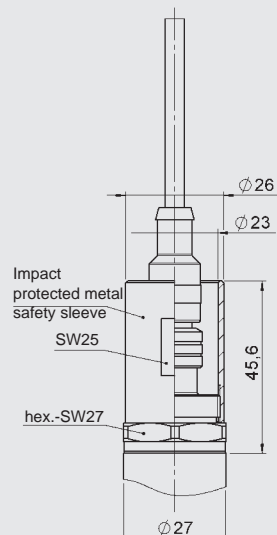
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Dimensions:

Protection types and applications (code): 1, C, D



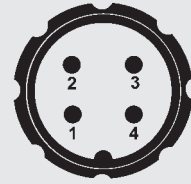
Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243

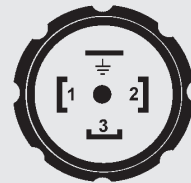
## Pin connections:

Binder series 714 M18



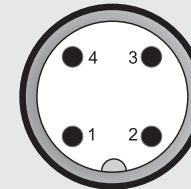
Pin	HDA 43x4-A
1	n.c.
2	Signal +
3	Signal -
4	n.c.

EN 175301-803 (DIN 43650)



Pin	HDA 43x5-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1, 4 pole



Pin	HDA 43x6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

**Note:**

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.



## Electronic Pressure Transmitter HDA 4100 IECEX Intrinsically Safe IECEX Dustproof Enclosure IECEX Non-sparking



### Description:

The pressure transmitter HDA 4100 in IECEx Intrinsically Safe version has been specially developed for use in potentially explosive atmospheres for absolute measurement in the low pressure range and is based on the HDA 4000 series.

As with the industrial version, the HDA 4100 with IECEx Intrinsically Safe approval has the field-proven ceramic measuring cell with thick-film strain gauge without interior seals.

Intended areas of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

### Protection types and applications:

Ex ia I Ma

Ex ia IIC T6 Ga

Ex ia IIC T6 Ga/Gb

Ex ia IIC T6 Gb

Ex nA IIC T6, T5, T4 Gc

Ex ic IIC T6, T5, T4 Gc

Ex ta IIIC T80/90/100°C Da  
T<sub>500</sub> 90/100/110°C Da

Ex tb IIIC T80/90/100°C Db

Ex tc IIIC T80/90/100°C Dc

Ex ic IIIC T80/90/100°C Dc

Ex ia IIIC T85°C Da

### Special features:

- Accuracy:  $\leq \pm 0.5\%$  FS typ.
- Certificate:  
IECEX TSA 09.0041X /  
IECEX KEM 08.0014X
- Output signal 4 .. 20 mA
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	1; 2.5 bar
Overload pressures	3; 8 bar
Burst pressures	5; 12 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Sensor: Ceramic Mech. connection: 1.4301 Seal: FPM / EPDM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 V) / 20 \text{ mA} [\text{k}\Omega]$
Accuracy to DIN 16086, max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1.0\%$ FS max.
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation zero point	$\leq \pm 0.02\%$ FS / °C typ. $\leq \pm 0.03\%$ FS / °C max.
Temperature compensation over range	$\leq \pm 0.02\%$ FS / °C typ. $\leq \pm 0.03\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 1.5 \text{ ms}$
Long term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-20 .. +85 °C
Operating temperature range	-20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +60 °C / -20 .. +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 36
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$
Protection class to IEC 60529	IP 65 (for male EN 175301-803 (DIN 43650) and Binder 714 M18) IP 67 (for M12x1 male, when an IP 67 female connector is used)
Relevant data for Ex applications	
Supply voltage	U <sub>i</sub> = 12 .. 28 V
Max. input current	I <sub>i</sub> = 100 mA
Max. input power	P <sub>i</sub> = 1 W
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22 \text{ nF}$
Inductance of the sensor	L <sub>i</sub> = 0 mH
Insulation voltage <sup>2)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2
Other data	
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range, B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -20 °C with FPM or EPDM seal, -40 °C on request

<sup>2)</sup> 500 V AC on request

## Areas of application:

Protection types and applications			Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb	Ex ia IIC T6 Gb	Ex nA IIC T6 Gc	Ex ta IIIC T80°C T <sub>500</sub> T90°C Da Ex tb IIIC T80°C Db	Ex ic IIC T6 Gc Ex ic IIIC T80°C Dc	Ex ia IIIC T85° C Da
Zones / Categories			Equipment level standard Ma Mining Protection class: intrinsically safe ia with barrier	Equipment level standard Ga, Ga/Gb Gases Protection class: intrinsically safe ia with barrier	Equipment level standard Gb Gases Protection class: intrinsically safe ia with barrier	Equipment level standard Gc Gases Protection class: non-sparking nA	Equipment level standard Da, Db Conductive dust Protection class: Dustproof enclosure	Equipment level standard Gc, Dc Gases/conductive dust Protection class: Intrinsically safe ic with barrier	Equipment level standard Da Conductive dust Protection class: intrinsically safe ia with barrier
Electrical connection			4, 5, 6	4, 5, 6	4, 5, 6	6	6	4, 5, 6	4, 5, 6
Code (see model code)	IECEX	IECEX Australia							
1	✓	✓	✓	✓	✓				
9	✓					✓			
A	✓						✓		
C	✓							✓	
D	✓		✓	✓	✓				✓

Certificate numbers: IECEx TSA 09.0041X, IECEx KEM 08.0014X

Devices in the ignition protection class "Dustproof enclosure" for the protection types Ex ta IIIC T80/90/100° C Da T500T90/T100/T110°C Da, Ex tb IIIC T80/90/100°C Db and Ex tc IIIC T80/90/100°C Dc are available with flying leads on request. Devices in the ignition protection class "non-sparking" for protection type Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

## Model code:

**HDA 4 1 4 X – A – XXXX – I N X – 000 – X 1**

### Mechanical connection

4 = G1/4 A DIN 3852

### Electrical connection

4 = Male, 4 pole Binder series 714 M18 (connector not supplied)

5 = Male, 3 pole + PE, EN 175301-803 (DIN 43650) (connector supplied)

6 = Male, M12x1, 4 pole (connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

01.0; 02.5;

### Approval

I = IECEx

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb

9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*

A = Ex ta IIIC T80°C T<sub>500</sub> T90°C Da (only in conjunction with electr. connection "6")\*  
Ex tb IIIC T80°C Db

C = Ex ic IIC T6 Gc  
Ex ic IIIC T80°C Dc

D = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex ia IIIC T85°C Da

### Modification number

000 = Standard

### Seal material (in contact with fluid)

F = FPM seal (e.g.: for hydraulic oils)

E = EPDM seal (e.g.: for refrigerants)

### Material of connection (in contact with fluid)

1 = Stainless steel

### Notes:

\* For design and electrical connection see device dimensions

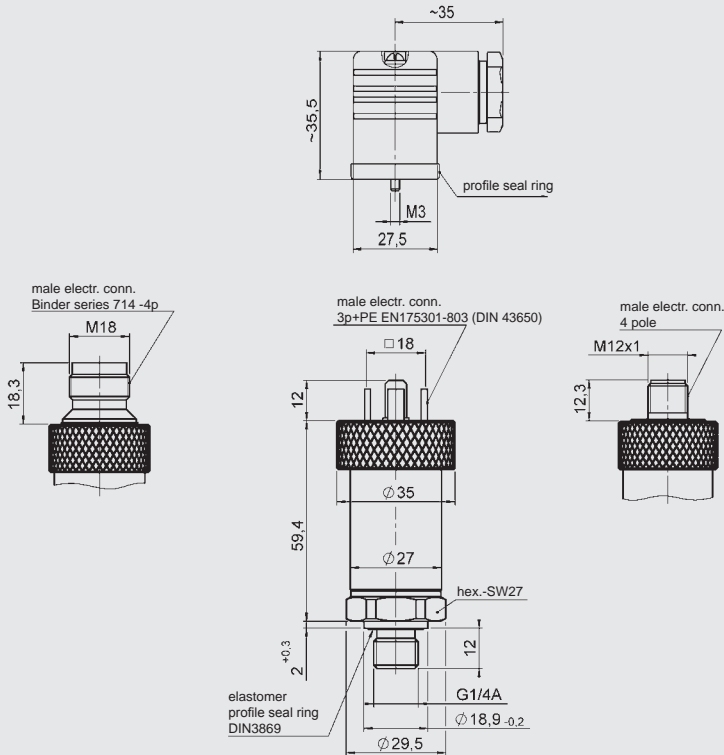
### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

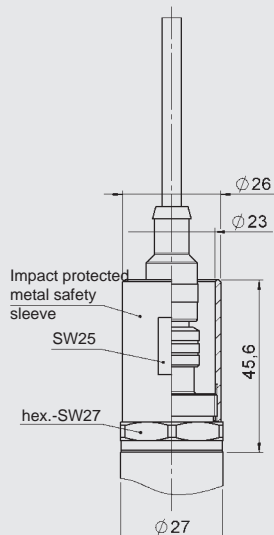


## Dimensions:

Protection types and applications: (code): 1, C, D



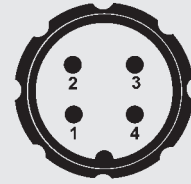
Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243

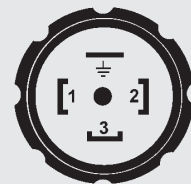
## Pin connections:

Binder series 714 M18



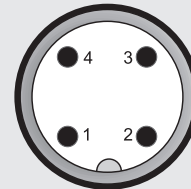
Pin	HDA 41x4-A
1	n.c.
2	Signal +
3	Signal -
4	n.c.

EN 175301-803 (DIN 43650)



Pin	HDA 41x5-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1, 4 pole



Pin	HDA 41x6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

**Note:**

The information in this brochure relates to the operating conditions and applications described.  
For applications or operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.



## Electronic Pressure Transmitter HDA 4700 with Flush Membrane ATEX Intrinsically Safe ATEX Dustproof Enclosure ATEX Non-sparking



### Description:

The pressure transmitter HDA 4700 in ATEX version with flush membrane has been specially developed for use in potentially explosive atmospheres.

Like the standard model, the HDA 4700 with flush membrane has a stainless steel measurement cell with a thin film strain gauge.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media, or in highly viscous media. Intended areas of application are, for example, the oil and gas industry, in mines or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

I M1 Ex ia I Ma

II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 3G Ex nA IIC T6, T5, T4 Gc  
II 3G Ex ic IIC T6, T5, T4 Gc

II 1D Ex ia IIIC T85 °C Da  
II 1D Ex ta IIIC T80/90/100 °C Da  
T<sub>500</sub> T90/T100/T110 °C Da  
II 2D Ex tb IIIC T80/90/100 °C Db  
II 3D Ex tc IIIC T80/90/100 °C Dc  
II 3D Ex ic IIIC T80/90/100 °C Dc

### Special features:

- Pressure connection has a flush membrane
- Accuracy  $\leq 0.25\%$  typ.
- Certificates:  
KEMA 05ATEX1016 X  
KEMA 05ATEX1021
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

### Technical data:

Input data		
Measuring ranges	40; 60; 100; 250; 400; 600 bar	
Overload ranges	80; 120; 200; 500; 800; 900 bar	
Burst pressure <sup>1)</sup>	200; 300; 500; 1000; 2000; 2000 bar	
Mechanical connection	G1/2 A DIN 3852 G1/2 with additional front O-ring seal	
Pressure transfer fluid	Silicon-free oil	
Torque value	45 Nm	
Parts in contact with medium <sup>2)</sup>	Stainless steel: 1.4435; 1.4301 Seal: FPM O-ring: FPM	
Output data		
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor R <sub>Lmax</sub> = (U <sub>B</sub> - 12 V) / 20 mA [kΩ]	
Accuracy to DIN 16086, max. setting	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.	
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.	
Temperature compensation	$\leq \pm 0.008\%$ FS / °C typ.	
Zero point	$\leq \pm 0.015\%$ FS / °C max.	
Temperature compensation	$\leq \pm 0.008\%$ FS / °C typ.	
Over range	$\leq \pm 0.015\%$ FS / °C max.	
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.	
Hysteresis	$\leq \pm 0.1\%$ FS max.	
Repeatability	$\leq \pm 0.05\%$ FS	
Rise time	$\leq 1.5$ ms	
Long term drift	$\leq \pm 0.1\%$ FS typ. / year	
Environmental conditions		
Compensated temperature range	-20 .. +85 °C	
Operating temperature range <sup>3)</sup>	-40 .. +60 °C / -20 .. +60 °C	
Storage temperature range	-40 .. +100 °C	
Fluid temperature range <sup>3)</sup>	-40 .. +60 °C / -20 .. +60 °C	
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 31 EN 50303	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g	
Protection class to IEC 60529	IP 65 (for male EN 175301-803(DIN 43650)) IP 67 (for M12x1 male, when an IP 67 female connector is used)	
Relevant data for Ex applications		
Supply voltage	U <sub>i</sub> = 12 .. 28 V	12 .. 28 V
Max. input current	i <sub>i</sub> = 100 mA	
Max. input power	P <sub>i</sub> = 1 W	max. power consumption $\leq 1$ W
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22$ nF	
Inductance of the sensor	L <sub>i</sub> = 0 mH	
Insulation voltage <sup>4)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Other data		
Residual ripple of supply voltage	$\leq 5\%$	
Life expectancy	$> 10$ million cycles 0 .. 100 % FS	
Weight	$\sim 180$ g	

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> G1/2 with additional front O-ring seal max. 1500 bar

<sup>2)</sup> Other seal materials on request

<sup>3)</sup> -20 °C with FPM seal, -40 °C on request

<sup>4)</sup> 500 V AC on request

## Areas of application:

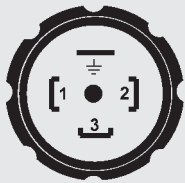
Code used in Model code	1		9	A	C	
Protection type	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85°C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6 Gc	II 1D Ex ta IIIC T80°C T <sub>500</sub> T90°C Da II 2D Ex tb IIIC T80°C Db	II 3G Ex ic IIC T6 Gc II 3D Ex ic IIIC T80°C Dc
Certificate	KEMA 05ATEX1016 X / KEMA 05ATEX1021					
Zones / Categories	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier	Group II Category 2G Gases Protection class: intrinsically safe ia with barrier	Group II Category 3G Gases Protection class: Non-sparking nA	Group III Category 1D, 2D Conductive dust Protection class: Dustproof enclosure	Group II, III Category 3G, 3D Gases/conductive dust Protection class: Intrinsically safe ic with barrier
Electrical Connection (see model code)	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ta IIIC T80/90/100° C Da T<sub>500</sub> T90/T100/T110°C Da, II 2D Ex tb IIIC T80/90/100°C Db and II 3D Ex tc IIIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

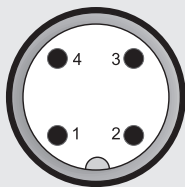
## Pin connections:

EN175301-803 (DIN 43650)



Pin	HDA 47Z5-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1, 4 pole



Pin	HDA 47Z6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

**HDA 4 7 Z X - A - XXXX - XXX - A N X - 000**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

5 = Male 3 pole + PE,  
EN 175301-803 (DIN 43650)  
(female connector supplied)

6 = Male M12x1, 4 pole  
(female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0040; 0060; 0100; 0250; 0400; 0600

### Mechanical connection

G01 = G1/2 A, DIN 3852

G02 = G1/2 with additional front O-ring seal

### Approval

A = ATEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = I M1 Ex ia I Ma  
II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 1D Ex ia IIIC T85 °C Da

9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*

A = II 1D Ex ta IIIC T80 °C T<sub>500</sub> T90 °C Da (only in conjunction with electr. connection "6")\*  
II 2D Ex tb IIIC T80 °C Db

C = II 3G Ex ic IIC T6 Gc  
II 3D Ex ic IIIC T80 °C Dc

### Modification number

000 = Standard

### Notes:

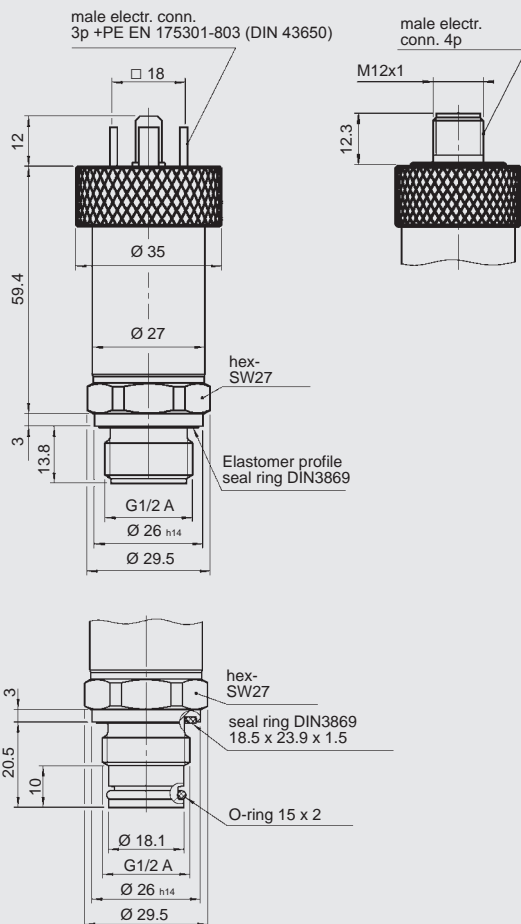
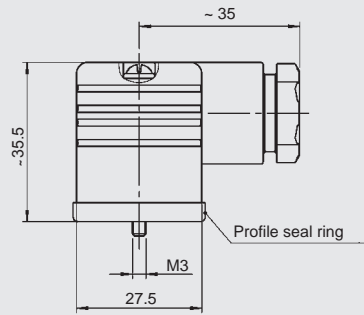
\* For design and electrical connection see Dimensions

### Accessories:

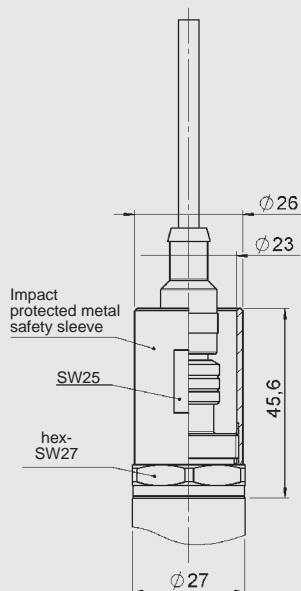
Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

## Dimensions:

Protection types and applications (code): 1, C



Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection, e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4400 with Flush Membrane ATEX Intrinsically Safe ATEX Dustproof Enclosure ATEX Non-sparking



### Description:

The pressure transmitter HDA 4400 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version, the HDA 4400 in ATEX version has a stainless steel measurement cell with thin-film strain gauge.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media. Intended areas of application are, for example, the oil and gas industry, in mines, or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

- I M1 Ex ia I Ma
- II 1G Ex ia IIC T6 Ga
- II 1/2G Ex ia IIC T6 Ga/Gb
- II 2G Ex ia IIC T6 Gb
- II 3G Ex nA IIC T6, T5, T4 Gc
- II 3G Ex ic IIC T6, T5, T4 Gc

- II 1D Ex ia IIIC T85 °C Da
- II 1D Ex ta IIIC T80/90/100 °C Da
- T<sub>500</sub> T90/T100/T110 °C Da
- II 2D Ex tb IIIC T80/90/100 °C Db
- II 3D Ex tc IIIC T80/90/100 °C Dc
- II 3D Ex ic IIIC T80/90/100 °C Dc

### Special features:

- Pressure connection has a flush membrane
- Accuracy ≤ 0.5 % typ.
- Certificates:  
KEMA 05ATEX1016 X  
KEMA 05ATEX1021
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

### Technical data:

Input data		
Measuring ranges	40; 60; 100; 250; 400; 600 bar	
Overload ranges	80; 120; 200; 500; 800; 900 bar	
Burst pressure <sup>1)</sup>	200; 300; 500; 1000; 2000; 2000 bar	
Mechanical connection	G1/2A DIN 3852 G1/2 with add. front O-ring seal G1/4 with add. front O-ring seal	
Pressure transfer fluid	Silicon-free oil	
Torque value	45 Nm for G1/2, G1/2 A 20 Nm for G1/4	
Parts in contact with medium <sup>2)</sup>	Stainless steel: 1.4435; 1.4301 Seal: FPM O-ring: FPM	
Output data		
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor R <sub>Lmax</sub> = (U <sub>B</sub> - 12 V) / 20 mA [kΩ]	
Accuracy to DIN 16086, max. setting	≤ ± 0.5 % FS typ. ≤ ± 1.0 % FS max.	
Accuracy at minimum setting (B.F.S.L.)	≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS max.	
Temperature compensation Zero point	≤ ± 0.015 % FS / °C typ. ≤ ± 0.025 % FS / °C max.	
Temperature compensation Over range	≤ ± 0.015 % FS / °C typ. ≤ ± 0.025 % FS / °C max.	
Non-linearity at max. setting to DIN 16086	≤ ± 0.3 % FS max.	
Hysteresis	≤ ± 0.4 % FS max.	
Repeatability	≤ ± 0.1 % FS	
Rise time	≤ 1.5 ms	
Long term drift	≤ ± 0.3 % FS typ. / year	
Environmental conditions		
Compensated temperature range	-20 .. +85 °C	
Operating temperature range	-20 .. +60 °C	
Storage temperature range	-40 .. +100 °C	
Fluid temperature range <sup>3)</sup>	-40 .. +60 °C / -20 .. +60 °C	
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 31 EN 50303	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	≤ 20 g	
Protection class to IEC 60529	IP 65 (for male EN 175301-803(DIN 43650)) IP 67 (for M12x1 male, when an IP 67 female connector is used)	
Relevant data for Ex applications		
Supply voltage	U <sub>i</sub> = 12 .. 28 V	Ex nA, ta, tb, tc 12 .. 28 V
Max. input current	i <sub>i</sub> = 100 mA	
Max. input power	P <sub>i</sub> = 1 W	max. power consumption ≤ 1 W
Connection capacitance of the sensor	C <sub>i</sub> = ≤ 22 nF	
Inductance of the sensor	L <sub>i</sub> = 0 mH	
Insulation voltage <sup>4)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Other data		
Residual ripple of supply voltage	≤ 5 %	
Life expectancy	> 10 million cycles	
	0 .. 100 % FS	
Weight	~ 180 g	

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L.** = Best Fit Straight Line

<sup>1)</sup> G1/2 with additional front O-ring seal max. 1500 bar

<sup>2)</sup> Other seal materials on request

<sup>3)</sup> -20 °C with FPM seal, -40 °C on request

<sup>4)</sup> 500 V AC on request

## Areas of application:

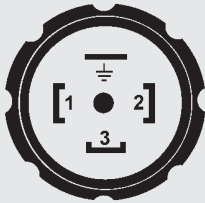
Code used in Model code	1		9	A	C	
Protection type	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85°C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6 Gc	II 1D Ex ta IIIC T80°C T <sub>500</sub> T90°C Da II 2D Ex tb IIIC T80°C Db	II 3G Ex ic IIC T6 Gc II 3D Ex ic IIIC T80°C Dc
Certificate	KEMA 05ATEX1016 X / KEMA 05ATEX1021					
Zones / Categories	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier	Group II Category 2G Gases Protection class: intrinsically safe ia with barrier	Group II Category 3G Gases Protection class: Non-sparking nA	Group III Category 1D, 2D Conductive dust Protection class: Dustproof enclosure	Group II, III Category 3G, 3D Gases/conductive dust Protection class: Intrinsically safe ic with barrier
Electrical Connection (see model code)	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ta IIIC T80/90/100°C Da T<sub>500</sub>T90/T100/T110°C Da, II 2D Ex tb IIIC T80/90/100°C Db and II 3D Ex tc IIIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

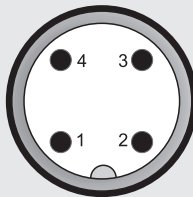
## Pin connections:

EN 175301-803 (DIN 43650)



Pin	HDA 44Z5-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1, 4 pole



Pin	HDA 44Z6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

**HDA 4 4 Z X - A - XXXX - XXX - A N X - 000**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

5 = Male 3 pole + PE,  
EN 175301-803 (DIN 43650)  
(female connector supplied)

6 = Male M12x1, 4 pole  
(female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0040; 0060; 0100; 0250; 0400; 0600

### Mechanical connection

G01 = G1/2 A, DIN 3852

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

### Approval

A = ATEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = I M1 Ex ia I Ma  
II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 1D Ex ia IIIC T85 °C Da

9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*

A = II 1D Ex ta IIIC T80 °C T<sub>500</sub> T90 °C Da (only in conjunction with electr. connection "6")\*  
II 2D Ex tb IIIC T80 °C Db

C = II 3G Ex ic IIC T6 Gc  
II 3D Ex ic IIIC T80 °C Dc

### Modification number

000 = Standard

### Notes:

\* For design and electrical connection see Dimensions

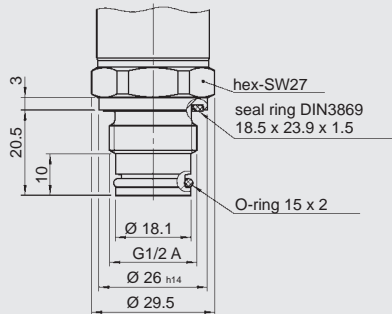
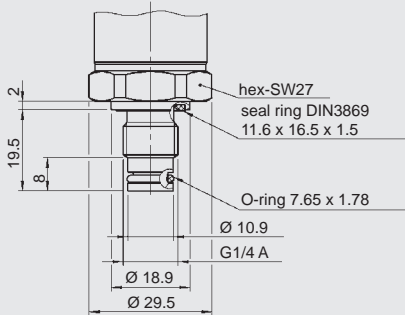
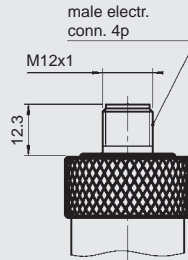
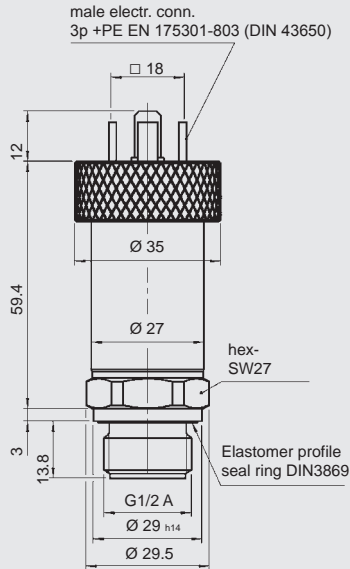
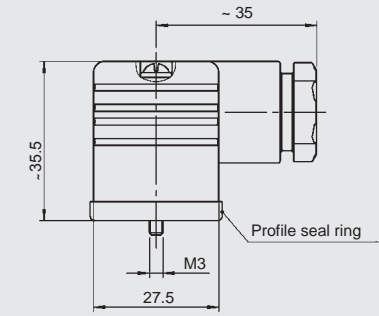
### Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

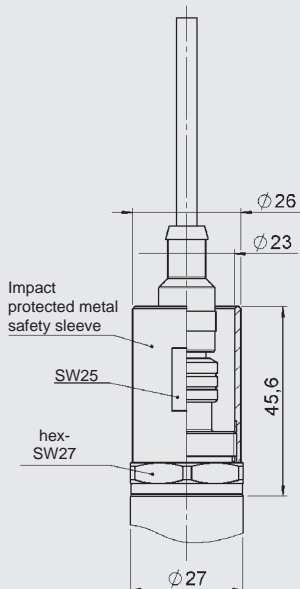


## Dimensions:

Protection types and applications (code): 1, C



Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection. e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4300 with Flush Membrane ATEX Intrinsically Safe ATEX Dustproof Enclosure ATEX Non-sparking



### Description:

The pressure transmitter HDA 4300 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version, the HDA 4300 in ATEX version has the field-proven ceramic measurement cell with thick-film strain gauge.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media. Intended areas of application are, for example, the oil and gas industry, in mines, or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

- I M1 Ex ia I Ma
- II 1G Ex ia IIC T6 Ga
- II 1/2G Ex ia IIC T6 Ga/Gb
- II 2G Ex ia IIC T6 Gb
- II 3G Ex nA IIC T6, T5, T4 Gc
- II 3G Ex ic IIC T6, T5, T4 Gc

- II 1D Ex ia IIIC T85°C Da
- II 1D Ex ta IIIC T80/90/100°C Da  
T<sub>500</sub> T90/T100/T110°C Da
- II 2D Ex tb IIIC T80/90/100°C Db
- II 3D Ex tc IIIC T80/90/100°C Dc
- II 3D Ex ic IIIC T80/90/100°C Dc

### Special features:

- Pressure connection has a flush membrane
- Accuracy:  $\leq \pm 0.5\%$  FS typ.
- Certificates:  
KEMA 05ATEX1016 X  
KEMA 05ATEX1021
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data		
Measuring ranges	-1 .. 1; -1 .. 9; 1; 2.5; 4; 6; 10; 16; 25 bar	
Overload range	3; 32; 3; 8; 12; 20; 32; 50; 80 bar	
Burst pressure	5; 48; 5; 12; 18; 30; 48; 75; 120 bar	
Mechanical connection	G1/2A DIN 3852 G1/2 with additional front O-ring seal G1/4 with additional front O-ring seal	
Pressure transfer fluid	Silicon-free oil	
Torque value	45 Nm for G1/2, G1/2 A 20 Nm for G1/4	
Parts in contact with medium <sup>1)</sup>	Stainless steel: 1.4435; 1.4301 Seal: FPM O-ring: FPM	
Output data		
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor R <sub>Lmax</sub> = (U <sub>B</sub> - 12 V) / 20 mA [kΩ]	
Accuracy to DIN 16086, max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1.0\%$ FS max.	
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.	
Temperature compensation	$\leq \pm 0.02\%$ FS / °C typ.	
Zero point	$\leq \pm 0.03\%$ FS / °C max.	
Temperature compensation	$\leq \pm 0.02\%$ FS / °C typ.	
Over range	$\leq \pm 0.03\%$ FS / °C max.	
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5\%$ FS max.	
Hysteresis	$\leq \pm 0.4\%$ FS max.	
Repeatability	$\leq \pm 0.1\%$ FS	
Rise time	$\leq 1.5$ ms	
Long term drift	$\leq \pm 0.3\%$ FS typ. / year	
Environmental conditions		
Compensated temperature range	-20 .. +85 °C	
Operating temperature range	-20 .. +60 °C	
Storage temperature range	-40 .. +100 °C	
Fluid temperature range <sup>2)</sup>	-40 .. +60 °C / -20 .. +60 °C	
CE-mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 31 EN 50303	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g	
Protection class to IEC 60529	IP 65 (for male EN 175301-803(DIN 43650)) IP 67 (for M12x1 male, when an IP 67 female connector is used)	
Relevant data for Ex applications		
Supply voltage	Ex ia, ic U <sub>i</sub> = 12 .. 28 V	Ex nA, ta, tb, tc 12 .. 28 V
Max. input current	i <sub>i</sub> = 100 mA	
Max. input power	P <sub>i</sub> = 1 W	max. power consumption $\leq 1$ W
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22$ nF	
Inductance of the sensor	L <sub>i</sub> = 0 mH	
Insulation voltage <sup>3)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Other data		
Residual ripple of supply voltage	$\leq 5\%$	
Life expectancy	> 10 million cycles 0 .. 100% FS	
Weight	~ 180 g	

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L.** = Best Fit Straight Line

<sup>1)</sup> Other seal materials on request

<sup>2)</sup> -20 °C with FPM seal, -40 °C on request

<sup>3)</sup> 500 V AC on request

## Areas of application:

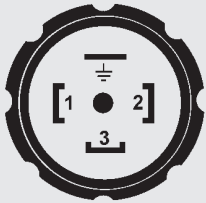
Code Model code	1		9	A	C	
Protection type	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85°C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6 Gc	II 1D Ex ta IIIC T80°C T <sub>500</sub> T90°C Da II 2D Ex tb IIIC T80°C Db	II 3G Ex ic IIC T6 Gc II 3D Ex ic IIIC T80°C Dc
Certificate	KEMA 05ATEX1016 X / KEMA 05ATEX1021					
Zones / Categories	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II, III Category 1G, 1/2G, 1D Gases/conductive dust Protection class: intrinsically safe ia with barrier	Group II Category 2G Gases Protection class: intrinsically safe ia with barrier	Group II Category 3G Gases Protection class: Non-sparking nA	Group III Category 1D, 2D Conductive dust Protection class: Dustproof enclosure	Group II, III Category 3G, 3D Gases/conductive dust Protection class: Intrinsically safe ic with barrier
Electrical Connection (see model code)	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in ignition protection class "Dustproof enclosure" for the protection types II 1D Ex ta IIIC T80/90/100° C Da T<sub>500</sub> T90/T100/T110°C Da, II 2D Ex tb IIIC T80/90/100°C Db and II 3D Ex tc IIIC T80/90/100°C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type II 3G Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

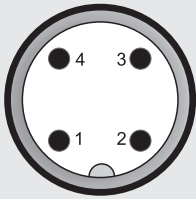
## Pin connections:

EN 175301-803 (DIN 43650)



Pin	HDA 43Z5-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1, 4 pole



Pin	HDA 43Z6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

**HDA 4 3 Z X - A - XXXX - XXX - A N X - XXX**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

5 = Male 3 pole + PE,  
EN 175301-803 (DIN 43650)  
(female connector supplied)  
6 = Male M12x1, 4 pole  
(female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0001(-1..1); 0009(-1..9); 01.0; 02.5; 04.0;  
06.0; 0010; 0016; 0025; 0040

### Mechanical connection

G01 = G1/2 A, DIN 3852  
G02 = G1/2 with additional front O-ring seal  
G04 = G1/4 with additional front O-ring seal

### Approval

A = ATEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

1 = I M1 Ex ia I Ma  
II 1G Ex ia IIC T6 Ga  
II 1/2G Ex ia IIC T6 Ga/Gb  
II 2G Ex ia IIC T6 Gb  
II 1D Ex ia IIIC T85 °C Da  
9 = II 3G Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*  
A = II 1D Ex ta IIIC T80 °C T<sub>500</sub> T90 °C Da (only in conjunction with electr. connection "6")\*  
II 2D Ex tb IIIC T80 °C Db  
C = II 3G Ex ic IIC T6 Gc  
II 3D Ex ic IIIC T80 °C Dc

### Modification number

000 = Standard

### Notes:

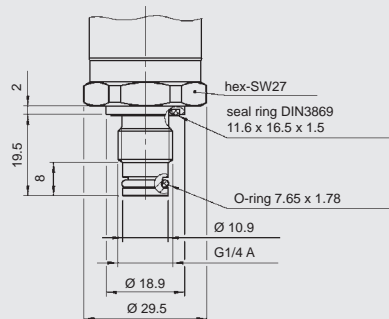
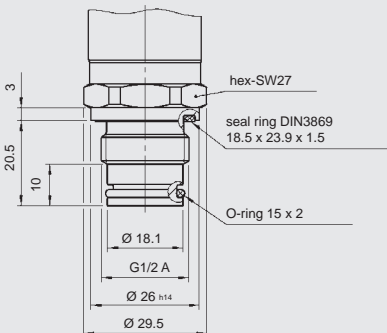
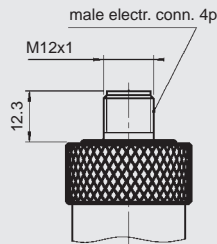
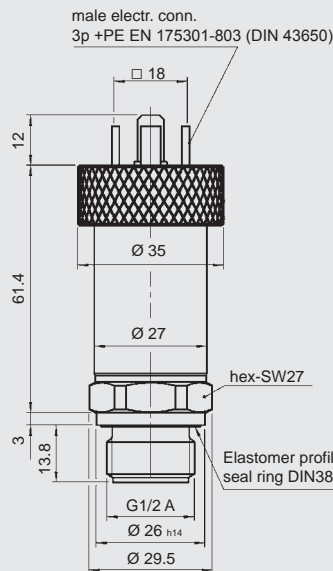
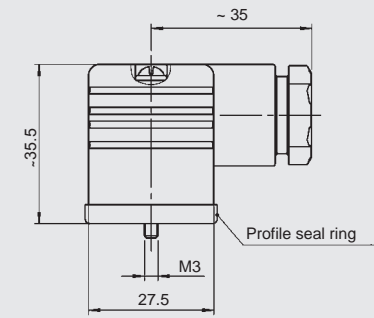
\* For design and electrical connection see Dimensions

### Accessories:

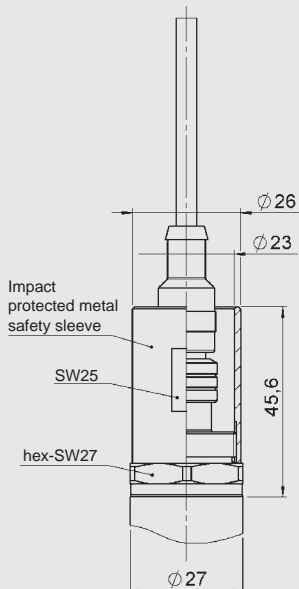
Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

## Dimensions:

Protection types and applications (code): 1, C



Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection. e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4700 with Flush Membrane IECEX Intrinsically Safe IECEX Dustproof Enclosure IECEX Non-sparking



### Description:

The pressure transmitter HDA 4700 in IECEx Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version of the HDA 4700, devices with IECEx Intrinsically Safe approval have a field-proven, all-welded stainless steel measurement cell with thin-film strain gauge without internal seal.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media, or in highly viscous media. Intended areas of application are, for example, the oil and gas industry, in mines or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

Ex ia I Ma

Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex nA IIC T6, T5, T4 Gc  
Ex ic IIC T6, T5, T4 Gc

Ex ta IIIC T80/90/100°C Da  
T<sub>500</sub> 90/100/110°C Da  
Ex tb IIIC T80/90/100°C Db  
Ex tc IIIC T80/90/100°C Dc  
Ex ic IIIC T80/90/100°C Dc  
Ex ia IIIC T85°C Da

### Special features:

- Pressure connection has a flush membrane
- Accuracy  $\leq 0.25\%$  FS typ.
- Certificate: IECEx KEM 08.0014X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

### Technical data:

Input data		
Measuring ranges	40; 60; 100; 250; 400; 600 bar	
Overload ranges	80; 120; 200; 500; 800; 900 bar	
Burst pressure <sup>1)</sup>	200; 300; 500; 1000; 2000; 2000 bar	
Mechanical connection	G1/2 A DIN 3852 G1/2 with additional front O-ring seal	
Pressure transfer fluid	Silicon-free oil	
Torque value	45 Nm	
Parts in contact with medium <sup>2)</sup>	Stainless steel: 1.4435; 1.4301 Seal: FPM O-ring: FPM	
Output data		
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 \text{ V}) / 20 \text{ mA}$ [kΩ]	
Accuracy to DIN 16086, max. setting	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.	
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.	
Temperature compensation zero point	$\leq \pm 0.008\%$ FS / °C typ. $\leq \pm 0.015\%$ FS / °C max.	
Temperature compensation over range	$\leq \pm 0.008\%$ FS / °C typ. $\leq \pm 0.015\%$ FS / °C max.	
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.	
Hysteresis	$\leq \pm 0.1\%$ FS max.	
Repeatability	$\leq \pm 0.05\%$ FS	
Rise time	$\leq 1.5 \text{ ms}$	
Long term drift	$\leq \pm 0.1\%$ FS typ. / year	
Environmental conditions		
Compensated temperature range	-20 .. +85 °C	
Operating temperature range <sup>3)</sup>	-40 .. +60 °C / -20 .. +60 °C	
Storage temperature range	-40 .. +100 °C	
Fluid temperature range <sup>3)</sup>	-40 .. +60 °C / -20 .. +60 °C	
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 36	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20 \text{ g}$	
Protection class to IEC 60529	IP 65 (for male EN 175301-803 (DIN 43650)) IP 67 (for M12x1 male, when an IP 67 female connector is used)	
Relevant data for Ex applications		
Supply voltage	$U_i = 12 \dots 28 \text{ V}$	Ex nA, ta, tb, tc 12 .. 28 V
Max. input current	$i_i = 100 \text{ mA}$	max. power consumption $\leq 1 \text{ W}$
Max. input power	$P_i = 1 \text{ W}$	
Connection capacitance of the sensor	$C_i = \leq 22 \text{ nF}$	
Inductance of the sensor	$L_i = 0 \text{ mH}$	
Insulation voltage <sup>4)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Other data		
Residual ripple of supply voltage	$\leq 5\%$	
Life expectancy	$> 10$ million cycles 0 .. 100 % FS	
Weight	$\sim 180 \text{ g}$	

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> G1/2 with additional front O-ring seal max. 1500 bar

<sup>2)</sup> Other seal materials on request

<sup>3)</sup> -20 °C with FPM seal, -40 °C on request

<sup>4)</sup> 500 V AC on request

## Areas of application:

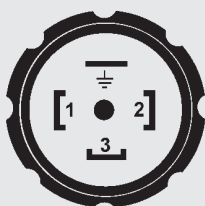
Code used in Model code	D			9	A	C
<b>Protection types and applications</b>	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIIC T85 °C Da	Ex ia IIC T6 Gb	Ex nA IIC T6 Gc	Ex ta IIIC T80 °C T <sub>500</sub> T90 °C Da Ex tb IIIC T80 °C Db	Ex ic IIC T6 Gc Ex ic IIIC T80 °C Dc
<b>Certificate</b>	IECEX KEM 08.0014X					
<b>Zones / Categories</b>	Equipment protection level Ma Mining Protection class: intrinsically safe ia with barrier	Equipment protection level Ga, Ga/Gb, Da Gases/conductive dust Protection class: intrinsically safe ia with barrier	Equipment protection level Gb Gases Protection class: intrinsically safe ia with barrier	Equipment protection level Gc Gases Protection class: Non-sparking nA	Equipment protection level Da, Db Conductive dust Protection class: Dustproof enclosure	Equipment protection level Gc, Dc Gases/conductive dust Protection class: Intrinsically safe ic with barrier
<b>Electrical Connection</b>	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in ignition protection class "Dustproof enclosure" for the protection types Ex ta IIIC T80/90/100 °C Da T<sub>500</sub> T90/T100/T110 °C Da, Ex tb IIIC T80/90/100 °C Db and Ex tc IIIC T80/90/100 °C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

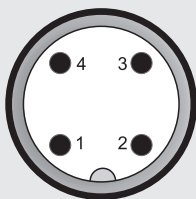
## Pin connections:

EN 175301-803 (DIN 43650)



Pin	HDA 47Z5-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1, 4 pole



Pin	HDA 47Z6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

**HDA 4 7 Z X - X - XXXX - XXX - I N X - 000**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

- 5 = Male 3 pole+ PE, EN 175301-803 (DIN 43650) (female connector supplied)
- 6 = Male M12x1, 4 pole (female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0040; 0060; 0100; 0250; 0400; 0600

### Mechanical connection

- G01 = G1/2 A, DIN 3852
- G02 = G1/2 with additional front O-ring seal

### Approval

I = IECEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

- D = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex ia IIIC T85 °C Da
- 9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6") \*
- A = Ex ta IIIC T80 °C T<sub>500</sub> T90 °C Da (only in conjunction with electr. conn. "6") \*  
Ex tb IIIC T80 °C Db
- C = Ex ic IIC T6 Gc  
Ex ic IIIC T80 °C Dc

### Modification number

000 = Standard

### Notes:

\* For design and electrical connection see Dimensions

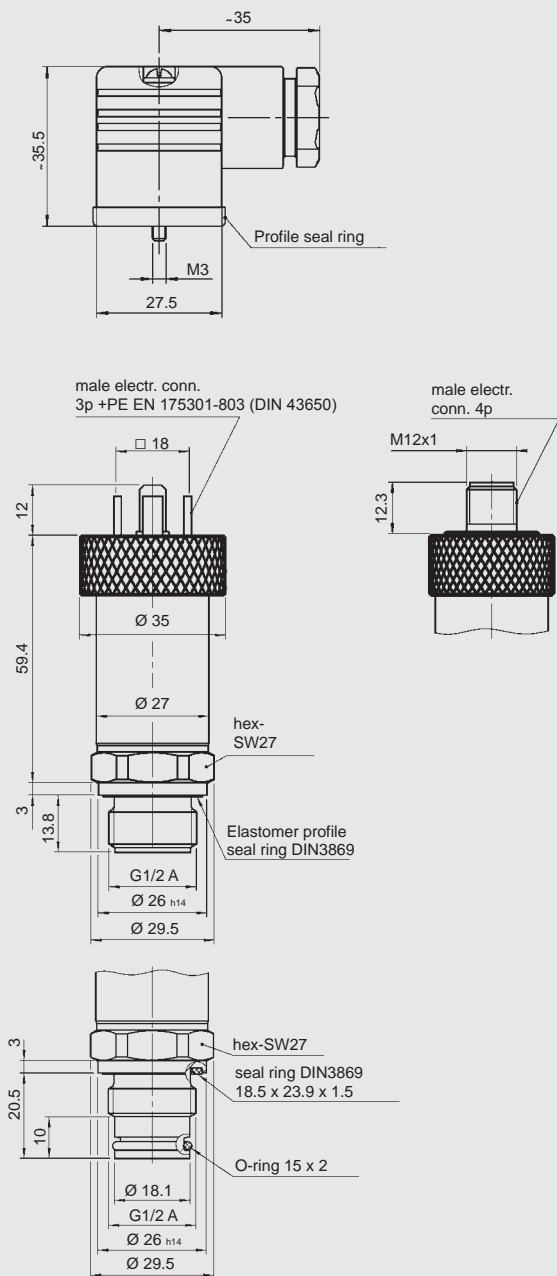
### Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

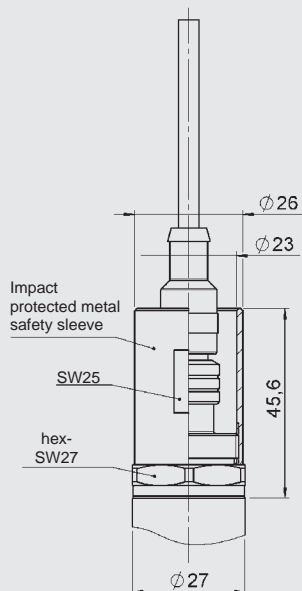


## Dimensions:

Protection types and applications (code): D, C



Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection. e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4400 with Flush Membrane IECEX Intrinsically Safe IECEX Dustproof Enclosure IECEX Non-sparking



### Description:

The pressure transmitter HDA 4400 in IECEx Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version of the HDA 4400, devices with IECEx Intrinsically Safe approval have a field-proven, all-welded stainless steel measurement cell with thin film strain gauge without internal seal.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media, or in highly viscous media. Intended areas of application are, for example, the oil and gas industry, in mines or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

Ex ia I Ma

Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex nA IIC T6, T5, T4 Gc  
Ex ic IIC T6, T5, T4 Gc

Ex ta IIIC T80/90/100 °C Da  
T<sub>500</sub> 90/100/110 °C Da  
Ex tb IIIC T80/90/100 °C Db  
Ex tc IIIC T80/90/100 °C Dc  
Ex ic IIIC T80/90/100 °C Dc  
Ex ia IIIC T85 °C Da

### Special features:

- Pressure connection has a flush membrane
- Accuracy:  $\leq \pm 0.5\%$  FS typ.
- Certificate: IECEx KEM 08.0014X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data		
Measuring ranges	40; 60; 100; 250; 400; 600 bar	
Overload pressures	80; 120; 200; 500; 800; 1000 bar	
Burst pressure <sup>1)</sup>	200; 300; 500; 1000; 2000; 2000 bar	
Mechanical connection	G1/2 A DIN 3852 G1/2 with additional front O-ring seal G1/4 with additional front O-ring seal	
Pressure transfer fluid	Silicon-free oil	
Torque value	45 Nm for G1/2, G1/2 A 20 Nm for G1/4	
Parts in contact with medium <sup>2)</sup>	Stainless steel: 1.4435; 1.4301 Seal: FPM O-ring: FPM	
Output data		
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_B - 12 V) / 20 mA [k\Omega]$	
Accuracy to DIN 16086, max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.	
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.	
Temperature compensation Zero point	$\leq \pm 0.015\%$ FS / °C typ $\leq \pm 0.025\%$ FS / °C max.	
Temperature compensation Over range	$\leq \pm 0.015\%$ FS / °C typ. $\leq \pm 0.025\%$ FS / °C max.	
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.	
Hysteresis	$\leq \pm 0.4\%$ FS max.	
Repeatability	$\leq \pm 0.1\%$ FS	
Rise time	$\leq 1.5$ ms	
Long term drift	$\leq \pm 0.3\%$ FS typ. / year	
Environmental conditions		
Compensated temperature range	-20 .. +85 °C	
Operating temperature range	-20 .. +60 °C	
Storage temperature range	-40 .. +100 °C	
Fluid temperature range <sup>3)</sup>	-40 .. +60 °C / -20 .. +60 °C	
CE - mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 36	
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g	
Protection class to IEC 60529	IP 65 (for male EN 175301-803(DIN 43650)) IP 67 (for M12x1 male, when an IP 67 female connector is used)	
Relevant data for Ex applications		
Supply voltage	Ex ia, ic $U_i = 12 .. 28$ V	Ex nA, ta, tb, tc 12 .. 28 V
Max. input current	$I_i = 100$ mA	
Max. input power	$P_i = 1$ W	max. power consumption $\leq 1$ W
Connection capacitance of the sensor	$C_i = \leq 22$ nF	
Inductance of the sensor	$L_i = 0$ mH	
Insulation voltage <sup>4)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Other data		
Residual ripple of supply voltage	$\leq 5\%$	
Life expectancy	> 10 million cycles	
	0 .. 100 % FS	
Weight		
	$\sim 180$ g	

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> G1/2 with additional front O-ring seal max. 1500 bar

<sup>2)</sup> Other seal materials on request

<sup>3)</sup> -20 °C with FPM seal, -40 °C on request

<sup>4)</sup> 500 V AC on request

## Areas of application:

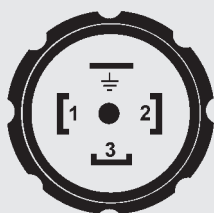
Code No. for use in Model code	D			9	A	C
Protection types and applications	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIC T85°C Da	Ex ia IIC T6 Gb	Ex nA IIC T6 Gc	Ex ta IIC T80°C T <sub>500</sub> T90°C Da Ex tb IIC T80°C Db	Ex ic IIC T6 Gc Ex ic IIC T80°C Dc
Certificate	IECEX KEM 08.0014X					
Zones / Categories	Equipment protection level Ma Mining Protection class: intrinsically safe ia with barrier	Equipment protection level Ga, Ga/Gb, Da Gases/conductive dust Protection class: intrinsically safe ia with barrier	Equipment protection level Gb Gases Protection class: intrinsically safe ia with barrier	Equipment protection level Gc Gases Protection class: Non-sparking nA	Equipment protection level Da, Db Conductive dust Protection class: Dustproof enclosure	Equipment protection level Gc, Dc Gases/conductive dust Protection class: Intrinsically safe ic with barrier
Electrical connection	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in ignition protection class "Dustproof enclosure" for the protection types Ex ta IIC T80/90/100 °C Da T<sub>500</sub>T90/T100/T110 °C Da, Ex tb IIC T80/90/100 °C Db and Ex tc IIC T80/90/100 °C Dc are available with flying leads on request.

Devices in the ignition protection class "Non-sparking" for the protection type Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

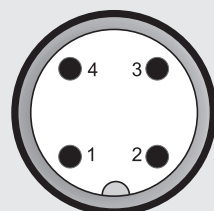
## Pin connections:

EN 175301-803 (DIN 43650)



Pin	HDA 44Z5-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1, 4 pole



Pin	HDA 44Z6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

**HDA 4 4 Z X - A - XXXX - XXX - I N X - 000**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

5 = Male 3 pole+ PE,  
EN 175301-803 (DIN 43650)  
(female connector supplied)  
6 = Male M12x1, 4 pole  
(female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0040; 0060; 0100; 0250; 0400; 0600

### Mechanical connection

G01 = G1/2 A, DIN 3852  
G02 = G1/2 with additional front O-ring seal  
G04 = G1/4 with additional front O-ring seal

### Approval

I = IECEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

D = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex ia IIC T85 °C Da  
9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*  
A = Ex ta IIC T80 °C T<sub>500</sub>T90 °C Da (only in conjunction with electr. connection "6")\*  
Ex tb IIC T80 °C Db  
C = Ex ic IIC T6 Gc  
Ex ic IIC T80 °C Dc

### Modification number

000 = Standard

### Notes:

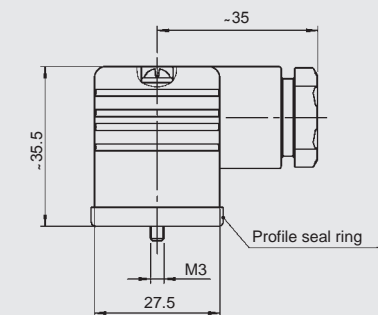
\* For design and electrical connection see Dimensions

### Accessories:

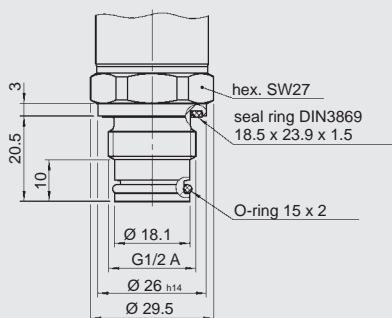
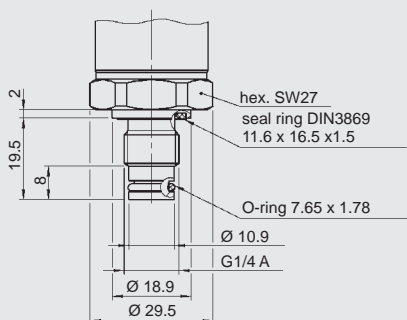
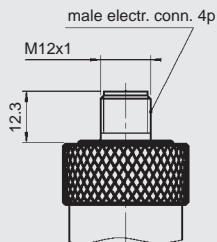
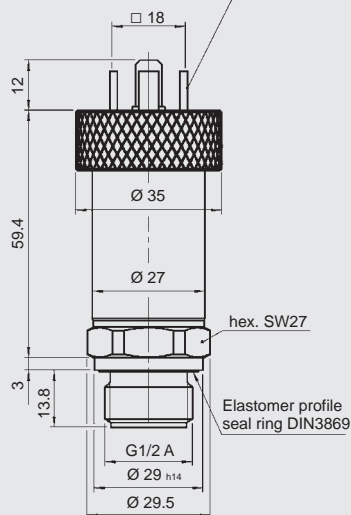
Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

## Dimensions:

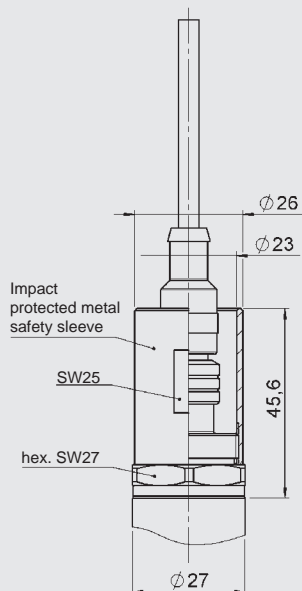
Protection types and applications (code): D, C



male electr. conn.  
3p +PE EN 175301-803 (DIN 43650)



Protection types and applications (code): 9, A



The impact protected metal safety sleeve is included. A straight female connector is required for electrical connection; e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part. No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4300 with Flush Membrane IECEX Intrinsically Safe IECEX Dustproof Enclosure IECEX Non-sparking



### Description:

The pressure transmitter HDA 4300 in IECEx Intrinsically Safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industrial version HDA 4300, the devices with IECEx Intrinsically Safe approval have the field-proven ceramic measuring cell with thick-film strain gauge.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media. Intended areas of application are, for example, the oil and gas industry, in mines, or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

Ex ia I Ma

Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex nA IIC T6, T5, T4 Gc  
Ex ic IIC T6, T5, T4 Gc

Ex ta IIIC T80/90/100 °C Da  
T<sub>500</sub> 90/100/110 °C Da  
Ex tb IIIC T80/90/100 °C Db  
Ex tc IIIC T80/90/100 °C Dc  
Ex ic IIIC T80/90/100 °C Dc  
Ex ia IIIC T85 °C Da

### Special features:

- Pressure connection has a flush membrane
- Accuracy:  $\leq \pm 0.5\%$  FS typ.
- Certificate: IECEx KEM 08.0014X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent long-term properties

### Technical data:

Input data	
Measuring ranges	-1 .. 1; -1 .. 9; 1; 2.5; 4; 6; 10; 16; 25 bar
Overload pressures	3; 32; 3; 8; 12; 20; 32; 50; 80 bar
Burst pressure	5; 48; 5; 12; 18; 30; 48; 75; 120 bar
Mechanical connection	G1/2 A DIN 3852 G1/2 with additional front O-ring seal G1/4 with additional front O-ring seal
Pressure transfer fluid	Silicon-free oil
Torque value	45 Nm for G1/2, G1/2 A 20 Nm for G1/4
Parts in contact with medium <sup>1)</sup>	Stainless steel: 1.4435; 1.4301 Seal: FPM O-ring: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA, 2 conductor R <sub>Lmax</sub> = (U <sub>B</sub> - 12 V) / 20 mA [kΩ]
Accuracy to DIN 16086, max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1.0\%$ FS max.
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation zero point	$\leq \pm 0.02\%$ FS / °C typ. $\leq \pm 0.03\%$ FS / °C max.
Temperature compensation over range	$\leq \pm 0.02\%$ FS / °C typ. $\leq \pm 0.03\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 1.5$ ms
Long term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-20 .. +85 °C
Operating temperature range	-20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +60 °C / -20 .. +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 / 36
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 (for male EN 175301-803 (DIN 43650)) IP 67 (for M12x1 male, when an IP 67 female connector is used)
Relevant data for Ex applications	
Supply voltage	U <sub>i</sub> = 12 .. 28 V
Max. input current	i <sub>i</sub> = 100 mA
Max. input power	P <sub>i</sub> = 1 W
Connection capacitance of the sensor	C <sub>i</sub> = $\leq 22$ nF
Inductance of the sensor	L <sub>i</sub> = 0 mH
Insulation voltage <sup>3)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2
Other data	
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 180 g

Note: Reverse polarity protection of the supply voltage, excess voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> Other seal materials on request

<sup>2)</sup> -20 °C with FPM seal, -40 °C on request

<sup>3)</sup> 500 V AC on request

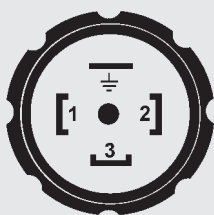
## Areas of application:

Code for use in Model code	D			9	A	C
<b>Protection types and applications</b>	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIIC T85°C Da	Ex ia IIC T6 Gb	Ex nA IIC T6 Gc	Ex ta IIIC T80°C T <sub>500</sub> T90°C Da Ex tb IIIC T80°C Db	Ex ic IIC T6 Gc Ex ic IIIC T80°C Dc
<b>Certificate</b>	IECEX KEM 08.0014X					
<b>Zones / Categories</b>	Equipment protection level Ma Mining Protection class: intrinsically safe ia with barrier	Equipment protection level Ga, Ga/Gb, Da Gases/conductive dust Protection class: intrinsically safe ia with barrier	Equipment protection level Gb Gases Protection class: intrinsically safe ia with barrier	Equipment protection level Gc Gases Protection class: Non-sparking nA	Equipment protection level Da, Db Conductive dust Protection class: Dustproof enclosure	Equipment protection level Gc, Dc Gases/conductive dust Protection class: Intrinsically safe ic with barrier
<b>Electrical Connection</b>	4, 5, 6	4, 5, 6	4, 5, 6	6	6	4,5,6

Devices in the ignition protection class "Dustproof enclosure" for the protection types Ex ta IIIC T80/90/100° C Da T<sub>500</sub> T90/T100/T110°C Da, Ex tb IIIC T80/90/100°C Db and Ex tc IIIC T80/90/100°C Dc are available with flying leads on request. Devices in the ignition protection class "non-sparking" for protection type Ex nA IIC T6, T5, T4 Gc are available with flying leads on request.

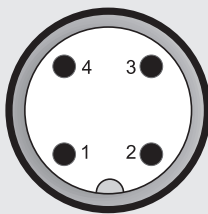
## Pin connections:

EN 175301-803 (DIN 43650)



Pin	HDA 43Z5-A
1	Signal +
2	Signal -
3	n.c.
⊥	Housing

M12x1, 4 pole



Pin	HDA 43Z6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

## Model code:

**HDA 4 3 Z X - A - XXXX - XXX - I N X - 000**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

5 = Male 3 pole + PE,  
EN 175301-803 (DIN 43650)  
(female connector supplied)  
6 = Male M12x1, 4 pole  
(female connector not supplied)

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0001 (-1..1); 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

### Mechanical connection

G01 = G1/2 A, DIN 3852  
G02 = G1/2 with additional front O-ring seal  
G04 = G1/4 with additional front O-ring seal

### Approval

I = IECEX

### Insulation voltage

N = 50 V AC

### Protection types and applications (code)

D = Ex ia I Ma  
Ex ia IIC T6 Ga  
Ex ia IIC T6 Ga/Gb  
Ex ia IIC T6 Gb  
Ex ia IIIC T85 °C Da

9 = Ex nA IIC T6 Gc (only in conjunction with electr. connection "6")\*

A = Ex ta IIIC T80 °C T<sub>500</sub> T90 °C Da (only in conjunction with electr. connection "6")\*  
Ex tb IIIC T80 °C Db

C = Ex ic IIC T6 Gc  
Ex ic IIIC T80 °C Dc

### Modification number

000 = Standard

### Notes:

\* For design and electrical connection see device dimensions

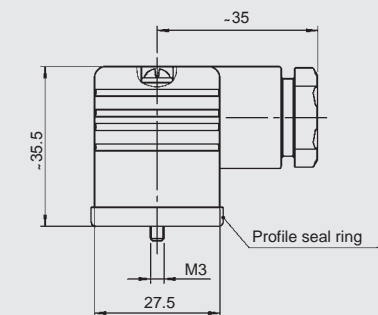
### Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

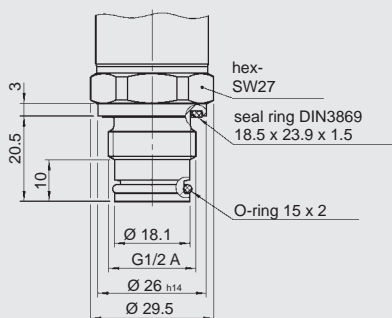
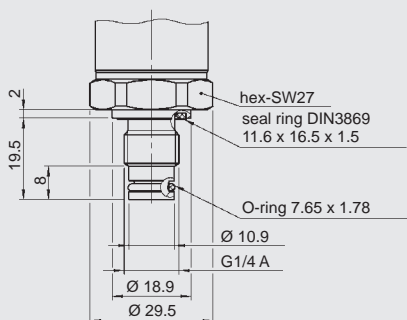
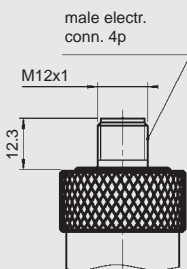
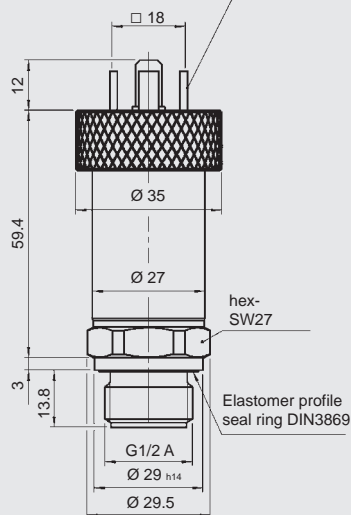


## Dimensions:

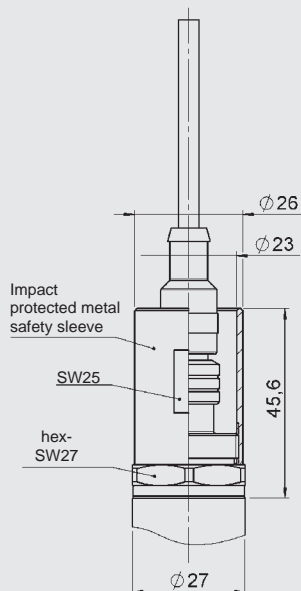
Protection types and applications (code): D, C



male electr. conn.  
3p +PE EN 175301-803 (DIN 43650)



Protection types and applications (code): 9, A



The Impact protected metal safety sleeve is included. A straight female connector is required for electrical connection. e.g. female connector M12x1, 4 pole, straight, with 3m shielded cable: ZBE 06S-03, Part No. 6098243

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.





## Electronic Pressure Transmitter HDA 4700 with Flush Membrane ATEX, IECEx, CSA Flameproof Enclosure



### Description:

The electronic pressure transmitter HDA 4700 with flush membrane is certified in the ignition protection class Flameproof Enclosure to ATEX, IECEx and CSA. The devices have triple approval, ensuring that they are universally suitable for use in potentially explosive environments around the world. Therefore it is no longer necessary to stock multiple devices with separate individual approvals.

The pressure connection is achieved with an all-welded stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure connection could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media, or in highly viscous media.

Its main applications are in mining and the oil and gas industry, e.g. in underground vehicles, hydraulic power units (HPU), blow-out preventers (BOPs), drill drives or in lubrication systems.

### Protection types and applications:

**CSA<sub>US</sub> Explosion Proof – Seal Not Required**  
Class I Group A, B, C, D, T6, T5  
Class II Group E, F, G  
Class III  
Type 4

### ATEX Flame Proof

I M2 Ex d I Mb  
II 2G Ex d IIC T6, T5 Gb  
II 2D Ex tb IIIC T110 .. 130 °C Db

### IECEx Flame Proof

Ex d I Mb  
Ex d IIC T6, T5 Gb  
Ex tb IIIC T110 .. 130 °C Db

### Special features:

- Accuracy ≤ 0.25 % FS typ.
- Certificates:  
ATEX KEMA 10ATEX0100 X  
CSA MC 224264  
IECEx KEM 10.0053X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	40; 60; 100; 250; 400; 600 bar
Overload ranges	80; 120; 200; 500; 800; 1000 bar
Burst pressure	300; 300; 500; 1000; 2000; 2000 bar
Mechanical connection <sup>1)</sup>	G1/2 A DIN 3852 G1/2 with add. front O-ring seal
Pressure transfer fluid	Silicon-free oil
Torque value	45 Nm
Parts in contact with medium	Stainless steel: 1.4435; 1.4301 Seal: FPM O-ring: FPM
Conduit, housing material	1.4404; 1.4435 (316L)
Output data	
Output signal, permitted load resistance <sup>2)</sup>	4 .. 20 mA, 2 conductor $R_{Lmax} = (U_b - 8 V) / 20 \text{ mA} [\text{k}\Omega]$
Accuracy to DIN 16086, max. setting	≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS max.
Accuracy at minimum setting (B.F.S.L.)	≤ ± 0.15 % FS typ. ≤ ± 0.25 % FS max.
Temperature compensation	≤ ± 0.008 % FS / °C typ.
Zero point	≤ ± 0.015 % FS / °C max.
Temperature compensation	≤ ± 0.008 % FS / °C typ.
Over range	≤ ± 0.015 % FS / °C max.
Non-linearity at max. setting to DIN 16086	≤ ± 0.3 % FS max.
Hysteresis	≤ ± 0.1 % FS max.
Repeatability	≤ ± 0.05 % FS
Rise time	≤ 1.5 ms
Long term drift	≤ ± 0.1 % FS typ. / year
Environmental conditions	
Compensated temperature range	T5, T130 °C: -25 .. +80 °C T6, T110 °C: -25 .. +60 °C
Operating temperature range <sup>3)</sup>	T5, T130 °C: -40 .. +80 °C / -20 .. +80 °C T6, T110 °C: -40 .. +60 °C / -20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>3)</sup>	T5, T130 °C: -40 .. +80 °C / -20 .. +80 °C T6, T110 °C: -40 .. +60 °C / -20 .. +60 °C
<b>CE mark</b>	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 1 / 31
Vibration resistance to DIN EN 60068-2-6 at 10 ..500 Hz	≤ 20 g
Protection class to IEC 60529 to ISO 20653	IP 65 (Vented Gauge) IP 69K (Sealed Gauge)
Other data	
Supply voltage	8 .. 30 V DC
Residual ripple of supply voltage	≤ 5 %
Life expectancy	> 10 million load cycles, 0 .. 100 % FS
Weight	~300 g

Note.: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

**B.F.S.L.** = Best Fit Straight Line

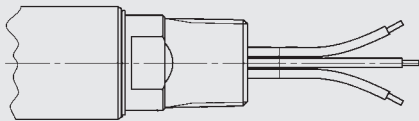
<sup>1)</sup> Other mechanical connections on request

<sup>2)</sup> Other output signals on request

<sup>3)</sup> -20 °C with FPM seal, -40 °C on request

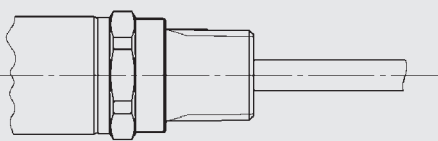
## Pin connections:

Conduit (single cores)



Core	HDA 47Z9-A
red	Signal +
black	Signal -
green-yellow	Housing

Conduit (flying leads)



Core	HDA 47ZG-A
white	Signal -
brown	Signal +
green	n.c.
yellow	n.c.

## Areas of application:

<b>Approvals</b>	cCSAus: Explosion Proof - Seal not required ATEX: Flame Proof IECEX: Flame Proof
<b>Certificate</b>	ATEX KEMA 10ATEX100X CSA MC 224264 IECEX KEM 10.0053X
<b>Applications / Protection types</b>	cCSAus: Class I Group A, B, C, D, T6; T5 Class II Group E, F, G Class III Type 4  ATEX: I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 130 °C Db  IECEX: Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 130 °C Db

## Model code:

**HDA 4 7 Z X - A - XXXX - XXX - D X - 000 (2m)**

### Mechanical process connection

Z = Flush membrane

### Electrical connection

9 = 1/2-14 NPT Conduit (male thread), single cores

G = 1/2-14 NPT Conduit (male thread), flying leads

### Signal

A = 4 .. 20 mA, 2 conductor

### Pressure ranges in bar

0040; 0060; 0100; 0250; 0400; 0600

### Mechanical connection

G01 = G1/2 A, DIN 3852

G02 = G1/2 with additional front O-ring seal

### Approval

D = CSA Explosion Proof – Seal not required

ATEX Flame Proof

IECEX Flame Proof

### Type of measurement cell

S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar

V = Vented Gauge (vented to atmosphere) ≤ 16 bar

### Modification number

000 = Standard

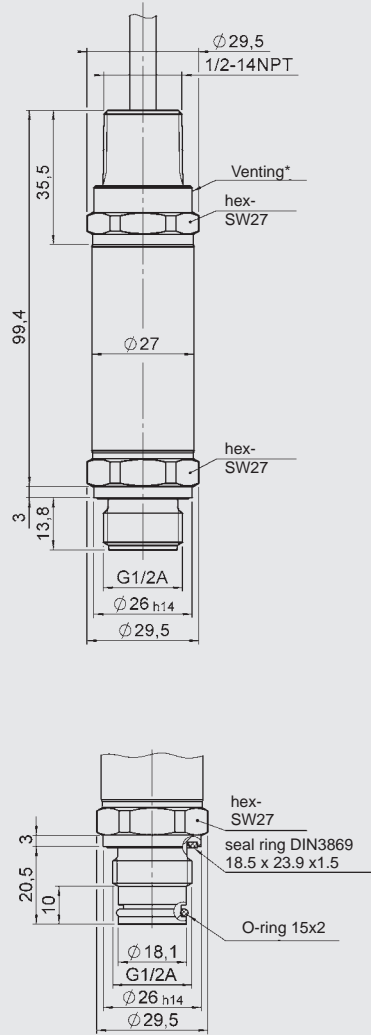
### Cable length in m

Standard = 2 m

### Accessories:

Appropriate accessories, such as electrical female connectors, can be found in the Accessories brochure.

## Dimensions:



\* optional, depending on gauge type "Sealed Gauge" / "Vented Gauge"

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.





## Electro-Mechanical Flow Switch HFS 2100 ATEX Encapsulation for Oils / Viscous Fluids



### Description:

The HYDAC HFS 2100 flow switch in ATEX version has been specially developed for use in potentially explosive atmospheres. Like the standard version it is based on the variable area float principle, and can be mounted in any position.

The test medium moves a spring-loaded float in the direction of flow, depending on the flow rate. A fully encapsulated reed contact is fitted to the outside of the instrument and is therefore separate from the flow circuit. When the magnet inside the float reaches the preset position, the reed contact switches.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

### Protection types and applications:

II 2G Ex mb II T6 / T5  
II 2D Ex tD A21 IP67 T80 °C / T100 °C

### Medium:

- Oils / viscous fluids

### Special features:

- Accuracy  $\leq \pm 10\%$  FS
- Viscosity compensation from 30 .. 600 cSt
- Any mounting position
- High level of functional reliability
- High level of switching accuracy
- Stepless switch point setting by user
- High pressure resistance
- Threaded connection
- Certificate:  
PTB 03 ATEX 2159 X  
PTB 03 ATEX N056-3

### Technical data:

Input data		
Switching ranges [l/min]	Size 1	Size 2
	0.5 .. 1.6	0.5 .. 1.5
	0.8 .. 3.0	1 .. 4
	2.0 .. 7.0	2 .. 8
		3 .. 10
		5 .. 15
		8 .. 24
		10 .. 30
		15 .. 45
		20 .. 60
	30 .. 90	
	35 .. 110	
Operating pressure		
Brass version	300 bar	250 bar
Stainless steel version	350 bar	300 bar
Pressure drop	0.02 .. 0.2 bar	0.02 .. 0.4 bar
Mechanical connection	See dimensions	
Parts in contact with medium		
Brass version	St. steel 1.4571; FPM <sup>1)</sup> ; brass nickel-pl.; brass; hard ferrite	
Stainless steel version	Stainless steel 1.4571; FPM <sup>1)</sup> ; hard ferrite	
Output data		
Switching outputs	1 or 2 Reed contacts	
	Change-over or normally open type <sup>2)</sup>	
Accuracy <sup>3)</sup>	$\leq \pm 10\%$ FS	
Repeatability	2 % FS max.	
Switching capacity		
Change-over contact	max. 250 V / 1 A / 30 W	
	Back-up fuse 1 A (outside the hazardous area)	
N/O contact	max. 250 V / 2 A / 60 W	
	Back-up fuse 2 A (outside the hazardous area)	
Environmental conditions		
Operating temperature range	T6 / T80 °C:	-20 .. +75 °C
	T5 / T100 °C:	-20 .. +90 °C
Fluid temperature range	T6 / T80 °C:	-20 .. +75 °C
	T5 / T100 °C:	-20 .. +90 °C
Max. surface temperature	T6 / T80 °C:	+75 °C
	T5 / T100 °C:	+90 °C
Viscosity range	30 .. 600 cSt	
CE - mark	Directive 2006 / 95 / EC Directive 2004 / 108 / EC Directive 94 / 9 / EC EN 60079-0:2006 / EN 60079-18:2004 EN 61241-0:2006 / EN 61241-1:2004	
Protection class to IEC 60529	IP 67	
Other data		
Housing material	Brass (nickel-plated) or stainless steel 1.4571	
Electrical connection	Flying leads (2 m cable length)	

Note.: **FS (Full Scale)** = relative to the complete measuring range

<sup>1)</sup> Other seal materials available on request

<sup>2)</sup> The contact opens / switches when the flow falls below the pre-set switching point.

<sup>3)</sup> 3% possible with calibration to a certain viscosity

## Pin assignment:

### Flying leads

Core	HFS 21X1-XS	HFS 21X1-XW
1		Centre
2	N/O contact	N/C contact
3		N/O contact

## Notes on installation:

- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!

## Safety instructions:

- The circuits must not incorporate any effective inductance or capacitance.
- The maximum ratings stipulated in the technical data must never be exceeded, not even for a short time.
- To protect the switching contact, a fuse for the circuit must be provided outside the hazardous area, unless the switching unit is connected to an intrinsically safe circuit.
- Unless the device is connected to an intrinsic safe circuit, special safety precautions have to be implemented.
- The device may be used in hazardous areas designated as category 2.
- The device must not be used in areas where there is a possibility that an electrostatic charge can be caused in the plastic housing.
- The device must not be used in machinery, systems or medical apparatus where, in the event of a malfunction, persons, animals or equipment could be harmed or damaged.

## Model code:

HFS 2 1 X 1 - XX - XXXX-XXXX - 7 - X - X - A00

### Measuring principle

2 = Variable area float

### Test medium

1 = Oils / viscous fluids

### Mechanical connection <sup>4) 5)</sup>

1 = 1/4 "  
2 = 3/8 "  
3 = 1/2 "  
4 = 3/4 "  
5 = 1 "

### Electrical connection

1 = Flying leads  
(2m in length)

### Switching contacts <sup>5)</sup>

1S = 1 N/O contact  
2S = 2 N/O contacts  
1W = 1 Change-over contact  
2W = 2 Change-over contacts

### Switching ranges in l/min <sup>6)</sup>

**Oil 10 % -Size 1-**  
00.5-01.6; 00.8-03.0; 02.0-07.0

### **Oil 10 % - Size 2-**

00.5-01.5; 0001-0004; 0002-0008; 0003-0010;  
0005-0015; 0008-0024; 0010-0030; 0015-0045;  
0020-0060; 0030-0090; 0035-0110

### Accuracy

7 = ≤ 10.0 % FS

### Housing material

B = Brass (nickel-plated)  
S = Stainless steel

### Mechanical indicator

0 = Without indicator  
1 = With indicator

### Modification number

A00 = ATEX version for potentially explosive areas

<sup>4)</sup> Mechanical connection options depend on housing type (see Dimensions).

<sup>5)</sup> When the model with 2 switching contacts is selected, the second contact is mounted on the side of the instrument, at 90° to the first contact.

<sup>6)</sup> Other models available on request.

### Note:

Special models on request.

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

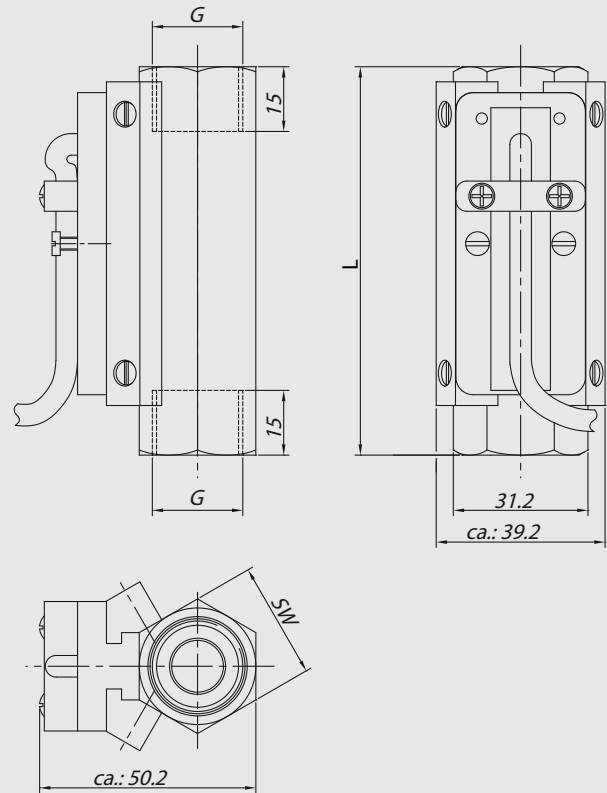


## Dimensions without indicator:

### OIL -Size 1- without indicator

Type [l/min]	Installation dimensions [mm]				Weight (approx.) [g]
	DN	SW	G	L	
	0.5 .. 1.6	8	24	1/4"	
	10	24	3/8"	119	500
	15	27	1/2" *)	90	400
0.8 .. 3.0	15	27	1/2"	90	400
2.0 .. 7.0					

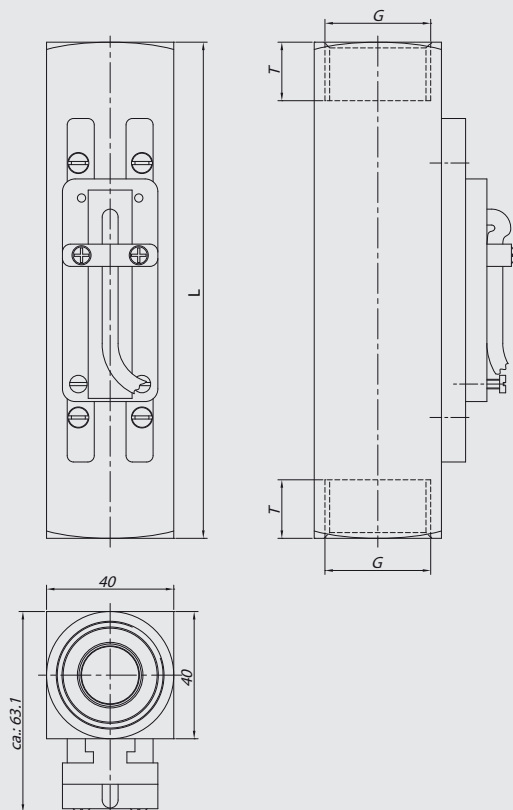
\*) Standard



### OIL -Size 2- without indicator

Type [l/min]	Installation dimensions [mm]					Weight (approx.) [g]
	[mm]					
	DN	SW	G	L	T	
0.5 .. 1.5	8	34	1/4"	152	10	1500
1 .. 4	15	34	1/2"	152	14	1425
	20	34	3/4"	152	15	1340
	25	40	1" *)	130	17	1160
2 .. 8	15	34	1/2"	152	14	1425
3 .. 10						
5 .. 15						
8 .. 24						
10 .. 30	20	34	3/4"	152	15	1340
15 .. 45						
20 .. 60	25	40	1" *)	130	17	1160
30 .. 90	25	40	1"	130	17	1160
35 .. 110						

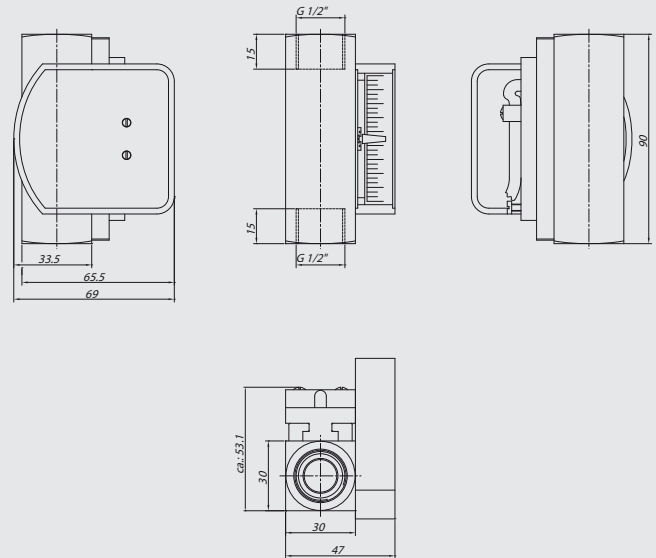
\*) Standard



## Dimensions with indicator:

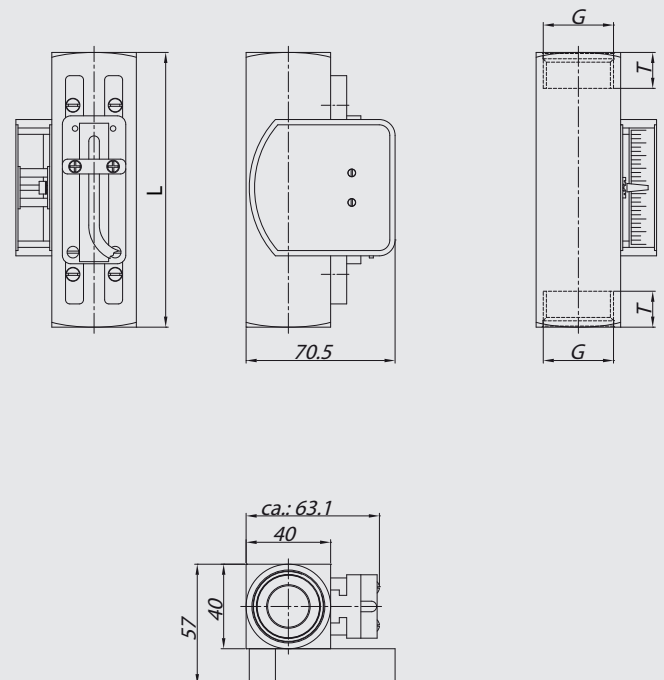
### OIL -Size 1- with indicator

Type [l/min]	Installation dimensions [mm]				Weight (approx.) [g]
	DN	SW	G	L	
0.5 .. 1.6	15	30	1/2"	90	570
0.8 .. 3.0					
2.0 .. 7.0					



### OIL -Size 2- with indicator

Type [l/min]	Installation dimensions [mm]					Weight (approx.) [g]
	DN	SW	G	L	T	
0.5 .. 1.5	8	34	1/4"	152	10	1590
1 .. 4	15	34	1/2"	152	14	1515
	20	34	3/4"	152	15	1430
	25	40	1" *)	130	17	1250
2 .. 8	15	34	1/2"	152	14	1515
3 .. 10						
20						
5 .. 15	25	40	1" *)	130	17	1250
	8 .. 24					
10 .. 30	20	34	3/4"	152	15	1430
15 .. 45						
25						
20 .. 60	25	40	1"	130	17	1250
30 .. 90						
35 .. 110						



\*) Standard

### Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications and operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

### HYDAC ELECTRONIC GMBH

Hauptstraße 27  
D-66128 Saarbrücken  
Tel.: 0 68 97 / 509-01  
Fax: 0 68 97 / 509-1726  
Internet: www.hydac.com  
E-mail: electronic@hydac.com



## Electro-Mechanical Flow Switch HFS 2500 ATEX Encapsulation for Water or Water-based Media



### Description:

The HYDAC HFS 2500 flow switch in ATEX version has been specially developed for use in potentially explosive atmospheres. Like the standard version it is based on the variable area float principle, and can be mounted in any position.

The test medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A fully encapsulated reed contact is fitted to the outside of the device and is therefore separate from the flow circuit. When the magnet inside the float reaches the preset position, the reed contact switches.

Intended areas of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust, e.g. in mills.

### Protection types and applications:

II 2G Ex mb II T6 / T5

II 2D Ex tD A21 IP67 T80 °C / T100 °C

### Medium:

- Water / water-based media

### Special features:

- Accuracy  $\leq \pm 5\%$  or  $\leq \pm 10\%$  FS
- Any mounting position
- High level of functional reliability
- High level of switching accuracy
- Stepless switch point setting by user
- High pressure resistance
- Threaded connection
- Certificate:  
PTB 03 ATEX 2159 X  
PTB 03 ATEX N056-3

### Technical data:

Input data			
Switching ranges [l/min]	5 % accuracy		10 % accuracy
			Size 2    Size 3
0.2 .. 4.0	8 .. 90	0.02 .. 0.2	10 .. 30
0.6 .. 5.0	5 .. 110	0.2 .. 0.6	15 .. 45
0.5 .. 8.0	10 .. 150	0.4 .. 1.8	20 .. 60
1 .. 14	35 .. 220	0.8 .. 3.2	30 .. 90
1 .. 28	35 .. 250	2 .. 7	60 .. 150
2 .. 40		3 .. 13	
4 .. 55		4 .. 20	
1 .. 70		8 .. 30	
Operating pressure			
Brass version	200 bar	300 bar	250 bar
Stainless steel version	300 bar	350 bar	300 bar
Pressure drop [bar]	0.02 .. 0.8	0.02 .. 0.3	0.02 .. 0.4
Mechanical connection	See dimensions		
Parts in contact with medium			
Brass version	Stainless steel 1.4571; NBR <sup>1)</sup> ; Brass; nickel-plated; Brass; Hard ferrite		
Stainless steel version	Stainless steel 1.4571; FPM <sup>1)</sup> ; Hard ferrite		
Output data			
Switching outputs	1 or 2 reed contacts Change-over or normally open type <sup>2)</sup>		
Accuracy	$\leq \pm 5\%$ or $\leq \pm 10\%$ FS		
Repeatability	2 % FS max.		
Switching capacity			
Change-over contact	max. 250 V / 1 A / 30 W Back-up fuse 1 A (outside the hazardous area)		
N/O contact	max. 250 V / 2 A / 60 W Back-up fuse 2 A (outside the hazardous area)		
Environmental conditions			
Operating temperature range	T6 / T80 °C:	-20 .. +75 °C	
	T5 / T100 °C:	-20 .. +90 °C	
Fluid temperature range	T6 / T80 °C:	-20 .. +75 °C	
	T5 / T100 °C:	-20 .. +90 °C	
Max. surface temperature	T6 / T80 °C:	+75 °C	
	T5 / T100 °C:	+90 °C	
CE mark	Directive 2006 / 95 / EC Directive 2004 / 108 / EC Directive 94 / 9 / EC EN 60079-0:2006 / EN 60079-18:2004 EN 61241-0:2006 / EN 61241-1:2004		
Protection class to IEC 60529	IP 67		
Other data			
Housing material	Brass (nickel-plated) or stainless steel 1.4571		
Electrical connection	Flying leads (2 m cable length)		

Note.: **FS (Full Scale)** = relative to the complete measuring range

<sup>1)</sup> Other seal materials available on request

<sup>2)</sup> The contact opens / switches when the flow falls below the pre-set switching point.

## Model code:

HFS 2 5 X 1 – XX – XXXX–XXXX – X – X – X – A00

### Measuring principle

2 = Variable area float

### Test medium

5 = Water or water-based

### Mechanical connection

<sup>3)5)</sup>

- 1 = 1/4 "
- 2 = 3/8 "
- 3 = 1/2 "
- 4 = 3/4 "
- 5 = 1 "
- 6 = 1 1/4 "
- 7 = 1 1/2 "

### Electrical connection

1 = Flying leads (2m in length)

### Switching contacts

- 1S = 1 N/O contact
- 2S = 2 N/O contacts
- 1W = 1 Change-over contact
- 2W = 2 Change-over contacts

### Switching ranges in l/min

#### Water 5 %

00.2-04.0; 00.6-05.0; 00.5-08.0;  
01.0-0014; 01.0-0028; 02.0-0040; 04.0-0055;  
01.0-0070; 08.0-0090; 0005-0110; 0010-0150;  
0035-0220; 0035-0250;

#### Water 10 % -Size 2-

0.02-00.2; 00.2-00.6; 00.4-01.8; 00.8-03.2;  
02.0-07.0; 03.0-0013; 04.0-0020; 08.0-0030

#### Water 10 % - Size 3 -

0010-0030; 0015-0045; 0020-0060;  
0030-0090; 0060-0150

### Accuracy

- 6 = ≤ 5.0 % FS
- 7 = ≤ 10.0 % FS

### Housing material

- B = Brass, nickel-plated
- S = Stainless steel

### Mechanical indicator

- 0 = Without indicator
- 1 = With indicator

### Modification number

A00 = ATEX version for potentially explosive areas

3) Mechanical connection options depend on housing type (see Dimensions)

4) When the model with 2 switching contacts is selected, the second switching contact is mounted on the side of the instrument, at 90° to the first contact.

5) Other models available on request.

### Note:

Special models on request.

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Pin connections:

### Flying leads

Pin	HFS 25X1-XS	HFS 25X1-XW
1	N/O contact	Centre
2		N/C contact
3		N/O contact

### Notes on installation:

- The medium must not contain solid particles! We recommend using contamination strainers.
- External magnetic fields can affect the switching contact. Ensure sufficient distance from magnetic fields (e.g. from electric motors)!

### Safety instructions:

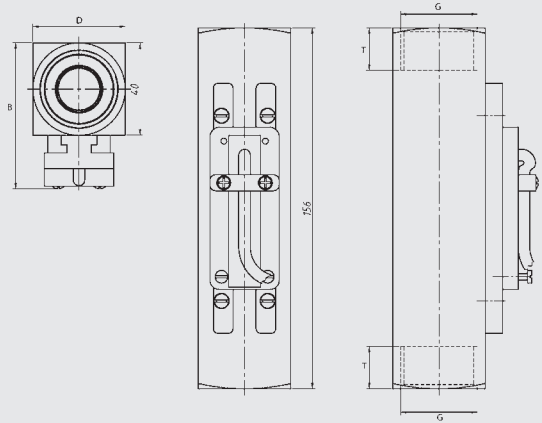
- The circuits must not incorporate any effective inductance or capacities.
- The maximum ratings stipulated in the technical data must never be exceeded, even for a short time.
- To protect the switching contact, a fuse for the circuit must be provided outside the hazardous area, unless the switching unit is connected to an intrinsically safe circuit.
- Unless the device is connected to an intrinsic safe circuit, special safety precautions have to be implemented.
- The device may be used in hazardous areas designated as category 2.
- The device must not be used in areas where an electrical charge in the plastic housing is likely.
- The device must not be used in machinery, systems or medical apparatus where, in the event of a malfunction, persons, animals or equipment could be harmed or damaged.

## Dimensions without indicator:

Type [l/min]	Installation dimensions							Weight (approx.) [g]
	[mm]							
	SW	D	B	G	DN	T	L	

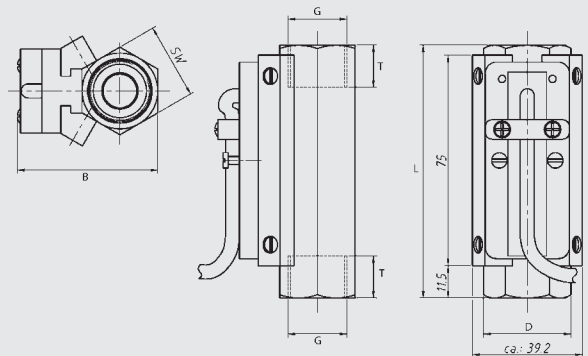
### Water 5 % accuracy

0.2 .. 4.0	27	30	53	1/4" 3/8" 1/2"	8 10 15	14	131	850
0.6 .. 5.0								
0.5 .. 8.0								
1 .. 14								
1 .. 28	27	30	53	1/2" 3/4"	15 20	14 16	146 174	900
2 .. 40								
4 .. 55	32	35	53	3/4" 1"	20 25	18 19	152 156	1400 1100
1 .. 70	34	40	63	3/4"	20	18	152	1400
8 .. 90	40	40	63	1"	25	19	156	1100
5 .. 110	50	50	73	1 1/4"	32	21	200	2750
10 .. 150								
35 .. 220	50	50	73	1 1/4"	32	21	200	3000
35 .. 250	60	60	78	1 1/2"	40	24	200	3800



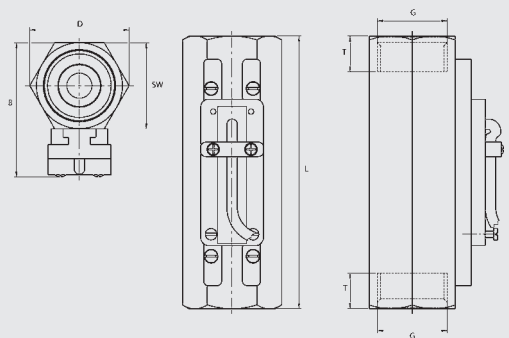
### Water 10 % Accuracy - Size 2-

0.02 .. 0.2	27	31	67	1/2"	15	15	90	400
0.2 .. 0.6								
0.4 .. 1.8								
0.8 .. 3.2								
2.0 .. 7.0								
3.0 .. 13.0								
4.0 .. 20.0								
8.0 .. 30.0								



### Water 10 % Accuracy - Size 3-

10 .. 30	34	47	93	3/4" 1")	20 25	21 17	152 130	1200 1050
15 .. 45								
20 .. 60								
30 .. 90	41	47	93	1"	25	17	130	1050
60 .. 150								



) Standard

## Dimensions with indicator:

Type [l/min]	Installation dimensions [mm]							Weight (approx.) [g]
	SW	D	B	G	DN	T	L	

### Water 5 % accuracy

0.2 .. 4.0	27	30	53	1/4" 3/8" 1/2"	8 10 15	14	131	940
0.6 .. 5.0								
0.5 .. 8.0								
1 .. 14								
1 .. 28	27	30	53	1/2" 3/4"	15 20	14 16	146 174	990
2 .. 40								
4 .. 55	32	35	53	3/4" 1"	20 25	18 19	152 156	1490 1190
1 .. 70	34	40	63	3/4" 1"	20 25	18 19	152 156	1490 1190
8 .. 90								
5 .. 110	40	40	63	1"	25	19	156	1190
10 .. 150	50	50	73	1 1/4"	32	21	200	2840
35 .. 220	50	50	73	1 1/4"	32	21	200	3090
35 .. 250	60	60	78	1 1/2"	40	24	200	3890

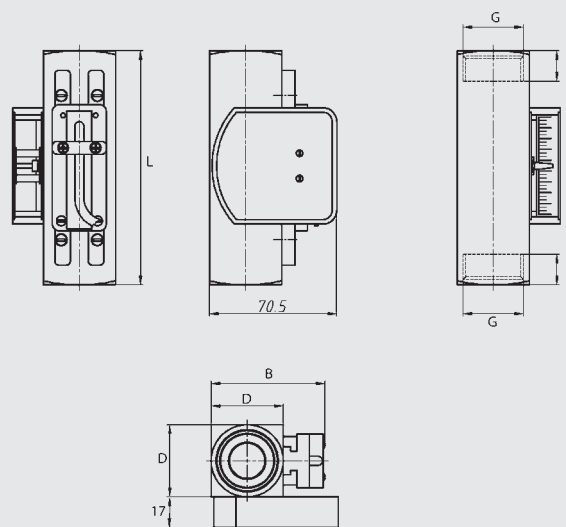
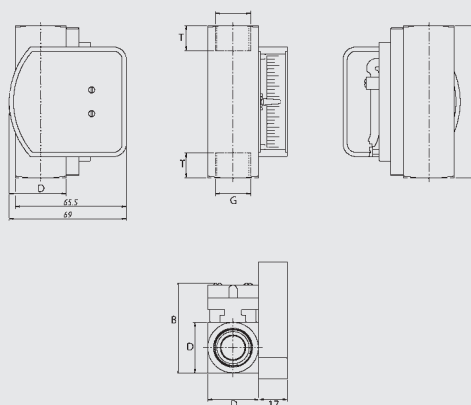
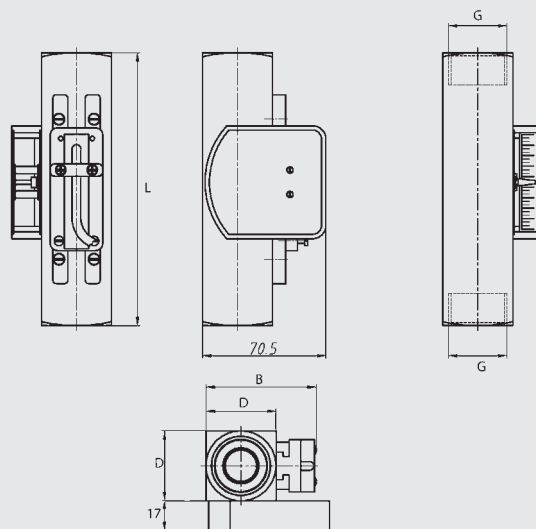
### Water 10 % Accuracy - Size 2-

0.02 .. 0.2	30	30	70	1/2"	15	15	90	570
0.2 .. 0.6								
0.4 .. 1.8								
0.8 .. 3.2								
2.0 .. 7.0								
3.0 .. 13.0								
4.0 .. 20.0								
8.0 .. 30.0								

### Water 10 % Accuracy - Size 3-

10 .. 30	34 40	40	93	3/4" 1"	20 25	15 17	152 130	1430 1250
15 .. 45								
20 .. 60								
30 .. 90								
60 .. 150	40	40	93	1"	25	17	130	1250

<sup>1)</sup> Standard



## Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications and operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

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## DISPLAY AND MONITORING UNITS

The universal display unit HDA 5500 provides the means of visualising and further processing the signals from our sensors. The unit is designed for front panel mounting with a standard 92 x 45 mm cut-out.

Universal display unit for general applications:

	Page
HDA 5500	313



## Digital Display Unit HDA 5500

### Description:

The digital display units in the HDA 5500 series are microprocessor-controlled display and monitoring instruments designed for control panel installation.

Different versions are available with a maximum of 3 analogue inputs, an analogue output (4 .. 20 mA or 0 .. 10V) and up to 4 relay outputs.

The analogue input signals are displayed according to the settings selected by the user.

Each of the relay outputs can be allocated to each of the sensor inputs or to the differential between input 1 and 2.

A PT 100 temperature probe can be connected directly to the instrument. There is also an option for frequency measurement using the HDS 1000 (HYDAC rpm probe), for example to measure the speed of rotating components.

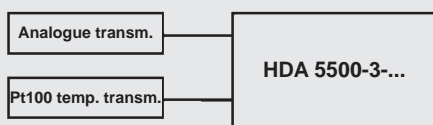
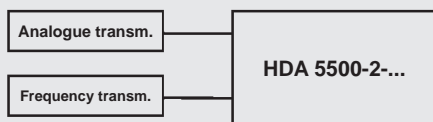
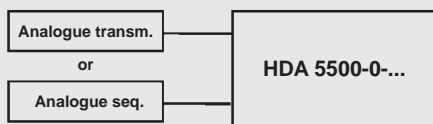
Depending on the model, it is also possible to connect SMART sensors (condition monitoring sensors). SMART sensors are a generation of sensors from HYDAC which can transmit several different measured values.



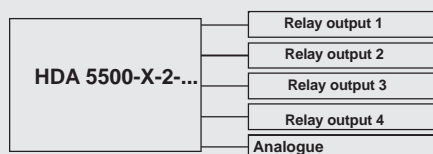
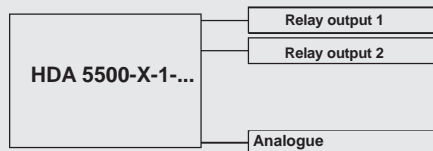
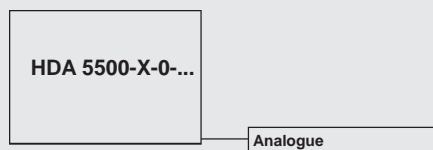
### Special features:

- Digital display of analogue signals
- Clear 4-digit 7-segment LED display
- Up to 3 analogue inputs (4 .. 20 mA, 0 .. 10 V or 0 .. 5 V)
- Accuracy  $\leq \pm 0.5 \%$
- Differential measurement possible
- Analogue output (4 .. 20 mA or 0 .. 10 V)
- Up to 4 relay switching outputs
- RS 232 interface
- Voltage supply 12 .. 32 V DC or 85 .. 265 V AC 50 / 60 Hz
- Option for PT100 sensor input or frequency input

## Input models:



## Output models:



## Connection terminals:

Supply voltage:  
plug-in terminal block 2 pole, RM 5.08  
(cross section max. 2.5 mm<sup>2</sup>)

Inputs / outputs:  
plug-in terminal block 11 pole, RM 3.5  
(cross section max. 1.5 mm<sup>2</sup>)

Relay:  
plug-in terminal block 5 pole, RM 5.08  
(cross section max. 2.5 mm<sup>2</sup>)

## Technical data:

<b>Display range</b>	
Display	4-digit 7-segment LED display, red, height of digits 14.2 mm 3 LEDs for active sensor, 4 LEDs for switch points
Display range	- 999 .. 9999 (user-adjustable)
Display units with background lighting	bar, kg/cm <sup>2</sup> , MPa, psi, °C, °F, mA, V, Hz, kN, m, mm, inch, l, l/min, gal, gal/min, 1/min, %, t
<b>Input data</b>	
<b>Analogue signal input(s)</b>	
Measuring range(s) (up to 3 analogue inputs)	select: 4 .. 20 mA, 0 .. 5 V, 0 .. 10 V or 4 .. 20 mA sequential (Modification 006)
Accuracy	≤ ± 0.5 % at 25 °C
<b>PT 100 input</b>	
Measuring range	- 25 .. 100 °C
Accuracy	≤ ± 0.5 % at 25 °C
<b>Frequency/counter input</b>	
Signal threshold	0 .. 0.6 V = LOW, 3 .. 24 V = HIGH
Frequency range	15 Hz to 24 kHz
<b>Output data</b>	
Analogue output	4 .. 20 mA, load resistance ≤ 400 Ω or 0 .. 10 V load resistance ≥ 2 kΩ
Accuracy	≤ ± 0.5 % at 25 °C
Rise time	70 ms
<b>Switching outputs</b>	
Type	2 or 4 relays each with separate common supply
Switching voltage	0.1 .. 250 V AC
Switching current	9 mA .. 2 A
Switching capacity	400 VA, 50 W (for inductive load, use varistors)
Life expectancy of switch contacts	≥ 20 million cycles at minimum load ≥ 1 million cycles at maximum load
Reaction time (with switching delay = 0 ms)	approx. 20 ms
Setting range of switch points	1.5 .. 100 % of the pre-set display range
Setting range of the switching hystereses (switch-back points)	0.5 .. 99 % of the pre-set display range
<b>Interface</b>	
Serial interface RS 232	Baud rate 19200 Bauds; 8 data bits; 2 stop bits; no parity; no handshake
<b>Environmental conditions</b>	
Nominal temperature range	0 .. +50 °C
Operating temperature range	0 .. +50 °C
Storage temperature range	- 40 .. +80 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
<b>Other data</b>	
Housing	control panel housing 96 x 48 x 109 mm; control panel cut-out 92 (+0.8) x 45 (+0.6) mm; front panel thickness 1.25 .. 15 mm; maximum installation depth 121 mm
Supply voltage	12 .. 32 V DC or 85 .. 265 V AC, 50 / 60 Hz
Power consumption	15 VA at 85 .. 230 V AC – fuse protection 1 AT
Supply of the meas. transmitter	12 V DC ± 1 %; max. 20 mA / analogue input
Residual ripple of supply voltage	≤ 5 %
Weight	approx. 320 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

## Model code:

HDA 5 5 0 0 - X - X - XX - 00X

### Inputs

- 0 = One analogue input
- 1 = Three analogue inputs
- 2 = One analogue input + frequency input / counter function
- 3 = One analogue input + PT 100 input

### Outputs

- 0 = 1 analogue output
- 1 = 1 analogue output + 2 relay outputs
- 2 = 1 analogue output + 4 relay outputs

### Supply voltage

- AC = 85 .. 265 V AC
- DC = 12 .. 32 V DC

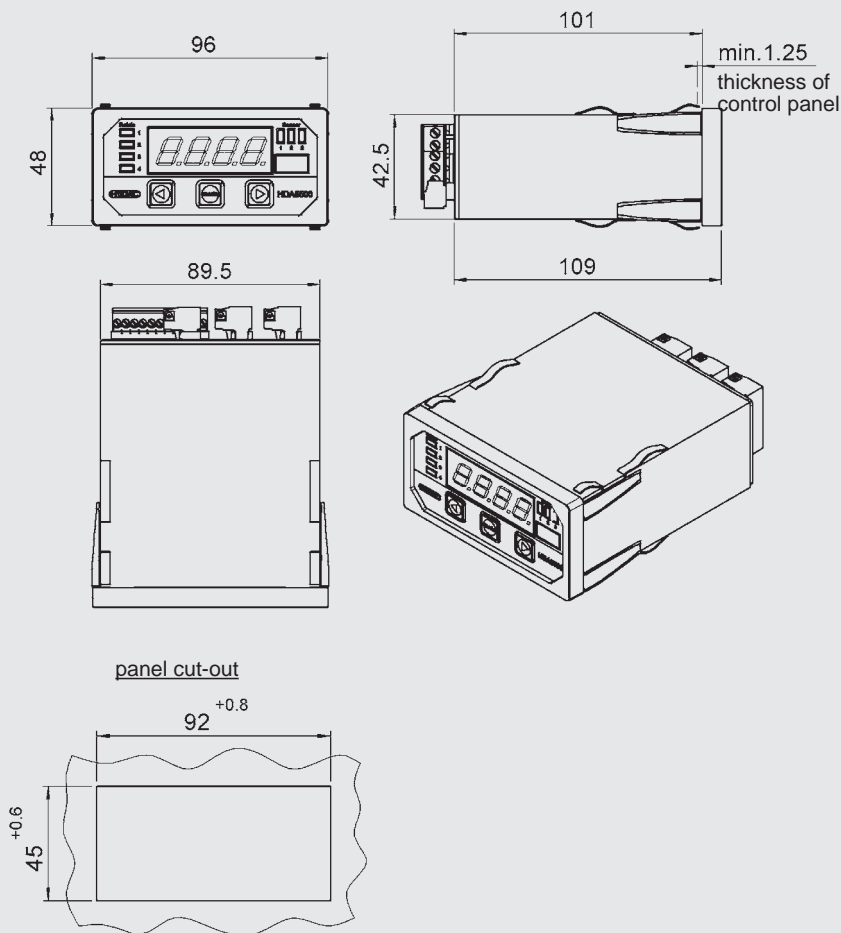
### Modification

- 000 = Standard
- 006 = Model with sequential analogue input for HLB 1300 and CS 1000 (only possible on input model "0" and output model "2")

## Notes:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Dimensions:



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## SERVICE INSTRUMENTS

Our service instruments have been specially developed for use in servicing, maintenance and the laboratory, as well as for commissioning.

All commonly available sensors (e.g. pressure, temperature, flow rate, condition monitoring, ...) with a very wide range of output signals can be connected to these instruments.

Service instruments for general applications:

	Page
HMG 500	317
HMG 510	319
HMG 3010	321
HDA 4748-H (Accessories)	325
ETS 4148-H (Accessories)	327
EVS 3100-H (Accessories)	329

## Portable Data Recorder HMG 500

### Description:

The HMG 500 is a portable measuring instrument for simple measuring tasks in fluid technology such as hydraulics, pneumatics, lubrication, process, refrigeration and air conditioning.

Up to two sensors with the **HYDAC Sensor Interface (HSI)** can be connected to the HMG 500 to measure pressure, temperature or flow rate (except for SMART sensors). The HMG 500 automatically recognises these sensors and takes all of the necessary basic settings from each sensor. The measurement values and the corresponding physical unit are displayed on an easy-to-read LCD display.

In addition, the HMG 500 offers a wealth of other advantages over mechanical pressure gauges, for example, for measuring pressure on machines and systems.

The user benefits from a technologically high level of measuring accuracy and dynamics.

The HMG 500 measures values at a very high sampling rate. It can therefore record and display pressure peaks in the maximum value memory or rapid pressure discharges in the minimum value memory, for example.

Furthermore, differential measurements can be carried out using two sensors of a similar type, to calculate pressure drops or temperature differentials.

To further extend the application range, HMG 500 has a function for setting mechanical pressure and temperature switches precisely and reliably.

Compact, simple and versatile - the HMG 500 is an invaluable tool for all those involved in maintenance, commissioning and service.



### Special features:

- Portable 2-channel data recorder
- Simple and user-friendly key operation
- Large LCD display including battery status indication
- 2 sensor inputs, automatic sensor recognition
- Measuring range and unit of measurement of the sensors connected to it are recognised automatically
- Zeroing (taring) of the individual measurement channels
- Display of the actual measured values
- Display of the differential (channel A minus channel B)
- Minimum or maximum value indication, with reset function
- Setting device for mechanical pressure and temperature switches

## Technical data:

<b>Measurement inputs</b>	2 analogue inputs for HYDAC measurement transmitters with HSI interface (except for SMART sensors**)
<b>Accuracy*</b>	≤ ± 0.1 % FS max.
<b>Functions</b>	<ul style="list-style-type: none"><li>● Automatic recognition of measuring range and unit of measurement</li><li>● Taring of the measuring channels</li><li>● Display of the actual meas. value</li><li>● Min./max. indication</li><li>● Reset of the min./max. values</li><li>● Measured values differential channel A - channel B</li><li>● Display of units, selectable</li><li>● Setting device for mechanical pressure and temperature switches</li></ul>
<b>Display</b>	4-digit 7 segment LCD display with battery status indication; 2 measurement values incl. unit displayed simultaneously
<b>Measurement unit</b> (depending on the sensors connected to HMG)	Selectable Pressure: bar, psi, MPa Temperature: °C, K, °F Flow rate: l/min, gallon/min (1 US gallon = 3.7853 l)
<b>Sampling rate</b>	0.1 ms
<b>Resolution</b>	12 bit
<b>CE mark</b>	EN 61000-6-1 / 2 / 3 / 4
<b>Safety</b>	EN 61010
<b>Protection class</b>	IP 54
<b>Voltage supply</b>	<ul style="list-style-type: none"><li>● 9 V battery Oper. time: approx. 10 h (with 2 sensors)</li><li>● Euro plug power supply (230 V AC) (available as an accessory)</li></ul>
<b>Environmental conditions</b>	Operating temp.: +5 .. +60 °C Storage temp.: -40 .. +70 °C Rel. humidity: 0 .. 70 %
<b>Weight</b>	410 g

### Note:

- \* **FS (Full Scale)** = relative to complete measuring range  
\*\* SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC which can provide a variety of different measurement values.

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications and operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

## Ordering details:

### HMG 500 - 000

#### Items supplied

- HMG 500
- Operating manual D/E/F
- 9 V battery

### HMG 500-Set 01

#### Items supplied

- HMG 500
- Operating manual D/E/F
- 9 V battery
- HDA 4748-H-0600-000
- ZBE 30-02, sensor cable M12x1, 2 m
- Connection adapter G1/4 female to Minimes 16X2
- Case for HMG 500 / 510

### HMG 500-Set 02

#### Items supplied

- HMG 500
- Operating manual D/E/F
- 9 V battery
- 2 off HDA 4748-H-0600-000
- 2 off ZBE 30-02, sensor cable M12x1, 2 m
- 2 off connection adapter G1/4 female to Minimes 16X2
- Case for HMG 500 / 510

## Accessories:

Appropriate accessories, such as electrical and mechanical connection adapters, power supply, etc. can be found in the Accessories brochure.

Examples of main accessories:

- **Pressure transmitter**  
HDA 4000 with HSI interface  
Pressure ranges: -1 .. 9 bar, 0 .. 16 bar, 0 .. 60 bar, 0 .. 100 bar, 0 .. 250 bar, 0 .. 400 bar, 0 .. 600 bar
- **Temperature transmitter**  
ETS 4000 with HSI interface  
Measuring range: -25 .. 100 °C
- **Flow rate transmitter**  
EVS 3000 with HSI interface  
Measuring ranges: 1.2 .. 20 l/min, 6 .. 60 l/min, 15 .. 300 l/min, 40 .. 600 l/min
- **Sensor simulator**  
SSH 1000, ideal for training purposes
- **Electrical connection adapter**  
UVM 3000, for mechanical pressure and temperature switches
- **Hydraulic adapters**

### HYDAC ELECTRONIC GMBH

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## Portable Data Recorder HMG 510

### Description:

The HMG 510 is a hand-held instrument for simple measurement tasks on hydraulic and pneumatic systems in mobile and industrial applications.

Compact and simple to use, the HMG 510 is an ideal tool for all those involved in maintenance, commissioning and service.

Up to two sensors with the **HYDAC Sensor Interface (HSI)** can be connected to the HMG 510.

Sensors are available to measure pressure, temperature and flow rate as well as sensors for condition monitoring (also known as SMART sensors). Some examples of SMART sensors are the HYDACLAB® Oil Condition Sensor, the AS 1000 AquaSensor and the CS 1000 Contamination Sensor.

The HMG 510 automatically recognises these sensors and takes all the necessary basic settings from each sensor.

The measurement values and the corresponding physical unit are displayed on an easy-to-read LCD display.

In addition to this, the HMG 510 enables measured values which have been saved in the SMART sensors to be uploaded to a PC.

With the aid of the HYDAC PC software "**CMWIN**", the measurement data stored in the SMART sensors can be displayed on a PC screen in the form of a graph, then analysed, edited and saved. The HMG has a standard integrated USB port to enable this data transfer.

To further extend the application range, the HMG 510 has a function for setting mechanical pressure and temperature switches precisely and reliably.



### Special features:

- Portable 2-channel data recorder
- Simple and user-friendly key operation
- Large LCD display including battery status indication
- 2 sensor inputs, automatic sensor recognition
- Specially designed to display measured values from condition monitoring sensors (SMART sensors)
- Measuring range and unit of measurement of the sensors connected to it are recognised automatically
- Zeroing (taring) of the individual measurement channels
- Display of the actual measured values
- Display of the differential (channel A minus channel B)
- Min. or max. value indication, with reset function
- Setting device for mechanical pressure and temperature switches
- USB port

## Technical data:

<b>Measurement inputs</b>	2 analogue inputs for HYDAC measurement transmitters with HSI interface and SMART sensors
<b>Accuracy*</b>	≤ ± 0.1 % FS max.
<b>Functions</b>	<ul style="list-style-type: none"><li>● Automatic recognition of measuring range and unit of measurement</li><li>● Taring of the measuring channels</li><li>● Display of the actual measured value</li><li>● Min./max. indication</li><li>● Reset of the min./max. values</li><li>● Measured values differential channel A - channel B</li><li>● Display of units, selectable</li><li>● Setting device for mechanical pressure and temperature switches</li><li>● Communication bridge to a connected PC</li></ul>
<b>Display</b>	4-digit 7 segment LCD display with battery status indication; 2 measured values incl. unit displayed simultaneously
<b>Measurement unit (depending on the sensors connected)</b>	<ul style="list-style-type: none"><li>● Selectable for<ul style="list-style-type: none"><li>Pressure: bar, psi, MPa</li><li>Temperature: °C, K, °F</li><li>Flow rate: l/min, gallon/min (1 US gallon = 3.7853 l)</li></ul></li><li>● Permanently pre-set on SMART sensors</li></ul>
<b>Sampling rate</b>	0.1 ms
<b>Resolution</b>	12 bit
<b>CE mark</b>	EN 61000-6-1 / 2 / 3 / 4
<b>Safety</b>	EN 61010
<b>Protection class</b>	IP 54
<b>Voltage supply</b>	<ul style="list-style-type: none"><li>● 9 V battery</li><li>Operating time: approx. 10 h (with 2 sensors)**</li><li>● Euro plug power supply (230 V AC) (available as an accessory)</li></ul>
<b>Environmental conditions</b>	<ul style="list-style-type: none"><li>● Operating temperature: +5 .. +60 °C</li><li>● Storage temperature: -40 .. +70 °C</li><li>● Rel. humidity: 0 .. 70 %</li></ul>
<b>Weight</b>	410 g

\* FS (Full Scale) = relative to complete measuring range

\*\* Not applicable to SMART sensors, as they require an external voltage.

## Dimensions:



## Ordering details:

### HMG 510 - 000

#### Items supplied

- Case for HMG 500 / 510
- HMG 510
- Operating manual D/E/F
- 9 V battery
- USB cable
- Y adapter blue (for HLB 1300)
- Y adapter yellow (for CS 1000)
- ZBE 30-02, sensor cable M12x1, 2m
- Software CD with "CMWIN"

#### Accessories:

Appropriate accessories, such as electrical and mechanical connection adapters, power supply, etc. can be found in the Accessories brochure.

Examples of main accessories:

- **Pressure transmitter**  
HDA 4000 with HSI interface  
Pressure ranges: -1 .. 9 bar, 0 .. 16 bar, 0 .. 60 bar, 0 .. 100 bar, 0 .. 250 bar, 0 .. 400 bar, 0 .. 600 bar
- **Temperature transmitter**  
ETS 4000 with HSI interface  
Measuring range: -25 .. 100 °C
- **Flow rate transmitter**  
EVS 3000 with HSI interface  
Measuring ranges: 1.2 .. 20 l/min, 6 .. 60 l/min, 15 .. 300 l/min, 40 .. 600 l/min
- **Sensor simulator**  
SSH 1000, ideal for training purposes
- **Electrical connection adapter**  
UVM 3000, for mechanical pressure or temperature switches
- **Hydraulic adapters**

#### Note:

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For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Portable Data Recorder HMG 3010

### Description:

The HMG 3010 is an impressive, top performance portable measuring and data recording device.

Automated setting procedures, a simple, self-explanatory operator guide and many comprehensive functions ensure the operator is able to carry out a wide range of measuring tasks within a very short time and to work in a way which is both time-saving and cost-effective. The HMG 3010 thus quickly becomes a reliable and helpful tool in the working environment of service, maintenance, development, test rig technology, quality assurance or commissioning of systems and machines.

The HMG 3010 is designed primarily to record pressure, temperature and flow rate values which are the standard variables in hydraulics and pneumatics. For this purpose, special sensors are available, with which the variable, the measurement range and unit are automatically detected by the HMG 3010. The device also offers measurement inputs for standard sensors with current and voltage signals. In addition to the analogue inputs, the HMG 3010 also has two digital inputs (e.g. for frequency or rpm measurements).

The ability to connect the HMG 3010 to a CAN bus and thus to display messages from the CAN bus completes the range of applications.

Due to the wide range of functions and its simple handling, the HMG 3010 is just as appropriate for users who take measurements only occasionally as it is for professionals for whom measuring and documentation are routine.

The update capability of the HMG 3010 via the integral USB port ensures that the user can benefit from future upgrades of the device software.

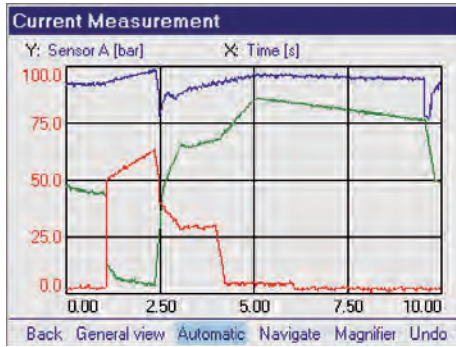


### Special features:

- Simple, user-friendly operation
- Practical, robust design
- Large, full-graphics colour display
- Quick and independent basic setting of the device through the use of automatic sensor recognition
- Up to 10 sensors can be connected simultaneously
- Up to 32 measurement channels can be displayed at a time
- Measuring rates up to 0.1 ms
- Extended voltage measurement -10 .. +10 V and 0 .. 50 V
- Can be connected to a CAN bus
- Very large data memory for archiving measurement curves
- Various measurement modes:
  - Normal measuring
  - Fast curve recording
  - Long term measuring
- 4 independent triggers, can be logically linked
- PC connection
  - USB
  - RS 232
- Convenient visualisation, archiving and data processing using the HMGWIN 3000 and CMWIN software supplied

## Function:

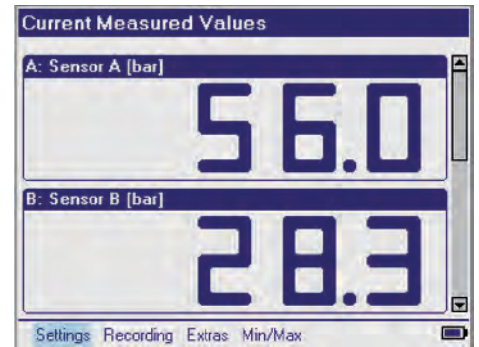
- Clear and graphical selection menus guide the operator very simply to all the device functions available. A navigation pad on the keypad ensures rapid operation.
- The HMG 3010 can monitor signals from up to **ten sensors simultaneously**. For this there are 5 robust standard input sockets. By using Y adapters, the number of inputs can be doubled individually to make a total of between 6 and 10.
- Up to 8 sensors can be connected to 4 of these input sockets:
  - 8 sensors (e.g. for pressure, temperature, and flow rate) with the special digital HSI interface (HYDAC Sensor Interface); this means the basic device settings (measured variable, range, and unit of measurement) are undertaken automatically
  - 8 standard analogue sensors with current and voltage signals
  - 4 Condition Monitoring sensors\* (SMART sensors); again, the basic device settings are carried out automatically
- Frequency measurements, counter functions, or triggers for data logging can be implemented via the fifth input socket with 2 digital inputs.
- For extended voltage measurement, the HMG 3010 offers the possibility of recording signals of 0 .. 50 V on two inputs and a signal of -10 .. +10 V on one input (e.g. proportional valve control).
- The connection to a **CAN bus** in conjunction with the CAN adapter ZBE 3010 makes it possible to record CAN messages (e.g. motor speed, motor oil pressure) in combination with measured data from the hydraulic system.
- HYDAC CAN bus sensors connected directly to the CAN adapter can be parameterized using the HMG 3010 (node ID and baud rate)
- All input channels can operate simultaneously at a **measurement rate** of 0.5 ms (1.0 ms for SMART sensors). To record highly dynamic processes, 2 analogue inputs are capable of recording measured values of 0.1 ms.
- The most impressive function of the HMG 3010 is its ability to record dynamic processes "online", i.e. in real-time, as a **measurement curve** and to render them as graphs in the field.



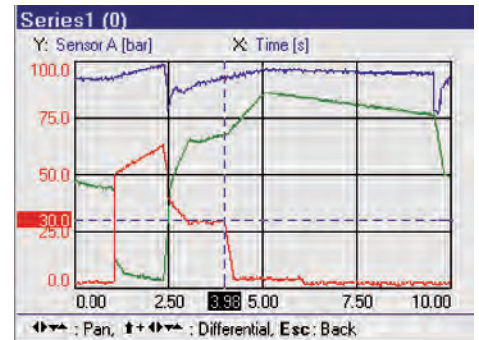
- The **data memory** for recording curves or logs can hold up to 500,000 measured values. At least 100 such full-length data records can be stored in an additional archive memory.
- For specific, **event-driven curves or logs**, the HMG 3010 has four independent triggers, which can be linked together logically.
- It is also possible to **determine differential values** between different input signals from sensors. Particularly when measuring flow rate by means of differential pressure measurement across a measuring orifice, the accuracy can be significantly improved by using a stored calibration curve. To generate such calibration curves, the HMG 3010 has an easy-to-use handheld recording function.
- User-specific device settings can be stored and re-loaded at any time as required. This means that repeat measurements can be carried out on a machine again and again using the same device settings.

Name	Savedt
power unit 10	28.06.06 12:44:58
injection machine 17	28.06.06 12:44:41
hydraulic press	28.06.06 12:43:04
power unit	28.06.06 12:42:03
injection machine 12	28.06.06 12:41:14

- Measured values, curves or texts are visualized on a **full-graphics colour display** in different selectable formats and display forms.



- Numerous useful and easy-to-use **auxiliary functions** are available, e.g. zoom, ruler tool, differential value graph creation and individual scaling, which are particularly for use when analysing the recorded measurement curves.



- The HMG 3010 communicates with a PC via the built-in USB port or RS 232 port.

## HMGWIN 3000:

The PC software HMGWIN 3000 is also supplied with the device. This software is a convenient and simple package for analysing and archiving curves and logs which have been recorded using the HMG 3010, or for exporting the data for integration into other PC programs if required. It is also possible to operate the HMG 3010 directly from the computer, to undertake basic settings, and to start measurements online and display them directly on the PC screen as measurement curve progressions.

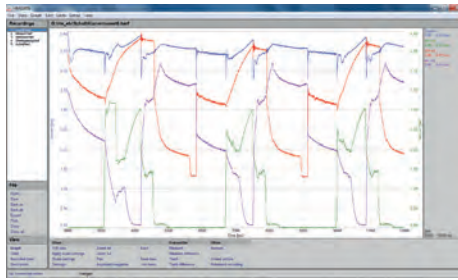
## CMWIN:

The HYDAC software CMWIN is also supplied with the device. This software enables you to communicate directly with SMART sensors \*) connected to the HMG 3010 from your PC.

Both programs can be run on PCs with Windows Vista / XP / 2000 and Windows 7 operating systems.

Some examples of the numerous useful additional functions:

- **Transfer and archiving** of measurements recorded using the HMG 3010
- Display of the measurements in graph form or as a table



- **Zoom function:** Using the mouse, a frame is drawn around an interesting section of a measurement curve, which is then enlarged and displayed.

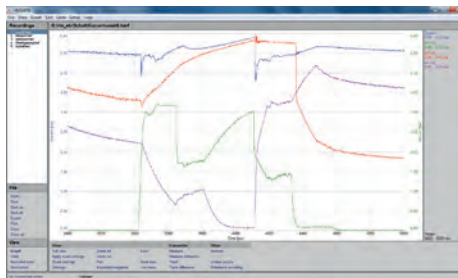
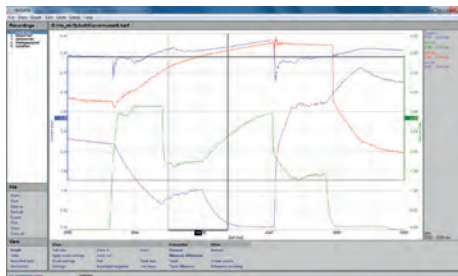
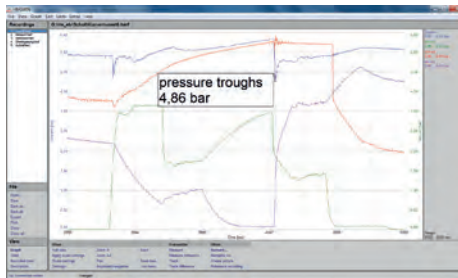


Fig.: Zoomed section of measurement curve

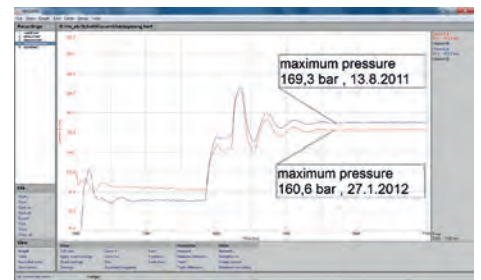
- **Accurate measurement** of the curves using the ruler tool (time values, amplitude values, and differentials)



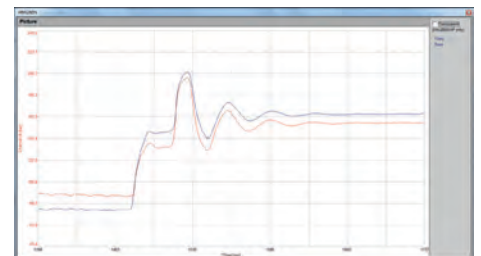
- Individual **comments** and measurement information can be inserted into the graph



- **Overlay** of curves, for example to document the wear of a machine (new condition/current condition)



- Using mathematical operations (calculation functions, filter functions) new curves can be added.
- Snap-shot function: comparable to the function of a digital camera, a picture can be taken immediately of any graph and saved as a jpg file.
- A **professional measurement report** can be produced at the click of a mouse: HMGWIN 3000 has an automatic layout function. Starting with a table of contents, all recorded data, descriptions, and graphics and/or tables are combined into a professional report and saved as a pdf file.
- **Online function:** Starting, recording, and online display of measurements (similar to the function of an oscilloscope)



- Change of axis assignment of the recorded measurement parameters in graph mode (e.g. to produce a p-Q graph )

\*) SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC which can provide a variety of different measured values.

## Technical data:

<b>Meas. inputs</b>	● 4 input sockets (channels A-H) for connecting up to 8 analogue sensors or up to 4 SMART sensors.
	● 1 input socket with 2 digital inputs (channels I-J) and one voltage input of -10 V to +10 V (shown on channel H) Sensors are connected using standard M12x1 male connectors (5 pole)

### Channels A, B, E, F, G

(Accuracy)	HSI	( $\leq \pm 0.1$ % FS max.)
	4 .. 20 mA	( $\leq \pm 0.1$ % FS max.)
	0 .. 20 mA	( $\leq \pm 0.1$ % FS max.)
	0 .. 4.5 V	( $\leq \pm 0.1$ % FS max.)
	0 .. 5 V	( $\leq \pm 0.2$ % FS max.)
	0 .. 10 V	( $\leq \pm 0.1$ % FS max.)
	0.5 .. 4.5 V	( $\leq \pm 0.1$ % FS max.)
	0.5 .. 5.5 V	( $\leq \pm 0.2$ % FS max.)
	1 .. 5 V	( $\leq \pm 0.2$ % FS max.)
	1 .. 6 V	( $\leq \pm 0.2$ % FS max.)

(Accuracy)	HSI	( $\leq \pm 0.1$ % FS max.)
	4 .. 20 mA	( $\leq \pm 0.1$ % FS max.)
	0 .. 20 mA	( $\leq \pm 0.1$ % FS max.)
	0 .. 4.5 V	( $\leq \pm 0.1$ % FS max.)
	0 .. 5 V	( $\leq \pm 1.0$ % FS max.)
	0 .. 10 V	( $\leq \pm 0.5$ % FS max.)
	0 .. 50 V	( $\leq \pm 0.1$ % FS max.)
	0.5 .. 4.5 V	( $\leq \pm 0.1$ % FS max.)
	0.5 .. 5.5 V	( $\leq \pm 1.0$ % FS max.)
	1 .. 5 V	( $\leq \pm 1.0$ % FS max.)
1 .. 6 V	( $\leq \pm 1.0$ % FS max.)	

(Accuracy)	HSI	( $\leq \pm 0.1$ % FS max.)
	4 .. 20 mA	( $\leq \pm 0.1$ % FS max.)
	0 .. 20 mA	( $\leq \pm 0.1$ % FS max.)
	0 .. 4.5 V	( $\leq \pm 0.1$ % FS max.)
	0 .. 5 V	( $\leq \pm 0.2$ % FS max.)
	0 .. 10 V	( $\leq \pm 0.1$ % FS max.)
	0.5 .. 4.5 V	( $\leq \pm 0.1$ % FS max.)
	0.5 .. 5.5 V	( $\leq \pm 0.2$ % FS max.)
	1 .. 5 V	( $\leq \pm 0.2$ % FS max.)
	1 .. 6 V	( $\leq \pm 0.2$ % FS max.)
-10 .. +10 V	( $\leq \pm 0.5$ % FS max.)	

(Accuracy)	Frequency range: 1 .. 30 000 Hz	( $\leq \pm 0.1$ % FS max.)
	Switching / switch-back threshold: 2 V / 1 V	Max. input voltage: 50 V

Differential channels	A - B	Difference channel for flow rate-measurement orifice (shown on channel B)
	C - D	

Measuring rate (dependent on the number of active channels)	0.1 ms, max. 2 analogue input channels
	0.2 ms, max. 4 analogue input channels
	0.5 ms, all 10 input channels
	1.0 ms, for SMART sensors

<b>Resolution</b>	12 bit
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<b>Memory</b>	At least. 100 measurement curves, each with up to 500,000 measured values
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<b>Display</b>	3.5" colour display
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<b>Interfaces</b>	1 USB, 1 serial port
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<b>CE mark</b>	EN 61000-1/2/3/4
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<b>Safety</b>	EN 61010
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<b>Protection class</b>	IP 40
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<b>Ambient conditions</b>	Operating temp.:	0 .. +50 °C
	Storage temp.:	-20 .. +60 °C
	Rel. humidity:	0 .. 70 %

<b>Weight</b>	1100 g
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**Note:**  
FS (Full Scale) = relative to the full measuring range

## Order details:

HMG 3010 - 000 - X

### Operating manual and documentation

D = German  
E = English  
F = French

### Items supplied

- HMG 3010
- Power supply for 90 .. 230 V AC
- Operating manual
- CD-ROM containing USB drivers, HMGWIN 3000 and CMWIN software
- USB connection cable

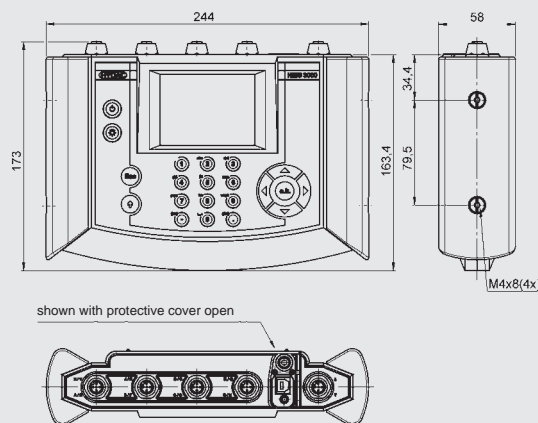
### Accessories:

- CAN adapter, required for CAN bus operation ( to be ordered separately)  
ZBE 3010 CAN adapter for HMG 3010  
Material No. 921238



- Additional accessories, such as electrical and mechanical connection adapters, power adapters, etc. can be found in the "Accessories - Service devices" catalogue section

## Dimensions:



### Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Electronic Pressure Transmitter with HSI Sensor Recognition HDA 4748-H

### Description:

The pressure transmitter HDA 4748-H with HSI sensor recognition has been specially developed for use in conjunction with HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 and CMU 1000.

For data transmission, the HDA 4748-H has an HSI interface (HYDAC Sensor Interface).

The HSI sensors are automatically recognised via the HSI interface by the above-mentioned HYDAC measuring instruments and all necessary basic device settings are taken from each sensor.

Like all pressure transmitters of the HDA 4700 series, the HDA 4748-H also has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane. It combines excellent technical specifications with a very compact design.

### Special features:

- Fully automatic recognition by, and voltage supply from, HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU 1000
- Automatic transfer of measuring range, measured value and measurement unit
- Accuracy  $\leq \pm 0.25\%$  FS typ.
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Excellent long term stability
- Very compact design

### Technical data:

Input data	
Measuring ranges <sup>1)</sup>	-1 .. 9; 16; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	20; 32; 120; 200; 500; 800; 1000; 1600 bar
Burst pressures	100; 200; 300; 500; 1000; 2000; 3000 bar
Mechanical connection <sup>1)</sup> (torque value)	G1/4 A DIN 3852 (20 Nm) G1/2 DIN 3852 (40 Nm)
Parts in contact with medium	Mech. connection: Stainless steel Seal: FPM
Output data	
Output signal	<b>HSI (HYDAC Sensor Interface)</b> Automatic sensor recognition
Accuracy to DIN 16086	$\leq \pm 0.25\%$ FS typ.
Max. setting	$\leq \pm 0.5\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.
Temperature compensation	$\leq \pm 0.008\%$ FS / °C typ.
Zero point	$\leq \pm 0.015\%$ FS / °C max.
Temperature compensation	$\leq \pm 0.008\%$ FS / °C typ.
Over range	$\leq \pm 0.015\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.1\%$ FS max.
Repeatability	$\leq \pm 0.05\%$ FS
Rise time	$\leq 0.5$ ms
Long-term drift	$\leq \pm 0.1\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>2)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 67 (when an IP 67 connector is used)
Other data	
Voltage supply	via HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU 1000
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the complete measuring range,

B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> 1000 bar only with mechanical connection G 1/2 DIN 3852 and vice versa

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

## Model code:

HDA 4 7 4 8 - H - XXXX - 000

### Mechanical connection

- 2 = G1/2 DIN 3852 (male)  
(only for "1000 bar" press. range)  
4 = G1/4 A DIN 3852 (male)

### Electrical connection

- 8 = Male, M12x1, 5 pole  
(connector not supplied)

### Signal

- H = HSI (automatic sensor recognition)

### Pressure ranges in bar

- 0009; 0016; 0060; 0100; 0250; 0400; 0600 (only in conjunction with mech. conn. "4")  
1000 (only in conjunction with mech. connection "2")

### Modification number

- 000 = Standard

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

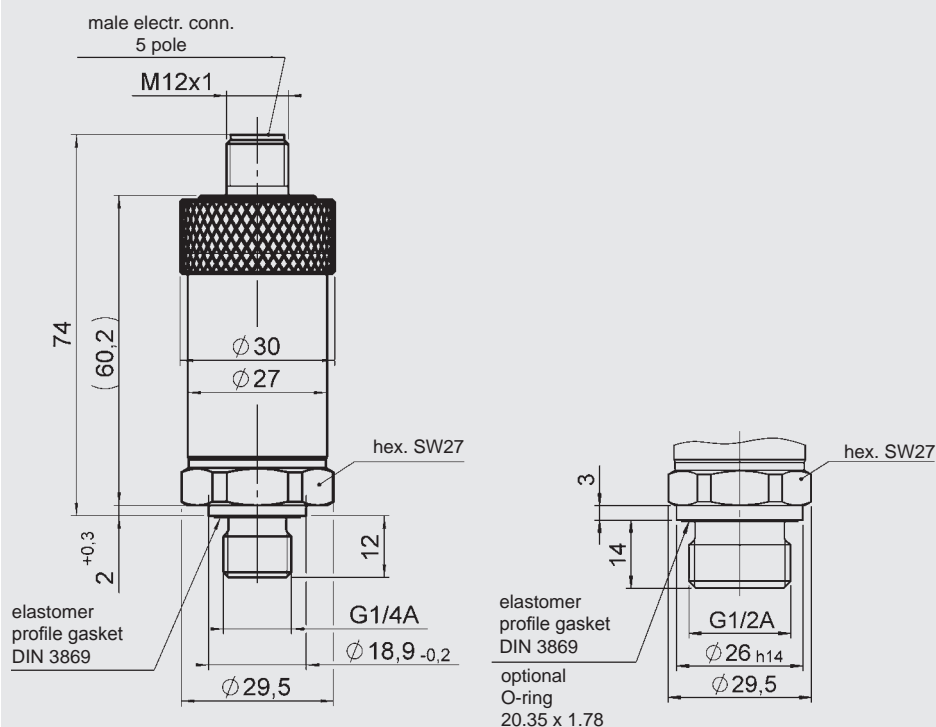
## Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

## Dimensions:



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## Electronic Temperature Transmitter with HSI Sensor Recognition ETS 4148-H

### Description:

The electronic temperature transmitter ETS 4148-H with HSI sensor recognition has been specially developed for use in conjunction with HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 and CMU 1000.

For data transmission, the ETS 4148-H has an HSI interface (HYDAC Sensor Interface). The HSI sensors are automatically recognised by the above-mentioned HYDAC measuring instruments and all necessary basic settings are taken from each sensor.

Like all temperature transmitters of the ETS 4000 series, the ETS 4148-H features a robust design and excellent EMC properties. Based on corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range  $-25\text{ °C}$  to  $+100\text{ °C}$ .

### Special features:

- Fully automatic sensor recognition by, and voltage supply from, HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 and CMU 1000
- Automatic transfer of measuring range, measured value and measurement unit
- Accuracy  $\leq \pm 0.8\%$  FS
- Robust design
- Excellent EMC characteristics
- Excellent long term stability
- Standard protection class IP 67

### Technical data:

Input data	
Measuring principle	PT 1000
Measuring range	$-25 \dots +100\text{ °C}$
Probe length	6 mm
Probe diameter	4.5 mm
Pressure resistance	600 bar
Overload pressure	900 bar
Mechanical connection	G $\frac{1}{4}$ A DIN 3852
Torque value	20 Nm
Parts in contact with medium <sup>1)</sup>	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal	<b>HSI (HYDAC Sensor Interface)</b> Automatic sensor recognition through HMG
Accuracy (at room temperature)	$\leq \pm 0.4\%$ FS typ. $\leq \pm 0.8\%$ FS max.
Temperature drift (environment)	$\leq \pm 0.01\%$ FS / °C
Rise time to DIN EN 60751	$t_{50}$ : ~4 s $t_{90}$ : ~8 s
Environmental conditions	
Operating temperature range <sup>2)</sup>	$-40 \dots +85\text{ °C}$ / $-25 \dots +85\text{ °C}$
Storage temperature range	$-40 \dots +100\text{ °C}$
Fluid temperature range <sup>2)</sup>	$-40 \dots 125\text{ °C}$ / $-25 \dots +125\text{ °C}$
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 25\text{ g}$
Protection class to IEC 60529	IP 67 (when an IP 67 connector is used)
Other data	
Electrical connection	M12x1, 5 pole
Voltage supply	via HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU
Weight	~ 200 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> Other seal materials available on request

<sup>2)</sup>  $-25\text{ °C}$  with FPM seal,  $-40\text{ °C}$  on request

## Model code:

ETS 4 1 4 8 - H - 006 - 000

### Mechanical connection

4 = G1/4 A DIN 3852 (male)

### Electrical connection

8 = Male, M12x1, 5 pole  
(connector not supplied)

### Signal

H = HSI (automatic sensor recognition)

### Probe length

006 = 6 mm

### Modification number

000 = Standard

### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

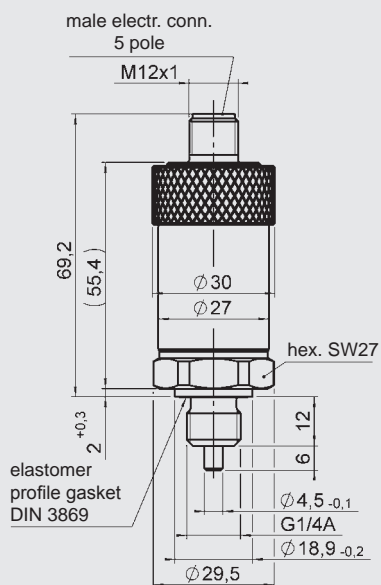
## Note:

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Subject to technical modifications.

## Dimensions:



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## Electronic Flow Rate Transmitter with HSI-Sensor Recognition

### EVS 3100-H

### EVS 3110-H

#### Description:

The flow rate transmitters in the series EVS 3100-H and EVS 3110-H with HSI sensor recognition have been specially developed for use in conjunction with HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 and CMU 1000.

For data transmission, the EVS 31x0-H has an HSI interface (HYDAC Sensor Interface).

The HSI sensors are recognised automatically via the HSI interface by the above-mentioned HYDAC measuring instruments, and all the necessary basic settings are taken from each instrument.

As with all flow rate transmitters in the series EVS 3100 and EVS 3110, the EVS 31x0-H also operates according to the turbine principle. The speed of an impeller turning in the fluid flow is measured and converted into an electronic signal.

#### Special features:

- Fully automatic recognition by, and voltage supply from, HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU 1000
- Automatic transfer of measuring range, measured value and measurement unit
- Viscosities of 1 .. 100 cSt
- Additional connection of temperature and / or pressure transmitters possible

#### Technical data:

Input data	
Measuring ranges <sup>1)</sup> and operating pressure	
EVS 3108-H-0020	1.2 .. 20.0 l/min 400 bar
EVS 3118-H-0020	
EVS 3108-H-0060	6.0 .. 60.0 l/min 400 bar
EVS 3118-H-0060	
EVS 3108-H-0300	15.0 .. 300.0 l/min 400 bar
EVS 3118-H-0300	
EVS 3108-H-0600	40.0 .. 600.0 l/min 315 bar
EVS 3118-H-0600	40.0 .. 600.0 l/min 400 bar
Additional connection options	2 x G1/4 female threads for pressure and/or temperature sensors
Output data	
Output signal	HSI (HYDAC Sensor Interface) Automatic sensor recognition
Accuracy	≤ 2 % of the actual value
Environmental conditions	
Compensated temperature range	-20 .. +70 °C
Operating temperature range	-20 .. +70 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-20 .. +90 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to IEC 60529	IP 67 (when an IP 67 connector is used)
Other data	
Housing material	EVS 3100-H: Aluminium EVS 3110-H: Stainless steel
Measuring medium <sup>2)</sup>	EVS 3100-H: Hydraulic oils EVS 3110-H: Water-based media
Viscosity range	1 .. 100 cSt
Calibration viscosity	EVS 3100-H: 30 cSt EVS 3110-H: 5 cSt
Voltage supply	via HYDAC measuring instruments HMG 500, HMG 510, HMG 3000, HMG 3010 or CMU 1000

Note: <sup>1)</sup> Other measuring ranges on request  
<sup>2)</sup> Other fluids on request

**Model code:**

EVS 3 1 X 8 - H - XXXX - 000

**Housing material**

- 0 = Aluminium  
1 = Stainless steel

**Electrical connection**

- 8 = Male M12x1, 5 pole  
(connector not supplied)

**Signal**

- H = HSI (Automatic Sensor Recognition)

**Measuring range**

- 0020 = 1.2 .. 20 l/min  
0060 = 6.0 .. 60 l/min  
0300 = 15.0 .. 300 l/min  
0600 = 40.0 .. 600 l/min

**Modification number**

- 000 = Standard

**Note:**

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

**Accessories:**

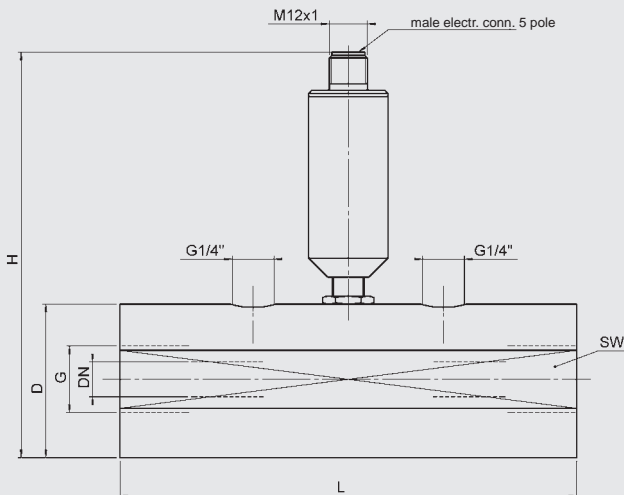
Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

**Note:**

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

**Dimensions:**

Model	Meas. range [l/min]	L [mm]	H [mm]	D / SW [mm]	G [mm]	Torque value [Nm]	DN [mm]
EVS 3108-H-0020	1.2 .. 20	117	135	47 / 46	G $\frac{1}{4}$ "	60	7
EVS 3108-H-0060	6 .. 60	144	135	48.5 / 46	G $\frac{1}{2}$ "	130	11
EVS 3108-H-0300	15 .. 300	155	150	63.5 / 60	G $1\frac{1}{4}$ "	500	22
EVS 3108-H-0600	40 .. 600	181	150	63.5 / 60	G $1\frac{1}{2}$ "	600	30
EVS 3118-H-0020	1.2 .. 20	117	135	47 / 46	G $\frac{1}{4}$ "	60	7
EVS 3118-H-0060	6 .. 60	144	135	48.5 / 46	G $\frac{1}{2}$ "	130	11
EVS 3118-H-0300	15 .. 300	155	150	63.5 / 60	G $1\frac{1}{4}$ "	500	22
EVS 3118-H-0600	40 .. 600	181	150	63.5 / 60	G $1\frac{1}{2}$ "	600	30

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## CONDITION MONITORING PRODUCTS

Condition monitoring is the process of logging and interpreting condition information from machines, systems and their components, with the aim of implementing predictive maintenance programs based on the condition of the system.

The operating data of the machine or system is recorded continuously using the HYDAC sensor system. The recorded data is then analysed and interpreted. Finally this compressed condition information can be transmitted to the operator, enabling him to monitor and control the machine or system using a variety of communication channels.

Condition monitoring products from HYDAC ELECTRONIC GMBH:

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## Condition Monitoring Unit CMU 1000

### Description:

The CMU1000 is an electronic evaluation unit designed for permanent online condition monitoring of machines and systems.

In order to achieve this, the device must be supplied with relevant data which is recorded by the sensors connected to it. This recorded data (processed or unprocessed) can be transferred by the CMU 1000 via different ports or as an analogue value to other devices and/or monitoring levels.

The CMU 1000 processes the application program stored in it continuously and cyclically like a PLC. The user creates this program simply and conveniently on a PC using the **CM Editor** developed for this purpose and then uploads it to the CMU 1000.

The **CM Editor** is part of the HYDAC PC software **CMWIN Version V03 or higher** (supplied) and it provides the various tools and functions in accordance with IEC 61131 for designing, integrating and testing the user program using "drag and drop" operations.

For status indication and for displaying messages and values on the device itself, there is a back-lit LCD display and three different coloured LEDs.

The CMU 1000 is operated and data is input on site using a built-in keypad within the menu structure of the device.

The CMU 1000 is designed for use in machines in both the stationary and mobile sectors.

It is possible to connect easily to higher-level control, monitoring and bus systems using the built-in interfaces or in combination with an additional coupling module.



### Special features:

- 8 input channels for HSI or SMART sensors
- 8 input channels for analogue sensors
- 4 input channels for digital signals
- 2 output channels for analogue signals
- 4 relay switching outputs with change-over contacts
- USB slave port for PC connection
- USB master port for storing measured data on a standard USB memory stick
- Ethernet interface
- RS 232 interface
- 2-line LCD display (2 x 16 characters) to display measured data and status and/or error messages
- 3 user-programmable LEDs in different colours, for status indication (red, yellow, green)
- Simple operation using navigation pad
- Creation of customised application program using the PC software **CMWIN** supplied

## CM Editor:

The CM Editor is part of the HYDAC PC software **CMWIN**, Version 03 or higher, and provides a wide variety of tools and functions for designing, integrating and testing the application program. An application program consists of many individual functions which can be linked together. During subsequent operation, this user program is processed as for a PLC, cyclically. The program is created according to the IEC 61131 (the standard for PLC programming).

The screenshot shows the CM Editor interface with a central workspace for 'Linked functions'. The workspace contains a ladder logic diagram starting with a 'Start' button, followed by a series of 'Setzen Text' (Set Text) functions (e.g., Setzen Text 1a to 1g, 1h to 1o, 2, 3, 4) connected to 'Text' display elements. The diagram uses RS (Reset Set) logic blocks.

On the left, the 'Function properties' panel shows details for 'Input1', including its position (X: 25, Y: 6) and functionality (Switch). Below it is a 'Function list' table:

Function	Name	Caption
And	Logik69	
And	Logik71	
And	Logik72	
And	Logik73	
Boolean input value	Eingabe2	Start
Boolean input value	Input1	Start
Display message	Aktion1	Text
Display message	Aktion10	Text
Display message	Aktion11	Text
Display message	Aktion12	Text
Display message	Aktion13	Text
Display message	Aktion14	Text

On the right, the 'Functions' sidebar contains toolbars for 'Data sources', 'Calculations', 'Numerical operations', 'Conditions', 'Links', 'Boolean operations', and 'Result values/actions'.

This screenshot shows the 'File' menu with the following options: Display, Simulate, Transfer into device, Receive from device, Deleting in the device, and Online debugging.

This screenshot shows the 'Device' menu with the following options: Apply from file, Apply from device, Uninstall, Saving to a file..., and Display.

The 'Simulation' window displays a table of sources and actions:

Sources		Actions		
Name	Input value	Name	Value	Cycle
Eingabe2	1	Aktion1	not triggered	
Input1	1	Aktion17	not triggered	
		Aktion18	not triggered	
		Aktion19	not triggered	

At the bottom, it shows 'Cycle: 0' and buttons for 'Perform cycle', 'start autom. cycle', 'end autom. cycle', and 'Close'.

The window title is 'CMWIN - CM Program - Programm CMU 1000-4\_Eng.hecmp'. The main area lists variables and their types:

- Eingabe2 Boolean input value(1;"Start 2";0)
- Input1 Boolean input value(1;"Start";0)
- Intervall1 Time sensor(1)
- Pulse generation1 Pulse generation(Input1)
- Flankenerkennung? Pulse generation(Eingabe2?)

Buttons for 'Print' and 'Close' are at the bottom right.

## Technical data:

### Supply

Input voltage	18.0 .. 35.0 V DC
Current consumption	max. 1.5 A (3.5 A when CSI-F-10 connected)
Reverse pol. protect.:	-30 V
Isolation voltage	+40 V

### Connection of sensors

Up to 8 sensors with HSI functionality or up to 8 SMART sensors<sup>1)</sup> and in addition up to 8 analogue sensors and up to 4 digital sensors  
4 x digital / 2 x digital + 2 x frequency / 3 x digital + 1 x frequency

### Analogue inputs

Channel I and J (Accuracy)	4 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0.5 .. 4.5 V ( $\leq \pm 0.1$ % FS max.) 0 .. 10 V ( $\leq \pm 0.1$ % FS max.)
Channel K and L (Accuracy)	4 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0.5 .. 4.5 V ( $\leq \pm 0.1$ % FS max.) 0 .. 50 V ( $\leq \pm 0.1$ % FS max.) -10 .. +10 V ( $\leq \pm 0.2$ % FS max.) L only!
Channel M and N (Accuracy)	4 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0.5 .. 4.5 V ( $\leq \pm 0.1$ % FS max.)
Channel O and P (Accuracy)	4 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0 .. 20 mA ( $\leq \pm 0.1$ % FS max.) 0.5 .. 4.5 V ( $\leq \pm 0.1$ % FS max.) -10 .. +10 V ( $\leq \pm 0.2$ % FS max.) P only!

### Digital inputs

Quantity	4, of which 2 are for frequency measurement (Channel Q and R)
Trigger threshold	approx. 2 V
Dynamics	30 kHz

### Measurement channels

Quantity	32 - A measurement channel can be a value of a connected sensor (also a subchannel of a SMART sensor) or a value derived (calculated) from sensor data.
----------	---

### Analogue outputs

Quantity	2
Type	individually selectable, current (4 .. 20 mA) or voltage (0 .. 10 V)

### Digital outputs

Quantity	4
Type:	Relay output, change-over contact
Switching capacity	30V DC / 1 A

### Calculation unit

Analogue value recording	12 bit A/D converter
--------------------------	----------------------

### Interfaces

Keypad	- 4 arrow keys (up, down, right, left) - OK key - ESC key
Display (back-lit)	- Two-line LCD display (2 x 16 characters) - Additional indication of status information via 3 different coloured LEDs is possible
USB Mass Storage Device <sup>2)</sup>	- USB 1.1 / USB 2.0 full speed port for connecting a mass storage device (memory stick) - Female connection type "A".
Ethernet, supported protocols	- RJ 45 8/8 Ethernet interface - HTTP Server - TCP/IP
Serial Interface 0 (UART 0)	- Implementing an RS 232 or an HSI master interface - Change-over user-programmable - Connection via plug-in terminals - No handshake lines
HSI Master	Cascading the CMU
USB Device	- USB 1.1 / USB 2.0 full speed port for connecting a PC / Notebook to configure the CMU - Female connection type "B".
CAN Bus Interface	Can be integrated as an option

### Cycle time

Independently determined at start of program  
Display of actual cycle time is possible in the CM Editor

### Operating and environmental conditions

Operating temperature	-20 .. +70 °C
Storage temperature	-30 .. +80 °C
Relative humidity	0 .. 70 %, non-condensing

### Dimensions and weight

Dimensions	approx. 212 x 106 x 36 mm
Weight	approx. 600 g

### Technical standards

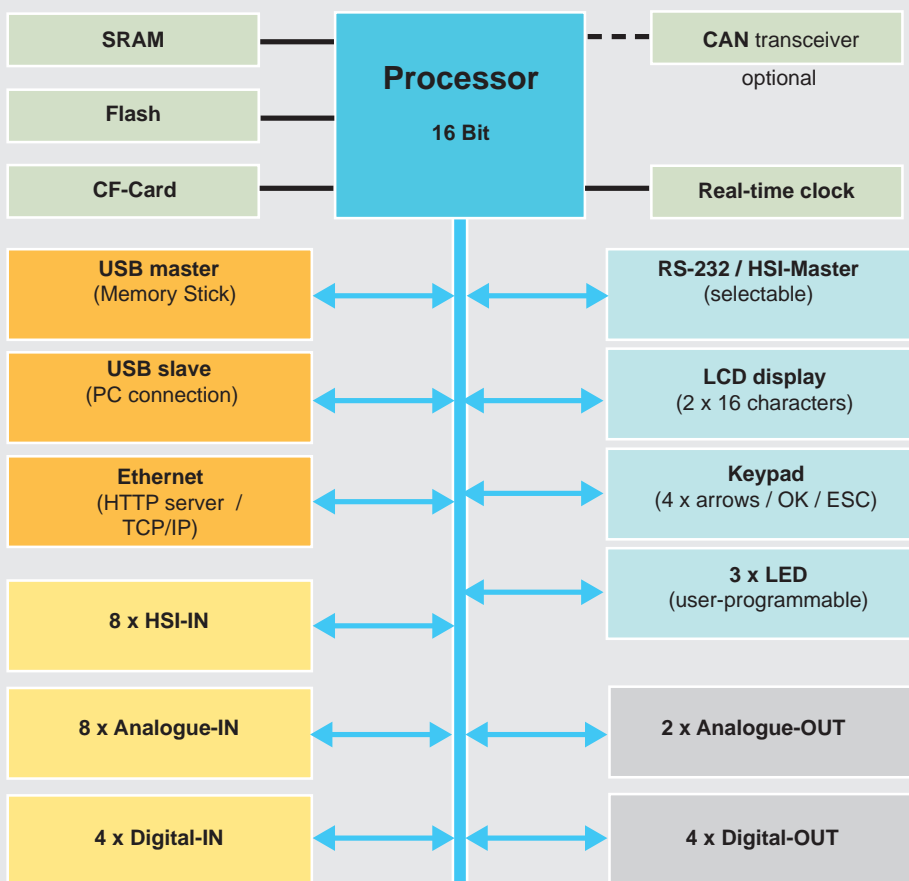
EMC	EN 61000-6-1 / 2 / 3 / 4
Safety	EN 61010
Protection class	IP 40

#### Note:

<sup>1)</sup> SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC, which can provide a variety of different measured values.

<sup>2)</sup> Recorded data from the CMU can be transferred to a memory stick via this interface. The USB Host supports mass storage devices exclusively.

## Block circuit diagram:



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Model code:

CMU 1000 – 000 – X

### Modification number

000 = Standard

### Operating manual and documentation

D = German  
E = English  
F = French

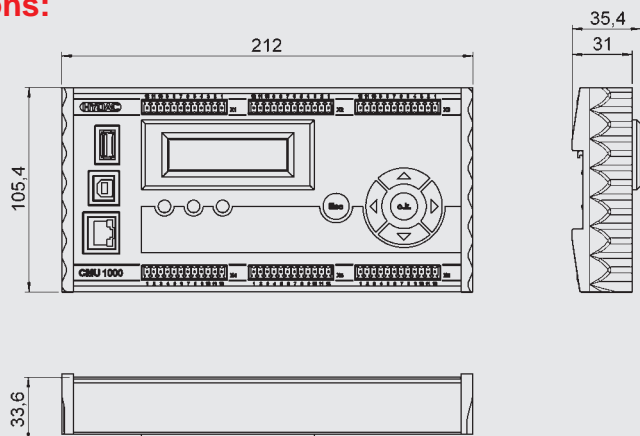
## Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Accessories:

Appropriate accessories, such as sensor lines for the electrical connection can be found in the Accessories brochure.

## Dimensions:



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## Description:

The condition monitoring interface module CSI-B-2 is another element in the HYDAC condition monitoring concept which connects the sensor level with the interpretation level. It is an all-purpose electronic instrument for converting the HSI signal from HYDAC SMART sensors into a standardised PC signal. Using the HYDAC "CMWIN" PC software, it is therefore possible to read the data and measured values of the connected SMART sensor directly.

The long-term memory can also be read as well as adjustments made and parameters set on the connected sensor (the setting options depend on the particular sensor).

The HSI signal can be converted either into an RS 232 or an RS 485 signal. The CSI-B-2 can be connected to any PC via the RS 232 interface (and possibly an additional standard RS 232/USB adapter<sup>1)</sup>). The RS 485 interface and appropriate additional coupling modules can also be used to connect to higher-level control and/or bus systems.

## Special features:

- 1 input channel for HYDAC SMART sensors
- Direct connection of the sensor via screw-type terminals
- Indication of the active interface via LED (RS 232 / RS 485)
- Very compact design
- Suitable for mounting on standard DIN rails
- Protection class IP 40

<sup>1)</sup> RS 232/USB adapter is not supplied with the device.

## Condition Monitoring Interface Module CSI-B-2

### Technical data:

Input data	
HSI interface	HYDAC Sensor Interface for digital linking of SMART sensors <sup>1)</sup> - Male X2
Output data	
Signal output	switchable: RS 485 half-duplex or RS 232 - Male X1 (RS 485) - SUB-D 9 pole female (RS 232)
Environmental Conditions	
Operating temperature range	-25 .. +85 °C
Storage temperature range	-30 .. +85 °C
Relative humidity	0 .. 70 %, non-condensing
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to IEC 60529	IP 40
Other data	
Supply voltage of the module	18 .. 35 V DC (male X1)
Current consumption (module + sensor)	30 mA to 300 mA max. (depending on the supply voltage and the connected sensor)
Sensor supply	15 V DC ± 5 % / 300 mA max. at 23 °C (male X2)
Electrical connection	
Cross-section of connection	Max. 1.5 mm <sup>2</sup>
X1 : Module supply + RS 232 / RS 485	Male terminal block, 8 pole RM 3.5
X2 : Sensor supply + HSI	Male terminal block, 5 pole RM 3.5
SUB-D: RS 232	9 pole female with thumbscrews
Conversion mode options	Option HSI - RS 232 or HSI - RS 485 via jumper (bridge): X1.3 - X1.4 open: HSI - RS 232 X1.3 - X1.4 closed: HSI - RS 485
Indication of active conversion mode	Green LED: HSI - RS 232 Yellow LED: HSI - RS 485
Dimensions and weight	
Housing	approx. 55 x 106 x 34 mm Housing to be mounted on rails (35 mm) to DIN EN 60715 TH 35 (formerly DIN EN 50022)
Weight	~ 140 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

<sup>1)</sup> SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC, which can provide a variety of different measured values.

## Model code:

CSI - B - 2 - 000

### Modification number

000 = Standard

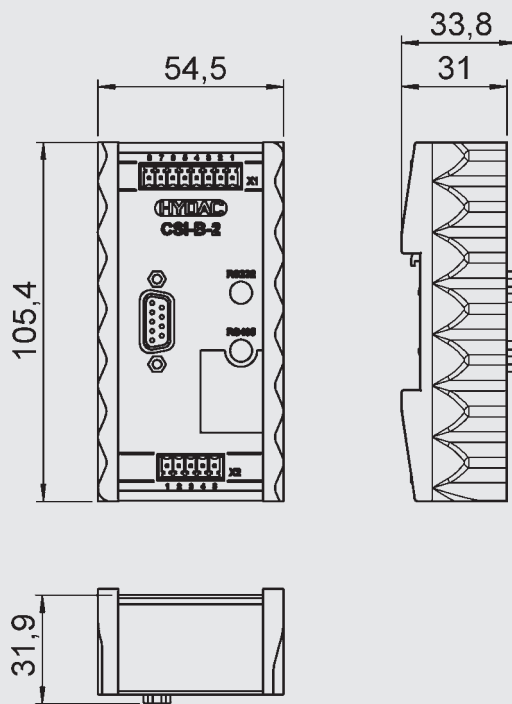
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as sensor lines for the electrical connection can be found in the Accessories brochure.

## Dimensions:



## Terminal assignment:

### Terminal strip -X1

Pin	Signal
1	RS 485 (-)
2	RS 485 (+)
3	3 - 4 open: HSI to RS 232
4	3 - 4 closed: HSI to RS 485
5	RxD RS 232 (connected to Pin 3 SUB-D 9 pole)
6	TxD RS 232 (connected to Pin 2 SUB-D 9 pole)
7	0 V (connected to Pin 5 SUB-D 9 pole)
8	+U <sub>B</sub> (18 .. 35 V DC) Module supply

### Terminal strip -X2

Pin	Signal
1	+U <sub>B</sub> (15 V DC) Sensor supply
2	0 V
3	HSI signal
4	0 V
5	0 V

### Note:

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For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications

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## Oil Condition Sensor HYDACLAB® HLB 1300

### Description:

The HYDACLab® HLB 1300 is a multifunctional sensor for online condition monitoring of standard and bio oils in stationary and mobile applications.

The user is thus informed in real time of changes in the fluids and can take immediate action in the case of deteriorating operating conditions.

Assertions can be made about the condition of an oil, e.g. ageing or mixing with other fluids, on the basis of the measured values for the relative change in dielectric constant, the saturation level and the temperature.

These measurements are available as sequential analogue signals and switching signals at the electrical output of the HYDACLab® (e.g. for activating warning devices or alarms).

The measured values can be displayed on various HYDAC display and measurement devices.

### Special features:

- Online condition monitoring of oils
- Applications in industrial and mobile sectors
- Analogue output signal for:
  - Saturation level
  - Temperature
  - Rel. change in dielectric constant
- Switching output
- Compact design
- Simple cartridge mounting

### Technical data:

Input data	
Rel. humidity	0 .. 100 % saturation
Temperature	-25 .. +100 °C
Dielectric constant ( $\epsilon_R$ )	1 .. 10
Operating pressure	< 50 bar
Pressure resistance	< 600 bar
Flow velocity	< 5 m/s
Output data - Saturation level	
Output signal	4 .. 20 mA (0 .. 100 %)
Calibration accuracy	$\leq \pm 2$ % FS max.
Accuracy <sup>1)</sup>	$\leq \pm 3$ % FS typ.
Output data - Temperature measurement	
Output signal	4 .. 20 mA (-25 .. +100°C)
Accuracy	$\leq \pm 3$ % FS max.
Output data - Relative change in dielectric constant ( $\epsilon_R$ )	
Output signal	12 mA $\pm$ 8 mA ( $\pm 30$ % of IV)
Accuracy <sup>2)</sup>	see below
Switch output	
Signal 1 (N/C)	PNP switching output 0.5 A max. switching level $\geq U_B - 4$ V
Default warning level SP1 Humidity	$\geq 85$ %
Default warning level SP1 Temperature	$\geq 80$ °C
Default warning level SP1 Dielectric constant	$\pm 15$ % (temperature compensated)
Environmental conditions	
Nominal temperature range	+20 .. +80 °C
Storage temperature	-40 .. +90 °C
Fluid compatibility	Mineral oils HLP (HLP-D on request) Esters: HEES, HETG Seal material: FPM
CE mark	EN 61000 - 6 - 1 / 2 / 3 / 4
Protection class to IEC 60529	IP 67
Other data	
Supply voltage $U_B$	10 .. 36 V DC
Residual ripple of supply voltage	$\leq 5$ %
Mechanical connection	G $\frac{3}{4}$ DIN 3852 E
Torque value	30 Nm
Electrical connection	M12x1, 5 pole
Housing	Stainless steel
Weight	~ 205 g

Note: Reverse polarity protection, short circuit protection provided.

**FS (Full Scale)** = relative to complete measuring range **IV (Initial Value)**

<sup>1)</sup> The max. accuracy achievable when measuring relative humidity is heavily dependent on the type of fluid or fluid additive. More precise information on this is available on request.

<sup>2)</sup> The accuracy achievable when measuring the relative change in dielectric constant is dependent on the application, the type of oil and the individual calibration of the sensor. Detailed information on this is available on request.

## Model code:

HLB 1 3 0 8 - 1 C - 000 - F 1

### Variables

3 = 3 variables

- Relative change in dielectric constant (DK)
- Saturation level
- Temperature

### Mechanical connection

0 = G3/4 A DIN 3852

### Electrical connection

8 = Male M12x1, 5-pole (connector not supplied)

### Type of signal, output 1

1 = Switching output / N/C

### Type of signal, output 2

C = 4 .. 20 mA, 3 conductor

### Modification number

000= Standard (cannot be adjusted)

### Seal material (parts in contact with the fluid)

F = FPM seal

### Connection material (in contact with fluid)

1 = Stainless steel

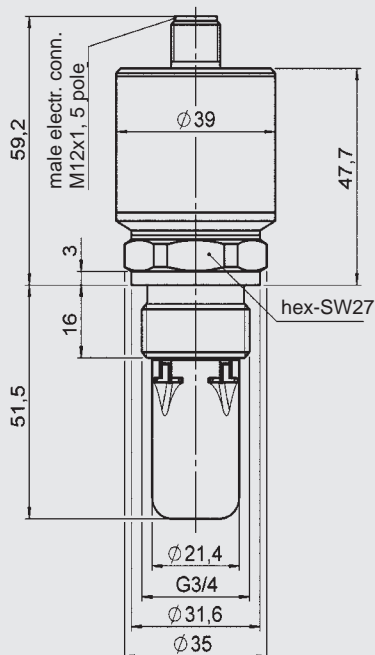
### Note:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

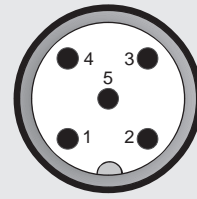
Appropriate accessories, such as electrical connectors, can be found in the Electrical Accessories brochure.

## Dimensions:



## Pin connections:

M12x1



Pin	
1	+U <sub>B</sub>
2	Signal 1
3	⊥
4	Signal 2
5	HSI* Reset (PLC)

\* **HSI** = **HYDAC Sensor Interface** (HYDAC's own communication interface)

Signal 1: PNP switching output  
Signal 2: Sequential analogue output (4 .. 20 mA)

## Display and read-out options:

HDA 5500-0-2-Zc-006  
Digital Display Unit; the HDA 5500 displays the sequential analogue output of the HYDACLAB® and provides the user with 4 programmable switching outputs.

HDA 5500-0-2-AC-006(CM1k)  
Order no.: 909925

HDA 5500-0-2-DC-006(CM1k)  
Order no.: 909926

### HMG 510

Portable 2-channel data recorder, specially designed for use with HSI and SMART sensors  
Order no.: 909889

### HMG 3010

Portable data recorder with full graphics colour display for indicating, displaying and editing measured values  
Order no.: 920930

Information on other read-out options can be found on our website at [www.hydac.com](http://www.hydac.com) or please contact your HYDAC representative.

## Note:

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## AquaSensor AS 1000

### Description:

The AquaSensor AS 1000 is the culmination of continued development of the successful AS 2000 series for online detection of water in oils, in particular as an OEM sensor for fluid conditioning monitoring. It measures the degree of saturation and the temperature of the fluid.

In the analogue output version, the AS 1000 transmits the values for the degree of saturation and the temperature as a 4 .. 20 mA signal.

In the version with 2 switch outputs, the AS 1000 can be configured individually using the HYDAC service instrument HMG 3010, the Condition Monitoring Unit CMU 1000 and the interface module CSI-B-2.

The following parameters can be adjusted:

- Saturation level / temperature
- Switch points
- Switch mode of the switch outputs
- Switching direction
- Switch delay times

The AS 1000 therefore enables hydraulic and lubrication oils to be monitored accurately, continuously and online.

### Special features:

- Reliable due to its compact and robust design
- Cost-effective sensor, also for use in OEM applications
- Not necessary to calibrate to different types of oil
- Pressure-resistant also during pulsations
- Wide fluid temperature range
- Individual configuration
- Early detection of water problems thereby preventing breakdowns and unnecessary interruption to operations.

### Technical data:

#### Input data

Saturation level	0 ... 100 %
Temperature	-25 .. 100 °C
Operating pressure	-0.5 .. 50 bar
Burst pressure	≤ 630 bar
Mechanical connection	G3/8 A DIN 3852
Torque value	25 Nm
Parts in contact with medium	Mech. connection: Stainless steel / Vacuum-metallized ceramic Seal: FPM or EPDM

#### Output data

##### Pin 2: Saturation level

Output signal	4 .. 20 mA (corresponds to 0 .. 100 %) $R_{Lmax} = (U_B - 10 V) / 20 \text{ mA} [k\Omega]$ or switch output (configurable)
Calibration accuracy	≤ ± 2 % FS max.
Accuracy in media measurements	≤ ± 3 % FS typ.
Pressure dependency	± 0.2 % FS / bar

##### Pin 4: Temperature

Output signal	4 .. 20 mA (corresponds to -25 .. 100 %) $R_{Lmax} = (U_B - 10 V) / 20 \text{ mA} [k\Omega]$ or switch output (configurable)
Accuracy	≤ ± 2 % FS max.

**Pin 5:** HSI (HYDAC Sensor Interface)  
Automatic sensor recognition

#### Switch outputs

Type	PNP transistor outputs (configurable as N/O or N/C)
Switching current	max. 1 A per switch output

#### Environmental conditions

Compensated temperature range	0 .. +90 °C
Operating temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +125 °C / -25 .. +125 °C
Viscosity range	1 .. 5000 cSt
Flow velocity	< 5 m/s
Fluid compatibility	mineral oil based fluids, synthetic and natural esters
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to IEC 60529	IP 67

#### Other data

Supply voltage	12 .. 32 V DC
Residual ripple of supply voltage	≤ 5 %
Weight	~ 145 g

Note: Reverse polarity protection, short circuit protection are provided.  
FS (Full Scale) = relative to complete measuring range  
<sup>1)</sup> -25 °C with FPM or EPDM seal, -40 °C on request

## Model code:

AS 1 X 0 8 - X - 000

### Medium

- 0 = Mineral oils
- 1 = Phosphate ester, e.g. Skydrol

### Mechanical connection

- 0 = G3/8 A DIN 3852

### Electrical connection

- 8 = Male M12x1, 5 pole  
(connector not supplied)

### Signal technology

- C = Output 1 Pin 2 saturation level (4 .. 20 mA)  
Output 2 Pin 4 temperature (4 .. 20 mA)
- 2 = 2 switching outputs

### Modification number

- 000 = Standard

### Notice:

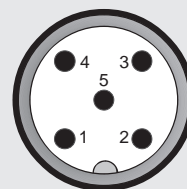
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instruments.

### Accessories:

Appropriate accessories, such as electrical connectors, can be found in the Accessories brochure.

## Pin connections:

M12x1



Pin	AS 1X08-C	AS 1X08-2
1	+U <sub>B</sub>	+U <sub>B</sub>
2	Saturation level 4 .. 20 mA	SP 1
3	0 V	0 V
4	Temperature 4 .. 20 mA	SP 2
5	HSI*	HSI*

\* HSI = HYDAC Sensor Interface (HYDAC's own communication interface)

## Display, read-out and configuration options:

### HDA 5500-1-1-xC-000

Digital Display Unit with 2 programmable switch outputs, which have been specifically designed for use with the AS 1000

HDA 5500-1-1-AC-000

Order no.: 908869

HDA 5500-1-1-DC-000

Order no.: 908870

### HMG 510

Portable 2-channel data recorder, specially designed for displaying measured values with HSI and SMART sensors

Order no.: 909889

### HMG 3010

Portable data recorder with full graphics colour display for indicating, displaying and editing measured values as well as for configuration of HSI and SMART sensors

Order no.: 920930

### CMU 1000

Electronic evaluation unit for online measured value monitoring as well as for the configuration of HSI and SMART sensors

Order no. 920716

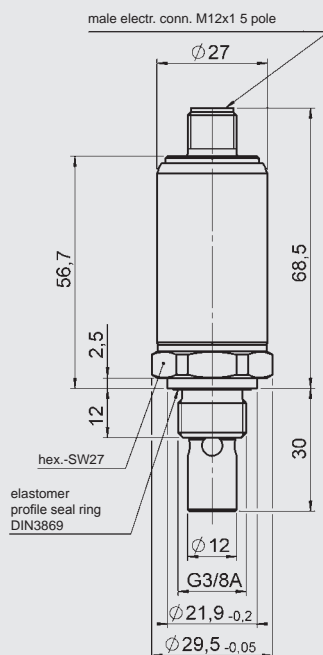
### CSI-B-2

Interface module, enables configuration of HSI and SMART sensors using HYDAC PC software CMWIN

Order no. 920134

Information on other read-out options can be found on our website at [www.hydac.com](http://www.hydac.com) or please contact your HYDAC representative.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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## AquaSensor AS 3000

### Description:

The AquaSensor AS 3000 with an integrated digital display is based on the proven AS 1000 series for the online detection of water in oils, particularly as a sensor for Condition Monitoring. The device has 2 switch outputs and one switchable analogue output signal (4 .. 20 mA or 0 .. 10 V). The AS 3000 detects the water saturation level and temperature of the fluid and transmits the values in the form of an analogue or switching signal. The display shows the actual measured values.

All settings offered by the AS 3000 are grouped in 2 clearly-arranged menus.

The following parameters can be adjusted:

- Saturation level / temperature
- Switch points
- Switch mode of the switch outputs
- Switching direction
- Switch delay times

The AS 3000 thus enables hydraulic and lubricating oils to be monitored accurately, continuously and online.

### Special features:

- 4-digit digital display
- Optimum alignment - can be rotated in two axes
- Reliable due to its robust design
- Not necessary to calibrate to different types of oil
- Pressure-resistant, also during pulsations
- Wide fluid temperature range
- Individual configuration
- User-friendly due to key programming
- Early detection of water problems thus preventing faults and unnecessary interruptions to operations.

### Technical data:

#### Input data

Saturation level	0 ... 100 %
Temperature	-25 .. 100 °C
Operating pressure	-0.5 .. 50 bar
Burst pressure	≤ 630 bar
Mechanical connection	G3/8 A DIN 3852
Torque value	25 Nm
Parts in contact with medium	Connector: Stainless steel / Vacuum-metallized ceramic Seal: FPM or EPDM

#### Output data

Calibration accuracy	≤ ± 2 % FS max.
Accuracy in media measurements	≤ ± 3 % FS typ.
Pressure dependency	± 0.2 % FS / bar

#### Analogue output

Signal	selectable: 4 .. 20 mA      ohmic resist. max. 500 Ω 0 .. 10 V      ohmic resist. min. 1 kΩ corresponds to measuring range selected
--------	--

#### Switch outputs

Type	PNP transistor outputs (programmable as N/O / N/C)
Assignment	Selectable: Saturation level or temperature
Switching current	max. 1.2 A per switch output
Switching cycles	> 100 million

#### Environmental conditions

Compensated temperature range	0 .. +80 °C
Operating temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
Viscosity range	1 .. 5000 cSt
Flow velocity	< 5 m/s
Fluid compatibility	mineral oil based fluids, synthetic and natural esters

#### CE mark

Protection class to IEC 60529	IP 67
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#### Other data

Supply voltage	18 .. 35 V DC
Residual ripple of supply voltage	≤ 5 %
Weight	~ 145 g

Note: Reverse polarity protection, short circuit protection are provided.

FS (Full Scale) = relative to the complete measuring range

<sup>1)</sup> -25 °C with FPM or EPDM seal, -40 °C on request

## Model code:

AS 3 X 0 8 - 5 - 000

### Medium

0 = Mineral oils

1 = Phosphate ester, e.g. Skydrol

### Mechanical connection

0 = G3/8 A DIN 3852

### Electrical connection

8 = Male M12x1, 5 pole

(connector not supplied)

### Signal technology

5 = 2 switch outputs and 1 analogue output

### Modification number

000 = Standard

### Note:

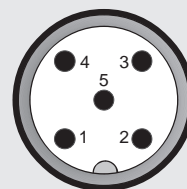
On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

### Accessories:

Appropriate accessories, such as electrical connectors, mechanical connection adaptors, etc. can be found in the Accessories brochure.

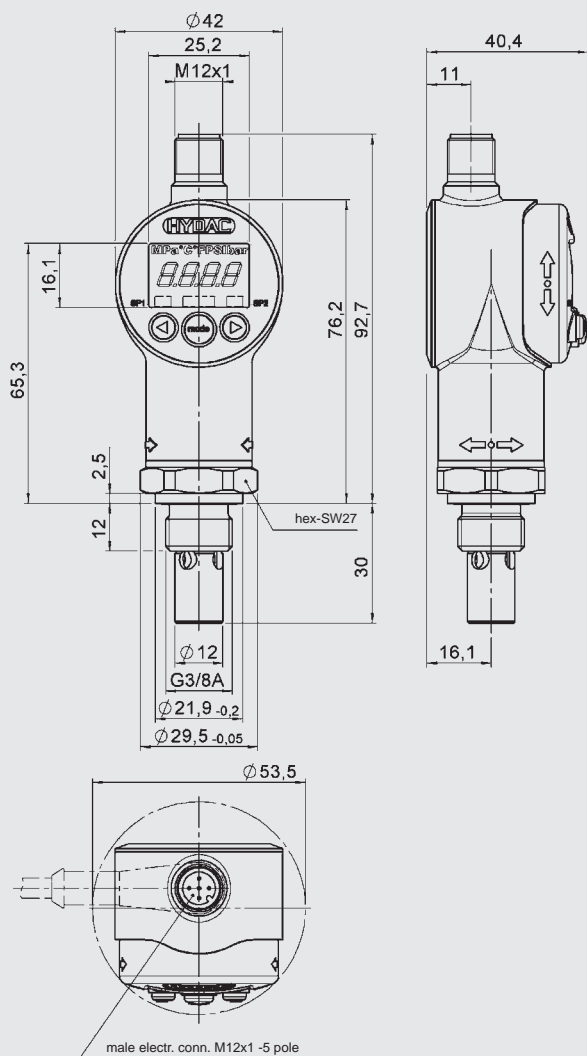
## Pin connections:

M12x1



Pin	AS 3X08-5
1	+U <sub>B</sub>
2	Analogue
3	0 V
4	SP 1
5	SP 2

## Dimensions:



### Note:

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## AquaSensor AS 3000 with IO-Link Interface



### Description:

The AS 3000 with its IO Link communication interface and integrated digital display is used for the online detection of water in oils, particularly as a sensor for condition monitoring. In addition, the AS 3000 measures the temperature of the operating fluid.

The instrument has a switching output and additional output that can be configured as switching or analogue (4 .. 20 mA or 0 .. 10 V).

Compared with the standard version, the IO-Link interface enables bidirectional communication between the device and the control. Parameterisation and cyclical transmission of process and service data is therefore possible.

The AquaSensor AS 3000 with communication interface IO-Link according to specification V1.1 has been specially designed to connect sensors in automation systems.

Typical fields of application are machine tools, handling and assembly automation, intralogistics or packaging industry.

### Special features:

- IO Link interface
- 1 PNP transistor output
- Additional signal output, can be configured as PNP transistor switching output or analogue output
- Not necessary to calibrate to different types of oil
- Wide fluid temperature range
- 4-digit display
- Display rotates in two planes for optimal alignment

### Technical data:

Input data	
Saturation level	0 ... 100 %
Temperature	-25 .. 100 °C
Operating pressure	-0.5 .. 50 bar
Burst pressure	≤ 630 bar
Mechanical connection	G3/8 A DIN 3852
Torque value	25 Nm
Parts in contact with medium	Mech. connection: Stainless steel / Vacuum-metallized ceramic Seal: FPM or EPDM
Output data	
Output signals	Output 1: PNP transistor switching output Output 2: can be configured as PNP transistor switching output or analogue output
Calibration accuracy	≤ ± 2 % FS max.
Accuracy in media measurements	≤ ± 3 % FS typ.
Pressure dependence	± 0.2 % FS / bar
Analogue output	
Signal	selectable: 4 .. 20 mA      load resistance max. 500 Ω 0 .. 10 V      load resist. min. 1 kΩ corresponds to measuring range selected
Switch outputs	
Type	PNP transistor switching outputs
Assignment	Selectable: Saturation level or temperature
Switching current	max. 250 A per switching output
Switching cycles	> 100 million
Parameterisation	
	<b>Via IO-Link interface, with HYDAC programming device HPG 3000 or push-buttons on the AS 3000</b>
Environmental conditions	
Compensated temperature range	0 .. +80 °C
Operating temperature range	-25 .. +80 °C
Storage temperature range	-40 .. +80 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
Viscosity range	1 .. 5000 cSt
Flow velocity	< 5 m/s
Fluid compatibility	mineral oil based fluids, synthetic and natural esters
CE mark	EN 61000-6-1 / 2 / 3 / 4
Protection class to IEC 60529	IP 67
Other data	
Supply voltage	18 .. 35 V DC
Current consumption	≤ 0.590 A with active switching outputs ≤ 90 mA with inactive switching outputs ≤ 110 mA with inactive switching output and analogue output
Residual ripple of supply voltage	≤ 5 %
Weight	~ 145 g

Note: Reverse polarity protection, short circuit protection are provided.  
**FS (Full Scale)** = relative to complete measuring range  
<sup>1)</sup> -25 °C with FPM or EPDM seal, -40 °C on request

## Setting options:

All terms and symbols used for setting the AS 3000 as well as the menu structure comply with the specifications in the VDMA Standard.

## Setting ranges for the switch outputs:

Measuring range	Lower limit of RP	Upper limit of SP
0..100 %	1 %	100 %

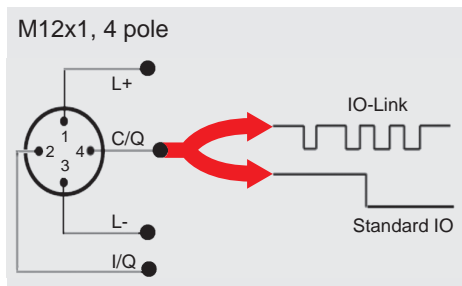
Measuring range	Minimum difference betw. RP and SP	Increment*
0 .. 100	1 %	0.2 %
-25 ..100 °C		0.1 °C

\* All ranges given in the table are adjustable by the increments shown.  
SP = switching point  
RP = switch-back point

## Additional functions:

- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V

## Pin connections:



Pin	Signal	Description
1	L+	Supply voltage
2	I/Q	Switching output (SP2) / analogue output
3	L-	Gnd
4	C/Q	IO-Link communication / switching output (SP1)

## IO-Link-specific data:

Baud rate	38.4 kBaud *
Cycle time	2.5 ms
Process data width	16 Bit
Frame type	2.2
Specification	V1.1

\* Connection with unshielded standard sensor line possible up to a max. line length of 20 m.

Download the IO Device Description (IODD) from:

<http://www.hydac.com/de-en/service/downloads-software-on-request/>

## Model code:

AS 3 X 0 6 - L - 000

### Medium

- 0 = Mineral oils
- 1 = Phosphate ester, e.g. Skydrol

### Mechanical connection

- 0 = G3/8 A DIN 3852

### Electrical connection

- 6 = Male M12x1, 4-pole (connector not supplied)

### Output

- L = IO Link interface

### Modification number

- 000 = Standard

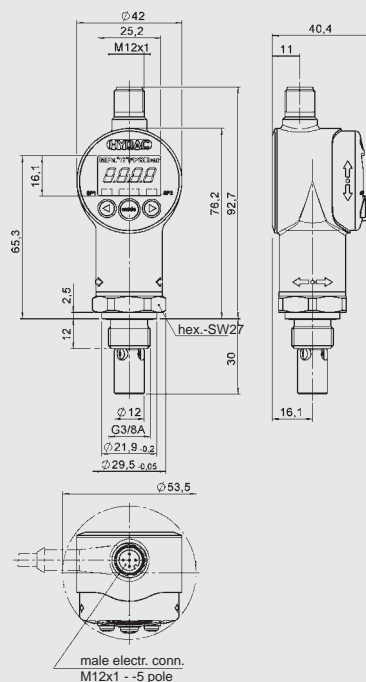
## Notes:

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

## Accessories:

Appropriate accessories, such as electrical connectors, mechanical connection adaptors, etc. can be found in the Accessories brochure.

## Dimensions:



## Note:

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## Electronic Contamination Switch EY-1356

### Description:

The contamination switch series EY-1356 works as a warning element in hydraulic systems and gearboxes and has been developed by HYDAC ELECTRONIC to meet the special requirements of our customers.

The sensor detects and attracts metal ferromagnetic particles in oil or in other hydraulic fluids. The accumulation of particles generates a switching signal (change in the ohmic resistance). The contamination sensor thus provides an early warning of possible wear. Substantial damage on bearings and gear wheels, for instance, can therefore be avoided.

The sensor is available with different mechanical and electrical connections and can be integrated into almost any application.

### Special features:

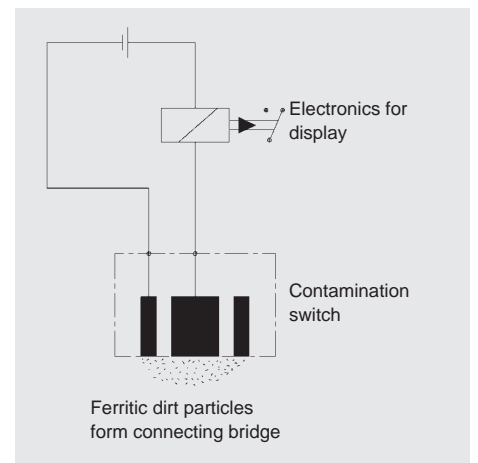
- Simple design
- Robust design
- Standard connection types

### Technical data:

<b>Maximum switching voltage</b>	30 VDC
<b>Maximum switching current</b>	200 mA
<b>Maximum oil pressure abs.</b>	6 bar (16 bar)
<b>Holding power of the permanent solenoid</b>	~ 1.5 W
<b>Ambient temperature</b>	-25 °C .. +90 °C
<b>Protection class to IEC 60529</b>	
DEUTSCH male connector DT04 2 pole	IP67
Integrated male connector according to EN175301-803/ ISO4400	IP65
<b>Mating connector supplied</b>	
DEUTSCH male connector DT04 2 pole	no
Integrated male connector according to EN175301-803/ ISO4400	yes
<b>Max. torque value</b>	
M14x1.5	15 Nm
M18x1.5	25 Nm
M22x1.5	60 Nm
M26x1.5	70 Nm
M33x2	140 Nm
<b>Installation position</b>	We recommend an "upside-down" mounting position, i.e. connector or cable outlet pointing downwards.
The contamination switch is supplied with seal ring DIN 3896 NBR.	

### Functional principle / diagram:

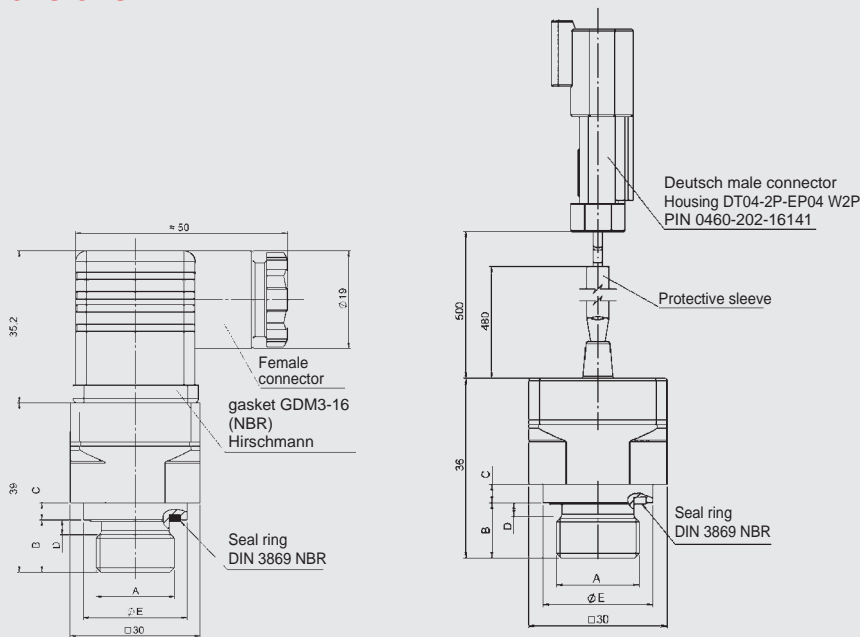
The permanent solenoid at the measuring surface of the contamination switch attracts the ferromagnetic particles from the passing oil. The increased accumulation of particles forms an electrical bridge between the permanent solenoid and the adjacent metal contact. The resulting switching signal can, for instance, activate a warning function or switch off the system.



## Order details:

Electrical connection	Mechanical connection	Part number
Integrated male connector according to EN175301-803/ ISO4400	M14x1.5	3252533
	M18x1.5	3305023
	M22x1.5	3731848
	M26x1.5	3731849
	M33x2	3252555
Strand DEUTSCH male connector DT04 2 pole	M14x1.5	3731852
	M18x1.5	3731853
	M22x1.5	3731854
	M26x1.5	3731855
	M33x2	3731856

## Dimensions:



Dim.	14	18	22	26	33	Other types of connection are available on request
A	M14x1.5	M18x1.5	M22x1.5	M26x1.5	M33x2	
B	12	12	12	12	12	
C	4	4	4	4	4.5	
D	3	3	3	3	4	
ØE	19	23.9	27	31.4	39.2	

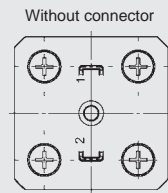
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## Pin connections:

in accordance with EN 175301-803

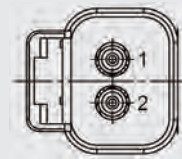


Pin

1	+U <sub>B</sub>
2	-U <sub>B</sub>

Reverse polarity permitted

Cable assignment for Deutsch DT04

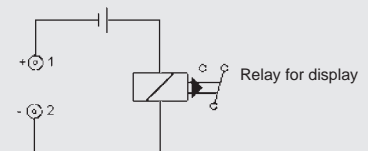


Pin

1	+U <sub>B</sub>
2	-U <sub>B</sub>

Reverse polarity permitted


Switching example:





## OEM PRODUCTS FOR LARGE VOLUME PRODUCTION

Areas of application for our OEM products for large volume production range from mobile and stationary industrial hydraulics, to pneumatics, machine building, automotive and mobile technology through to mining, oil depots, marine and the off-shore industry.

Our sensors are available in a variety of electrical output signals, connector and fluid port connection options. This versatility, combined with certification to ATEX, CSA and IECEx or , ensures an almost limitless range of applications for our products.

OEM Products for Large Volume Production:

Pressure transmitters	Page
• HDA 8700 (minimum order 500 pieces)	351
• HDA 8400 (minimum order 500 pieces)	353
• HDA 8700 for appl. with increased functional safety (minimum order 500 pieces)	355
• HDA 7400 (minimum order 100 pieces)	357
• HDA 9300 (minimum order 1000 pieces)	359

Electronic pressure switches	
• EDS 810 (minimum order 500 pieces)	361
• EDS 710 (minimum order 100 pieces)	363
• EDS 410 (minimum order 50 pieces)	365
• EDS 4400 ATEX, CSA, IECEx Flameproof encl. (min. order 50 pieces)	367
• EDS 4400 ATEX Intrinsically safe (minimum order 50 pieces)	369
• EDS 4300 ATEX Intrinsically safe (minimum order 50 pieces)	371
• EDS 4100 ATEX Intrinsically safe (minimum order 50 pieces)	373

Temperature transmitters	
• HTT 8000 (minimum order 500 pieces)	375

Electronic temperature switch	
• HTS 8000 (minimum order 500 pieces)	377

Electronic position switch	
• HLS 100 for appl. with increased functional safety (minimum order 100 pieces)	379

Special products	381
- Position switches IES 2010 / 2015 / 2020	
- Position sensor IWE 40	
- Position switch HLS 200 for applications with increased functional safety	



## Electronic Pressure Transmitter HDA 8700

(Minimum order quantity 500 units)

### Description:

The pressure transmitter series HDA 8700 has been specifically developed for the OEM market, e.g. in mobile applications. Like most of our pressure transmitter series, the HDA 8700 is based on a robust, long-life thin-film sensor.


All parts (sensor and pressure connection) which are in contact with the fluid are made of stainless steel and are welded together. This means that there are no sealing points in the interior of the sensor and the possibility of leakage is excluded.

The pressure transmitters are available in various pressure ranges from 0 .. 40 bar to 0 .. 600 bar. For integration into modern controls, standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V. Ratiometric output signals are also available.



For the electrical connection, various integrated connections are available.

A basic accuracy of max.  $\leq \pm 0.5\%$  FS, combined with a small temperature drift, ensures a broad range of applications for the HDA 8700.

### Special features:

- Accuracy  $\leq \pm 0.25\%$  FS typ.
- Outstanding performance in terms of temperature effect and EMC
- Very compact design
- ECE type approval  (approved for road vehicles)

### Technical data:

Input data	
Measuring ranges	40; 60; 100; 160; 250; 400; 600 bar
Overload pressures	80; 120; 200; 320; 500; 800; 1000 bar
Burst pressures	200; 300; 500; 800; 1250; 2000; 2000 bar
Mechanical connection (Torque value)	G1/4 A DIN 3852 (20 Nm) 7/16-20 UNF 2A (15 Nm) 9/16-18 UNF 2A (20 Nm) each with orifice 0.5 mm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal	e.g.: 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V, 0 .. 10 V, ratiometric: 0.5 .. 4.5 V for $U_B = 5$ V DC (10 .. 90 % $U_B \pm 5\%$ ), etc.
Accuracy to DIN 16086	$\leq \pm 0.25\%$ FS typ.
Max. setting	$\leq \pm 0.5\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.
Temperature compensation	$\leq \pm 0.01\%$ FS / °C typ.
Zero point	$\leq \pm 0.02\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.01\%$ FS / °C typ. $\leq \pm 0.02\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.1\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 1.5$ ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +125 °C / -25 .. +125 °C
 mark	EN 61000-6-1 / 2 / 3 / 4
 mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 5 .. 2000 Hz	$\leq 25$ g
Shock resistance to DIN EN 60068-2-27	100 g / 6 ms / half sine 500 g / 1 ms / half sine
Protection class to IEC 60529 to ISO 20653	IP 65, IP 67 (depending on the electrical connection) IP 69 K (depending on the electrical connection)
Other data	
Electrical connection	M12x1, 4 pole AMP DIN 72585 code 1, 3 pole Packard Metri Pack Series 150, 3 pole Deutsch DT 04, 3 pole AMP Superseal, 3 pole. AMP Junior Power Timer, 3 pole Flying leads, 1 m cable length EN175301-803 (DIN 43650), 3 pole
Supply voltage	8 .. 30 V DC 12 .. 30 V DC for output signal 0 .. 10 V 5 V $\pm 5\%$ for ratiometric output signal - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
for use acc. to UL specification	
Current consumption	max. 22 mA total
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 55 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

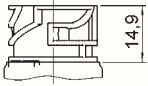
B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

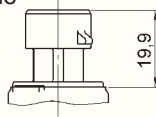
<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Dimensions:

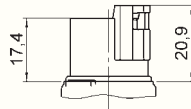
Male connection  
DIN 72585  
3 pole



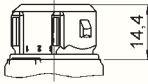
Male connection  
Metri-Pack  
series 150  
3 pole



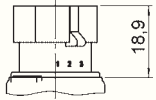
Male connection  
Deutsch DT04  
3 pole



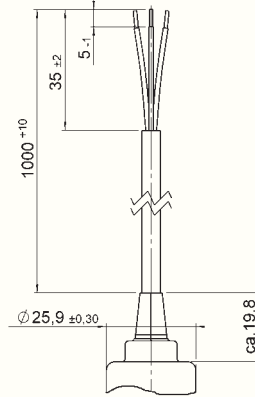
Male connection  
Junior Power Timer  
3 pole



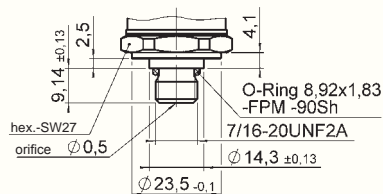
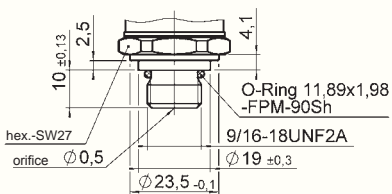
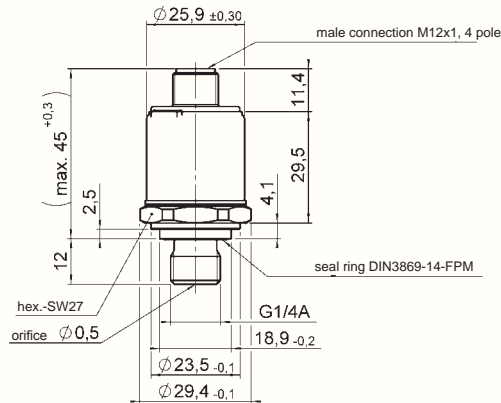
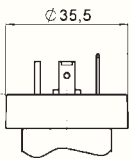
Male connection  
Superseal  
series 1.5  
3 pole



Flying leads



Male connection  
EN175301-803 (DIN 43650)  
3 pole



## Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications or operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

## Order details:

The electronic pressure switch HDA 8700 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type.  
For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

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## Electronic Pressure Transmitter HDA 8400

(Minimum order quantity 500 units)

### Description:

The pressure transmitter series HDA 8400 has been specifically developed for the OEM market, e.g. in mobile applications. Like most of our pressure transmitter series, the HDA 8400 is based on a robust and long-life, thin-film sensor.

All parts (sensor and pressure connection) which are in contact with the fluid are made of stainless steel and are welded together. This means that there are no sealing points in the interior of the sensor. The possibility of leakage is excluded.

The pressure transmitters are available in various pressure ranges from 0 .. 40 bar to 0 .. 600 bar. For integration into modern controls, standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V. Ratiometric output signals are also available.

For the electrical connection, different types of integrated connections are available.

A basic accuracy of max.  $\leq \pm 1\%$  FS, combined with a small temperature drift, ensures a broad range of applications for the HDA 8400.

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Outstanding performance in terms of temperature effect and EMC
- Very compact design
- ECE type approval (E13) (approved for road vehicles)

### Technical data:

Input data	
Measuring ranges	40; 60; 100; 160; 250; 400; 600 bar
Overload pressures	80; 120; 200; 320; 500; 800; 1000 bar
Burst pressures	200; 300; 500; 800; 1250; 2000; 2000 bar
Mechanical connection (Torque value)	G1/4 A DIN 3852 (20 Nm) 7/16-20 UNF 2A (15 Nm) 9/16-18 UNF 2A (20 Nm) each with orifice 0.5 mm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal	e.g.: 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V, 0 .. 10 V, ratiometric: 0.5 .. 4.5 V for $U_B = 5$ V DC (10 .. 90 % $U_B \pm 5\%$ ), etc.
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Zero point	$\leq \pm 0.025\%$ FS / °C max.
Temperature compensation Over range	$\leq \pm 0.015\%$ FS / °C typ. $\leq \pm 0.025\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 1.5$ ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +125 °C / -25 .. +125 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
usmark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 5 .. 2000 Hz	$\leq 25$ g
Shock resistance to DIN EN 60068-2-27	100 g / 6 ms / half sine 500 g / 1 ms / half sine
Protection class to IEC 60529 to ISO 20653	IP 65, IP 67 (depending on the electrical connection) IP 69 K (depending on the electrical connection)
Other data	
Electrical connection	M12x1, 4 pole AMP DIN 72585 code 1, 3 pole Packard Metri Pack Series 150, 3 pole Deutsch DT 04, 3 pole AMP Superseal, 3 pole. AMP Junior Power Timer, 3 pole Flying leads, 1 m cable length EN175301-803 (DIN 43650), 3 pole
Supply voltage	8 .. 30 V DC 12 .. 30 V DC for output signal 0 .. 10 V 5 V $\pm 5\%$ for ratiometric output signal
for use acc. to UL specification	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 55 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

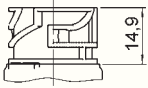
B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

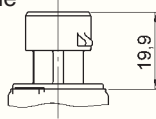
<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Dimensions:

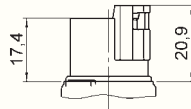
Male connection  
DIN 72585  
3 pole



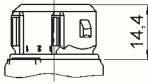
Male connection  
Metri-Pack  
series 150  
3 pole



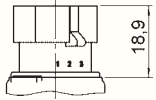
Male connection  
Deutsch DT04  
3 pole



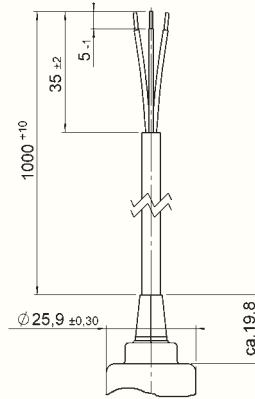
Male connection  
Junior Power Timer  
3 pole



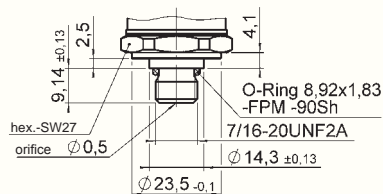
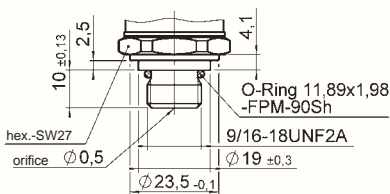
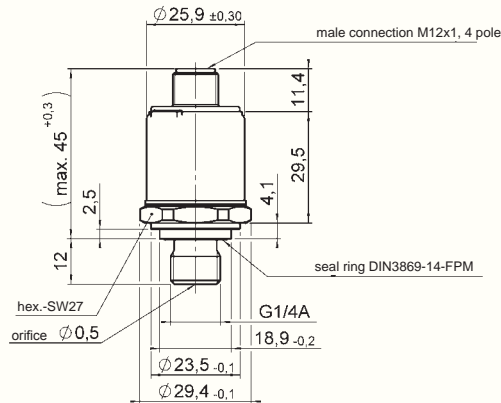
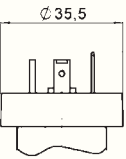
Male connection  
Superseal  
series 1.5  
3 pole



Flying leads



Male connection  
EN175301-803 (DIN 43650)  
3 pole



## Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications or operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

## Order details:

The electronic pressure switch HDA 8400 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type.  
For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

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Internet: [www.hydac.com](http://www.hydac.com)



## Electronic Pressure Transmitter HDA 8700 for Applications with Increased Functional Safety

(Minimum order quantity 500 units)

**Functional Safety**  
PL d  
SIL 2



### Description:

This version of the pressure transmitter series HDA 8700 has been developed specifically for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to SIL 2 (IEC 61508) or PL d (ISO 13849).

During normal operation, the pressure transmitter HDA 8700 generates a pressure-proportional output signal. In the background, the pressure transmitter performs cyclical diagnostic tests to detect internal errors.

If an instrument error is detected, the pressure transmitter HDA 8700 supplies an output signal < 3 mA which is recognised by the user as an unacceptable discrepancy.

This means that the pressure transducer HDA 8700 achieves Performance Level d in the Safety category (based on a Category 2 of the architecture) and SIL 2. As a result, the pressure transducer can be recommended for use in applications where safety is critical.

The main areas of application are in mobile and stationary safety-oriented systems such as load torque displays or load torque limitation in loading cranes or working platforms.

### Special features:

- SIL 2 / PL d certification
- Accuracy  $\leq \pm 0.25\%$  FS typ.
- Outstanding performance in terms of temperature effect and EMC
- Very compact design

### Technical data:

Input data	
Measuring ranges	40; 60; 100; 160; 250; 400; 600 bar
Overload pressures	80; 120; 200; 320; 500; 800; 1000 bar
Burst pressures	200; 300; 500; 800; 1250; 2000; 2000 bar
Mechanical connection (Torque value)	G1/4 A DIN 3852 (20 Nm) 7/16-20 UNF 2A (15 Nm) 9/16-18 UNF 2A (20 Nm)
Parts in contact with medium <sup>1)</sup>	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal, permitted load resistance	4 .. 20 mA $R_{Lmax} = (U_B - 8 V) / 20 \text{ mA} [\text{k}\Omega]$
Output signal with error recognition	< 3 mA
Accuracy to DIN 16086	$\leq \pm 0.25\%$ FS typ.
Max. setting	$\leq \pm 0.5\%$ FS max.
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.15\%$ FS typ. $\leq \pm 0.25\%$ FS max.
Temperature compensation	$\leq \pm 0.01\%$ / °C typ.
Zero point	$\leq \pm 0.02\%$ / °C max.
Temperature compensation	$\leq \pm 0.01\%$ / °C typ.
Over range	$\leq \pm 0.02\%$ / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.03\%$ FS max.
Hysteresis	$\leq \pm 0.1\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS.
Rise time	$\leq 10 \text{ ms}$
Long term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. 85 °C
Operating temperature range <sup>2)</sup>	-40 .. 100 °C / -25 .. 100 °C
Storage temperature range	-40 .. 100 °C
Fluid temperature range <sup>2)</sup>	-40 .. 125 °C / -25 .. 125 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance according to DIN EN 60068-2-6 at 0 .. 500 Hz	$\leq 25 \text{ g}$
Shock resistance according to DIN EN 60068-2-29 (11 ms)	100 g / 6 ms / half-sine 500 g / 1 ms / half-sine
Protection class to IEC 60529	IP 67
Other data	
Electrical connection	AMP Junior Power Timer, 2 pole
Supply voltage	8 .. 32 V DC
Service life	> 10 million cycles (0 .. 100 %)
Weight	~ 75 g
Safety-related data	
Performance level	
Based on	DIN EN ISO 13849-1:2008
PL	d
Architecture	Category 2
Safety Integrity Level	
Based on	DIN EN 61508:2001
SIL	2

Note.: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

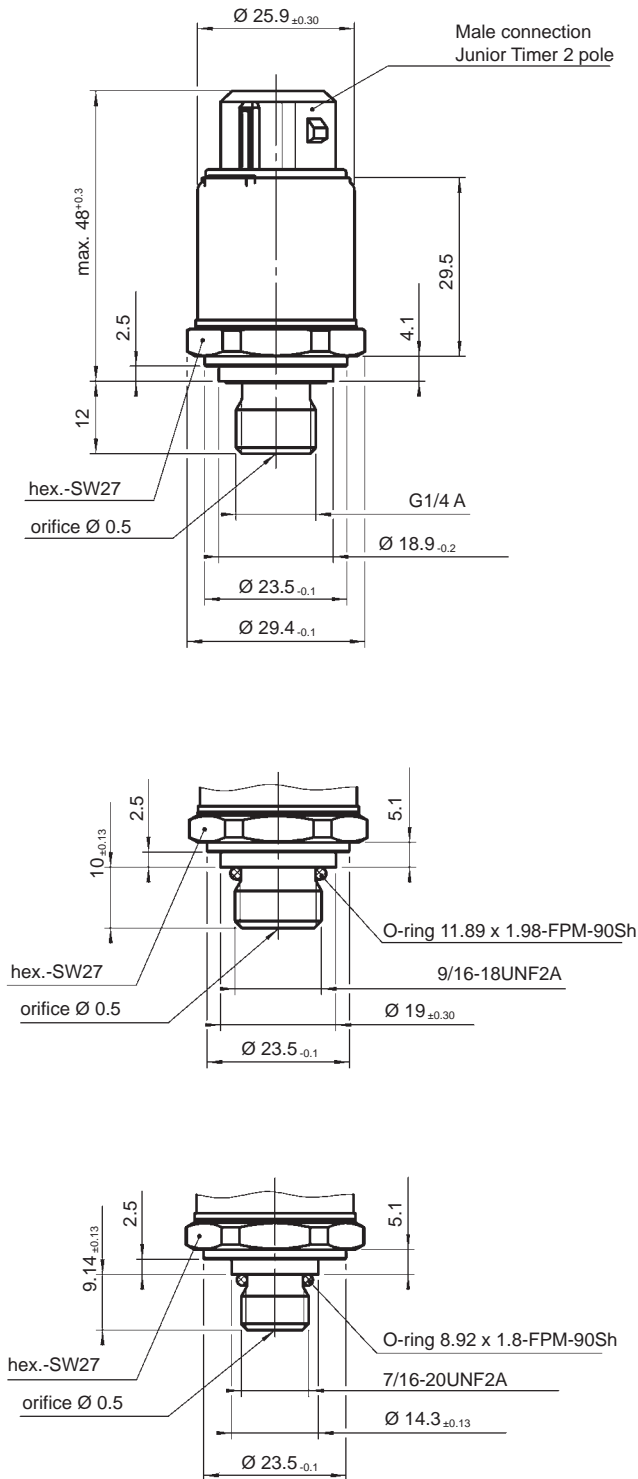
Other seal materials on request

<sup>1)</sup>

<sup>2)</sup>

-25°C with FPM seal, -40°C on request

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Order details:

This version of the electronic pressure transducer HDA 8700 has been specially developed for OEM customers and is available for minimum order quantities of 500 pieces per type.

For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

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 Internet: [www.hydac.com](http://www.hydac.com)



## Electronic Pressure Transmitter HDA 7400

(Minimum order quantity 100 units)

### Description:

The pressure transmitter series HDA 7400 combines excellent technical specifications with a highly compact design.

The HDA 7400 was specifically developed for OEM applications e.g. in mobile applications. A stainless steel sensor cell with thin-film strain gauge is the basis for a robust, long-life pressure transmitter.

Various pressure ranges between 0 .. 40 bar and 0 .. 600 bar provide versatility when adapting to particular applications.

For integration into modern controls (e.g. with PLC), standard analogue output signals are available.

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Highly robust sensor cell
- Highly compact design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	40; 60; 100; 160; 250; 400; 600 bar
Overload pressures	80; 120; 200; 320; 500; 800; 1000 bar
Burst pressures	200; 300; 500; 800; 1250; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal <sup>1)</sup>	e.g.: 4 .. 20 mA, 0 .. 5 V, 0.5 .. 4.5 V, 1 .. 6 V, 0 .. 10 V etc.
Accuracy to DIN 16086	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Accuracy at min. setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation	$\leq \pm 0.015\%$ FS / °C typ.
Zero point / Over range	$\leq \pm 0.025\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.3\%$ FS max.
Hysteresis	$\leq \pm 0.4\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS
Rise time	$\leq 2$ ms
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range <sup>1)</sup>	-25 .. +85 °C
Operating temperature range <sup>2)</sup>	-40 ..+85 °C / -25 ..+85 °C
Storage temperature range	-40 ..+100 °C
Fluid temperature range <sup>2)</sup>	-40 .. +100 °C / -25 ..+100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>3)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 IP 67 (for M12x1, when an IP 67 connector is used)
Other data	
Electrical connection <sup>1)</sup>	e.g. M12x1 (4 pole) Flying leads
Supply voltage	10 .. 30 V DC 2 conductor 12 .. 30 V DC 3 conductor
for use acc. to UL specification	- limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage	$\leq 5\%$
Current consumption	max. 34 mA total
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 60 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

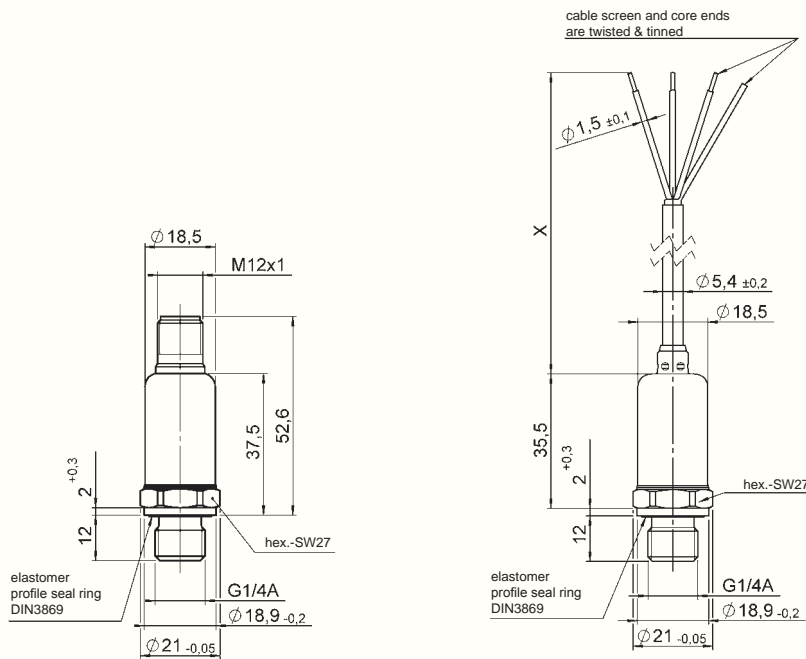
B.F.S.L. = Best Fit Straight Line

<sup>1)</sup> Other models on request

<sup>2)</sup> -25 °C with FPM seal, -40 °C on request

<sup>3)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Dimensions (examples):



## Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

## Order details:

The electronic pressure switch HDA 7400 has been specially developed for OEM customers and is available for minimum order quantities of 100 units per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

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Internet: [www.hydac.com](http://www.hydac.com)



## Electronic Pressure Transmitter HDA 9300

(Minimum order quantity 1000 units)

### Description:

The pressure transmitter series HDA 9000 has been specially developed for low pressure applications in the industrial and mobile sectors.

The transmitters are available in various pressure ranges from 0 .. 1 bar to 0 .. 100 bar.

For integration into modern controls, standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V.

Ratiometric output signals are also available.

For the electrical connection, different types of integrated connections are available.

A basic accuracy of  $\leq \pm 0.5\%$  FS typ., combined with a small temperature drift, ensures a broad range of applications for the HDA 9300, e.g. in pump and compressor controls, refrigerating plants and air conditioning, or for pilot controls in the mobile sector.

### Special features:

- Accuracy  $\leq \pm 0.5\%$  FS typ.
- Outstanding performance in terms of temperature effect and EMC
- Very compact design

### Technical data:

Input data	
Measuring ranges	1; 1.6; 2.5; 4; 6; 10; 16; 25; 40; 60; 100 bar -1 .. 1; -1 .. 4 bar
Overload pressures	2; 5; 8; 12; 20; 32; 50; 80; 120; 200; 200 bar 3.2; 12 bar
Burst pressures	3; 7.5; 12; 18; 30; 48; 75; 120; 180; 300; 300 bar 4.8; 18 bar
Mechanical connection <sup>1)</sup> (Torque value)	G1/4 A DIN 3852 (20 Nm) 1/4-18 NPT, external thread (40 Nm) 7/16-20 UNF 2A (15 Nm) 9/16-18 UNF 2A (20 Nm)
Parts in contact with medium	Connector: Stainless steel Measuring cell: Ceramics Seal: FPM, EPDM
Output data	
Output signal	e.g.: 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V, 0 .. 10 V, ratiometric: 0.5 .. 4.5 V for $U_a = 5$ V DC
Accuracy to DIN 16086, max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Accuracy at minimum setting (B.F.S.L.)	$\leq \pm 0.25\%$ FS typ. $\leq \pm 0.5\%$ FS max.
Temperature compensation zero point	$\leq \pm 0.02\%$ FS / °C typ. $\leq \pm 0.04\%$ FS / °C max.
Temperature compensation over range	$\leq \pm 0.02\%$ FS / °C type $\leq \pm 0.04\%$ FS / °C max.
Non-linearity at max. setting to DIN 16086	$\leq \pm 0.5\%$ FS max.
Hysteresis	$\leq \pm 0.25\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS max.
Rise time	$\leq 4$ ms
Long term drift	$\leq \pm 0.3\%$ FS / year typ.
Environmental conditions	
Compensated temperature range	-25 .. 85 °C
Operating temperature range <sup>2)</sup>	-40 .. 100 °C / -25 .. 100 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>2)</sup>	-40 .. 125 °C / -25 .. 125 °C
CE - mark	EN 61000-6-1 / 2 / 3 / 4
cULus - mark <sup>3)</sup>	Certificate No.: E318391
Vibration resistance according to DIN EN 60068-2-6 at 5 .. 2000 Hz	$\leq 25$ g
Shock resistance to DIN EN 60068-2-27	100 g / 6 ms / half-sine 500 g / 1 ms / half-sinus
Protection class to IEC 60529 to ISO 20653	IP 65, IP 67 (depending on electrical connection) IP 69K (depending on electrical connection)
Other data	
Electrical connection	M12x1, 4 pol. Packard Metri Pack Series 150, 3 pole. Deutsch DT 04, 3 pole EN 175301-803 (DIN 43650), 3 pole + PE
Supply voltage	8 .. 36 V DC 12 .. 36 V DC for 0 .. 10 V, 5 V DC $\pm 5\%$ (ratiometric)
Residual ripple of supply voltage	$\leq 5\%$
Service life	> 10 million cycles, 0 .. 100 % FS
Weight	~ 100 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

**FS** (Full Scale) = relative to complete measuring range

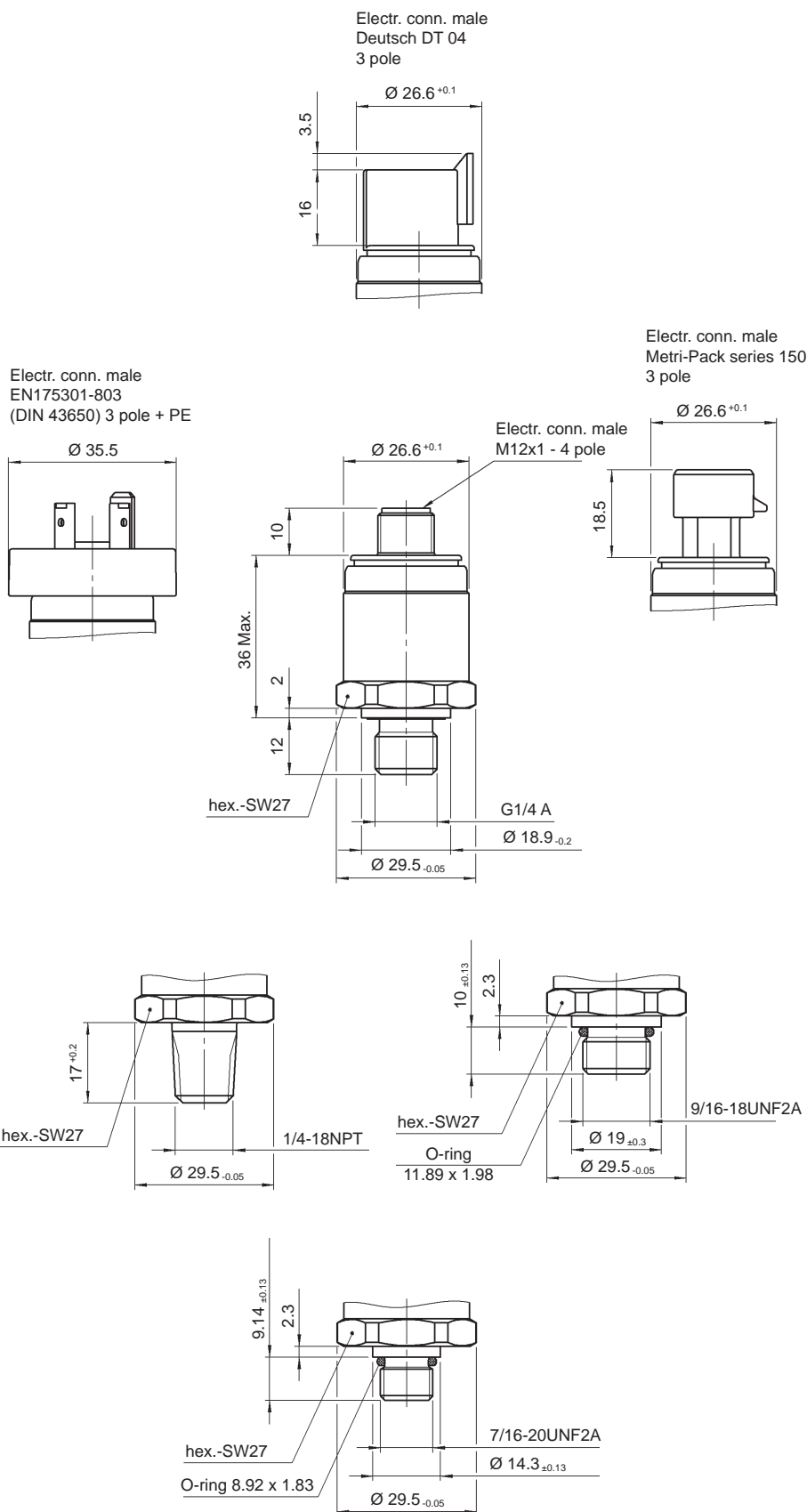
**B.F.S.L.** = Best Fit Straight Line

<sup>1)</sup> Other mechanical connections on request

<sup>2)</sup> -25 °C with FPM or EPDM seal, -40 °C on request

<sup>3)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described.  
For applications or operating conditions not described, please contact the relevant technical department.  
Subject to technical modifications.

## Order details:

The electronic temperature switch HDA 9300 has been specially developed for OEM customers and is available for minimum order quantities of 1000 units per type.  
For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

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## Electronic Pressure Switch EDS 810

(Minimum order quantity 500 units)

### Description:

The electronic pressure switch EDS 810 has been specially developed for use in volume production machines.


The highly compact instrument is equipped with a very robust pressure sensor with thin-film strain gauge on a stainless steel membrane.

The transistor switching output is available with either N/C or N/O function.



The switching and switch-back point of the EDS 810 is factory-set according to customer specification (not field-adjustable).

Various pressure ranges between 0.. 40 bar and 0 .. 600 bar are available.

### Special features:

- Accuracy  $\leq \pm 1\%$  FS
- Outstanding performance in terms of temperature effect and EMC
- Very compact design
- ECE type approval  (approved for road vehicles)

### Technical data:

Input data	
Measuring ranges	40; 60; 100; 160; 250; 400; 600 bar
Overload pressures	80; 120; 200; 320; 500; 800; 1000 bar
Burst pressures	200; 300; 500; 800; 1250; 2000; 2000 bar
Mechanical connection (Torque value)	G1/4 A DIN 3852 (20 Nm) 7/16-20 UNF 2A (15 Nm) 9/16-18 UNF 2A (20 Nm) each with orifice 0.5 mm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Switch output	Either: - 1 PNP or 1 NPN transistor switching output - 2 PNP transistor switching outputs (only in conjunction with electrical connection M12x1, 4 pole)
Switching direction	N/C / N/O function (according to customer specification)
Output load	$\leq 500$ mA per switching output
Switching points	according to customer specification
Switch-back points	according to customer specification
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability (at 25 °C)	$\leq \pm 0.1\%$ FS max.
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Rising switch point and falling switch point delay	8 ms to 2000 ms (standard 32 ms); factory-set according to customer spec.
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +125 °C / -25 .. +125 °C
 mark	EN 61000-6-1 / 2 / 3 / 4
 mark <sup>2)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 5 .. 2000 Hz	$\leq 25$ g
Shock resistance to DIN EN 60068-2-27	100 g / 6 ms / half sine 500 g / 1 ms / half sine
Protection class to IEC 60529 to ISO 20653	IP 65, IP 67 (depending on the electrical connection) IP 69 K (depending on the electrical connection)
Other data	
Electrical connection	M12x1, 4 pole AMP DIN 72585 code 1, 3 pole Packard Metri Pack series 150, 3 pole Deutsch DT 04, 3 pole AMP Superseal, 3 pole AMP Junior Power Timer, 3 pole Flying leads, 1 m cable length EN175301-803 (DIN 43650), 3 pole
Supply voltage for use acc. to UL spec.	8 .. 32 V DC - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	1 PNP max. 0.52 A total/max. 20 mA with inactive switch output 2 PNP max. 1.02 A total/max. 20 mA with inactive switch outputs NPN max. 20 mA total
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 55 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

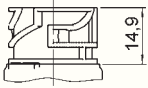
FS (Full Scale) = relative to the complete measurement range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

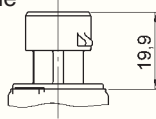
<sup>2)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Dimensions:

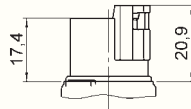
Male connection  
DIN 72585  
3 pole



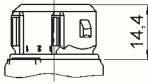
Male connection  
Metri-Pack  
series 150  
3 pole



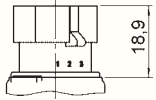
Male connection  
Deutsch DT 04  
3 pole



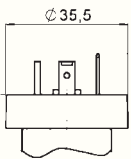
Male connection  
Junior Power Timer  
3 pole



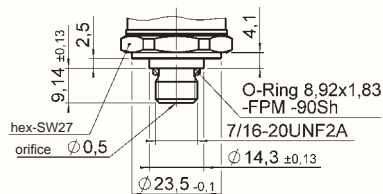
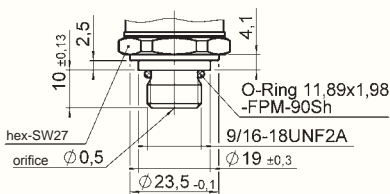
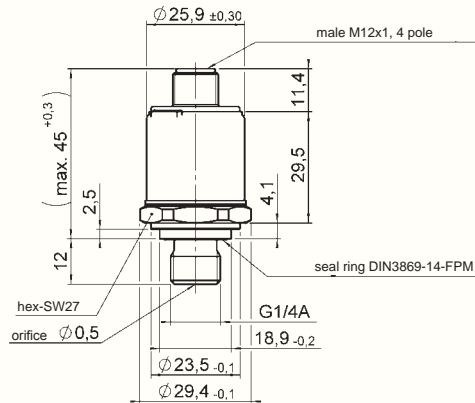
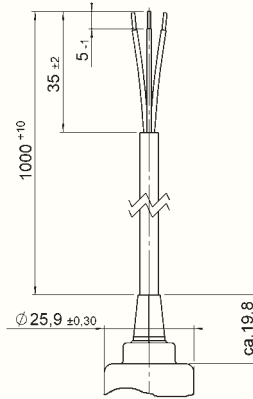
Male connection  
Superseal  
series 1.5  
3 pole



Male connection  
DIN EN175301-803 (DIN 43650)  
3 pole



Flying leads



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Order details:

The electronic pressure switch EDS 810 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type. For precise specifications, please contact our the Sales Department of HYDAC ELECTRONIC.

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## Electronic Pressure Switch EDS 710

(Minimum order quantity 100 units)

### Description:

The electronic pressure switch EDS 710 has been specially developed for use in large volume production machines.

The highly compact unit has a very robust pressure sensor with thin-film strain gauge on a stainless steel membrane.

The EDS 710 is available with 1 transistor switching output (PNP) which can be defined either as N/C or N/O.

Switching and switch-back points of the EDS 710 are factory-set according to customer specification (not field-adjustable).

Various pressure ranges between 0 .. 16 bar and 0 .. 600 bar are available.

### Special features:

- 1 transistor switch output (PNP), either as N/C or N/O
- Factory-set according to customer specification (not field-adjustable)
- Accuracy  $\leq \pm 1\%$  FS
- Highly robust sensor cell
- Highly compact design
- Very small temperature error

### Technical data:

Input data	
Measuring ranges	16; 60; 100; 250; 400; 600 bar
Overload pressures	32; 200; 200; 500; 800; 1000 bar
Burst pressures	200; 500; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Switch output	1 transistor switching output (N/C or N/O)
Output load	400 mA
Switching points	according to customer specification
Switch-back points	according to customer specification
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability (at 25 °C)	$\leq \pm 0.1\%$ FS max.
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Rising switch point and falling switch point delay	8 ms to 2000 ms (standard 32 ms); factory-set according to customer spec.
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Shock resistance to DIN EN 60068-2-29 (1 ms)	$\leq 100$ g
Protection class to IEC 60529	IP 67
Other data	
Electrical connection <sup>2)</sup>	e.g. M12x1 (4 pole) Flying leads
Supply voltage	10 .. 30 V DC
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 60 g

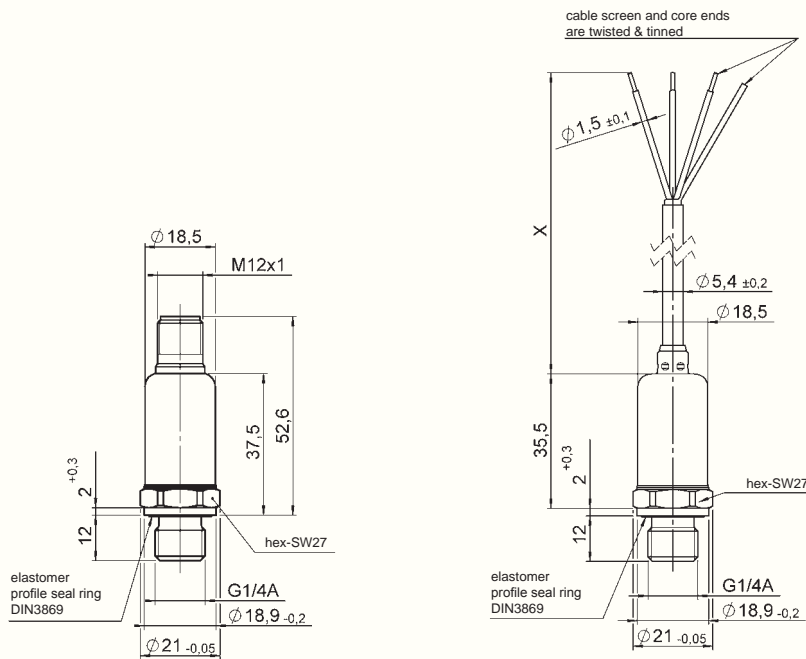
Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

**FS (Full Scale)** = relative to complete measuring range

<sup>1)</sup> -25 °C with FPM seal, -40 °C on request

<sup>2)</sup> Other electrical connection options, e.g. cables with different types of connector, available on request.

## Dimensions (examples):



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Order details:

The electronic pressure switch EDS 710 has been specially developed for OEM customers and is available for minimum order quantities of 100 pieces per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

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## Electronic Pressure Switch EDS 410

(Minimum order quantity 50 pieces)

### Description:

The electronic pressure switch EDS 410 has been specially developed for use in volume production machines, and is based on the EDS 4000 pressure switch series.

The EDS 410 is available with 1 or 2 transistor switching outputs (PNP), which can be defined as either N/C or N/O.

The switching and reset points of the EDS 410 are factory-set according to customer specification (not field-adjustable).

As with the EDS 4000 standard model, the EDS 410 has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range, and a stainless steel measurement cell with thin-film strain gauge for measuring in the high pressure range.

Various pressure ranges between 0 .. 1 bar and 0 .. 600 bar as well as different electrical and mechanical connection types are available.

### Special features:

- 1 or 2 transistor switching outputs (PNP), either as N/C or N/O
- Factory-set according to customer specification (not field-adjustable)
- Accuracy  $\leq \pm 1\%$  FS
- Highly robust sensor cell
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	1; 2.5; 6; 10; 16; 40; 60; 100; 250; 400; 600 bar
Overload pressures	3; 8; 15; 20; 32; 80; 120; 200; 500; 800; 1000 bar
Burst pressures	5; 12; 30; 48; 75; 180; 300; 500; 1000; 2000; 2000 bar
Mechanical connection <sup>2)</sup>	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Mech. connection: Stainless steel Sensor cell: Ceramic or stainless steel Seal: FPM or EPDM
Output data	
Switch output	1 or 2 PNP transistor switching outputs (N/C or N/O)
Output load	1.2 A per switching output
Switching points	according to customer specification
Switch-back points	according to customer specification
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability (at 25 °C)	$\leq \pm 0.1\%$ FS max.
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Rising switch point and falling switch point delay	8 ms to 2000 ms (standard 32 ms); factory-set according to customer spec.
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Compensated temperature range	-25 .. +85 °C
Operating temperature range <sup>1)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>1)</sup>	-40 .. +100 °C / -25 .. +100 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Shock resistance to DIN EN 60068-2-29 (1 ms)	$\leq 100$ g
Protection class to IEC 60529	IP 65 IP 67 (M12x1, when an IP 67 connector is used)
Other data	
Electrical connection <sup>2)</sup>	e.g. EN175301-803 (DIN 43650) M12x1 (4 pole) Flying lead
Supply voltage	8 .. 32 V DC
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 145 g

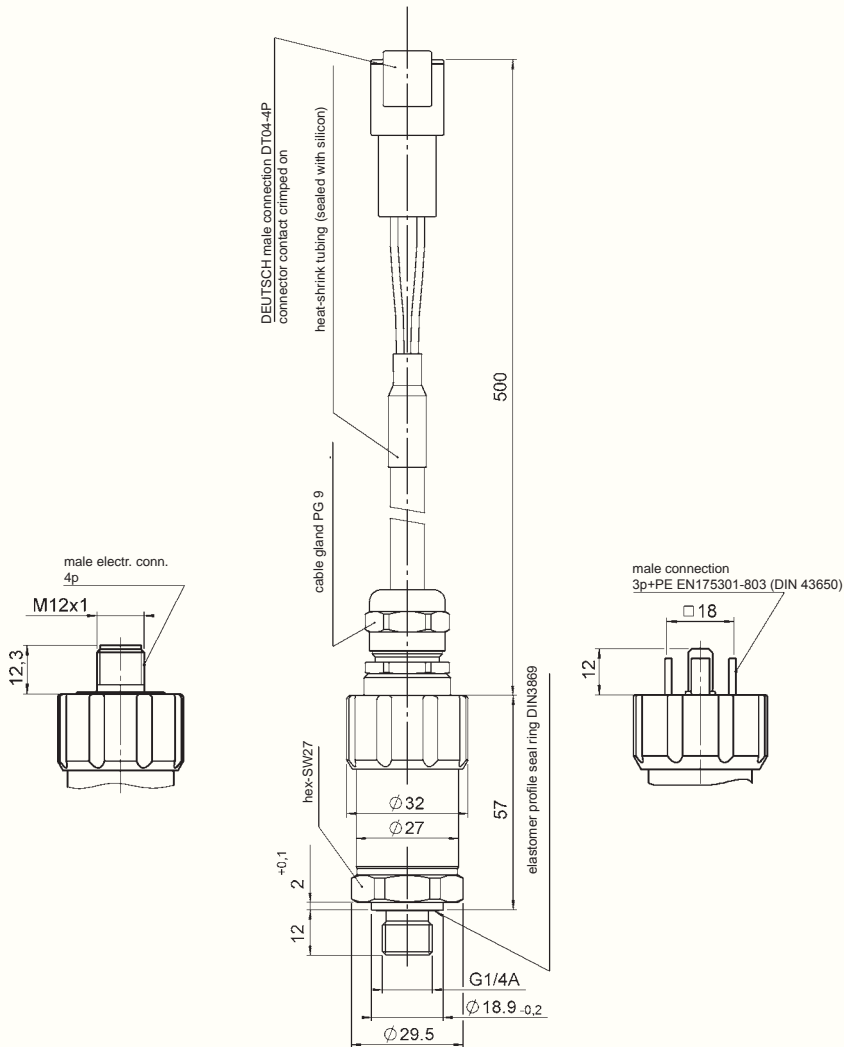
Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

**FS (Full Scale)** = relative to the full measuring range

<sup>1)</sup> -25 °C with FPM or EPDM seal, -40 °C on request

<sup>2)</sup> Other connection options available on request.

## Dimensions (examples):



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Order details:

The electronic pressure switch EDS 410 has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

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## Electronic Pressure Switch EDS 4400 ATEX, CSA, IECEx Flameproof Enclosure



(Minimum order quantity 50 units)

### Description:

The electronic pressure switch EDS 4400 with flameproof enclosure and triple approval according to ATEX, CSA and IECEx ensures the instrument is universally suitable for use in potentially explosive environments around the world.

Each device is certified by the three approval organizations and is labelled accordingly. Therefore it is no longer necessary to stock multiple devices with separate individual approvals.

The switching point and switch-back point, the function of the switching output as N/C or N/O and the switching delay are permanently set in accordance with the customer's requirements.

As with the industrial version of the EDS 4400, those with triple approval have a field-proven, all-welded stainless steel measurement cell with thin film strain gauge without internal seals. Its main applications are in mining and the oil and gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in areas with high dust loads.

### Protection types and applications:

cCSAus Explosion Proof - Seal Not Required

- Class I Group A, B, C, D, T6, T5
- Class II Group E, F, G
- Class III
- Type 4

### ATEX Flame Proof

- I M2 Ex d I Mb
- II 2G Ex d IIC T6, T5 Gb
- II 2D Ex tb IIIC T110 .. 130 °C Db

### IECEx Flame Proof

- Ex d I Mb
- Ex d IIC T6, T5 Gb
- Ex tb IIIC T110 .. 130 °C Db

### Special features:

- Accuracy  $\leq \pm 1.0$  % FS typ.
- Certificates:  
ATEX KEMA 10ATEX100 X  
CSA MC 224264  
IECEx KEM 10.0053X
- Robust design
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	6; 16; 40; 60; 100; 250; 400; 600; 1000 bar
Overload pressures	15; 32; 80; 120; 200; 500; 800; 1000; 1600 bar
Burst pressure	100; 200; 200; 300; 500; 1000; 2000; 2000; 3000 bar
Mechanical connection <sup>1)</sup> (Torque value)	G1/2 A DIN 3852 (40 Nm) G1/4 A DIN 3852 (20 Nm)
Parts in contact with medium	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
	Seal: FPM
Conduit and housing material	1.4404; 1.4435 (316L)
Output data	
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5$ % FS typ. $\leq \pm 1.0$ % FS max.
Repeatability	$\leq \pm 0.1$ % FS max.
Temperature drift	$\leq \pm 0.03$ % FS / °C max. zero point $\leq \pm 0.03$ % FS / °C max. range
Switch output <sup>2)</sup>	1 or 2 PNP transistor switch outputs
Output load	max. 1.2 A on 1 switch output version max. 1 A each on 2 switch output version
Switch points / hysteresis / N/C or N/O function	permanently pre-set acc. to customer spec.
Rising switch point and falling switch point delay	32 ms standard (8 .. 2000 ms pre-set to customer spec.)
Long-term drift	$\leq \pm 0.3$ % FS typ. / year
Environmental conditions	
Compensated temperature range	T5, T130 °C: -25 .. +80 °C T6, T110 °C: -25 .. +60 °C
Operating temperature range <sup>3)</sup>	T5, T130 °C: -40 .. +80 °C / -20 .. +80 °C T6, T110 °C: -40 .. +60 °C / -20 .. +60 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>3)</sup>	T5, T130 °C: -40 .. +80 °C / -20 .. +80 °C T6, T110 °C: -40 .. +60 °C / -20 .. +60 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 1 / 31
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529 to ISO 20653	IP 65 (Vented Gauge) IP 69K (Sealed Gauge)
Other data	
Voltage supply	12 .. 30 V DC
Current consumption	~ 25 mA (plus switching current)
Residual ripple of supply voltage	$\leq 5$ %
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, overvoltage, overrange and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

<sup>1)</sup> Other mechanical connection options available on request

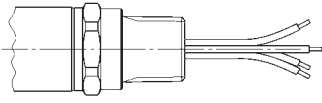
<sup>2)</sup> Other output signals available on request

<sup>3)</sup> -20 °C with FPM seal, -40 °C on request

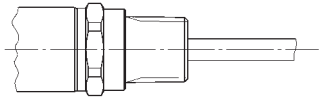
## Pin connections:

Pin connections are configured according to customer specification.

### Conduit (single cores)



### Conduit (flying leads)



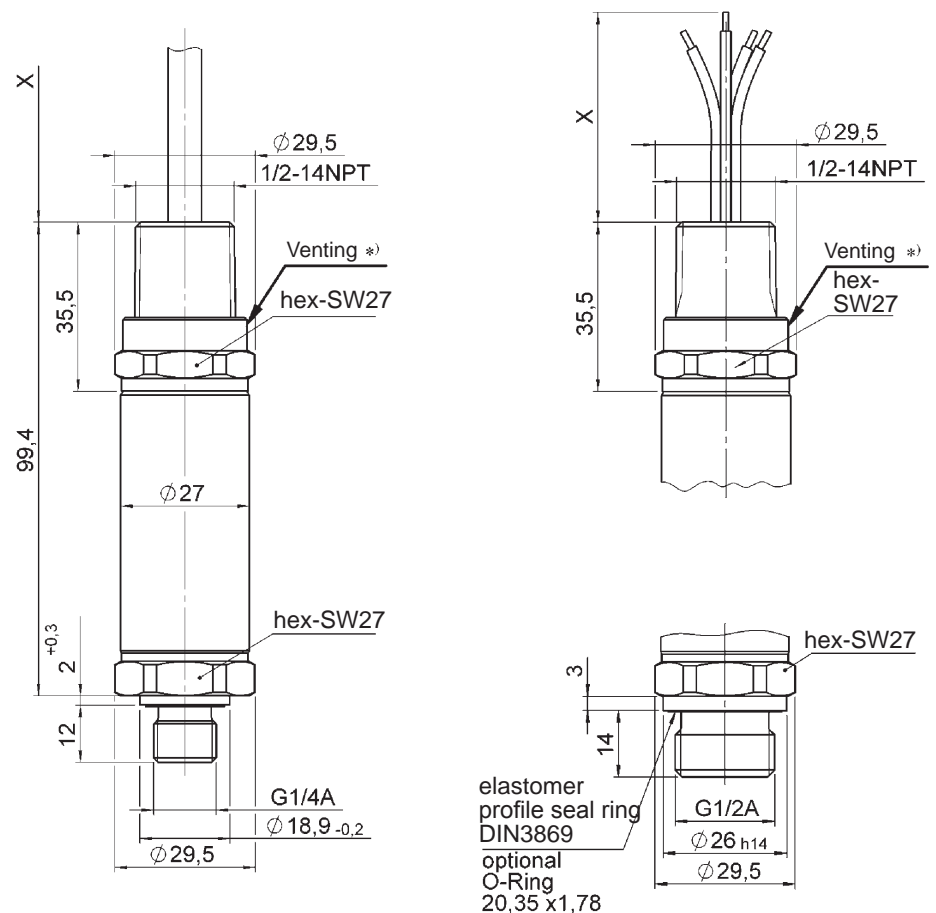
## Areas of application:

<b>Approvals</b>	cCSA <sub>US</sub> : Explosion Proof - Seal not required ATEX: Flame Proof IECEX: Flame Proof
<b>Certificate</b>	ATEX KEMA 10ATEX100X CSA MC 224264 IECEX KEM 10.0053X
<b>Applications / Protection types</b>	cCSA <sub>US</sub> : Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4  ATEX: I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 130 °C Db  IECEX: Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 130 °C Db

## Order details:

The electronic pressure switch EDS 4400 with triple approval has been specially developed for OEM customers and is available for minimum order quantities of 50 units per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

## Dimensions:



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

\*) optional, depending on gauge type "Sealed Gauge" / "Vented Gauge"

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## Electronic Pressure Switch EDS 4400 ATEX Intrinsicly Safe



(Minimum order quantity 50 units)

### Description:

The pressure switch EDS 4400 in ATEX version, has been specially developed for use in potentially explosive atmospheres, and is based on the EDS 4000 series.

The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set according to customer requirement (not field-adjustable).

As with the industry model, the EDS 4400 in ATEX version has a stainless steel measurement cell with thin-film strain gauge for measuring relative pressure in the high pressure range.

With approval for the following

### Protection types and applications:

- I M1 Ex ia I
- II 1G Ex ia IIC T4, T5, T6
- II 1/2G Ex ia IIC T4, T5, T6
- II 2G Ex ia IIC T4, T5, T6
- II 1 D Ex iaD 20 T100°C

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available upon request.

### Special features:

- Switching point and switch-back point factory-set according to customer specification (not field-adjustable)
- Accuracy  $\leq \pm 1\%$  FS
- Certificates: DEKRA EXAM BVS 07 ATEX E 041 X
- Various types of electrical connection
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	60; 100; 250; 400; 600 bar
Overload pressures	120; 200; 500; 800; 1000 bar
Burst pressures	300; 500; 1000; 2000; 2000 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301
	Seal: FPM
Output data	
Switch output	1 x PNP N/C or N/O
Output load	during operation: $I_{max} \leq 34$ mA
Switching point	Factory-set acc. to customer specification
Switch-back point	Factory-set acc. to customer specification
Accuracy to DIN 16086,	$\leq \pm 0.5\%$ FS typ.
Max. setting	$\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS at 25 °C
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Rising switch point and falling switch point delay	32 ms standard (8 .. 2000 ms factory-set to customer spec.)
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Environmental conditions	
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-20 .. +60 °C / +70 °C / +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 61241-0 / 11 EN 50303
Vibration resistance to	$\leq 20$ g
DIN EN 60068-2-6 at 10 .. 500 Hz	
Protection class to IEC 60529	IP 65 (male to EN175301-803 (DIN 43650)) IP 67 (M12x1 male, when an IP 67 connector is used)

### Relevant data for Ex applications

	I M1 II 1G, 1/2G, 2G	II 1 D
Supply voltage	14 .. 28 V DC	
Compensated temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Operating temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Max. ambient temperature $T_a$	T6: +60 °C T5, T4: +70 °C	T100: +70 °C
Max. input current	100 mA	93 mA
Max. input power	0.7 W	0.65 W
Max. internal capacitance	33 nF	33 nF
Max. internal inductance	0 mH	0 mH
Insulation voltage <sup>1)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Approved intrinsic safety barriers	Pepperl & Fuchs: Telematic Ex STOCK:	Z 787 MTL 7087

### Other data

Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

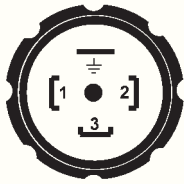
Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to the full measuring range  
<sup>1)</sup> 500 V AC on request

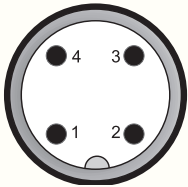
## Pin connections:

Pin connections are configured according to customer specification.

EN175301-803 (DIN 43650)



M12x1



## Safety instructions:

- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit from the switching output.
- Dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that measured fluids in contact with the pressure switch are compatible with the materials used.

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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Internet: [www.hydac.com](http://www.hydac.com)

## Areas of application:

Protection Type	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
Certificate	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X
Zones / Categories	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 0	Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0	Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20
		T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	T100: T <sub>a</sub> = 70 °C

Instruments for other Protection types and applications are available upon request. Please contact our technical sales department for more information.

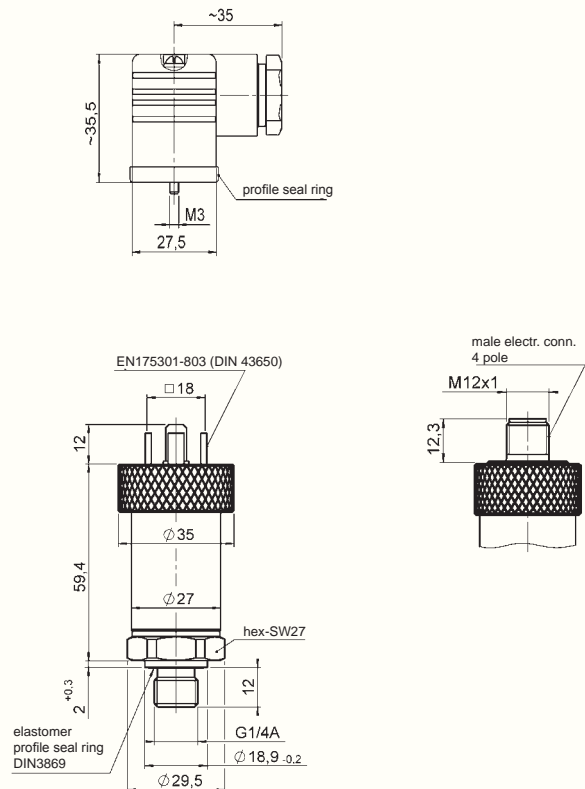
## Order details:

The electronic pressure switch EDS 4400 in ATEX version has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

## Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

## Dimensions:





## Electronic Pressure Switch EDS 4300 ATEX Intrinsicly Safe



(Minimum order quantity 50 units)

### Description:

The pressure switch EDS 4300 in ATEX version, has been specially developed for use in potentially explosive atmospheres, and is based on the EDS 4000 series.

The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set according to customer requirement (not field-adjustable).

As with the industry model, the EDS 4300 in ATEX version has a ceramic measurement cell with thick-film strain gauge for measuring relative pressure in the low pressure range.

With approval for the following

### Protection types and applications:

I M1	Ex ia I
II 1G	Ex ia IIC T4, T5, T6
II 1/2G	Ex ia IIC T4, T5, T6
II 2G	Ex ia IIC T4, T5, T6
II 1 D	Ex iaD 20 T100°C

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available upon request.

### Special features:

- Switching output factory-set (not field-adjustable)
- Accuracy  $\leq \pm 1\%$  FS
- Certificates:  
DEKRA EXAM BVS 07 ATEX E 041 X
- Various types of electrical connection
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	1; 2.5; 4; 6; 10; 16; 25; 40 bar
Overload pressures	3; 8; 12; 20; 32; 50; 80; 120 bar
Burst pressures	5; 12; 18; 30; 48; 75; 120; 180 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Sensor: Ceramic Mech. connection: 1.4301 Seal: FPM / EPDM

Output data	
Switch output	1 x PNP N/C or N/O
Output load	during operation: $I_{max} \leq 34$ mA
Switching point	factory-set to customer specification
Switch-back point	factory-set to customer specification
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS at 25 °C
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Rising switch point and falling switch point delay	32 ms standard; (8 .. 2000 ms factory-set to customer spec.)
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year

Environmental conditions	
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-20 .. +60 °C / +70 °C / +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 61241-0 / 11 EN 50303
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 (male to EN175301-803 (DIN 43650)) IP 67 (M12x1 male, when an IP 67 connector is used)

### Relevant data for Ex applications

	I M1 II 1G, 1/2G, 2G	II 1 D
Supply voltage	14 .. 28 V DC	
Compensated temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Operating temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Max. ambient temperature $T_a$	T6: +60 °C T5, T4: +70 °C	T100: +70 °C
Max. input current	100 mA	93 mA
Max. input power	0.7 W	0.65 W
Max. internal capacitance	33 nF	33 nF
Max. internal inductance	0 mH	0 mH
Insulation voltage <sup>1)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Approved intrinsic safety barriers	Pepperl & Fuchs: Telematic Ex STOCK:	Z 787 MTL 7087

Other data	
Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

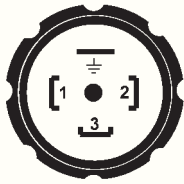
FS (Full Scale) = relative to the full measuring range

<sup>1)</sup> 500 V AC on request

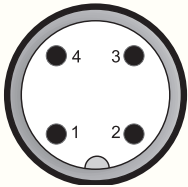
## Pin connections:

Pin connections are configured according to customer specification.

EN175301-803 (DIN 43650)



M12x1



## Safety instructions:

- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit from the switching output.
- Dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that measured fluids in contact with the pressure switch are compatible with the materials used.

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Areas of application:

Protection Type	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
Certificate	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X
Zones / Categories	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 0	Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0	Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20 T100: T <sub>a</sub> = 70 °C
		T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	T4, T5: T <sub>a</sub> = 70 °C T6: T <sub>a</sub> = 60 °C	

Instruments for other Protection types and applications are available on request. Please contact our technical sales department for more information.

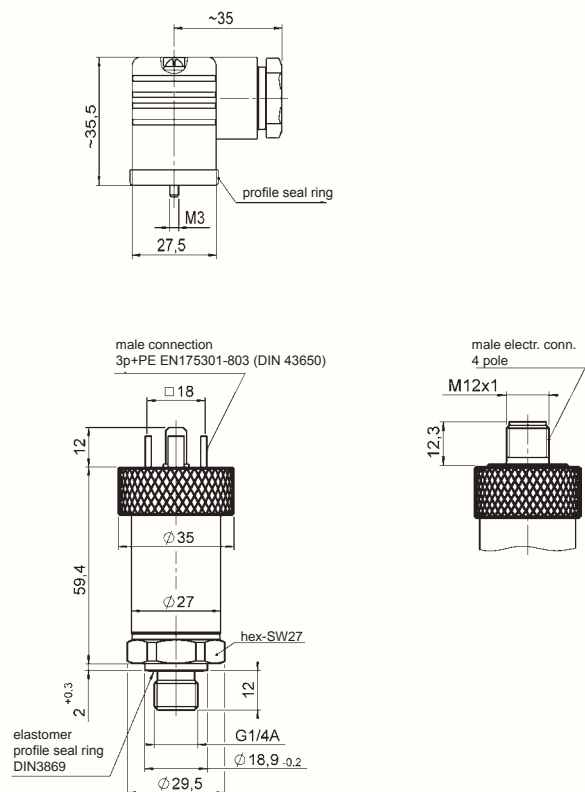
## Order details:

The electronic pressure switch EDS 4300 in ATEX version has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

### Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

## Dimensions:





## Electronic Pressure Switch EDS 4100 ATEX Intrinsicly Safe



(Minimum order quantity 50 units)

### Description:

The pressure switch EDS 4100 in ATEX version, has been specially developed for use in potentially explosive atmospheres, and is based on the EDS 4000 series.

The switching point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set according to customer requirement (not field-adjustable).

As with the industry model, the EDS 4100 in ATEX version has a ceramic measurement cell with thick-film strain gauge for measuring absolute pressure in the low pressure range.

With approval for the following

### Protection types and applications:

I M1 Ex ia I  
II 1G Ex ia IIC T4, T5, T6  
II 1/2G Ex ia IIC T4, T5, T6  
II 2G Ex ia IIC T4, T5, T6  
II 1 D Ex iaD 20 T100 °C

almost all requirements are covered regarding ignition group, error class and temperature class.

Versions for other Protection types and applications are available on request.

### Special features:

- Switching output factory-set (not field-adjustable)
- Accuracy  $\leq \pm 1\%$  FS
- Certificates:  
DEKRA EXAM BVS 07 ATEX E 041 X
- Various types of electrical connection
- Very small temperature error
- Excellent EMC characteristics
- Excellent durability

### Technical data:

Input data	
Measuring ranges	1; 2.5 bar
Overload pressures	3; 8 bar
Burst pressures	5; 12 bar
Mechanical connection	G1/4 A DIN 3852
Torque value	20 Nm
Parts in contact with medium	Sensor: Ceramic Mech. connection: 1.4301 Seal: FPM / EPDM

Output data	
Switch output	1 x PNP N/C or N/O
Output load	during operation: $I_{max} \leq 34$ mA
Switching point	factory-set to customer specification
Switch-back point	factory-set to customer specification
Accuracy to DIN 16086, Max. setting	$\leq \pm 0.5\%$ FS typ. $\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.1\%$ FS at 25 °C
Temperature drift	$\leq \pm 0.03\%$ FS / °C max. zero point $\leq \pm 0.03\%$ FS / °C max. range
Rising switch point and falling switch point delay	32 ms standard (8 .. 2000 ms factory-set to customer spec.)
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year

Environmental conditions	
Storage temperature range	-40 .. +100 °C
Fluid temperature range	-20 .. +60 °C / +70 °C / +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 61241-0 / 11 EN 50303
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 20$ g
Protection class to IEC 60529	IP 65 (male to EN175301-803 (DIN 43650)) IP 67 (M12x1 male, when an IP 67 connector is used)

### Relevant data for Ex applications

	I M1 II 1G, 1/2G, 2G	II 1 D
Supply voltage	14 .. 28 V DC	
Compensated temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -25 .. +70 °C	
Operating temperature range	T6: -20 .. +60 °C T5, T4: -20 .. +70 °C T100: -20 .. +70 °C	
Max. ambient temperature $T_a$	T6: +60 °C T5, T4: +70 °C	T100: +70 °C
Max. input current	100 mA	93 mA
Max. input power	0.7 W	0.65 W
Max. internal capacitance	33 nF	33 nF
Max. internal inductance	0 mH	0 mH
Insulation voltage <sup>1)</sup>	50 V AC, with integrated overvoltage protection EN 61000-6-2	
Approved intrinsic safety barriers	Pepperl & Fuchs: Telematic Ex STOCK:	Z 787 MTL 7087

### Other data

Residual ripple of supply voltage	$\leq 5\%$
Life expectancy	> 10 million cycles 0 .. 100 % FS
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

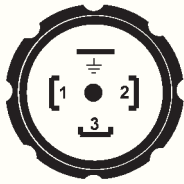
FS (Full Scale) = relative to the full measuring range

<sup>1)</sup> 500 V AC on request

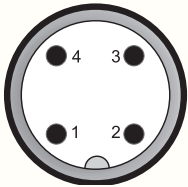
## Pin connections:

Pin connections are configured according to customer specification.

EN175301-803 (DIN 43650)



M12x1



## Safety instructions:

- The switching output draws the switching energy from the power supply to the pressure switch. No additional energy is introduced into the electrical circuit through the switching output.
- Dual Zener barriers specified and approved in the technical data must be used to connect the pressure switch. These have a reverse polarity diode to decouple the signal. The signal path may only be passively loaded.
- Ensure that the measured fluids in contact with the pressure switch are compatible with the materials used.

## Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

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## Areas of application:

Protection Type	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
Certificate	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X	DEKRA EXAM BVS 07 ATEX E 041 X
Zones / Categories	Group I Category M1 Mining Protection class: intrinsically safe ia with barrier	Group II Category 1G Gases Protection class: intrinsically safe ia with barrier For use in Zone 0	Group II Category 2G, 1/2G Gases Protection class: intrinsically safe ia with barrier For use in Zone 1, 2 For mounting to Zone 0	Group II Category iD Dusts Protection class: intrinsically safe ia with barrier For use in Zone 20, 21, 22 For mounting to Zone 20
		T4, T5: $T_a = 70\text{ °C}$ T6: $T_a = 60\text{ °C}$	T4, T5: $T_a = 70\text{ °C}$ T6: $T_a = 60\text{ °C}$	T100: $T_a = 70\text{ °C}$

Instruments for other protection types and applications are available on request. Please contact our technical sales department for more information.

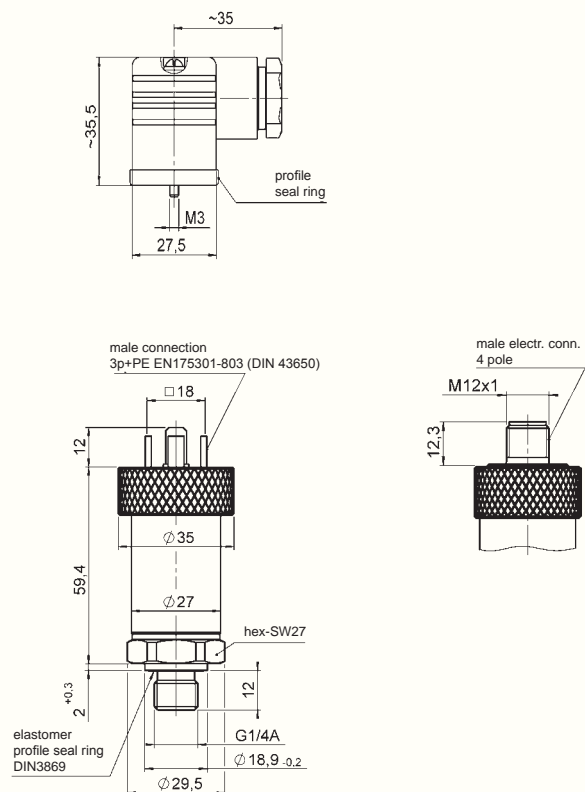
## Order details:

The electronic pressure switch EDS 4100 in ATEX version has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

## Accessories:

Appropriate accessories, such as electrical connectors can be found in the Accessories brochure.

## Dimensions:





## Electronic Temperature Transmitter HTT 8000

(Minimum order quantity 500 units)

### Description:

The HTT 8000 series of temperature transmitters was specifically developed for OEM applications e.g. in mobile applications. It is based on a silicon semiconductor device with corresponding evaluation electronics. All parts in contact with the medium are in stainless steel, and are welded together.

For integration into modern controls, standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V.

Ratiometric output signals are also available.

For the electrical connection, various built-in connections are available.

The pressure resistance up to 600 bar and excellent EMC characteristics make the HTT 8000 ideal for use in harsh conditions.

### Special features:

- Accuracy  $\leq \pm 1.5\%$  FS typ.
- Small, compact design
- Excellent EMC characteristics
- Long-term stability

### Technical data:

Input data	
Measuring principle	Silicon semiconductor device
Measuring range <sup>1)</sup>	-25 .. +125 °C
Probe length	16 mm
Pressure resistance	600 bar
Mechanical connection <sup>2)</sup> (Torque value)	G1/4 A DIN 3852 (20 Nm)
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal	e.g.: 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V, 0 .. 10 V, ratiometric: 0.5 .. 4.5 V for $U_B = 5$ V DC (10 .. 90 % $U_B \pm 5\%$ ), etc.
Accuracy (at room temperature)	$\leq \pm 1.0\%$ FS typ. $\leq \pm 2.0\%$ FS max.
Temperature drift (environment)	$\leq \pm 0.02\%$ FS / °C
Rise time to DIN EN 60751	$t_{50} \sim 4$ s $t_{90} \sim 8$ s
Environmental conditions	
Ambient temperature range <sup>3)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>3)</sup>	-40 .. +125 °C / -25 .. +125 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>4)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 25$ g
Shock resistance to DIN EN 60068-2-27	100 g / 6 ms / half sine 500 g / 1 ms / half sine
Protection class to IEC 60529	IP 67
Other data	
Electrical connection	M12x1, 4 pole AMP DIN 72585 code 1, 3 pole Packard Metri Pack Series 150, 3 pole Deutsch DT 04, 3 pole AMP Superseal, 3 pole AMP Junior Power Timer, 3 pole Flying leads, 1 m cable length EN175301-803 (DIN 43650), 3 pole. + PE
Supply voltage	8 .. 30 V DC 12 .. 30 V DC for 0 .. 10 V, 5 V DC $\pm 5\%$ (ratiometric) - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
for use acc. to UL spec.	
Current consumption	$\leq 25$ mA
Residual ripple of supply voltage	$\leq 5\%$
Weight	$\sim 145$ g

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short circuit protection are provided.

**FS (Full Scale)** = relative to the complete measuring range

<sup>1)</sup> Other measuring ranges on request

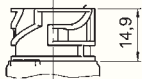
<sup>2)</sup> Other mechanical connections on request

<sup>3)</sup> -25 °C with FPM seal, -40 °C on request

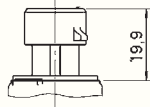
<sup>4)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Dimensions:

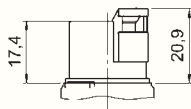
Male connection  
DIN 72585  
3 pole



Male connection  
Metri-Pack series 150  
3 pole



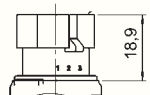
Male connection  
DT04 3 pole



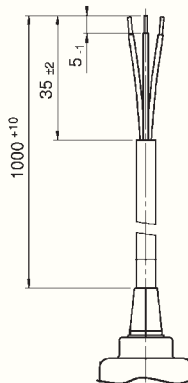
Male connection  
Junior Power Timer  
3 pole



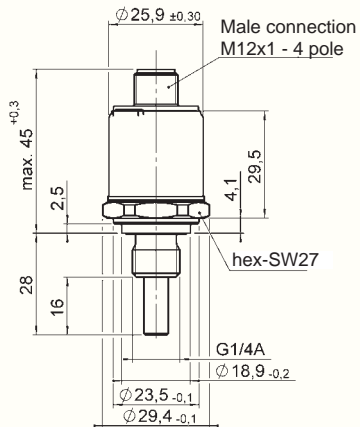
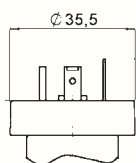
Male connection  
Superseal series 1.5  
3 pole



Flying leads



Male connection  
EN175301-803 (DIN 43650)  
3 pole + PE



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Order details:

The electronic temperature transmitter HTT 8000 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

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Internet: [www.hydac.com](http://www.hydac.com)





## Electronic Temperature Switch HTS 8000

(Minimum order quantity 500 units)

### Description:

The temperature switch series HTS 8000 has been specifically developed for the OEM market, e.g. in mobile applications. It is based on a silicon semiconductor device with corresponding evaluation electronics.

All parts in contact with the medium are in stainless steel, and are welded together.

The transistor switching output is available with either a N/C or a N/O function.

The switching and switch-back point of the HTS 8000 is factory-set according to customer specification.

For the electrical connection, various built-in connections are available.

With a pressure resistance of 600 bar and excellent EMC characteristics, the HTS 8000 is ideal for use in harsh conditions.

### Special features:

- Accuracy  $\leq \pm 1.5\%$  FS typ.
- Small, compact design
- Excellent EMC characteristics
- Long-term stability

### Technical data:

Input data	
Measuring principle	Silicon semiconductor device
Measuring range <sup>1)</sup>	-25 .. +125 °C
Probe length	16 mm
Pressure resistance	600 bar
Mechanical connection <sup>2)</sup> (Torque value)	G1/4 A DIN 3852 (20 Nm)
Parts in contact with medium	Mech. conn.: Stainless steel Seal: FPM
Output data	
Output signal	Either - 1 PNP transistor switching output - 2 PNP transistor switching outputs (only in conjunction with electr. conn. M12x1, 4 pole)
Switching direction	N/C / N/O function (according to customer specification)
Output load	$\leq 500$ mA per switching output
Switching points / switch-back points	according to customer specification
Accuracy (at room temperature)	$\leq \pm 1.0\%$ FS typ. $\leq \pm 2.0\%$ FS max.
Temperature drift (environment)	$\leq \pm 0.02\%$ FS / °C
Accuracy to DIN 16086, Max. setting	$\leq \pm 3.0\%$ FS max. $\leq \pm 1.5\%$ FS typ.
Repeatability (at 25 °C)	$\leq \pm 1\%$ FS max.
Rising switch point and falling switch point delay	32 ms standard (8 .. 2000 ms pre-set to customer spec.)
Environmental conditions	
Ambient temperature range <sup>3)</sup>	-40 .. +85 °C / -25 .. +85 °C
Storage temperature range	-40 .. +100 °C
Fluid temperature range <sup>3)</sup>	-40 .. +125 °C / -25 .. +125 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
UL mark <sup>4)</sup>	Certificate No. E318391
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	$\leq 25$ g
Shock resistance to DIN EN 60068-2-27	100 g / 6 ms / half sine 500 g / 1 ms / half sine
Protection class to IEC 60529	IP 67
Other data	
Electrical connection	M12x1, 4 pole AMP DIN 72585 code 1, 3 pole Packard Metri Pack Series 150, 3 pole Deutsch DT 04, 3 pole AMP Superseal, 3 pole AMP Junior Power Timer, 3 pole Flying lead, 1 m cable length EN175301-803 (DIN 43650), 3 pole + PE
Supply voltage for use acc. to UL spec.	8 .. 32 V DC - limited energy - according to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Current consumption	$\leq 20$ mA with inactive switching outputs $\leq 0.52$ A with 1 switching output $\leq 1.02$ A with 2 switching outputs
Residual ripple of supply voltage	$\leq 5\%$
Weight	$\sim 145$ g

Note: Reverse polarity protection of the supply voltage, excess voltage, override, short-circuit protection are provided.

FS (Full Scale) = relative to the complete measuring range

<sup>1)</sup> Other measuring ranges on request

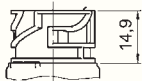
<sup>2)</sup> Other mechanical connections on request

<sup>3)</sup> -25 °C with FPM seal, -40 °C on request

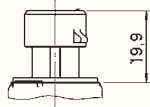
<sup>4)</sup> Environmental conditions according to 1.4.2 UL 61010-1; C22.2 No 61010-1

## Dimensions:

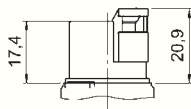
Male connection  
DIN 72585  
3 pole



Male connection  
Metri-Pack series 150  
3 pole



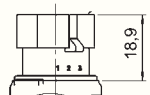
Male connection  
DT04 3 pole



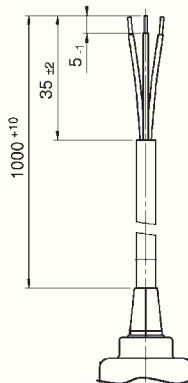
Male connection  
Junior Power Timer  
3 pole



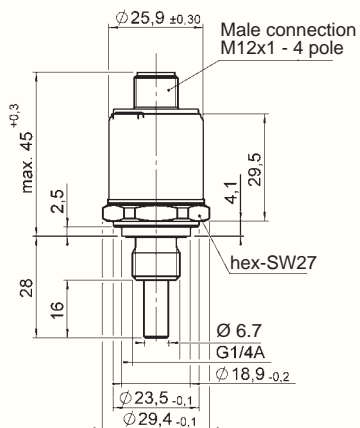
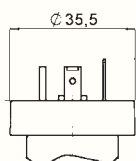
Male connection  
Superseal series 1.5  
3 pole



Flying leads



Male connection  
EN175301-803 (DIN 43650)  
3 pole + PE



## Note:

The information in this brochure relates to the operating conditions and applications described. For applications and operating conditions not described, please contact the relevant technical department. Subject to technical modifications.

## Order details:

The electronic temperature switch HTS 8000 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type. For a precise specification, please contact the Sales Department of HYDAC ELECTRONIC.

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Internet: [www.hydac.com](http://www.hydac.com)



## Electronic Position Switch HLS 100 for Applications with Increased Functional Safety

**Functional Safety**  
PL d  
SIL 2



(Minimum order quantity 100 units)

### Description:

The position switch series HLS 100 has been specifically developed to detect the end position of safety-related devices on mobile machinery.

The position switches are designed for continuous use in safety circuits/safety functions as part of the functional safety of machines up to SIL 2 (IEC 61508) or PL d (ISO 13849).

The HLS 100 consists of two parts, the encoder magnet and the sensor unit.

Using two Hall sensors integrated into the sensor unit, the sensor detects the defined position (end position) of the magnet and transmits the switching condition "ON" if this position is detected, or otherwise the switching condition "OFF".

Switching conditions are output as permanent PWM signals.

During stable normal operation, the position switch cyclically performs internal diagnostic steps, which identify systematic and random errors.

Errors which occur are therefore detected immediately. The output signal is then deactivated completely and the sensor is restarted.

### Special features:

- Compact design
- Robust housing suitable for mobile applications
- High operating temperature range
- PWM output
- IP 67 male connector
- SIL 2 / PL d certification

### Technical data:

Input data	
Switching range <sup>1)</sup>	± 3 .. ± 9 mm
Switching distance magnet – sensor <sup>1)</sup>	0 .. 11 mm
Lateral offset magnet – sensor <sup>1)</sup>	± 6 mm
Steel plate thickness	Magnet: min. 5 mm Sensor: 6 .. 8 mm
Output data	
Type	PWM 50 Hz ± 3 % (Push-Pull)
Duty cycle of the output signal OFF (magnet outside the switching range)	26 ± 1 %
Duty cycle of the output signal ON (magnet within the switching range)	74 ± 1 %
Output current consumption	
High level	60 mA min. / 150 mA max.
Low level	30 mA min. / 110 mA max.
Output voltage	
High level	> +U <sub>B</sub> – 1.2 V at I = 10 mA
Low level	< GND + 0.2 V at I = 10 mA
Response times after activation	0.5 .. 1.5 s
Output signal response time	< 100 ms
Internal diagnostic interval	≤ 500 ms typ. (hardware) ≤ 1 s (memory modules)
Environmental conditions	
Nominal temperature range (function)	-30 .. +85 °C
Operating temperature range (failsafe)	-40 .. +100 °C
Storage temperature range	-60 .. +110 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4
Functional safety	SIL 2 to EN 61508 PL d to ISO 13849
Vibration resistance to DIN EN 60068-2-6 at 10 .. 500 Hz	25 g
Shock resistance to DIN EN 60068-2-29 (6 ms)	50 g (half sine)
Protection class to IEC 60529	IP 67
Other data	
Electrical connection <sup>2)</sup>	Male ITT Canon Sure Seal, 3 pole
Supply voltage	8 .. 32 V DC
Current consumption	< 10 mA (inactive output)
Residual ripple of supply voltage	≤ 5 %
Life expectancy	10 years
Weight	Sensor ~ 75 g Magnet ~ 25 g
Safety-related data	
Performance level	
Based on	DIN EN ISO 13849-1: 2008
PL	d
Architecture	Category 2
Safety Integrity Level	
Based on	DIN EN 61508: 2001 1oo1 - B
SIL	2

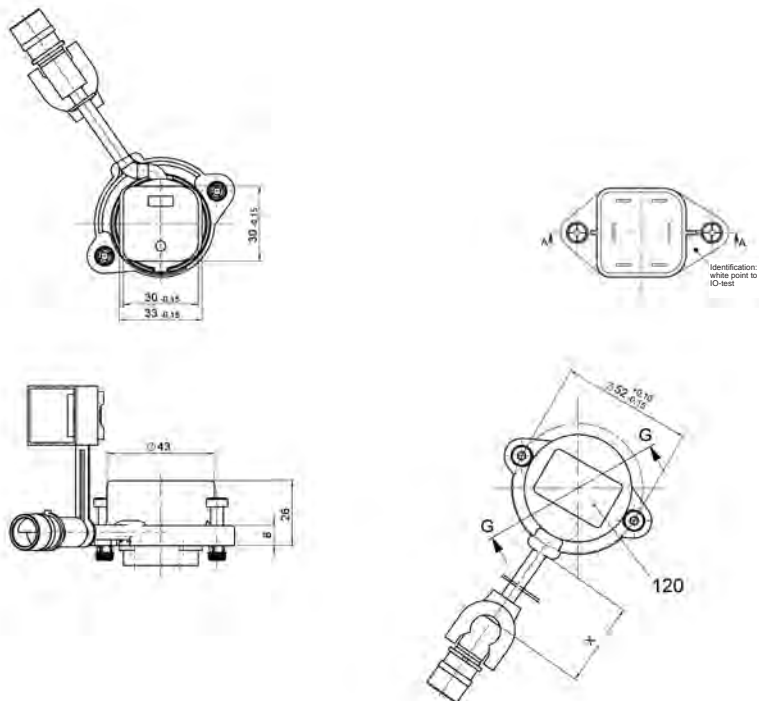
Note: Reverse polarity protection of the supply voltage, excess voltage, override, short circuit protection are provided.

**FS (Full Scale)** = relative to the complete measuring range

<sup>1)</sup> All values apply to installation in magnetic steel plate of the required material thickness. If installed in thicker steel plate or other materials, the entire system must be tested thoroughly.

<sup>2)</sup> Other connectors available on request

## Dimensions:



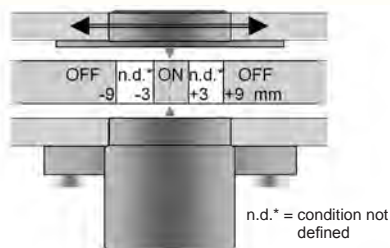
## Order details:

The electronic positioning switch HLS 100 has been especially developed for OEM customers and is available for minimum order quantities of 100 units per type.

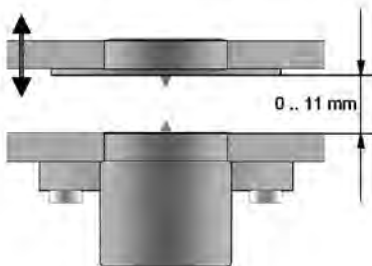
For a precise specification, please contact the Sales Department of HYDAC ELECTRONIC.

## Switching ranges:

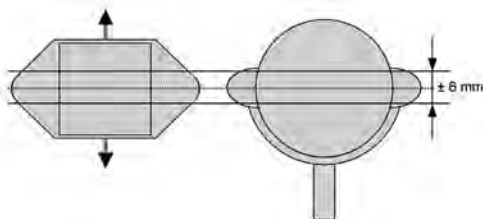
### Switching range:



### Switching distance:



### Lateral offset:



## Note:

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## Special Products Position Sensors and Position Switches

The position sensors and switches have been developed for short distance monitoring and can be used on the one hand for monitoring valve settings and on the other as part of a control. Based on different measuring techniques, HYDAC provides different variants for a diverse range of applications.



### Position switch IES 2010 / 2015 / 2020

The position switch for monitoring valve settings (end or centre position) is primarily used in stationary applications such as:

- Hydraulic presses
- Plastics machines
- Machine tools

#### Special features:

- Pressure resistant to 400 bar
- Inductive measurement (LVDT)
- Various stroke sizes
- Output: 2 switching outputs with change-over function
- Electrical connection: M12x1 (4 pole)



### Position sensor IWE 40

The IWE 40 position sensors for short distance detection are primarily used in stationary applications such as:

- Hydraulic presses
- Plastics machines
- Machine tools

#### Special features:

- Pressure resistant to 400 bar
- Inductive measurement (LVDT)
- Different measuring ranges (up to max.  $\pm 7$  mm)
- Output: Analogue 4 .. 20 mA
- Electrical connection: M12x1 (4 pole)



### Position switch HLS 200 with increased functional safety

Functional Safety  
PL d

The position switch HLS 200 is used for reliable detection of valve centre positions. They are used both in mobile and in stationary applications.

#### Special features:

- PL d certification
- Measuring technique: IR light barriers
- Output: 2 switching outputs with change-over function
- Electrical connection: M12x1 (4 pole); Deutsch DT 04 (4 pole)

### Order details:

The position sensors and position switches are OEM products which have been especially developed for volume production customers. For a precise specification, please contact the Sales Department of HYDAC ELECTRONIC.

### Note:

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## ACCESSORIES

Accessories to suit every sensor!

Whether it's electrical connectors, mechanical adapters or the instrument mounting clamps, the wide range of products from HYDAC offers solutions for all applications.

Saving time on installation and commissioning.

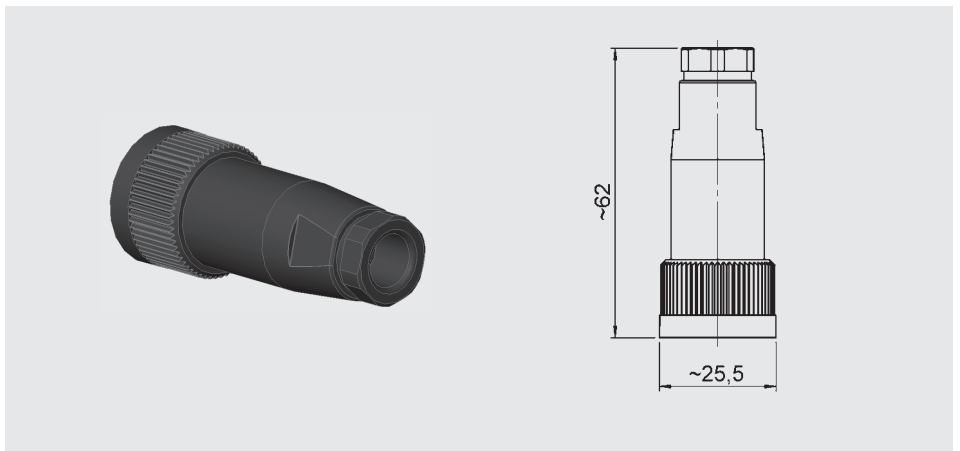
<u>Electrical Accessories</u>	<u>Page</u>
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## Electrical Accessories Female Connectors for Sensors

### ZBE 02

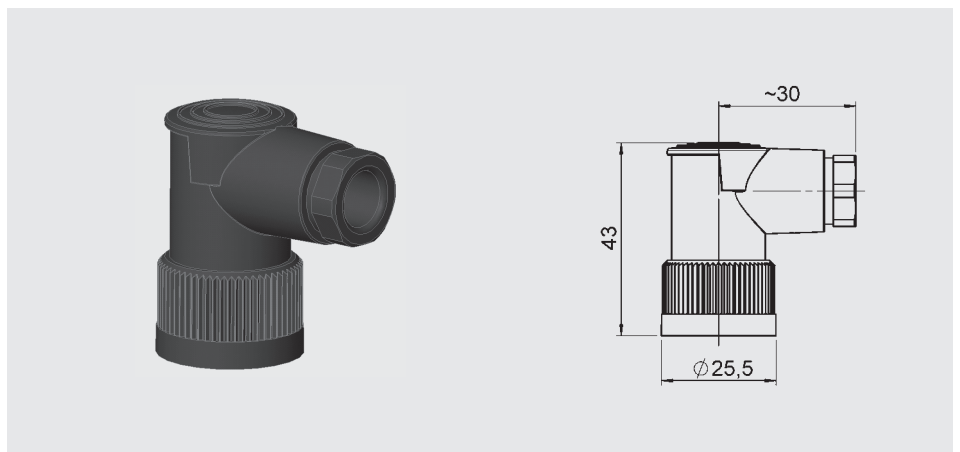
Female connector  
Binder Series 714 M18  
4 pole, straight  
Cable diameter: 6.5 .. 8 mm  
Part No.: 609479

**With electrical connection type "4":  
(Male Binder series 714 M18)**



### ZBE 03

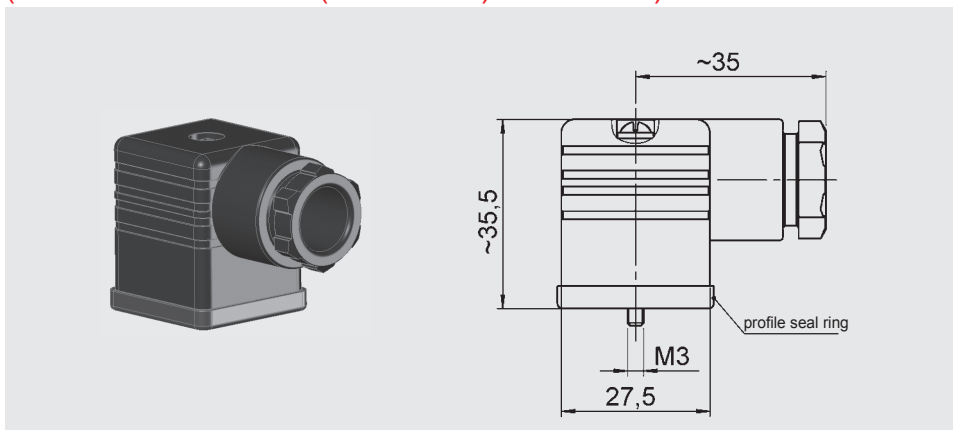
Female connector  
Binder Series 714 M18  
4 pole, right-angle  
Cable diameter: 6.5 .. 8 mm  
Part No.: 609480



### ZBE 01

Female connector  
EN175301-803 (DIN 43650) / ISO 4400  
3 pole + PE, right-angle  
Cable diameter: 4.5 .. 7 mm  
Part No.: 905701

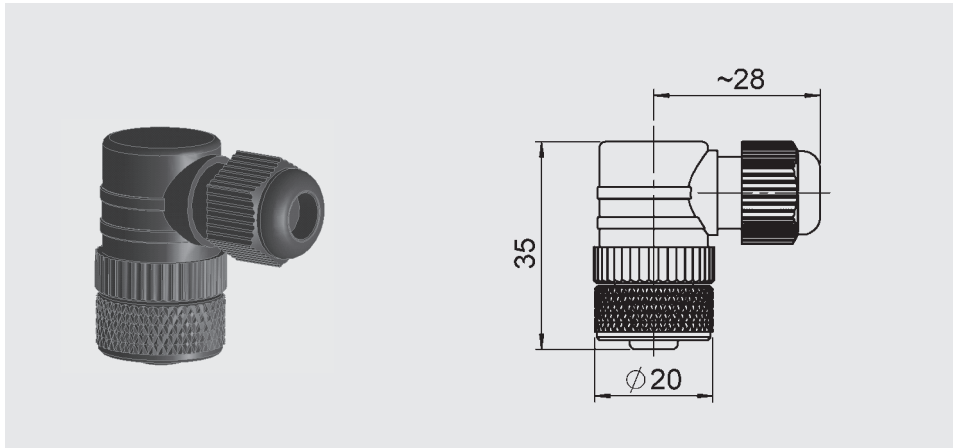
**With electrical connection type "5":  
(Male EN175301-803 (DIN 43650) / ISO 4400)**



## ZBE 06

Female connector M12x1  
4 pole, right-angle  
Cable diameter: 2.5 .. 6.5 mm  
Part No.: 6006788

**With electrical connection type "6":  
(Male M12x1, 4 pole)**



## ZBE 06-02

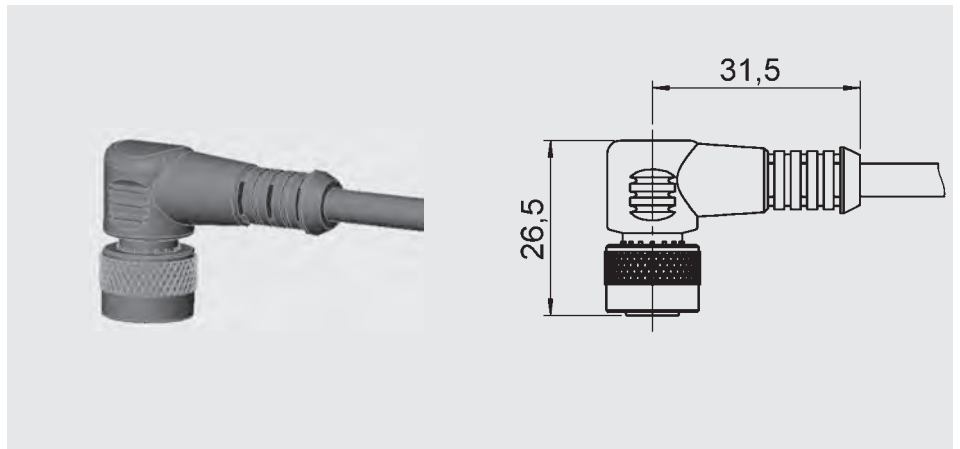
Female connector M12x1  
4 pole, right-angle  
with 2 m cable  
Part No.: 6006790

## ZBE 06-05

Female connector M12x1  
4 pole, right-angle  
with 5 m cable  
Part No.: 6006789

Colour code:

Pin 1: brown  
Pin 2: white  
Pin 3: blue  
Pin 4: black

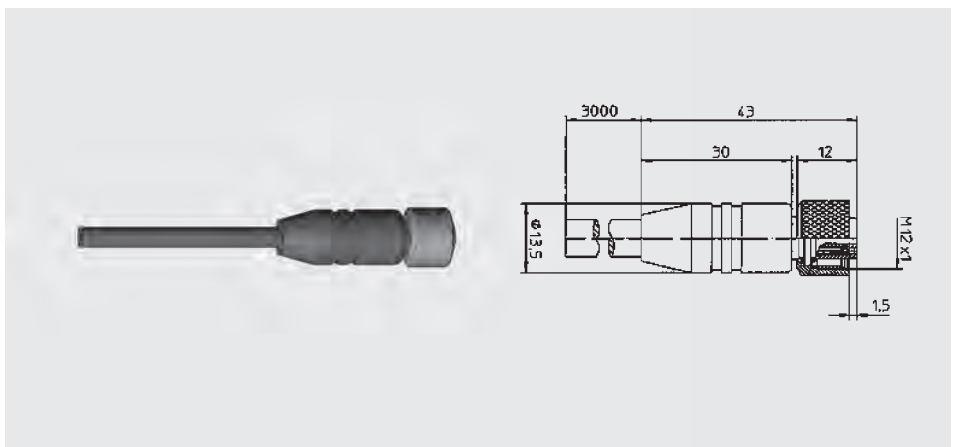


## ZBE 06S-03

Female connector M12x1  
4-pole, straight  
with 3 m cable, shielded  
Part No.: 6098243

## ZBE 06S-05

Female connector M12x1  
4-pole, straight  
with 5 m cable, shielded  
Part No.: 6143284

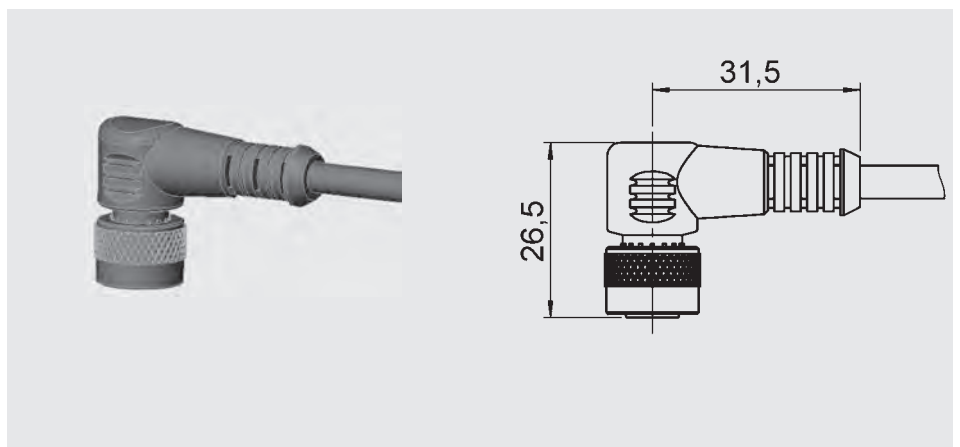


## ZBE 06S-05

Female connector M12x1  
4 pole, right-angle  
with 5 m cable, shielded  
Part No.: 6044891

Colour code:

Pin 1: brown  
Pin 2: white  
Pin 3: blue  
Pin 4: black

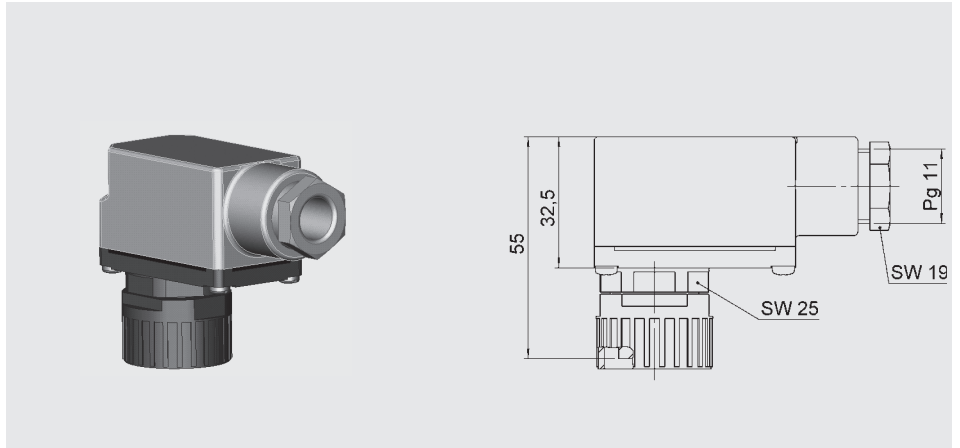




## ZBE 10

Female connector DIN 43651  
6 pole + PE, right-angle  
Cable diameter: 7 .. 9 mm  
Part No.: 654527

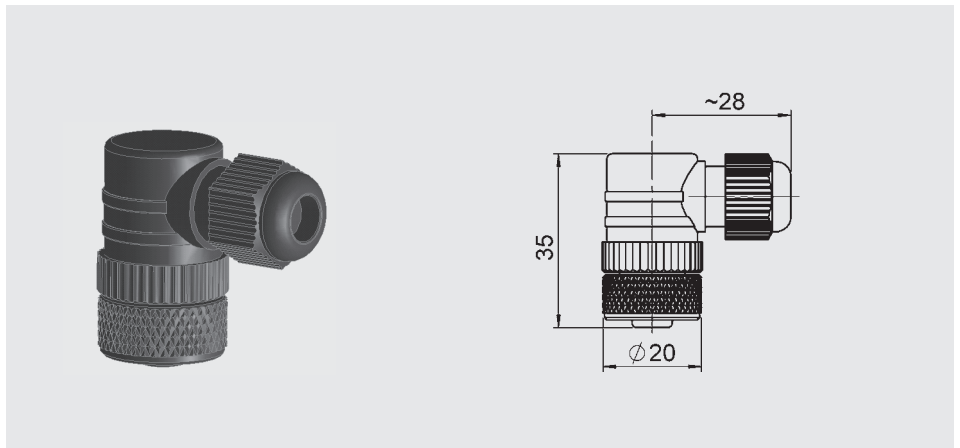
### With electrical connection type "7": (Male DIN 43651)



## ZBE 08

Female connector M12x1  
5 pole, right-angle  
Cable diameter: 2.5 .. 6.5 mm  
Part No.: 6006786

### With electrical connection type "8": (Male M12x1, 5 pole)



## ZBE 08-02

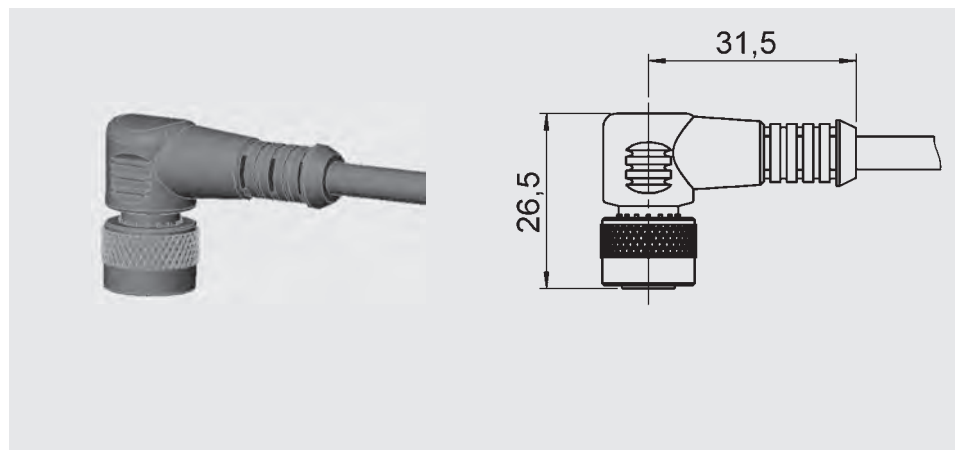
Female connector M12x1  
5 pole, right-angle  
with 2 m cable  
Part No.: 6006792

## ZBE 08-05

Female connector M12x1  
5 pole, right-angle  
with 5 m cable  
Part No.: 6006791

Colour code:

- Pin 1: brown
- Pin 2: white
- Pin 3: blue
- Pin 4: black
- Pin 5: grey



### ZBE 08S-02

Female connector M12x1  
5 pole, right-angle  
with 2 m cable, shielded  
Part No.: 6019455

### ZBE 08S-05

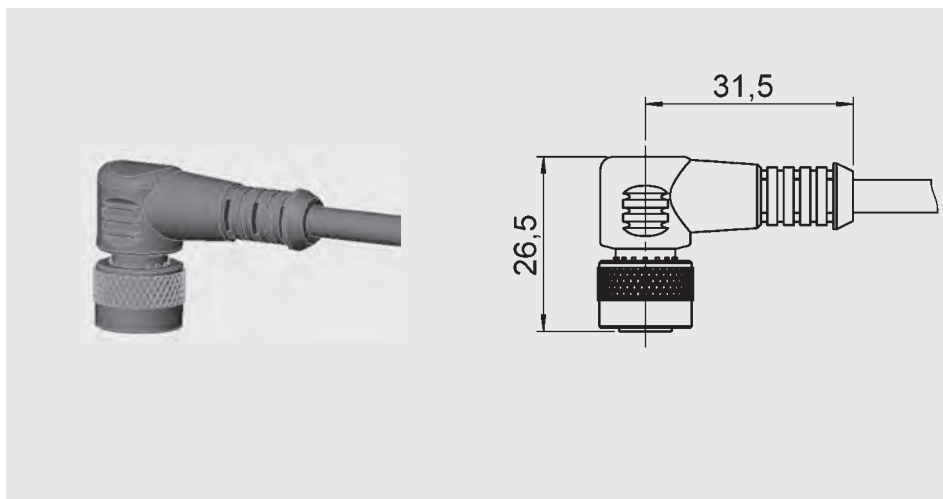
Female connector M12x1  
5 pole, right-angle  
with 5 m cable, shielded  
Part No.: 6019456

### ZBE 08S-10

Female connector M12x1  
5 pole, right-angle  
with 10 m cable, shielded  
Part No.: 6023102

Colour code:

- Pin 1: brown
- Pin 2: white
- Pin 3: blue
- Pin 4: black
- Pin 5: grey

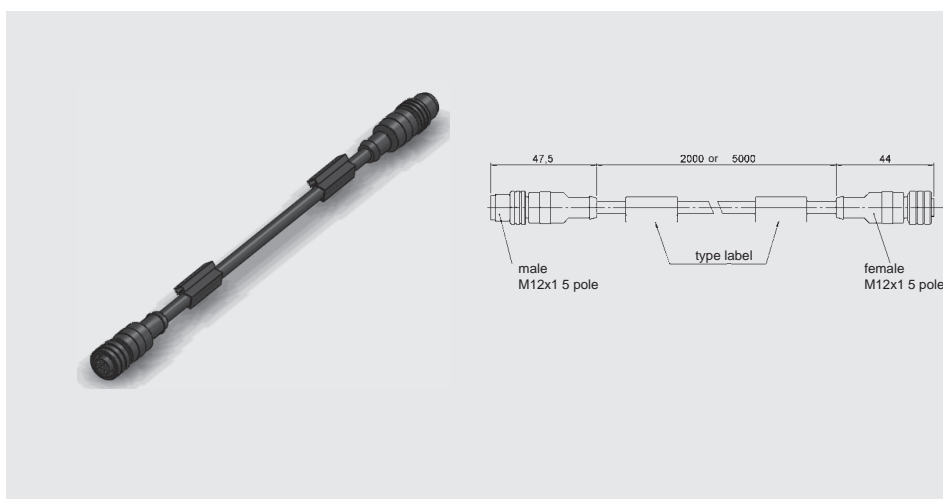


### ZBE 30-02

Connection cable M12x1  
plug/socket  
5 pole, 2 m  
Part No.: 6040851

### ZBE 30-05

Connection cable M12x1  
plug/socket  
5 pole, 5 m  
Part No.: 6040852



## ZBE 0P

Female connector M12x1  
8 pole, right-angle  
Cable diameter: 4 .. 8 mm  
Part No.: 6055444

## ZBE 0P-02

Female connector M12x1  
8 pole, right-angle  
with 2 m cable  
Part No.: 6052697

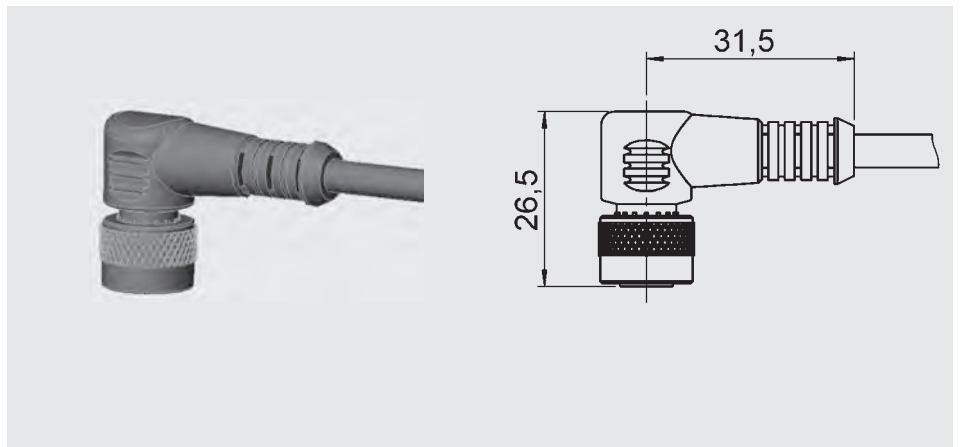
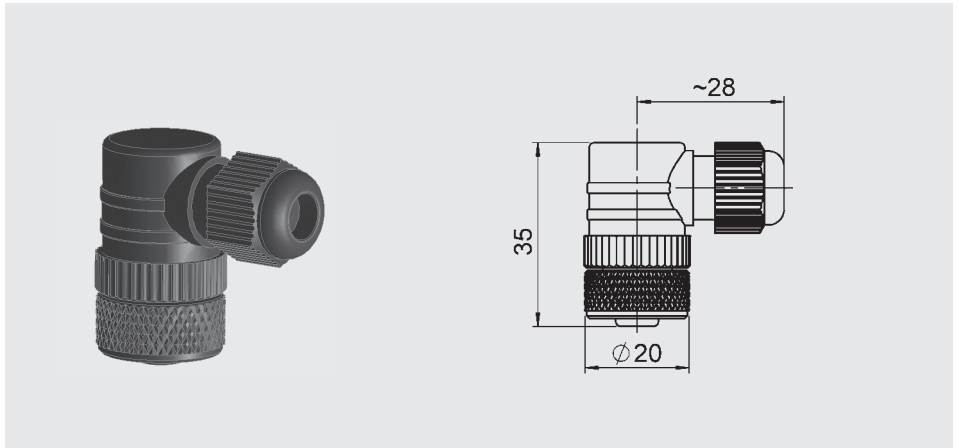
## ZBE 0P-05

Female connector M12x1  
8 pole, right-angle  
with 5 m cable  
Part No.: 6052698

Colour code:

- Pin 1: white
- Pin 2: brown
- Pin 3: green
- Pin 4: yellow
- Pin 5: grey
- Pin 6: pink
- Pin 7: blue
- Pin 8: red

**With electrical connection type "P":  
(Male M12x1, 8 pole)**



**Note:**

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Subject to technical modifications.

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## Mechanical Accessories

### ZBM 01

Adapter female thread G1/4 – male thread G1/2 B, DIN EN 837-1

Part No.: 257276

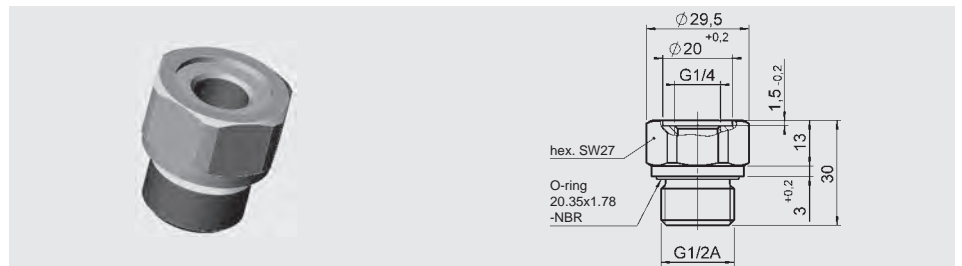
### Connection accessories for pressure sensors



### ZBM 02

Adapter female thread G1/4 – male thread G1/2 A, DIN 3852

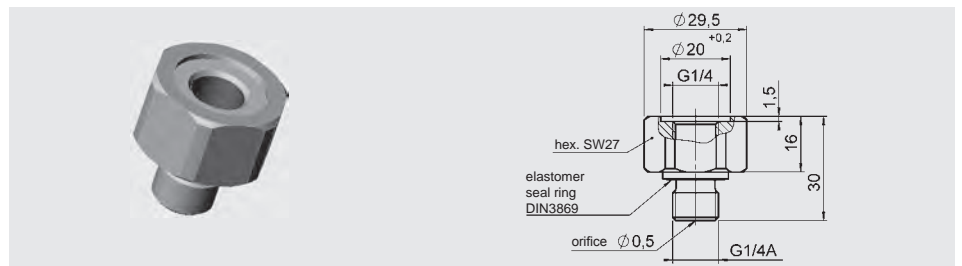
Part No.: 257277



### ZBM 13

Adapter female thread G1/4 – male thread G1/4 A, with orifice 0.5 mm

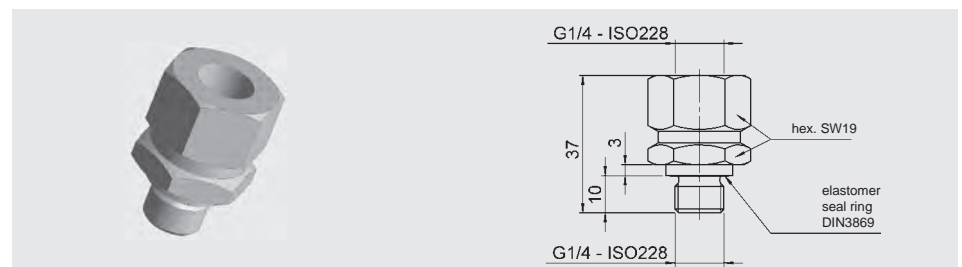
Part No.: 906968



### ZBM 14

Adapter female thread G1/4 – male thread G1/4 (rotating)

Part No.: 907818



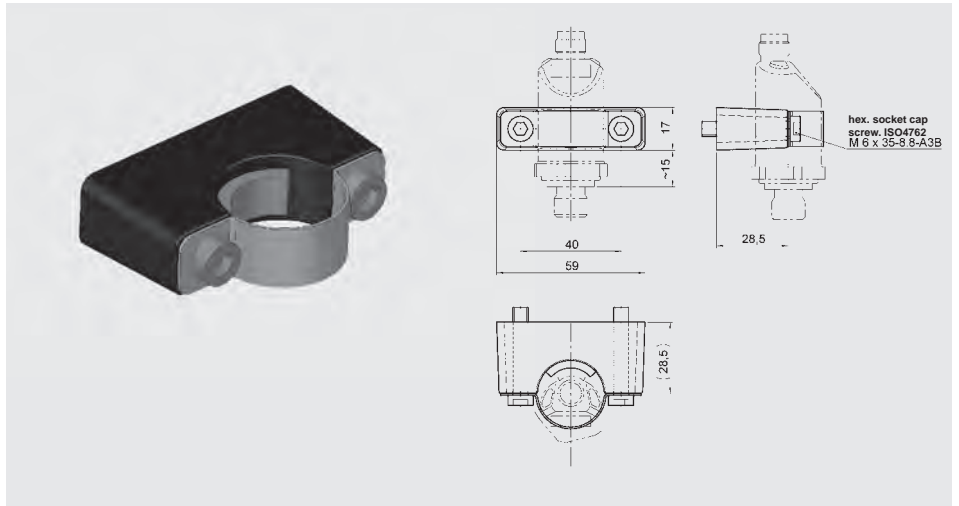
## Mounting accessories, device-specific EDS 8000, HDA 8000; EDS 810

### ZBM 8000

Clamp for wall-mounting  
- screw-type fitting -

(Material of lower section:  
TPE Santoprene 10187;  
Material of top section:  
Steel strip DIN 95381-1.4571)

Part No.: 3546755

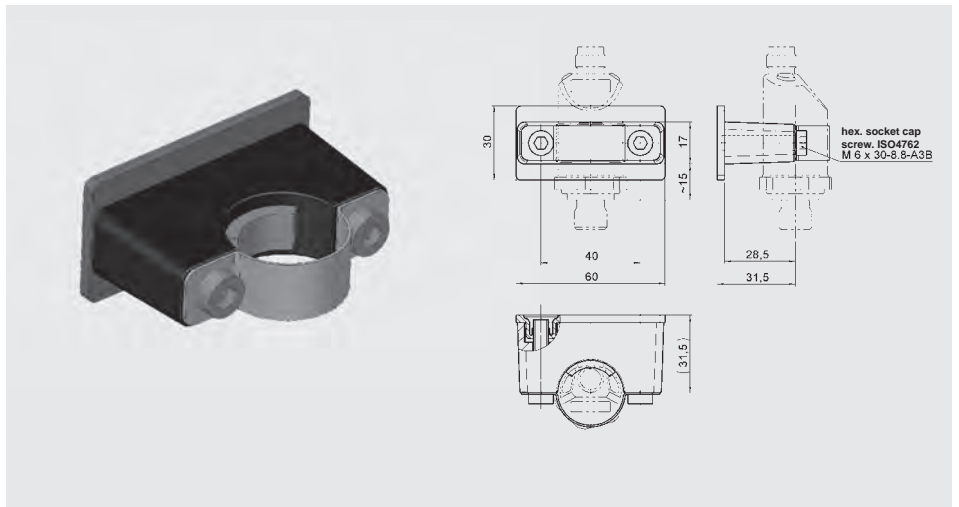


### ZBM 8100

Clamp for wall-mounting  
- weld-type fitting -

(Material of welding bridge:  
QSTE340TM, zinc coating  
EN 12329 FE/ZN8/B;  
Material of lower section:  
TPE Santoprene 10187;  
Material of top section:  
Steel strip DIN 95381-1.4571)

Part No.: 3546757



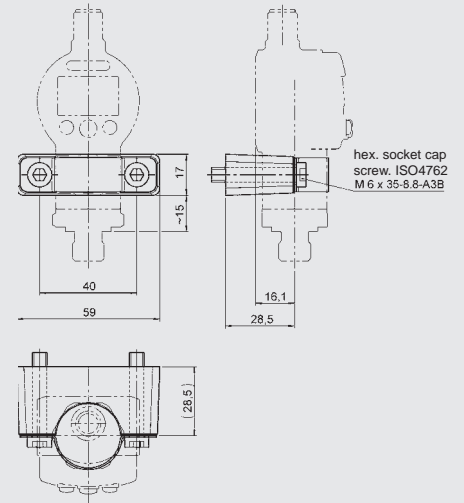
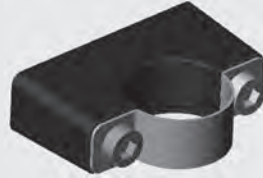
**Mounting accessories, device-specific**  
**EDS 3000, ETS 3000, AS 3000, ENS 3000 and HNS 3000**

**ZBM 3000**

Clamp for wall-mounting  
 - screw-type fitting -

(Material of lower section:  
 TPE Santoprene 10187;  
 Material of top section:  
 Steel strip DIN 95381-1.4571)

Part No.: 3184630

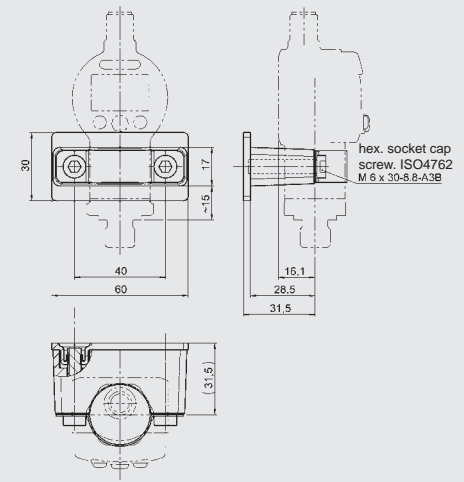


**ZBM 3100**

Clamp for wall-mounting  
 - weld-type fitting -

(Material of welding bridge:  
 QSTE340TM, zinc coating  
 EN 12329 FE/ZN8/B;  
 Material of lower section:  
 TPE Santoprene 10187;  
 Material of top section:  
 Steel strip DIN 95381-1.4571)

Part No.: 3184632

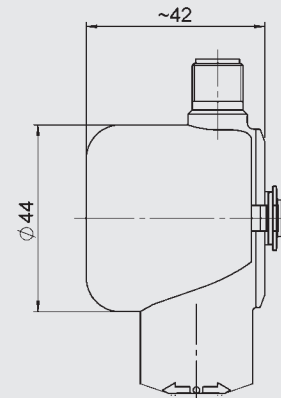


**ZBM 3200**

Splash guard

(Material:  
 Elastollan S60 A15 SPF 000)

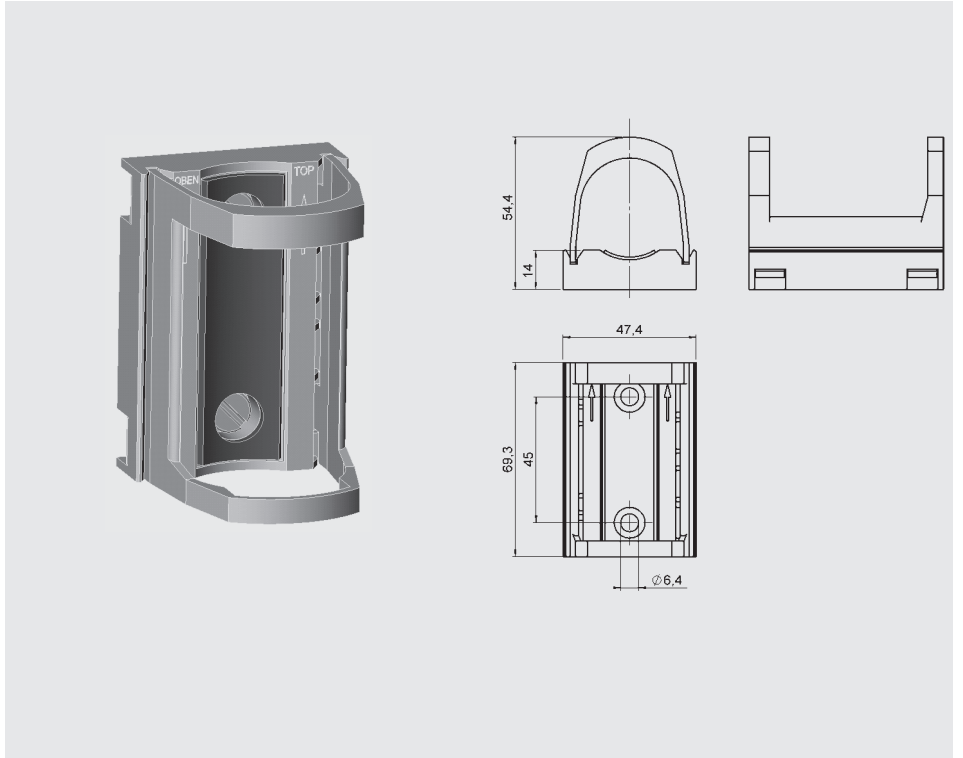
Part No.: 3201919



**Mounting accessories, device-specific  
EDS 300, ETS 300**

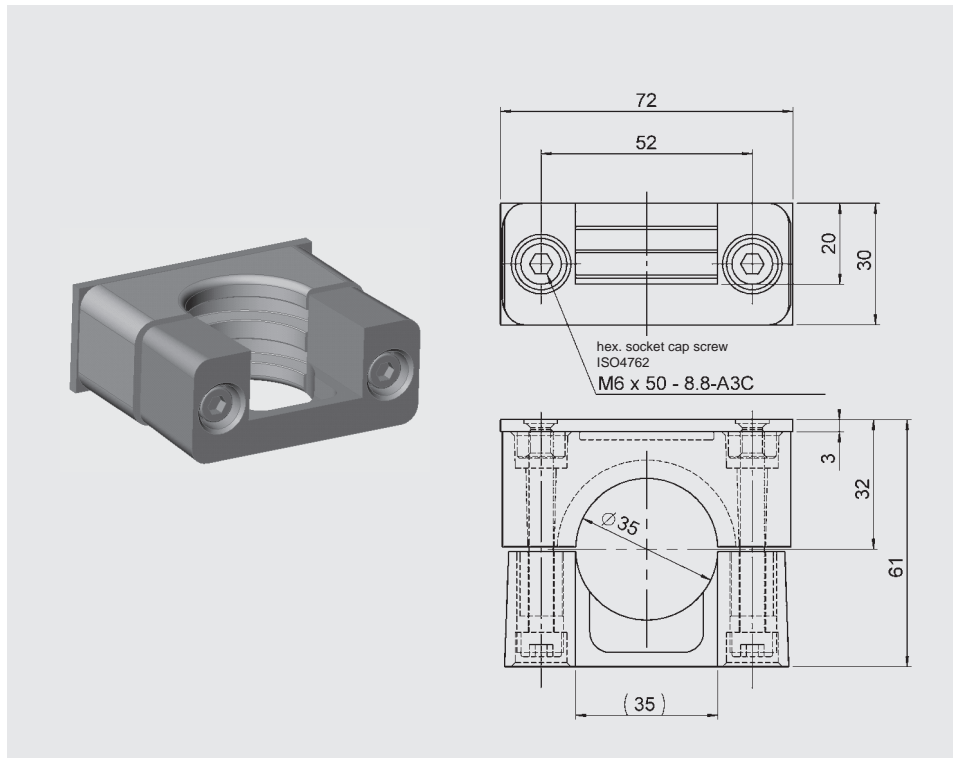
**ZBM 300**

Clamp for wall-mounting  
- screw-type fitting -  
(Material polypropylene)  
Part No.: 906385



**ZBM 310**

Clamp for wall-mounting  
- weld-type fitting -  
(Material polypropylene,  
aluminium AlSi12, steel)  
Part No.: 6011511

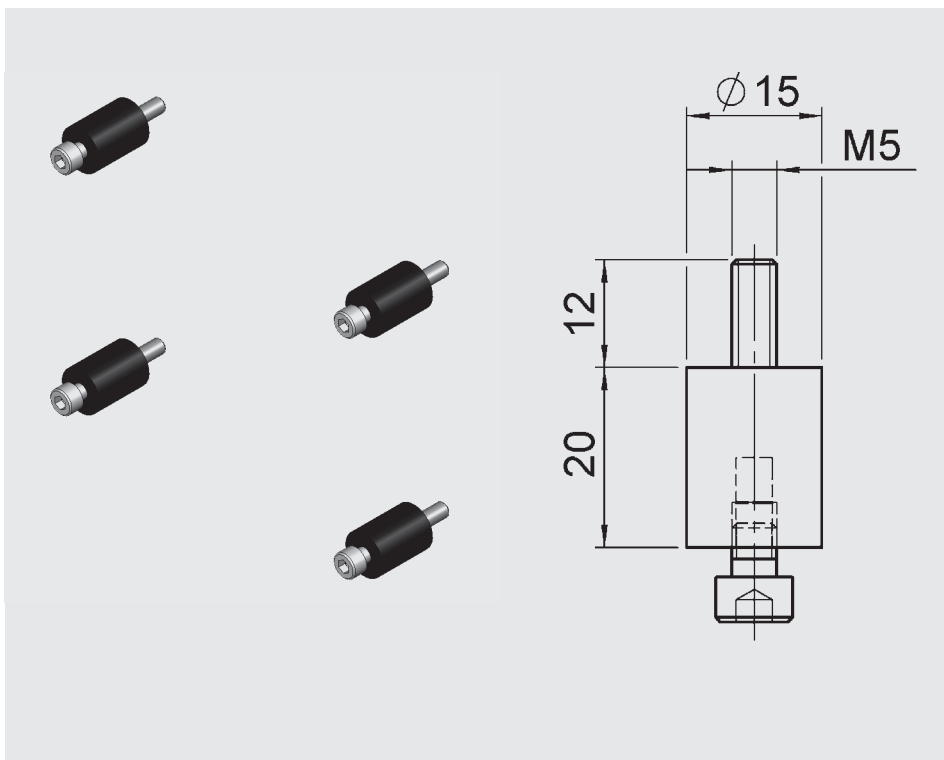




## Vibration mounts

Part No.: 257492

## Mounting accessories, device-specific EDS 1700, ETS 1700

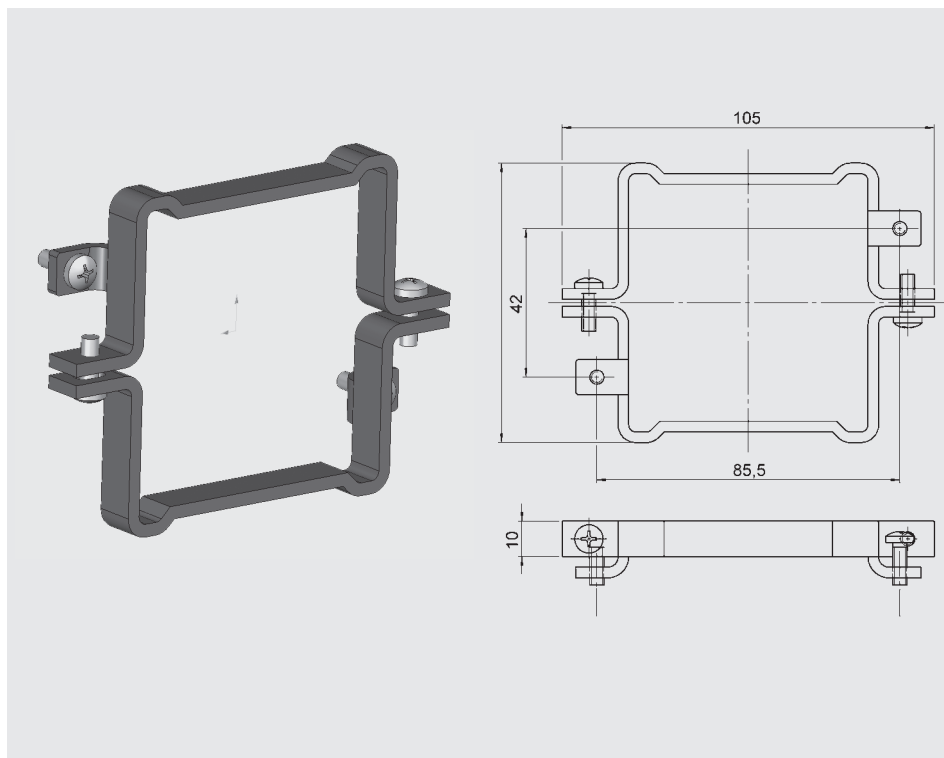


## Mounting kit EDS 601

- for front panel mounting-  
(St4K32 DIN 1544)

Part No.: 905404

## Mounting accessories, device-specific EDS 601

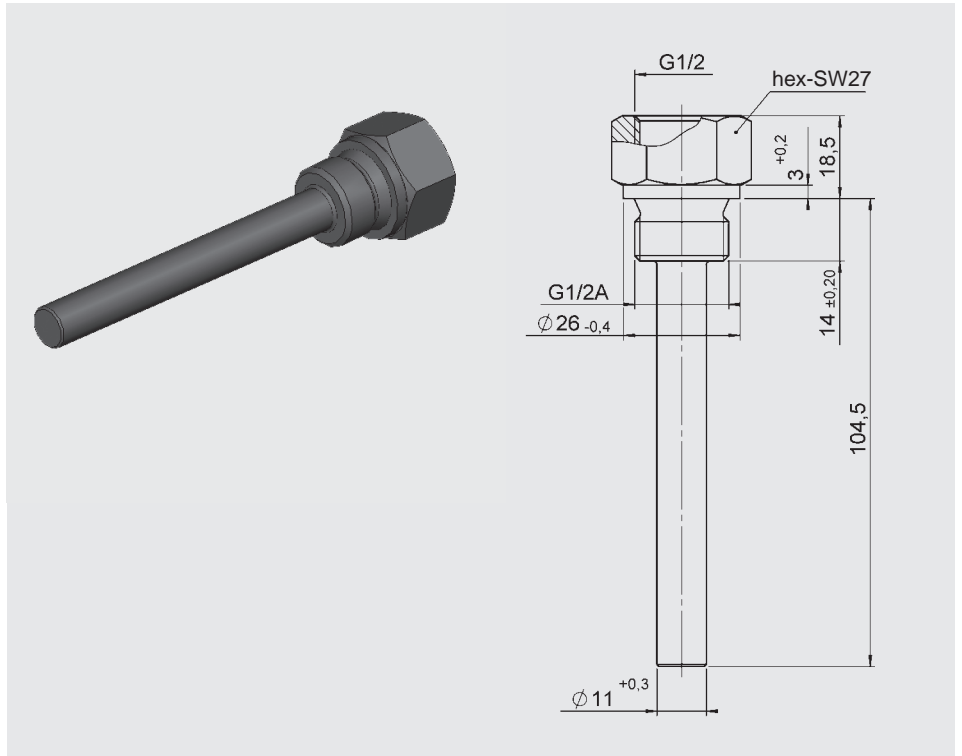


## Protective sleeve for tank-mounting

(Material CuZn39Pb3 - DIN 1763, electro-nickel-plated)

Part No.: 909640

## Tank mounting sleeve , device-specific ETS 3000 (100 mm)



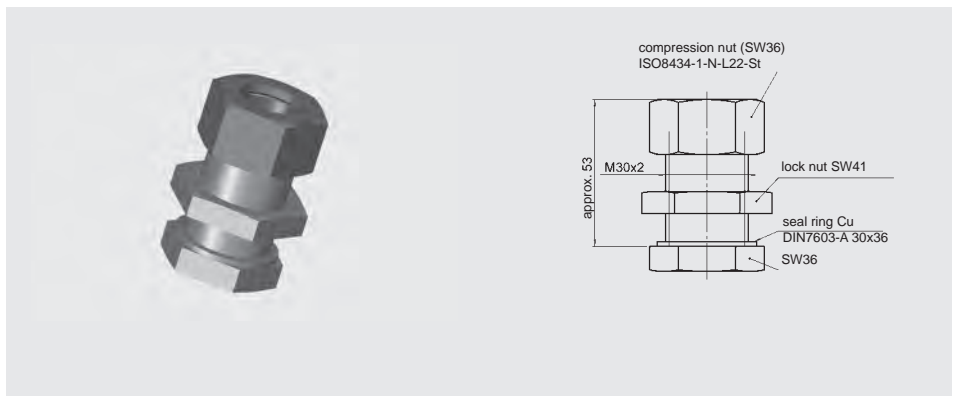
## ZBM 19

Straight bulkhead union ISO 8434

Part No.: 908738

**Note:** Not suitable for ENS with 250 mm probe length

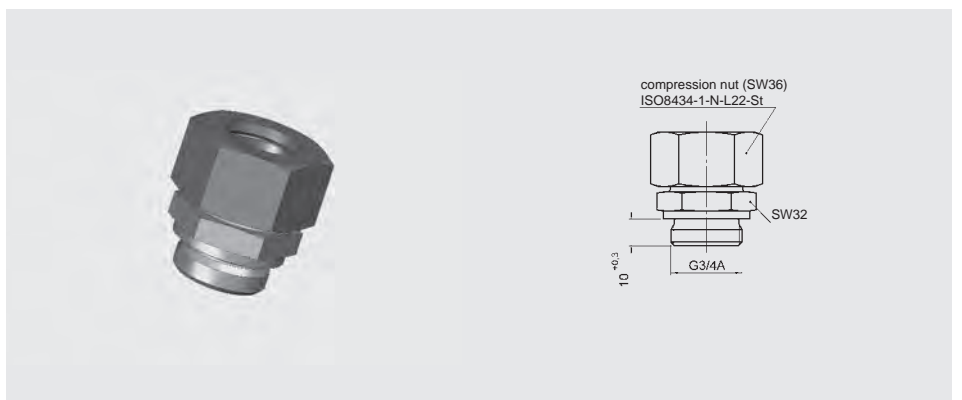
## Connection accessories, device-specific ENS 3000



## ZBM 20

Straight male stud coupling to ISO 8434

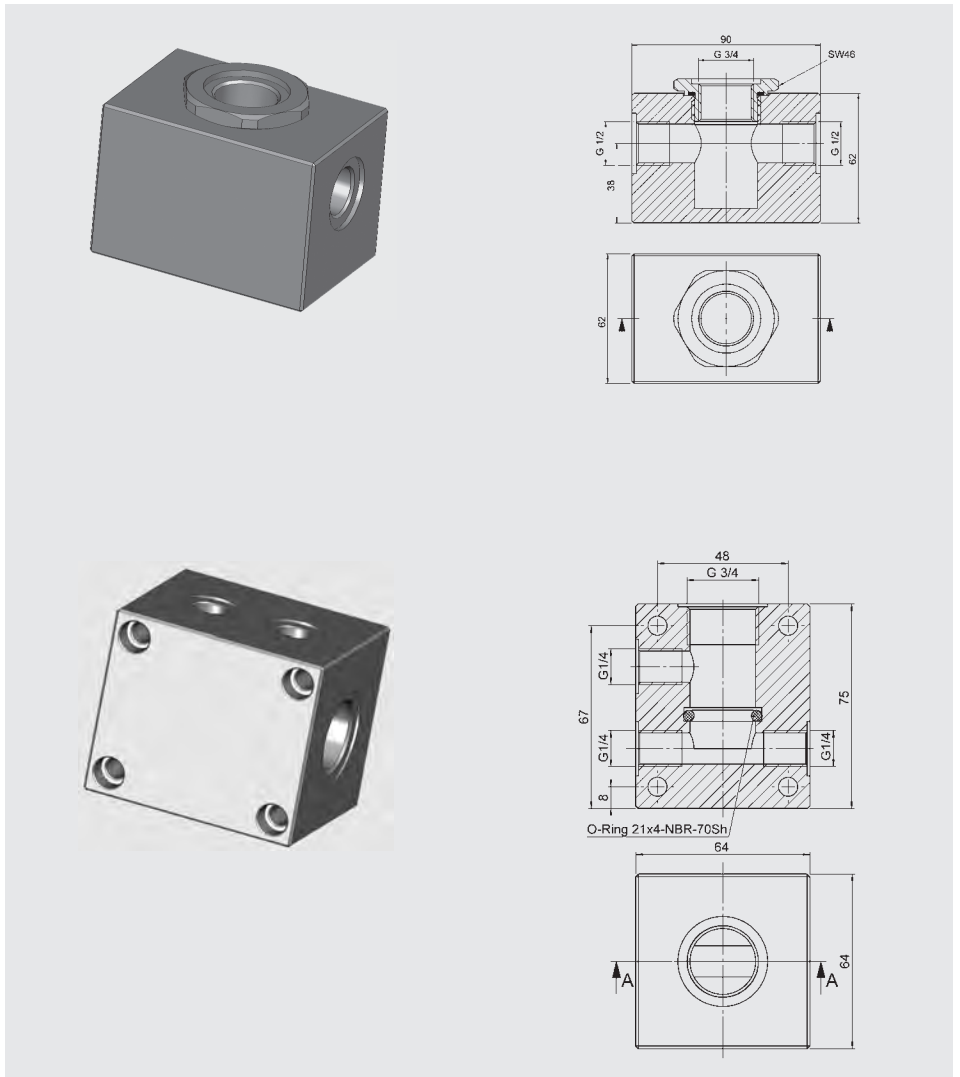
Part No.: 908739



### ZBM 21 (Flow)

Mounting block for HLB 1300  
for flow rates > 2 l/min  
Part No.: 3244260

## Mounting block, device-specific HLB 1300



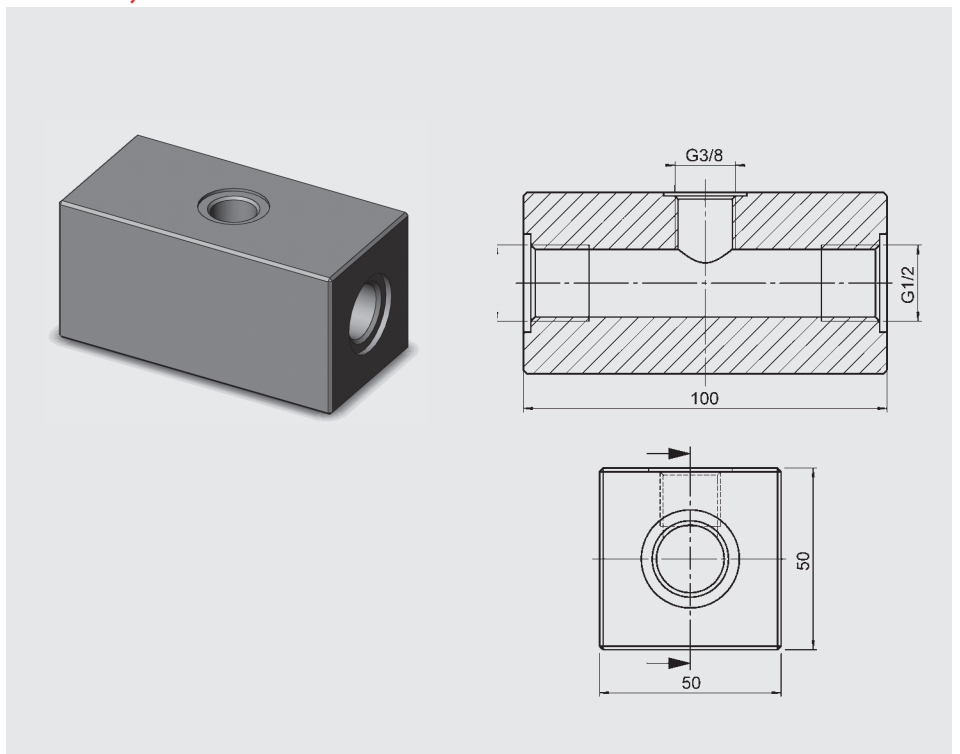
### ZBM 23 (Low Flow)

Mounting block for HLB 1300  
for flow rates from 0.5 .. 10 l/min  
Part No.: 3299331

### ZBM 22

Mounting block for AquaSensor  
AS 1000 and AS 3000  
Part No.: 3248511

## Connection accessories, device-specific AS 1000, AS 3000



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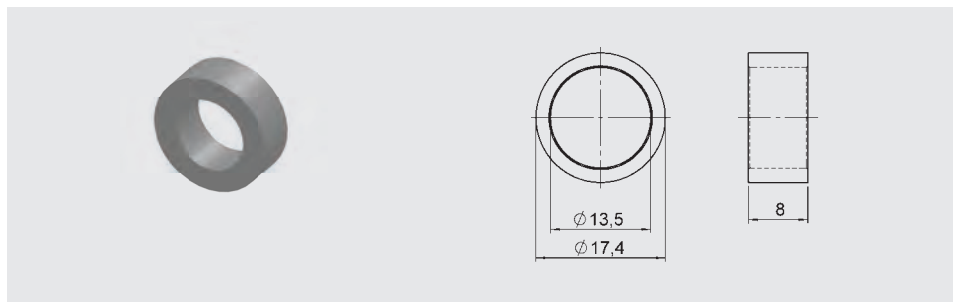
## Accessories Sensors for Distance and Position

### ZBL MR17

Position magnet for HLT 1000 and HLT 2100

Part No.: 6119372

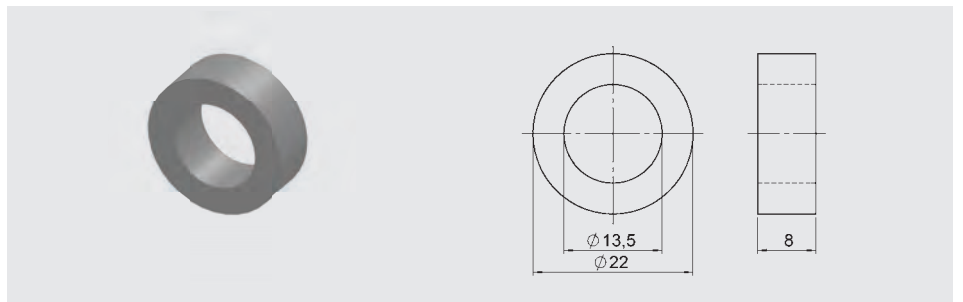
### Magnets for HLT 1000, HLT 2000, HNT 1000



### ZBL MR22

Position magnet for HLT 1000 and HLT 2100

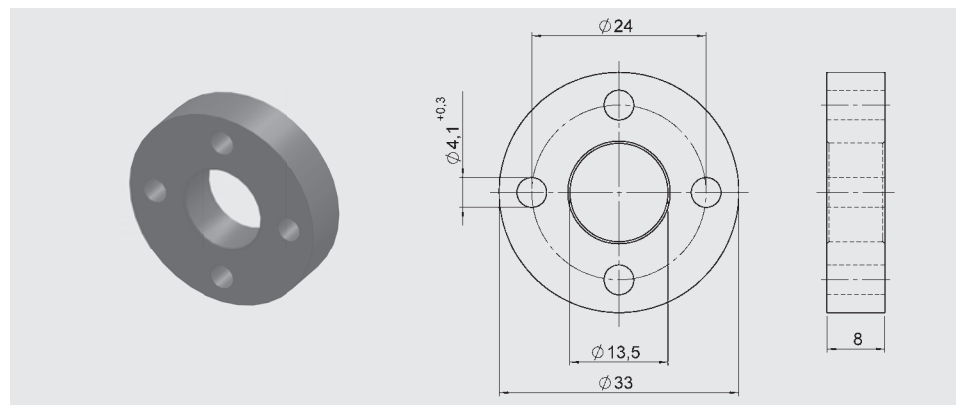
Part No.: 6084453



### ZBL MR33

Position magnet for HLT 1000 and HLT 2100

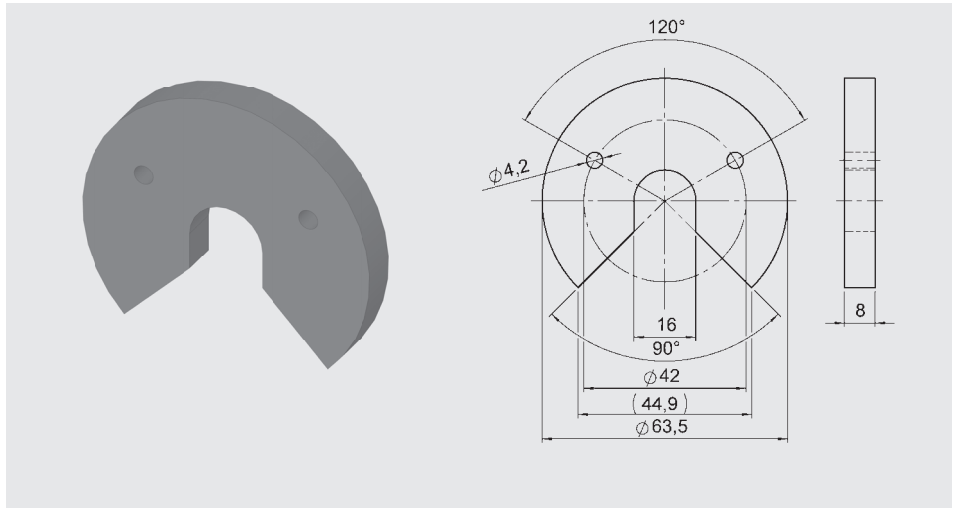
Part No.: 6084207



### ZBL MV63

Position magnet for  
HLT 1000, HLT 2100 and  
HLT 2500-L2

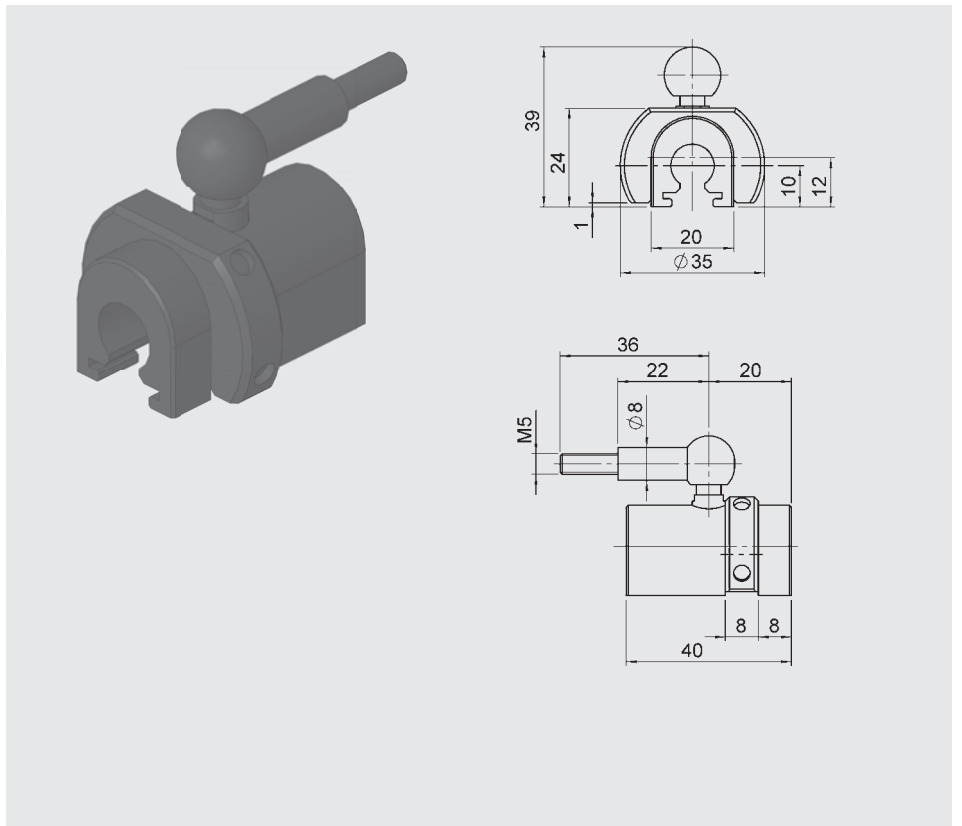
Part No.: 6084454



### ZBL MS35-39

Measuring slide for  
HLT 2500-L2

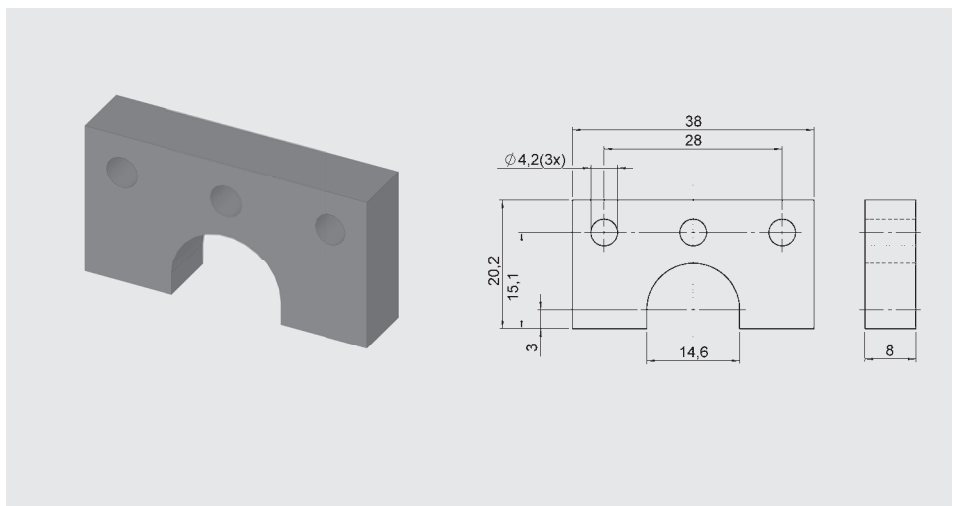
Part No.: 6105654



### ZBL MU38-20

Position magnet for  
HLT 1000, HLT 2100 and  
HLT 2500-L2

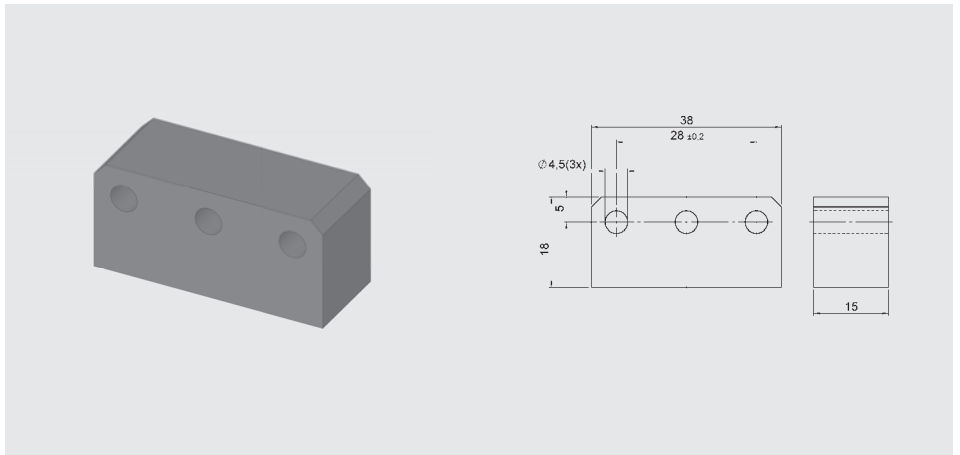
Part No.: 6084455



### ZBL MF38-18

Position magnet for  
HLT 2500-F1

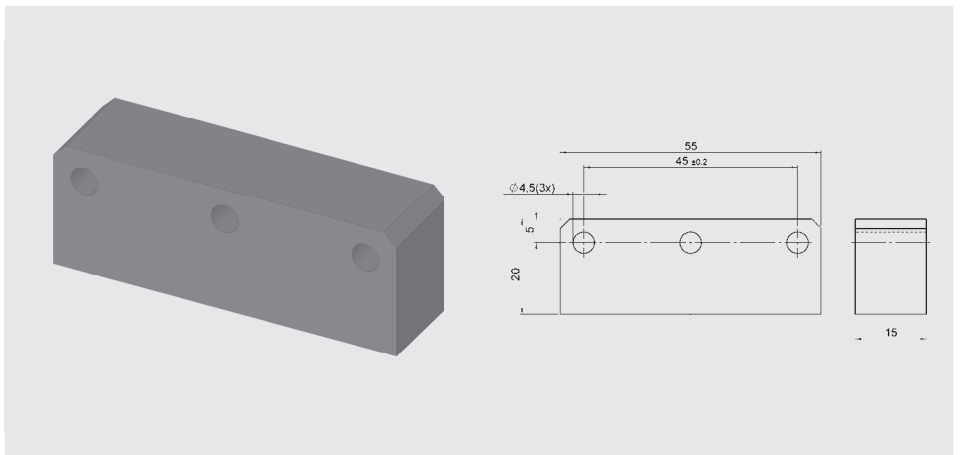
Part No.: 6084456



### ZBL MF55-20

Position magnet for  
HLT 2500-F1

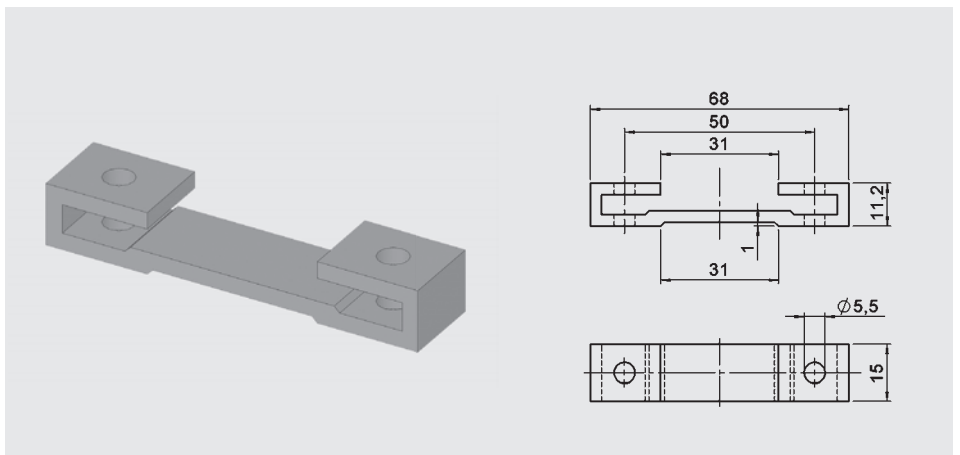
Part No.: 6084457



### ZBL Mounting set

Mounting set for HLT 2500

Part No.: 6105653



### Electrical accessories HLT 2000

Electrical connection	Signal output	HYDAC description	Part number
M06	Analogue	Cable connector C091, 6 pole, straight	654653
M08	Analogue	Cable connector C091, 8 pole, straight	6123255
C61	CAN / DVN	ZBE 08 cable connector M12x1, 5 pole, right-angle	6006786
S01	SSI	Cable connector M23, 12 pole, straight	6120462
S01	SSI	Cable connector M23, 12 pole, right-angle	6120463

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## Accessories for Service Instruments

### Aluminium case

for HMG 30X0 and accessories

Part No.: 6042959



### Bag with carrying strap

for HMG 30X0

Part No.: 909795



### Power supply unit

for HMG 30X0, Spare Part

Part No.: 6054296



### ZBE 31

Car charger for HMG 30X0

Part No.: 909739



### ZBE 34

Adapter for HMG 30X0 for connecting  
HYDAC transmitters

(4 .. 20 mA, 2 conductor)

Male M12x1 to

Binder series 714 M18

(electrical connection type "4")

Part No.: 3236597



### ZBE 35

Adapter for HMG 30X0 for connecting  
HYDAC transmitters

(4 .. 20 mA, 2 conductor)

Male M12x1 to

Male EN175301-803

(DIN 43650)

(electrical connection type "5")

Part No.: 3236601



### ZBE 36

Adapter for HMG 30X0 for connecting an AquaSensor AS 1000

Part No.: 909737



### ZBE 38

Y adapter (black) for HMG 30X0 to double the number of input sockets

Part No.: 3224436



### ZBE 41

Y adapter (yellow) for HMG 30X0 for connecting a ContaminationSensor CS 1000

Part No.: 910000



### ZBE 3010

CAN adapter for HMG 3010 for connecting a CAN-Bus

Part No.: 921238



### Connection cable

for HMG 30X0 - PC (USB), Spare Part

Part No.: 6040585



### Hydraulic adapter kit

for HMG

2 pieces each

- Adapter hose DN 2 -1620 / 1620 (400 mm and 1000 mm)
- Pressure gauge conn. 1620 / G1/4
- Adapter 1650 / 1620
- Bulkhead union 1620 / 1620

Part No.: 903083



### HDS 1000 RPM probe

for HMG 30X0

including reflective foil set

Part No.: 909436

### HDS 1000 reflective foil set

Spare Part, Quantity: 25

Part No.: 904812



## UVM 30X0

Module for HMG 30X0 for connecting different input signals

Part No.: 909752



## Plastic case

for HMG 500/510 and accessories

Part No.: 6043006



## Power supply (230 V AC)

for HMG 500/510

Part No.: 6043562



## Connection cable

for HMG 510 - PC (USB), Spare Part

Part No.: 6049553



## ZBE 30-02 (5 pole)

Connection cable M12x1, 2 m male/female

Part No.: 6040851

## ZBE 30-05 (5 pole)

Connection cable M12x1, 5 m male/female

Part No.: 6040852



## SSH 1000

Sensor simulator to simulate 2 HSI sensors, ideal for training purposes

Part No.: 909414



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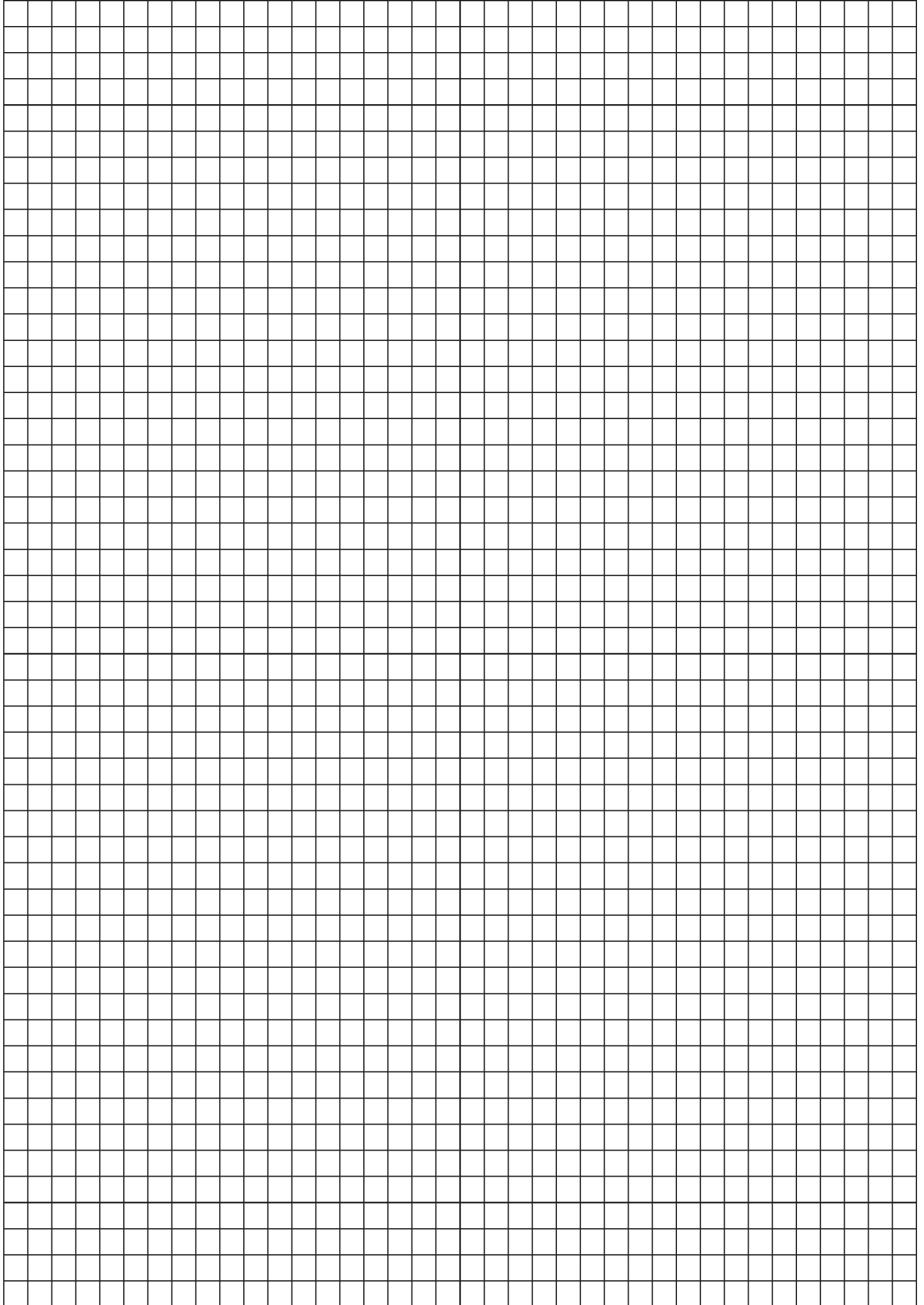
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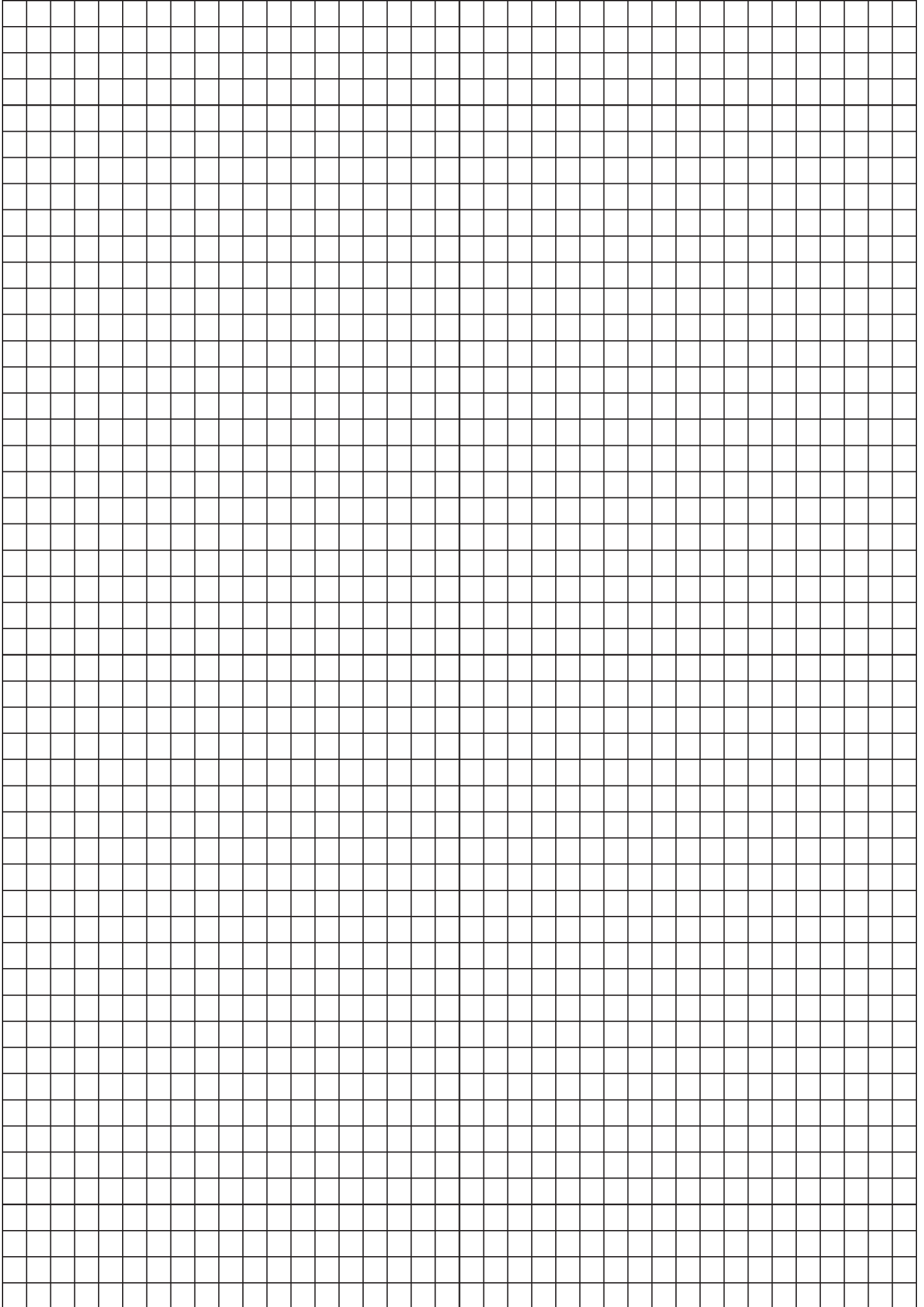
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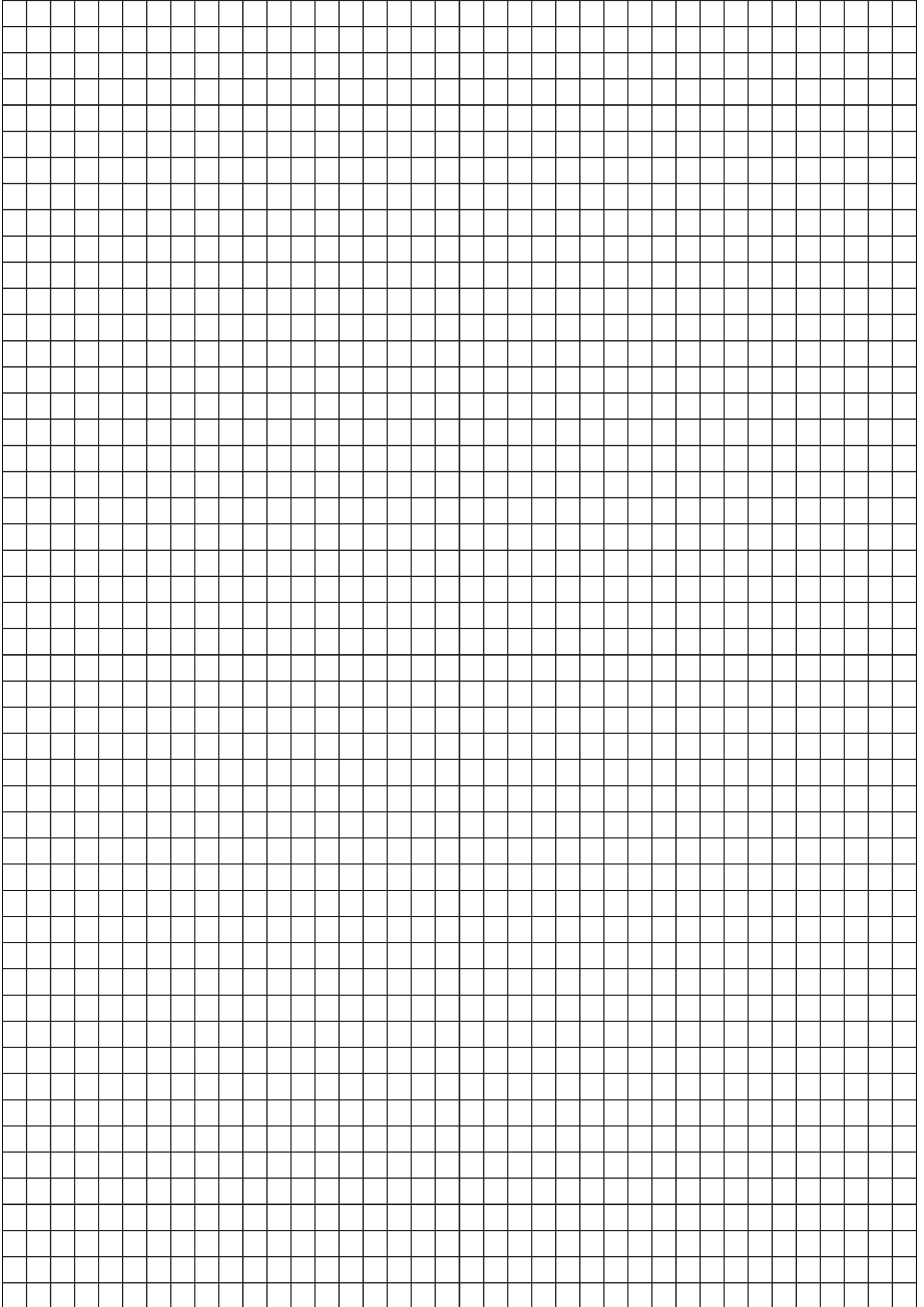
**Notes:**



**Notes:**



**Notes:**



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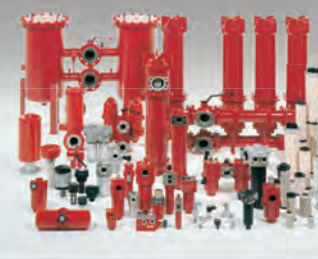
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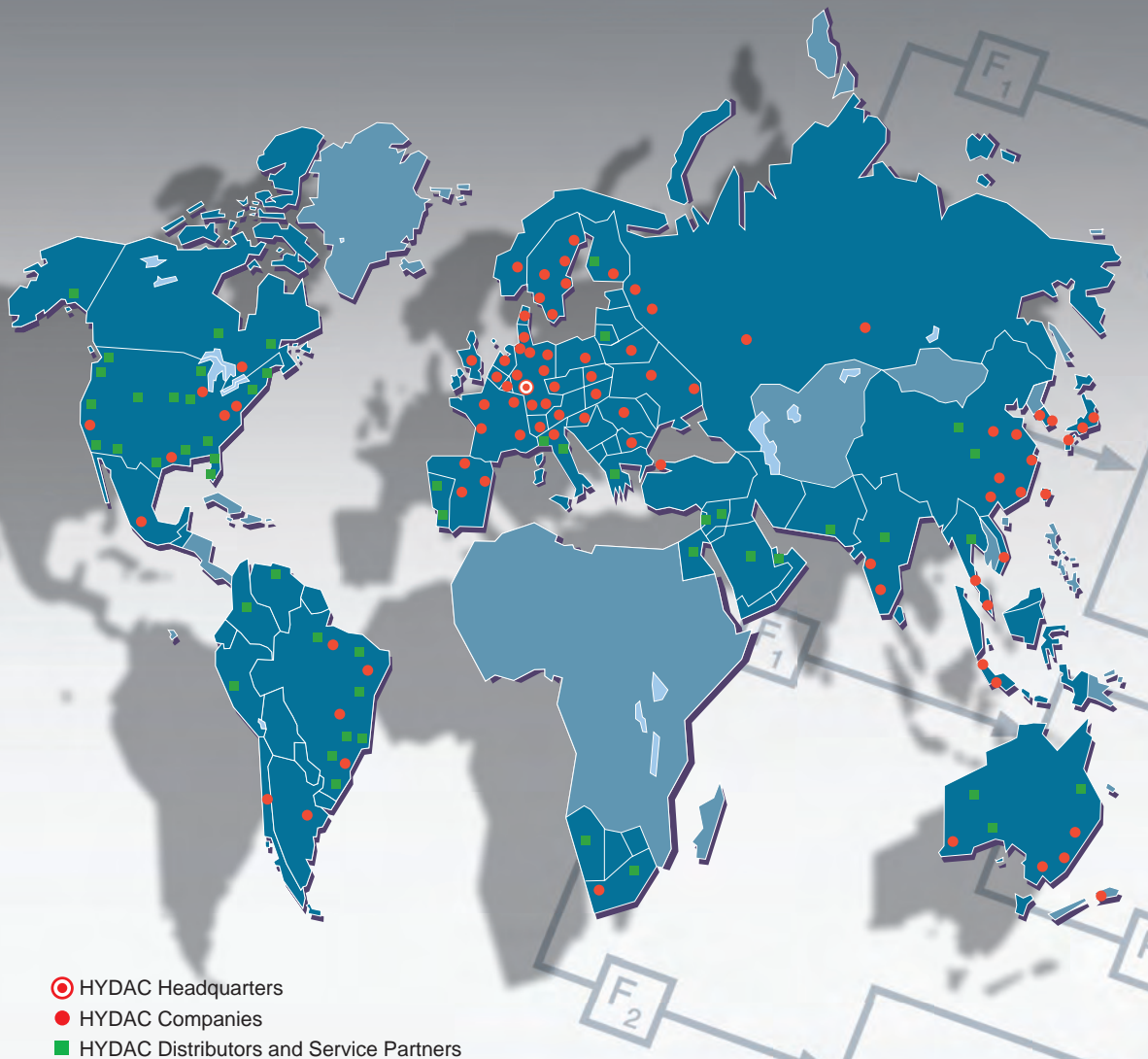


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