

HYDAC INTERNATIONAL

Electronics

Safe, Accurate, Reliable



www.hydacusa.com

About HYDAC

HYDAC stands for worldwide presence and accessibility to the customer. **HYDAC** has over 1000 distributors worldwide and more than 40 wholly owned branches. **HYDAC** has been active in the field of pressure monitoring for more than 30 years and has become one of the leaders in innovative pressure monitoring in hydraulics and pneumatics. Our know-how has evolved primarily from solving customers' problems, combined with the extensive experience of the whole **HYDAC** group.

HYDAC Products



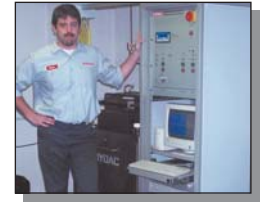
Our product range extends from simple pressure transmitters to the intelligent multiple pressure switches with customized software. In the field of sensors, we employ different techniques, enabling us to offer the most appropriate solution to a customer's specific application.



HYDAC Quality



HYDAC stands for quality and customer satisfaction. We are certified to ISO 9001 and can supply our products with certification if required. To ensure that our products are as innovative as possible, they are developed, manufactured, and tested by qualified personnel using advanced technology.



HYDAC Customer Service



Our internal staff and worldwide distribution network take care of the important matter of customer service. **HYDAC** values high standards, professional ethics, and mutual respect in all transactions with customers, vendors, and employees. We invest in our relationships by providing expertise, quality, dependability, and accessibility to foster growth and a sense of partnership. Our customer service representatives are committed to serving the customers' needs.



Energy and Environmental Technology

HYDAC Electronics have played a key role in providing innovative developments in hydroelectric, heating, wind, and waste power plants. **HYDAC** has vast expertise in solvent and waste water processing technologies.



Offshore Shipbuilding and Marine Technology

Maritime technology places special demands on material functionality and reliability. **HYDAC** products meet these demands due to our high quality and test standards. **HYDAC** products have been applied under the toughest conditions from drilling rigs to deep sea applications.



Mobile Market

The aim of our engineers has always been to reduce volume and weight, resulting in increased product performance. **HYDAC** provides compact high performance components for the Mobile Market, which can be found in construction, forestry, and agricultural equipment.



Industrial Engineering

Since we began, **HYDAC** has been involved in many industrial engineering applications. Our knowledge and expertise of many industries provides a comprehensive range of versatile hydraulic components. **HYDAC** offers custom solutions for machine tools, plastic injection molding machines, test equipment, presses, and welding robots. Other industrial applications include: steel and heavy industry, power transmissions, and paper mills.



Process Technology

The core products of **HYDAC** process technology are electronics, filters, and filtration systems for the industrial and environmental processing industries. **HYDAC** products are found in chemical, petrochemical, and plastics industries. Also, paper and dye production, foundries, steel manufacturing, and power plants.

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ISO Certified:

HYDAC has become a leader in hydraulics and pneumatics. We have earned that role by emphasizing quality, innovation, and excellence in everything we manufacture. **HYDAC** is committed to maintaining those high standards of quality and service in accordance with the ISO 9001 International Standard and QS-9000 Automotive Standard.



Common Terms:

Accuracy - combined error of linearity, hysteresis and repeatability

Ambient Conditions - conditions of the medium surrounding the transducer
(temperature, EMC, safety type shock, vibrations)

Best Fit Straight Line (BFSL) - a way to measure transducer error; a straight line is shifted in the measured output for equal errors above and below the linearity and provide an average error

Excitation - the external power supply applied to a device for its proper operation

EMI Susceptibility - the level or degree to which a device is vulnerable to electromagnetic interference

Full Scale (FS) - relative to the full measuring range

Hysteresis - the maximum difference in electrical output at any pressure value within the specified range between an increasing and decreasing cycle

Linearity - maximum deviation of the calibration curve from a straight line, expressed in % of full scale output at increasing pressure

Pressure - force per unit of area exerted by a fluid at some point in the system

Repeatability - the ability to reproduce the output readings when the same pressure value is applied consecutively, under the same conditions and in the same direction

Temperature Range (Operating) - the interval of temperatures in which the transducer is intended to be used

PLEASE NOTE:

Certain combinations are subject to availability and/or approval. There may be a minimum quantity required for certain combinations. Requirements will be determined at time of inquiry or purchase order. Alternatives may be suggested by product management.

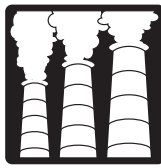
Specifications and dimensions given in this catalog represent engineering configurations at the time of printing.

Modifications may take place and product materials are subject to change without prior notice.

Symbols:



Gearboxes



Industrial



Shipbuilding



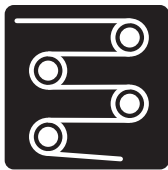
Agricultural



Railways



Offshore



Pulp & Paper



Construction



Steel / Heavy Industrial



Power Generation

Approvals:



What is ATEX?

This page helps to explain what ATEX is, where ATEX is applied and who should use ATEX Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres (ATEX) DIRECTIVE 94/9/EC

The Directive applies to both electrical and mechanical equipment and protective systems intended for use in potentially explosive atmospheres below ground, on the surface, and on fixed offshore installations. These include: equipment and protective systems for use within potentially explosive atmospheres; devices for use outside potentially explosive atmospheres, but which are required for or contribute to the safe functioning of equipment and protective systems located inside such atmospheres; and components relating to the above.

Coverage (ATEX)

The potential for explosive atmospheres can exist in locations such as mines, factories, agricultural silos, and oil and gas platforms. There is a wide range of products intended for use in such areas, including control equipment and sensors, transformers, fans, pumps, compressors, flour mills, fork lift trucks, locomotives, lights and beacons.

HDA 4400 & 4700



About HDA 4400 & 4700 Pressure Transducers:

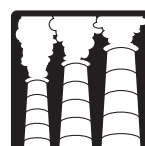
Series HDA 4000 transducers are compact, heavy-duty, pressure instruments designed for both OEM industrial and off-road applications where accuracy, repeatability, and stability can not be compromised. This series utilizes a shock resistant thin film sensor as the pressure to electrical conversion element. Thin film technology is used because it maintains its accuracy over a wide temperature range, extreme dynamic conditions, and hostile environments. When combined with a proprietary amplification circuit, its typical accuracy class is $\leq \pm 0.5\%$ or $\leq \pm 0.25\%$ BFS. Wetted metal parts are corrosion resistant stainless steel. It is available in eight pressure ranges from 150 psi up to 9000 psi. It is protected from extreme EMI emissions and can be applied in critical closed loop operating systems. It carries the **CE** mark and is designed and manufactured to ISO 9001 Quality System requirements.

Technical Details:

Input Data	HDA 4400	HDA 4700
Measuring ranges	150, 750, 1000, 1500, 3000, 5000, 6000, 9000 psi 16, 60, 100, 250, 400, 600 bar	150, 750, 1000, 1500, 3000, 5000, 6000, 9000 psi 6, 16, 60, 100, 250, 400, 600 bar
Overload pressure	150% FS, maximal 13000 psi (900 bar)	200% FS, maximal 13000 psi (900 bar)
Burst pressure	300% FS	
Mechanical Connection	SAE 6 9/16-18 UNF2A male G 1/4 A DIN 3852 (bar version)	
Tightening torque	approx. 15 lb-ft (20 Nm)	
Parts in contact with media	Stainless steel, FPM seal	
Output Data		
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	$\leq \pm 0.5\%$ FS max	$\leq \pm 0.25\%$ FS max
Temperature compensation zero point	$\leq \pm 0.0085\%$ FS/°F typ. $\leq \pm 0.014\%$ FS/°F max.	$\leq \pm 0.0045\%$ FS/°F typ. $\leq \pm 0.0085\%$ FS/°F max.
Temperature compensation over range	$\leq \pm 0.0085\%$ FS/°F typ. $\leq \pm 0.014\%$ FS/°F max.	$\leq \pm 0.0045\%$ FS/°F typ. $\leq \pm 0.0085\%$ FS/°F max.
Rise time	approx. 1 ms	
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year	$\leq \pm 0.1\%$ FS typ. / year
Ambient Conditions		
Nominal temperature range	32 to 158°F (0 to 70°C)	-13 to 185°F (-25 to 85°C)
Operating temperature range	-13 to 185°F (-25 to 85°C)	-40 to 185°F (-40 to 85°C)
Storage temperature range	-40 to 212°F (-40 to 100°C)	
Fluid temperature range	-40 to 212°F (-40 to 100°C)	
CE mark	EN 50081-1, EN 50081-2 EN 50082-1, EN 50082-2	
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	$\leq 20g$ (196.2 m/s ²)	
Safety type to DIN 40050	IP 65 (DIN 43650 and M18x1 connectors) IP 67 (ZBE 06 molded cable)	
Other data		
Supply voltage 2-conductor	10 to 30 VDC	
Supply voltage 3-conductor	12 to 30 VDC	
Residual ripple supply voltage	$\leq 5\%$	
Current consumption 3-conductor	approx. 25 mA	
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard	
Life expectancy	> 100 million load cycles 0 to 100%FS	
Weight	approx. 145 g	

Special models on request.

Applications:



Approvals:



Model Code:

Series

HDA 4 = 4000 series Pressure Transducer

Accuracy

4 = 0.5% BFS
7 = 0.25% BFS

Mechanical Connection

4 = G 1/4 A DIN 3852 male (bar ranges only)
7 = SAE 6 9/16-18 UNF2A male (psi ranges only)

Electrical Connection

4 = 4 pole plug M18x1 (connector not included)
5 = DIN 43650/ISO 4400 plug, 3 pole + ground (connector ZBE 01 included)
6 = M12x1 plug, 4-pole (connector not included)

Output Signal

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

Pressure Range

For Mechanical Connection (7)

0150 = 150 psi (10 bar)	3000 = 3000 psi (207 bar)
0750 = 750 psi (52 bar)	5000 = 5000 psi (345 bar)
1000 = 1000 psi (69 bar)	6000 = 6000 psi (413 bar)
1500 = 1500 psi (103 bar)	9000 = 9000 psi (620 bar)

For Mechanical Connection (4)

006 = 6 bar (87 psi)	250 = 250 bar (3625 psi)
016 = 16 bar (232 psi)	400 = 400 bar (5800 psi)
060 = 60 bar (870 psi)	600 = 600 bar (8700 psi)
100 = 100 bar (1450 psi)	

Modification Number

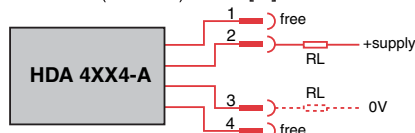
000 = Standard

Note: Not all combinations are available. See product management for other variations.

Circuit Connection:

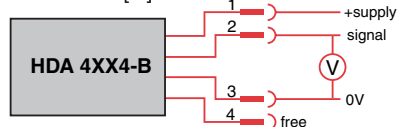
Two-Conductor 4 to 20 mA

$RL_{max} = (UB-10V)/0.02A [\Omega]$



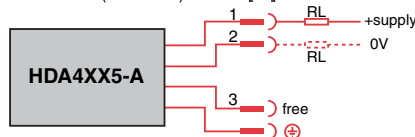
Three-Conductor 0 to 10 VDC

$RL_{min} = 2k [\Omega]$



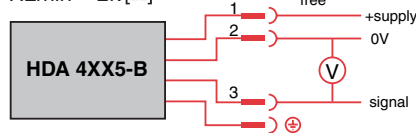
Two-Conductor 4 to 20 mA

$RL_{max} = (UB-10V)/0.02A [\Omega]$



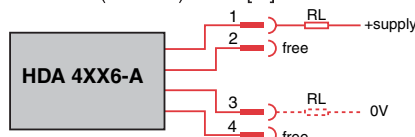
Three-Conductor 0 to 10 VDC

$RL_{min} = 2k [\Omega]$



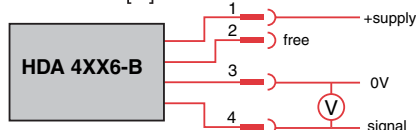
Two-Conductor 4 to 20 mA

$RL_{max} = (UB-10V)/0.02A [\Omega]$



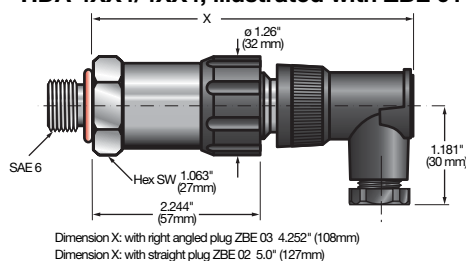
Three-Conductor 0 to 10 VDC

$RL_{min} = 2k [\Omega]$

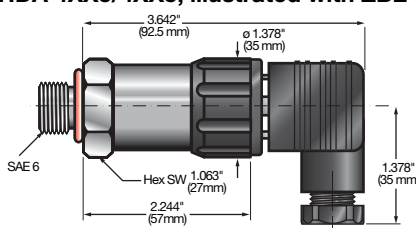


Dimensions:

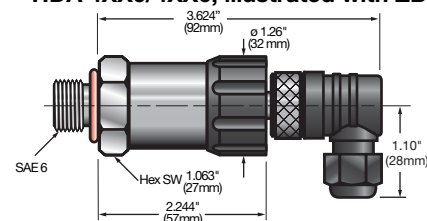
HDA 4XX4/4XX4, illustrated with ZBE 01



HDA 4XX5/4XX5, illustrated with ZBE 03

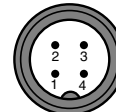


HDA 4XX6/4XX6, illustrated with ZBE 06

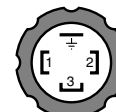


Plug Connection:

HDA4XX4 use with ZBE 02 or ZBE 03 (see page 60)



HDA4XX5 use with ZBE 01 (see page 60)



HDA4XX6 use with ZBE 06 (see page 60)



HDA 4100 & 4300



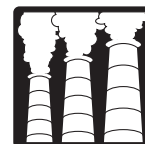
About HDA 4100 & 4300 Low Pressure Transducers:

The HDA 4100 & 4300 is similar in design to our HDA 4400 series. This transducer utilizes a ceramic sensor element to provide our customers a low cost, low pressure sensor while maintaining accuracy, repeatability, and stability. The body is stainless steel. Pressure ranges from 0 to 15 psi, up to 1500 psi, and vacuum are available. A number of port sizes and electrical connection combinations make this an attractive and affordable solution to your low pressure needs. These transducers are ideal for your pneumatic applications.

Technical Details:

Input Data	
Measurement range	0 to 15, 50 psi (A) 0 to 15, 30, 50, 100, 150, 250, 500 psi (G)
Overload pressure	200%FS
Burst pressure	300%FS
Mechanical connection	1/4"-18 NPT male
Parts in contact with media	Ceramic, FPM or EPDM seal
Output data	
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	≤ ±0.5 %FS max.
Temperature compensation	≤ ±0.012%/°F typ.
Zero point	≤ ±0.017%/°F max.
Temperature compensation over range	≤ ±0.012%/°F typ.
	≤ ±0.017%/°F max.
Rise time approx.	2 ms
Long-term drift	≤ ±0.3%FS typ. / year
Ambient Conditions	
Nominal temperature range	32° to 176°F (0° to 80°C)
Operating temperature range	-13° to 185°F (-25° to 85°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)
Fluid temperature range	-40° to 212°F (-40° to 100°C)
CE mark	EN 50081-1, EN 50081-2 EN 50082-1, EN 50082-2
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	≤ 20 g (196,2 m/s ²)
Safety type to DIN 40050	IP 65 (DIN 43650 connector) IP 67 (ZBE 06 molded cable)
Other Data	
Supply voltage 2-conductor	10 to 30 V DC
Supply voltage 3-conductor	12 to 30 V DC
Residual ripple supply voltage	≤ 5 %
Current consumption 3-conductor	approx. 25 mA
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard
Life expectancy	>10 million load cycles (0 to 100%FS)
Weight	approx. 145 g

Applications:



Approvals:



Model Code:

Series

HDA 4 = 4000 series Pressure Transducer

Accuracy

- 1 = Absolute (ceramic) 0.5% BFSI
- 3 = Gauge (ceramic) 0.5% BFSI

Mechanical Connection

- 8 = 1/4" - 18 NPT male thread

Electrical Connection

- 5 = DIN 43650/ISO 4400 plug, 3 pole + ground (connector ZBE 01 included)
- 6 = M12x1 plug, 4-pole (connector not included)

Output Signal

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

Pressure Range

Absolute

- 0015 = 0 to 15 psi
- 0050 = 0 to 50 psi

Gauge

- 0015 = 0 to 15 psi
- 0030 = 0 to 30 psi
- 0030(-15 to 30) = -15 to 30 psi
- 0050 = 0 to 50 psi
- 0100 = 0 to 100 psi
- 0150 = 0 to 150 psi
- 0250 = 0 to 250 psi
- 0500 = 0 to 500 psi

Modification Number

- 000 = Standard

Sealing Material (in contact with media)

- F = FPM seal (to be used for example with hydraulic fluid)
- E = EPDM seal (to be used for example with refrigerant coolant or fluids containing ammonia)

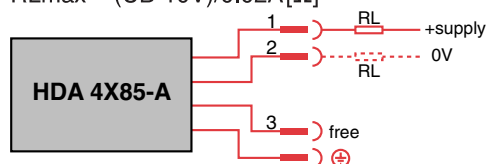
Material for Mechanical Connection / Housing (in contact with media)

- 1 = Stainless Steel

Circuit Connection:

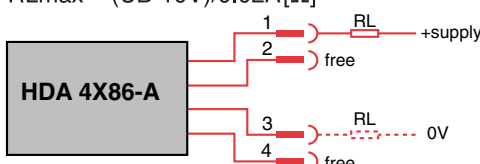
Two-Conductor 4 to 20 mA

$$RL_{max} = (UB - 10V) / 0.02A [\Omega]$$



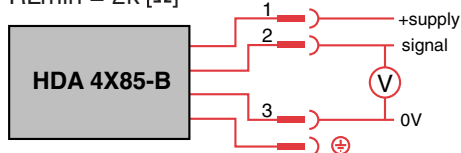
Two-Conductor 4 to 20 mA

$$RL_{max} = (UB - 10V) / 0.02A [\Omega]$$



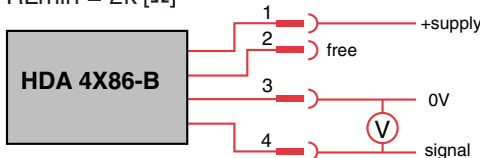
Three-Conductor 0 to 10 VDC

$$RL_{min} = 2k [\Omega]$$



Three-Conductor 0 to 10 VDC

$$RL_{min} = 2k [\Omega]$$

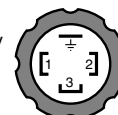


Plug Connection:

HDA 4XX5

use with

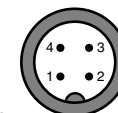
ZBE 01
(see page 60)



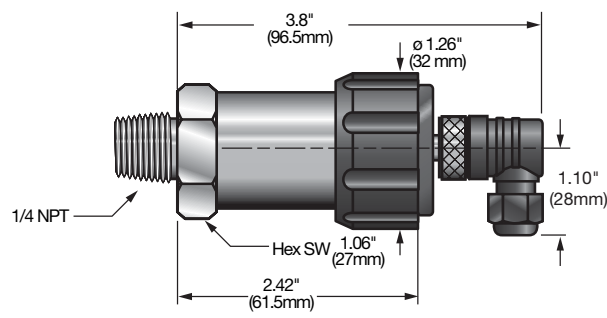
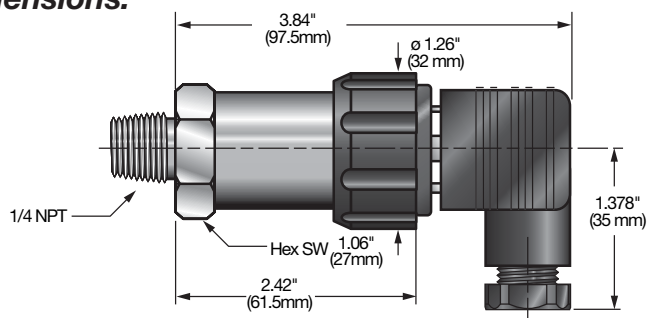
HDA 4XX6

use with

ZBE 06
(see page 60)



Dimensions:



HDA 7000



About HDA 7000 OEM Pressure Transducers:

The pressure transducer series HDA 7000 combines excellent technical specifications with a very compact design.

The HDA 7000 was specifically developed for severe applications e.g. mobile applications. A thin film sensor cell is the basis for a robust, long-life pressure transmitter.

Various pressure ranges between 0 to 150 psi and 0 to 9000 psi facilitate adaptation to the particular application.

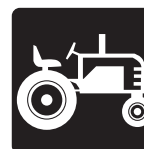
For integration into modern controls (e.g. with PLC) different analog output signals, including 4 to 20 mA or 0 to 5 V, are available on the standard version. Ratio-metric output signals are also available on request.

A minimum order of 25 pieces is needed.

Technical Details:

Input Data	
Measuring ranges	0 to 500, 750, 1000, 1500, 3000, 5000, 6000, 9000 psi
Overload pressure	150% FS, maximal 13000 psi
Burst pressure	300% FS
Mechanical Connection	SAE 6 9/16-18 UNF2A male, G 1/4 A DIN 3852, SAE 4, 1/4" NPT
Tightening torque G 1/4, SAE 6 SAE 4	approx. 15 lb-ft (20 Nm) approx. 11 lb-ft (15 Nm)
Parts in contact with media	Stainless steel, FPM seal
Output Data	
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	$\leq \pm 0.5\% \text{ FS}$
Temperature compensation zero point	$\leq \pm 0.0085\% \text{ FS}/^{\circ}\text{F}$ $\leq \pm 0.017\% \text{ FS}/^{\circ}\text{C}$
Temperature compensation over range	$\leq \pm 0.0085\% \text{ FS}/^{\circ}\text{F}$ $\leq \pm 0.017\% \text{ FS}/^{\circ}\text{C}$
Rise time	approx. 1 ms
Long-term drift	$\leq \pm 0.3\% \text{ FS typ. / year}$
Ambient Conditions	
Nominal temperature range	-13° to 185°F (-25° to 85°C)
Operating temperature range	-40° to 185°F (-40° to 85°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)
Fluid temperature range	-40° to 212°F (-40° to 100°C)
CE mark	EN 50081-1, EN 50081-2 EN 50082-1, EN 50082-2
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	$\leq 20g$ (196.2 m/s ²)
Safety type to DIN 40050	IP 67 (w/ ZBE 06 molded cable or flying lead)
Other data	
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard
Life expectancy	≥ 10 million load cycles 0 to 100%FS
Weight (with M12 connector)	approx. 48 g

Applications:



Approvals:



Model Code: OEM Quantities Only

HDA 7 4 X X - X - XXXX - 000

Series

HDA 7 = 7000 series Pressure Transducer

Accuracy

4 = 0.5% BFSL

Mechanical Connection

4 = G 1/4 A DIN 3852

7 = SAE 6 9/16-18 UNF2A male

Electrical Connection

0 = flying leads

6 = M12 connector

X = customer specified connector

Output Signal

A = 2 conductor, 4-20 mA

B = 3 conductor, 0-10V

G = 3 conductor, (please specify output voltage)

Pressure Range

0500 = 500 psi (34 bar) 3000 = 3000 psi (207 bar)

0750 = 750 psi (52 bar) 5000 = 5000 psi (345 bar)

1000 = 1000 psi (69 bar) 6000 = 6000 psi (413 bar)

1500 = 1500 psi (103 bar) 9000 = 9000 psi (620 bar)

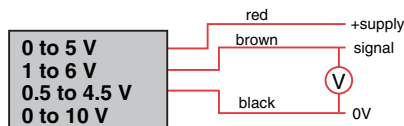
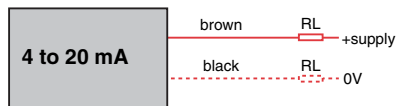
Modification Number

000 = Standard

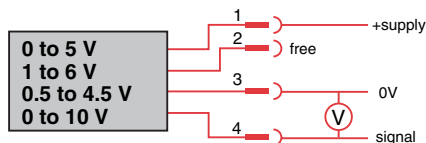
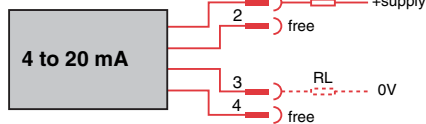
* Specifications must be submitted by customer.

Circuit Connection:

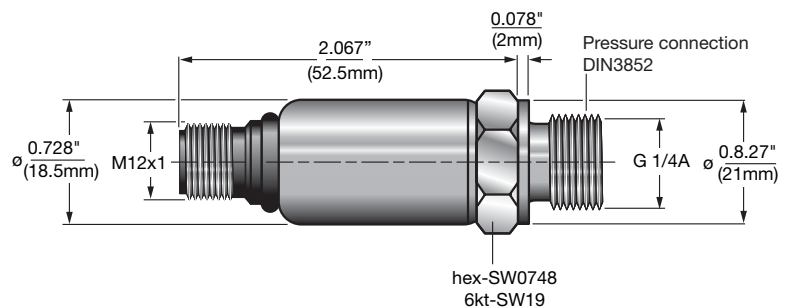
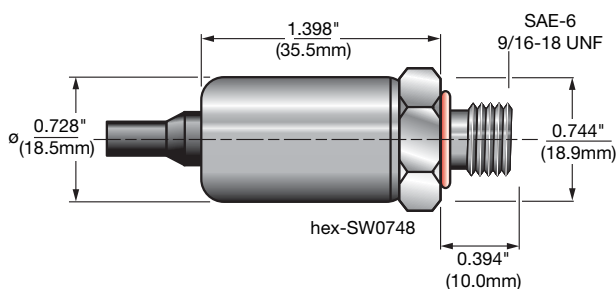
Flying Leads:



M12x1:



Dimensions:



HDA 3700 & 3800



About HDA 3700 & 3800 Pressure Transducers:

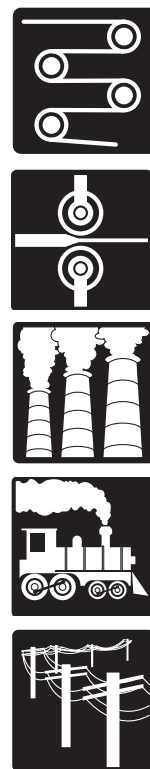
The HDA 3000 family of transducers is designed to provide exceptional durability and accuracy in demanding industrial and mobile applications. They are used to convert hydraulic or pneumatic pressure into an electrical output signal linearly proportional to the input pressure. The signals can be sent to most commonly used processors and controllers, including PLC's, computers, recorders, and digital displays.

Technical Details:

Input Data	HDA 3700	HDA 3800
Measuring ranges	6, 16, 60, 100, 250, 400, 600 bar	6, 16, 60, 100, 250, 400, 600 bar
Overload pressure	200% FS, maximum 900 bar	200% FS, maximum 900 bar
Burst pressure	300% FS	300% FS
Mechanical Connection	G 1/4 A DIN 3852 SAE 6 9/16-18 UNF2A male (with adapter)	G 1/4 A DIN 3852 SAE 6 9/16-18 UNF2A male (with adapter)
Tightening torque	15 lb-ft (20 Nm)	15 lb-ft (20 Nm)
Parts in contact with media	Stainless steel, FPM seal	Stainless steel, FPM seal
Output Data		
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	≤ ±0.25 %FS max.	≤ ±0.15 %FS max.
Temperature compensation zero point	≤ ±0.0045%FS/°F typ. ≤ ±0.0085%FS/°F max.	≤ ±0.003%FS/°F typ. ≤ ±0.006%FS/°F max.
Temperature compensation over range	≤ ±0.0045%FS/°F typ. ≤ ±0.0085%FS/°F max.	≤ ±0.003%FS/°F typ. ≤ ±0.006%FS/°F max.
Rise time	approx. 0.5 ms	approx. 0.5 ms
Long-term drift	≤ ±0.1%FS typ. / year	≤ ±0.1%FS typ. / year
Ambient Conditions		
Nominal temperature range	-13 to +185°F (-25° to +85 °C)	-13 to +185°F (-25° to +85 °C)
Operating temperature range	-40 to +185°F (-40° to +85 °C)	-40 to +185°F (-40° to +85 °C)
Storage temperature range	-40 to +212°F (-40° to +100 °C)	-40 to +212°F (-40° to +100 °C)
Fluid temperature range	-40 to +212°F (-40° to +100 °C)	-40 to +212°F (-40° to +100 °C)
CE mark	EN 50081-1, EN 50081-2 EN 50082-1, EN 50082-2	EN 50081-1, EN 50081-2 EN 50082-1, EN 50082-2
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	≤ 20g (196.2 m/s ²)	≤ 20g (196.2 m/s ²)
Safety type to DIN 40050	IP 65	IP 65
Other data		
Supply voltage 2-conductor	10 to 30 VDC	10 to 30 VDC
Supply voltage 3-conductor	12 to 30 VDC	12 to 30 VDC
Residual ripple supply voltage	≤ 5%	≤ 5%
Current consumption 3-conductor	approx. 15 mA	approx. 15 mA
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard	standard
Life expectancy	10 million load cycles, 0 to 100%FS	10 million load cycles, 0 to 100%FS
Weight	approx. 180 g	approx. 180 g

Special models on request.

Applications:



Approvals:



Model Code:

Series

HDA 3 = 3000 series Pressure Transducer

Accuracy

7 = 0.25% B.F.S.L.

8 = 0.15% B.F.S.L.

Mechanical Connection

4 = G 1/4 A DIN 3852

7 = SAE 6 9/16-18 UNF2A male supplied with adapter

*Adapter is included to convert G1/4 Male to SAE-6 Male connection on some models

Electrical Connection

4 = 4 pole plug, M18x1 (connector not included)

5 = DIN43650/ISO4400 plug, 3 pole + ground (connector ZBE 01 included)

Output Signal

A = 2 conductor, 4-20 mA

B = 3 conductor, 0-10 VDC

E = 3 conductor, 0-20 mA, sourcing

Pressure Range

006 = 87 psi (6 bar)*

016 = 232 psi (16 bar)*

060 = 870 psi (60 bar)*

100 = 1450 psi (100 bar)*

250 = 3625 psi (250 bar)*

400 = 5800 psi (400 bar)*

600 = 8700 psi (600 bar)*

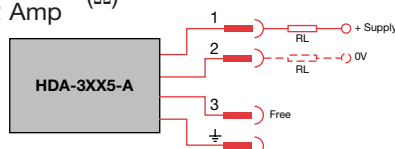
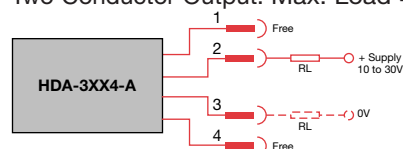
Modification Number

000 = Standard

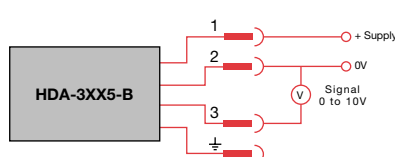
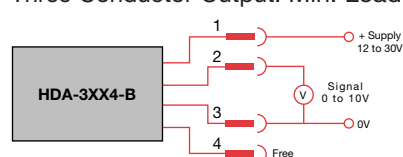
Some model codes may no longer be available. Contact product management for crossovers to HDA 4000 series.

Circuit Connection:

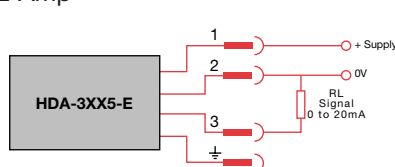
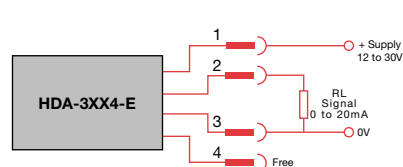
Two Conductor Output: Max. Load = $\frac{\text{Supply} - 10V}{0.02 \text{ Amp}} (\Omega)$



Three Conductor Output: Min. Load = 2k (Ω)

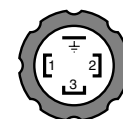


Three Conductor Output: Max. Load = $\frac{\text{Supply} - 7V}{0.02 \text{ Amp}} (\Omega)$

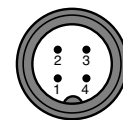


Plug Connection:

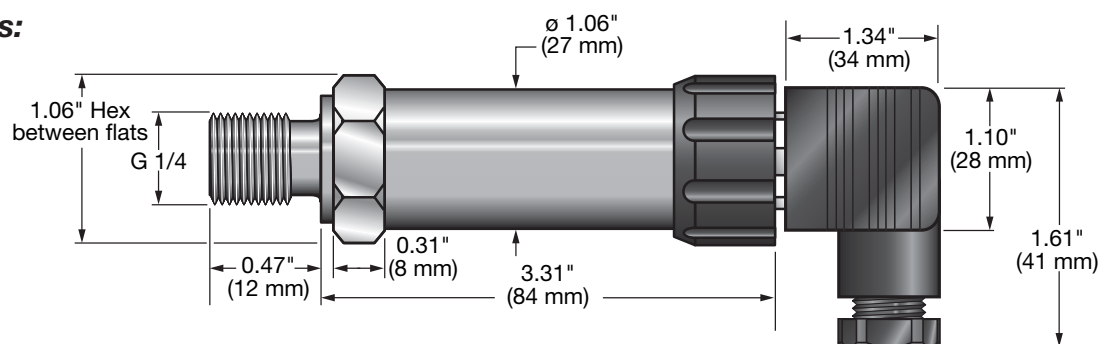
HDA 3XX5 use with ZBE 01 (see page 60)



HDA 3XX4 use with ZBE 02 or ZBE 03 (see page 60)



Dimensions:



HDA 4000 - CAN Bus



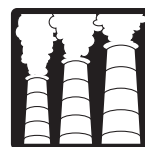
About HDA 4000 - CAN Bus Pressure Transducers:

HYDAC has developed the HDA 4000 CAN-bus sensor to meet the needs of the marketplace for a field-bus sensor. There are several field-bus systems on the market designed for specific industries. One of the most known in the hydraulic industry is the CAN-bus. The purpose of CAN-bus is to eliminate the need for heavy cabling trees, particularly in the automotive and process industries. The HDA 4000 CAN-Bus sensors are interfaced by a pair of twisted wires which enables a CAN system to receive, dispatch and monitor information from hydraulic systems. CAN-bus is a relatively simple and uncomplicated system. In the hydraulic field there are applications for many mobile machine manufacturers such as excavators and tractors. Each CAN-bus sensor is custom designed for every OEM to meet their individual system needs.

Technical Details:

Input Data	
Measuring range	500, 1000, 1500, 3000, 5000, 6000, 9000 psi 40, 100, 250, 400, 600 bar
Overload range	200% FS max. 13000 psi (900 bar)
Burst pressure	300% FS
Thread connection	G 1/4 A DIN 3852 SAE 6 9/16-18 UNF 2A
Mounting torque	20 Nm
Parts in contact with media	Stainless-steel, FPM-seal
Output data	
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	$\leq \pm 0.25 \%FS$
Temperature compensation zero point	$\leq \pm 0.0045\%FS/^{\circ}F$ $\leq \pm 0.0085\%FS/^{\circ}F$
Temperature compensation over range	$\leq \pm 0.0045\%FS/^{\circ}F$ $\leq \pm 0.0085\%FS/^{\circ}F$
Rise time	approx. 1 ms
Long-term drift	$\leq \pm 0.1\%FS$ typ. / year
Ambient Conditions	
Nominal temperature range	-13° to 185°F (-25° to 85°C)
Operating temperature range	-40° to 185°F (-40° to 85°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)
Fluid temperature range	-40° to 212°F (-40° to 100°C)
CE mark	EN 61000-6-1, EN 61000-6-2 EN 61000-6-3, EN 61000-6-4
Vibration resistance acc. IEC 68-2-6 at 10..500 Hz	≤ 20 g (196.2 m/s ²)
Type of protection acc.DIN 40050	IP 67 (ZBE 06 molded cable)
Other Data	
Supply voltage	10 to 35 VDC
Residual ripple supply voltage	$\leq 5 \%$
Current consumption	25 mA
Reverse polarity protection of supply voltage, excess voltage, override and short circuit protection	standard
Type of electric connection M12x1 acc. CIA-DR-303-1	Pin 1: PE, shield Pin 2: +Vb Pin 3: 0 V Pin 4: CANH Pin 5: CANL
Life expectancy	>10 Mio. cycles (0 to 100 % FS)
Weight	ca. 150 g

Applications:



Approvals:

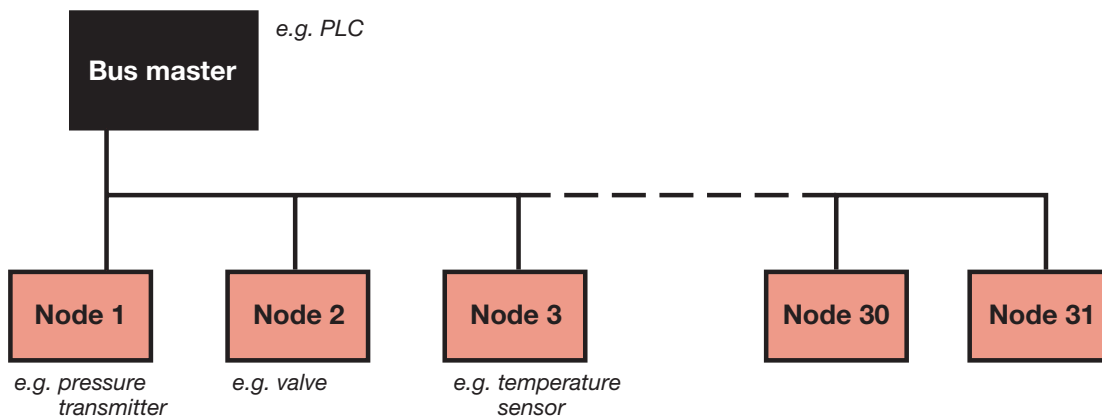


What Are Field-Bus Systems?

A field-bus system is a data network with the objective to receive data from a production process, exchange data between devices or machines, control steps or processes in production. Data transmission happens serially with digital signals (equivalent to Internet data transmission.)

The most basic design of such a data network is a 2-wire cable with various individual sensors (e.g. Pressure transmitters), actors (e.g. solenoid valves), controllers, periphery units, and control units (e.g. PLC, industrial PCs) connected at any point. BUS participants need a suitable interface, which transfers flow of data. Each individual component gets its own address.

Structure of a Bus System:



Remarks: Communication of process data is performed by means of every individual sensor, component, and so on, being connected via its own wiring to high layer control.

Advantages:

- Easy wiring with clear reduction of cabling (best case: only two cables)
- Clear structure
- Diagnostic functions, connected units may be checked on functionality
- All system functions are available in high layer control at any time
- High level of transmission safety, information may be checked on validity through multiple transmissions
- Easy to be enlarged, since at any place of network a unit may be added
- Easy implementation into higher leveled systems:
 - connection to other bus system
 - distance diagnostic systems
 - service units

HDA 3400 & 3700 - Shipbuilding and Offshore



About HDA 3400 Pressure Transducers:

This pressure transmitter, which has been specially developed for shipbuilding and offshore applications, is based on a very robust and accurate sensor cell with a thin film strain gauge on a stainless steel membrane.

All parts in contact with the fluid are in stainless steel and are welded together. Since no seals are required in the sensor chamber, leakage is eliminated.

The 4 to 20 mA output signal in two conductor technic enables connection to the relevant evaluation electronics. Since accuracy varies markedly with the temperature of the fluid being measured, this instrument offers outstanding characteristics in this respect.

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

Technical Details:

Input Data	HDA 3400	HDA 3700
Measuring ranges	16, 60, 100, 250, 400, 600 bar	6, 16, 60, 100, 250, 400, 600 bar
Overload pressure	200% FS, maximal 900 bar	
Burst pressure	400% FS	
Mechanical Connection	G 1/4 A DIN 3852	
Tightening torque	approx. 15 lb-ft (20 Nm)	
Parts in contact with media	Stainless steel, FPM seal	
Output Data		
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	$\leq \pm 0.5\%FS$	$\leq \pm 0.25\%FS$
Temperature compensation zero point	$\leq \pm 0.0085\%FS/^{\circ}F$ typ. $\leq \pm 0.014\%FS/^{\circ}F$ max.	$\leq \pm 0.0045\%FS/^{\circ}F$ typ. $\leq \pm 0.0085\%FS/^{\circ}F$ max.
Temperature compensation over range	$\leq \pm 0.0085\%FS/^{\circ}F$ typ. $\leq \pm 0.014\%FS/^{\circ}F$ max.	$\leq \pm 0.0045\%FS/^{\circ}F$ typ. $\leq \pm 0.0085\%FS/^{\circ}F$ max.
Rise time	approx. 1 ms	
Long-term drift	$\leq \pm 0.3\%FS$ typ. / year	
Ambient Conditions		
Nominal temperature range	32° to 158°F (0° to 70°C)	-13° to 185°F (-25° to 85°C)
Operating temperature range	-13° to 185°F (-25° to 85°C)	-40° to 185°F (-40° to 85°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)	
Fluid temperature range	-40° to 212°F (-40° to 100°C)	
CE mark	EN 50081-1 and EN 50081-2 EN 50082-1 and EN 50082-2	
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	5 to 25 Hz: 3.2 mm 25 to 100 Hz: 4 g	
Safety type to DIN 40050	IP 65	
Other Data		
Supply voltage	10 to 30 V	
Residual ripple supply voltage	$\leq 5\%$	
Current consumption 3-conductor	approx. 25 mA	
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	available	
Life expectancy	> 100 million load cycles 0 to 100%FS	
Weight	approx. 145 g	

Applications:



Approvals:



American Bureau of Shipping
No.: 00-ES 19976-X



Lloyds Register of Shipping
No.: 00/20049



Det Norske Veritas
No.: A-7711 (892.10)



Germanischer Lloyd
No.: 15520-00HH



Bureau Veritas
No.: 10342 /A0 BV

Model Code:

HDA 3 X 4 5 - A - XXX - S00

Series

HDA3 = 3000 series Pressure Transducer for Shipbuilding & Offshore

Accuracy

- 4 = 0.5% B.F.S.L.
- 7 = 0.25% B.F.S.L.

Mechanical Connection

- 4 = G 1/4 A DIN 3852
- 7 = SAE-6 9/16-18 UNF2A male (using adapter)
- 8 = 1/4"-18 NPT male thread (using adapter)

Electrical Connection

- 5 = DIN 43650/ISO 4400 plug, 3 pole + ground (connector ZBE 01 included)

Signal Technology

- A = 2-conductor, 4 to 20 mA

Measuring Ranges

- 006 = 6 bar (HDA 3700 only)
- 016 = 16 bar
- 060 = 60 bar
- 100 = 100 bar
- 250 = 250 bar
- 400 = 400 bar
- 600 = 600 bar

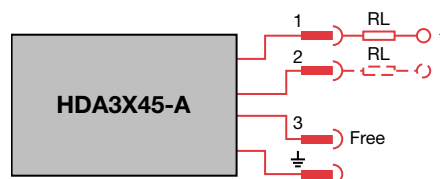
Modification Number

- S00 = standard

Note: On units with a different modification number, please read the label or the technical amendment details supplied with the unit. All details are subject to technical modifications.

Circuit Connection:

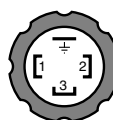
2-conductor 4 to 20 mA



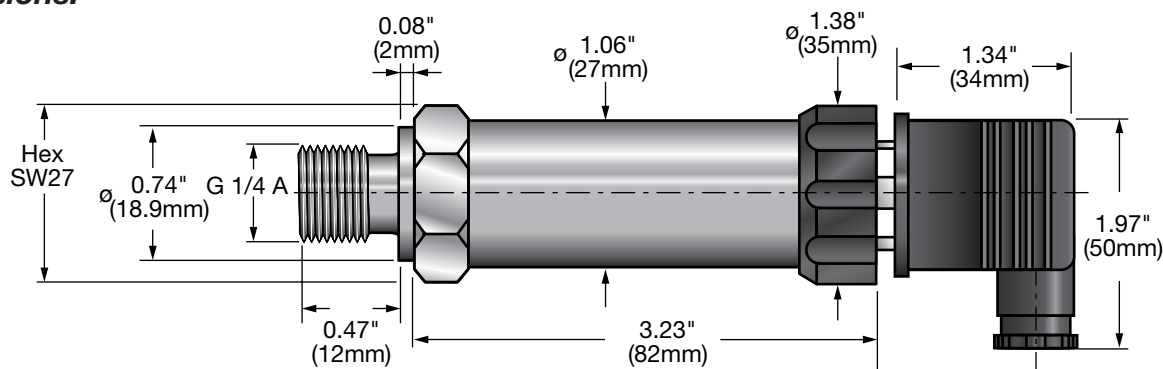
$$RL \text{ max.} = \frac{UB - 10 \text{ V}}{0.02 \text{ A}} [\Omega]$$

Plug Connection:

HDA 3X45 use with ZBE 01 (see page 60)



Dimensions:



HDA 3700 - Hazardous Locations - Class 1, Division 1 / 2



About HDA 3700 Pressure Transducers:

The pressure transducer series HDA 3700 is available in a version for measuring pressure in hazardous locations.

The HDA 3700 family of transducers is designed to provide exceptional durability and accuracy in demanding industrial and process applications. They are used to convert hydraulic or pneumatic pressure into an electrical output signal linearly proportional to the input pressure. The signals can be sent to most commonly used processors and controllers, including PLC's, computers, recorders, and digital displays.

The pressure measured by the sensor is converted to a proportional, analog 4 to 20 mA output signal. The signals can be sent to most commonly used processors and controllers, including PLC's, computers, recorders, and digital displays.

Technical Details:

Input Data	
Measuring ranges	0 to 100, 150, 200, 300, 500, 600, 750, 1000, 1500, 3000, 5000, 6000, 9000, 10000 psi
Overload pressure	200% FS, max. (except 13,000 psi for 9000 psi / 16,000 psi for 10,000 psi)
Burst pressure	300% FS, max. 29,000psi
Standard Mechanical Ports	SAE 6 9/16-18 UNF2A male 1/4"-18 NPT male thread 1/4"-18 NPT female thread
Tightening torque	approx. 15 lb-ft (20 Nm) (standard models only)
Parts in contact with media	Stainless steel, FPM seal
Output Data	
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	±0.25 %FS max
Temperature compensation zero point	≤ ±0.0045%FS/°F typ. ≤ ±0.0085%FS/°F max.
Temperature compensation over range	≤ ±0.0045%FS/°F typ. ≤ ±0.0085%FS/°F max.
Rise time	approx. 0.5 ms
Long-term drift	≤ ±0.2%FS typ. / year
Ambient Conditions	
Type of Protection Intrinsically Safe	
Nominal temperature range	-4° to 140°F (-20° to 60°C)
Operating temperature range	-4° to 140°F (-20° to 60°C)
Enclosures against dust non incendive	
Nominal temperature range	-4° to 185°F (-20° to 85°C)
Operating temperature range	-4° to 185°F (-20° to 85°C)
Storage temperature range (all)	-40° to 212°F (-40° to 100°C)
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	196.2 m/s² (≤ 20g)
Safety type to DIN 40050	min. IP 65 (depending on connector)
Other Data	
Supply voltage	12 to 28 V (max 1W up to 26 V, max 0.8W for 26 - 28 V)
Maximum supply current	100 mA
Capacitance of transducer	≤ 12 nF
Inductance of transducer	0H
Residual ripple supply voltage	≤ 5%
Reverse polarity protection of the supply voltage, and short circuit protection	standard
Life expectancy	> 100 million load cycles 0 to 100%FS
Weight	approx. 180 g
Some Models Conform to NACE MR-0175	consult factory

Applications:



Approvals:



Intrinsically Safe (all connector versions):

Ex ia Class I, II, III; Division 1,
Groups A, B, C, D, E, F, G T6
Class I, II, III; Division 1,
Groups A, B, C, D, E, F, G T6
Ex ia IIC T6

Class 1, Zone 0, AEx IIC T6
Ambient temperature max. 60°C

Non Incendive (connectors: 9; A only)

Class I, II, III, Division 2,
Groups A, B, C, D, F, G T4A
Ex nA II T4 or Ex nL IIC T4
Class I, Zone 2, AEx nA II T4 or AEx nL IIC T4
Ambient temperature max. 85°C

Non Incendive (all connectors versions):

Class I, II, III, Division 2,
Groups A, B, C, D, F, G T4A
Ex nL IIC T4
Class I, Zone 2, AEx nL IIC T4
Ambient temperature max. 85°C

Model Code:

Series _____ **HDA 3** **X** **X** **X** - **A** - **XXXX** - **U** **00** **(PSI)** **(XX inch)**
HDA3 = 3000 series Pressure Transducer for Hazardous Locations


Accuracy _____
7 = 0.25% BFSL

Mechanical Connection _____
4 = G 1/4" BSPP male
5 = SAE-4 female
7 = SAE-6 9/16-18 UNF2A male
8 = 1/4"-18 NPT male thread
9 = G 1/4" BSPP female
F = 1/4"-18 NPT female thread
C = Autoclave female port

Electrical Connection _____
5 = DIN 43650 / ISO4400 plug
9 = 1/2" NPT male conduit (wire leads)
A = DIN 43650 with 1/2" NPT female conduit

Signal _____
A = 4 to 20mA

Pressure Ranges _____
0 to 100, 150, 200, 300, 500, 600, 750, 1000, 1500, 3000, 5000, 6000, 9000, 10,000 (psi)

Approval _____
U = 

Modification Number _____
used for pin connection, special calibration in pressure range

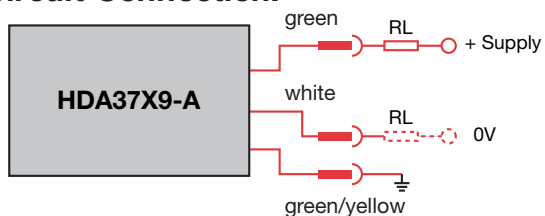
Additional Declaration for PSI _____

Wire Length _____
48 inch (longer wires on request)

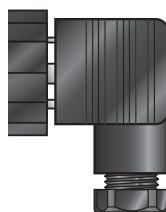
Bar ranges available upon request

Model Codes Containing RED are non-standard items - Minimum quantities may apply
Contact **HYDAC** for information and availability

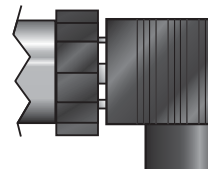
Circuit Connection:



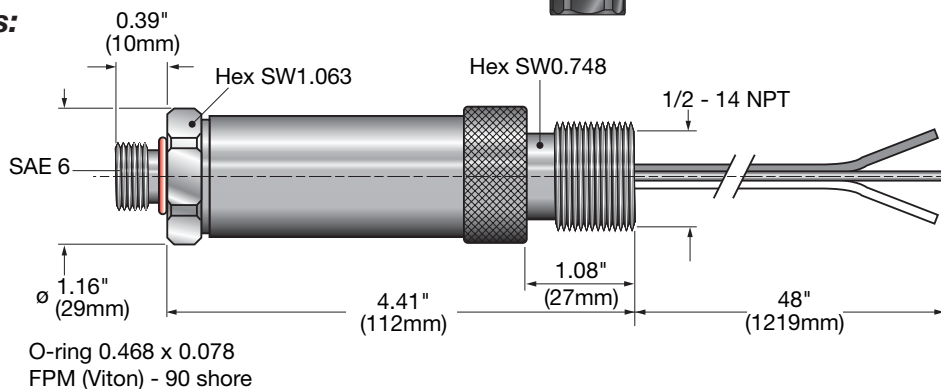
DIN 43650 / ISO4400 plug:



DIN 43650 with 1/2" NPT female conduit:



Dimensions:



HDA 3700 - Intrinsically Safe with ATEX Approval



About HDA 3700 Pressure Transducers:

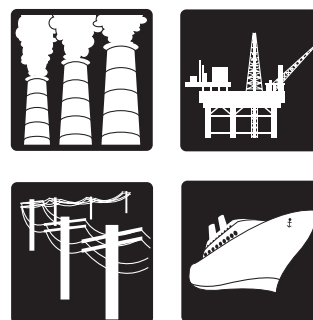
The pressure transducer series HDA 3700 is available in a version for intrinsically safe circuits for measuring pressure in hazardous applications.

Like the industrial version of the HDA 3700, the ATEX-version also has a very accurate, robust pressure sensor. With a basic accuracy of $\leq 0.25\%$ BFS/L and outstanding specifications regarding the temperature effect, this series is suitable for use in a wide range of applications. The pressure measured by the sensor is converted to a proportional, analog 4 to 20 mA signal. The signals can be sent to most commonly used processors and controllers, including PLC's, computers, recorders, and digital displays.

Technical Details:

Input Data	
Measuring ranges (psi)	0 to 100, 150, 200, 300, 500, 600, 750, 1000, 1500, 3000, 6000, 9000 psi 6, 16, 60, 100, 250, 400, 600 bar
Overload pressure	200% FS, maximal 13,000 psi (900 bar)
Burst pressure	300% FS
Mechanical Ports	G 1/4 (m)
Tightening torque	approx. 15 lb-ft (20 Nm)
Parts in contact with media	Stainless steel, FPM seal
Output Data	
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	$\leq \pm 0.25\%$ FS max
Temperature compensation zero point	$\leq \pm 0.0045\%$ FS/°F $\leq \pm 0.0085\%$ FS/°F
Temperature compensation over range	$\leq \pm 0.0045\%$ FS/°F $\leq \pm 0.0085\%$ FS/°F
Rise time	approx. 0.5 ms
Long-term drift	$\leq \pm 0.2\%$ FS typ. / year
Ambient Conditions	
Nominal temperature range	-13° to 140°F (-25° to 60°C)
Operating temperature range	-40° to 140°F (-40° to 60°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)
Approval no.	02 ATEX E 257 X
CE mark	EN 61000-6-1/2/3/4; EN500014; EN500020; EN50284
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	196.2 m/s ² ($\leq 20g$)
Safety type to DIN 40050	IP 65
Other Data	
Supply voltage	12 to 28 V (max 1W up to 26 V, max 0.8W for 26 - 28 V)
Maximum supply current	100 mA
Capacitance of transducer	≤ 12 nF
Inductance of transducer	0H
Residual ripple supply voltage	$\leq 5\%$
Reverse polarity protection of the supply voltage, short circuit protection	standard
Life expectancy	> 100 million load cycles 0 to 100%FS
Weight	approx. 180 g

Applications:



Equipment Group 1

- I Equipment Group 1
Designated for use in the underground parts of mines as well as those parts of surface installations of such endangered by firedamp and/or combustible gases
- M1 Category
Designated for use in the underground parts of mines dealing with all CH₄ concentrations

Equipment Group 2

- II Equipment Group 2
Designated for use in areas in which explosive atmospheres caused by mixtures of air and gas vapors or mists or by air/dust mixtures are present continuously, for long periods or frequently
- 1 Category 1
Use in zones 0, 1, 2 possible
- 2 Category 2
Use in zones 1, 2 possible
- 1 / 2 Category 1 / 2
Use in zones 1 and 2 possible
Designated for use in zones 0 and 1, with the pressure sensor assuming the function of an isolating element

Approvals:



02 ATEX E 257 X

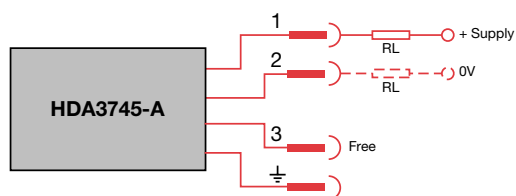
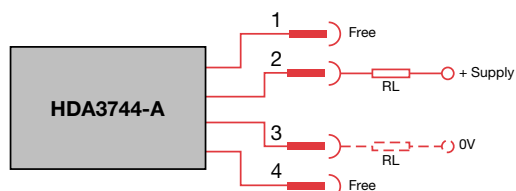
- IM1 EEx ia I
- II 1G EEx ia IIC T6
- II 1/2 G EEx ia IIC T6

Model Code:

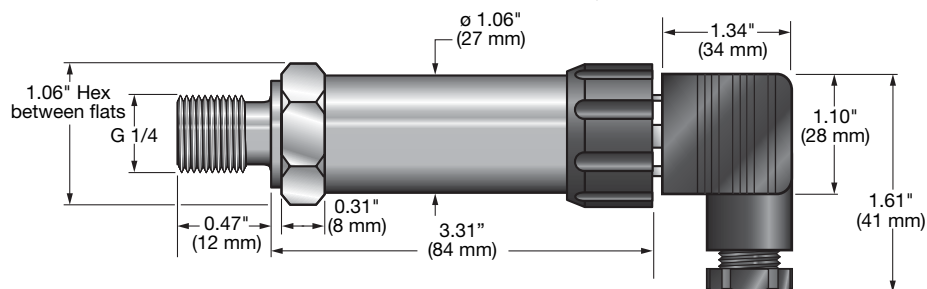
	HDA 3	7	X	X	- A -	XXXX	- A00	(PSI)	XX inch
Series	HDA 3 = 3000 series Intrinsically Safe Pressure Transducer								
Accuracy	7 = 0.25% BFSL								
Mechanical Connection	4 = G 1/4 BSPP male 7 = SAE-6 9/16-18 UNF2A male (with adapter) 8 = 1/4 NPT male F = 1/4"-18 NPT female thread								
Electrical Connection	4 = 4 pole plug M18x1 plug (connector not included) 5 = DIN 43650 / ISO4400 plug, 3 pole + ground (connector ZBE 01 included) 9 = 1/2" NPT male conduit - 48" or 72" leads								
Output Signal	A = 2-conductor / 4 to 20mA								
Pressure Ranges	0 to 100, 150, 200, 300, 500, 600, 750, 1000, 1500, 3000, 5000, 6000, 9000 psi 6, 16, 60, 100, 250, 400, 600 bar								
Modification Number	A00 = IM1 EEX ia I, II1G EEX ia IIC T6, II1/2G EEx ia IIC T6								
Additional Declaration for PSI									
Wire Length									

Model Codes Containing RED are non-standard items - Minimum quantities may apply
Contact **HYDAC** for information and availability

Circuit Connection:

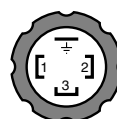


Dimensions:

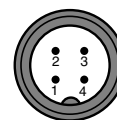


Plug Connection:

HDA 37X5 use with ZBE 01 (see page 60)

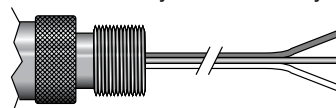


HDA 37X4 use with ZBE 02 or ZBE 03 (see page 60)



1/2" NPT male conduit:

consult factory for availability



HDA 3800 - Steel Works

About HDA 3800 Pressure Transducers:

This high-precision pressure transducer has been specially developed and adapted for the sophisticated measurement demands of steelworks technology. The unit has a very robust sensor cell with a thin-film DMS which is applied to a stainless steel membrane. It's outstanding specifications with reference to temperature effect (temperature drift for zero point and range are at maximum $\leq \pm 0.01$ FS/°C each) and accuracy ($\leq \pm 0.15\%$ FS typ.) makes it ideally suited for use in the harsh ambient conditions found in steelworks. The excellent EMC characteristics guarantee signal stability during the harshest high-frequency, electro-magnetic interference.



Technical Details:

Input Data	
Measuring ranges	350 bar
Overload pressure	900 bar
Burst pressure	2000 bar
Mechanical Connection	G1/4 A DIN 3852, G1/2 A male SAE 6 9/16-18 UNF2A male
Tightening torque	approx. 15 lb-ft (20 Nm) for G1/4 A approx. 33 lb-ft (45 Nm) for G1/2 A
Parts in contact with media	Stainless steel, FPM seal (G1/4 A) NBR O-ring (G 1/2 A)
Output Data	
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	$\leq \pm 0.15\%$ FS max.
Temperature compensation zero point	$\leq \pm 0.0028\%$ FS/°F typ. $\leq \pm 0.0056\%$ FS/°F max.
Temperature compensation over range	$\leq \pm 0.0028\%$ FS/°F typ. $\leq \pm 0.0056\%$ FS/°F max.
Rise time	≤ 1.5 ms
Long-term drift	$\leq \pm 0.1\%$ FS typ. / year
Ambient Conditions	
Nominal temperature range	-13° to 185°F (-25° to 85°C)
Operating temperature range	-40° to 185°F (-40° to 85°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)
Fluid temperature range	-40° to 212°F (-40° to 100°C)
CE mark	EN 50081-1 and EN 50081-2 EN 50082-1 and EN 50082-2
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	≤ 25 g
Safety type to DIN 40050	IP 68
Other Data	
Supply voltage	2 conductor - 10 to 30 V 3 conductor - 12 to 30 V
Residual ripple supply voltage	$\leq 5\%$
Current consumption 3-conductor	approx. 25 mA
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard
Life expectancy	≥ 10 million load cycles, 0 to 100%FS
Weight	210 g

Applications:



Approvals:



Note: F.S. (Full Scale) = Relative to the full measuring range
* = Other measuring ranges on request

Model Code:

HDA 3 8 X 0 - X - 350 - 124 XM

Series

HDA 3 = Pressure Transducer for Steel Works

Accuracy

8 = $\leq 0.15\%$

Mechanical Connection

0 = G 1/2 A male thread

4 = G 1/4 A DIN 3852

7 = SAE 6 9/16-18 UNF2A male

Electrical Connection

0 = flying lead 6m (Teflon cable, silicon-free)

Output Signal

A = 2 conductor, 4-20 mA

E = 3 conductor, 0-20 mA

Pressure Range

350, 400, 600 bar

3000, 5000, 6000, 9000, 10,000 psi

Modification Number

124 (determined by manufacturer)

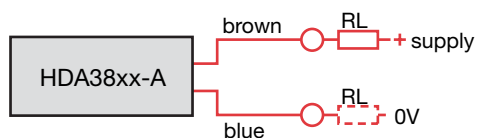
Cable Length

6 (standard), 10, 15, 20, 25, 30 M

Note: Other pressure ranges on request

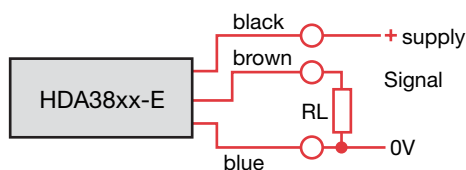
Circuit Connection:

2 conductor 4 to 20 mA



$$RL_{max.} = \frac{UB - 10 V}{0.02 A}$$

3 conductor 0 to 20 mA



$$RL_{max.} = \frac{UB - 7 V}{0.02 A}$$

Plug Connection:

A-Signal

Brown: + Supply

Blue: 0V

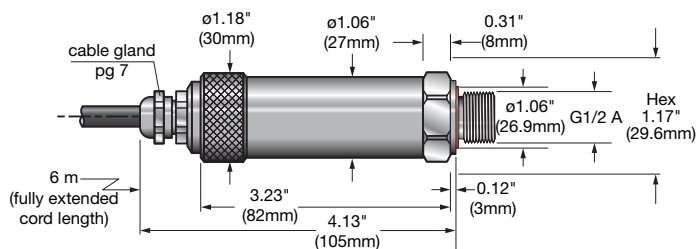
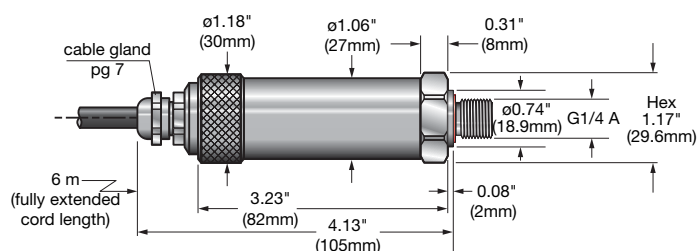
E-Signal

Black: + Supply

Brown: Signal

Blue: 0V

Dimensions:



HDA 4380 - Submersible

About HDA 4380 Submersible Transducers:



HYDAC's HDA 4380 Series transmitter is a submersible pressure transducer suitable for liquid level and depth measurement in a variety of industrial and municipal level measurement applications. Its stainless steel sealed housing makes it suitable for immersion in most industrial liquids and oils as well as wastewater and seawater. Safety rated to IP 68, they are specifically designed to operate under the rigorous conditions encountered in liquid level measurement and control. A 40 foot vented polyurethane cable (other lengths available) provides an atmospheric pressure reference. Each transducer is shipped with a membrane barrier that prevents moisture from entering the cable vent tube.

Technical Details:

Input Data	
Measurement range	5, 10, 15 psi
Overload range	10, 20, 30 psi
Burst pressure	20, 40, 60 psi
Mechanical connection	1/4" NPT male
Tightening torque	20 Nm
Parts in contact with media	Stainless steel, ceramic seal: EPDM
Output Data	
Output signal	4 to 20 mA, 2-conductor
Accuracy (calibrated at 68°F)	$\leq \pm 0.5$ %FS B.F.S.L
Zero point (calibrated with pressure port pointing downwards)	$\leq \pm 0.3$ %FS ($\leq \pm 0.05$ mA) typ. $\leq \pm 0.6$ %FS ($\leq \pm 0.10$ mA) max.
Temperature compensation zero point in the range 41 to 104°F (in the range 5 to 40°C)	$\leq \pm 0.02$ %FS/°C typ. $\leq \pm 0.03$ %FS/°C max.
Temperature compensation span in the range 41 to 104°F (in the range 5 to 40°C)	$\leq \pm 0.02$ %FS/°C typ. $\leq \pm 0.03$ %FS/°C max.
Long term drift	$\leq \pm 0.5$ %FS typ. / year
Ambient Conditions	
Operating temperature range	-13 to 158°F (-25 to 70 °C)
Storage temperature range	-13 to 158°F (-25 to 70 °C)
Fluid temperature range	-13 to 158°F (-25 to 70 °C)
mark	EN 61000-6-1, EN 61000-6-2 EN 61000-6-3, EN 61000-6-4
Safety type to DIN 40050	IP 68
Other Data	
Supply voltage	10 to 30 V
Load resistance [Ω]	RLmax = Usupply -10V / 0,02 A
Residual ripple supply voltage	≤ 5 %
Electrical connection	1/2" Conduit with vented cable
Tensile strength (transducer with cable)	100 lbs
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	Standard Features
Life expectancy	>10 Mio. load cycles 0 to 100 %FS

Applications:



Approvals:



Model Code:

Series _____ **HDA 4380** - **A** - **XXXX** - **XXX** **E1(PSI)**
HDA 4380 = submersible transducer
Output Signal _____
A = 2 conductor, 4-20 mA
Current Range _____
XXXX = Pressure range 5, 10, 15, 30, 50, 100, 150, 250, 500 psi
Modification Number _____
XXX = Modification Number
EPDM Seal _____
E1

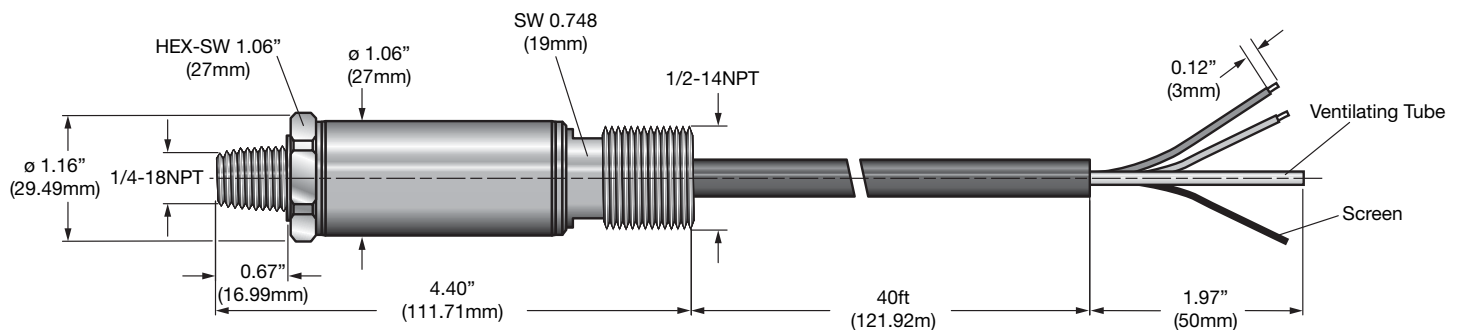
Other pressure ranges up to 500 psi available upon request.

Contact product management for availability.

Circuit Connection:

red	+ supply
black	0 V

Dimensions:



HDA 5500



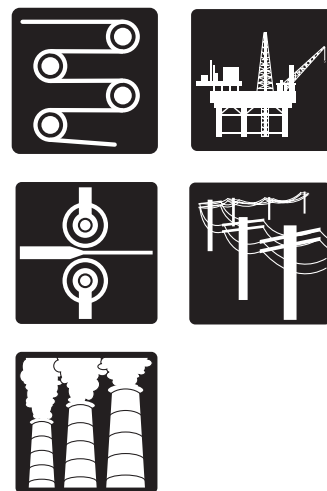
About HDA 5500 Intelligent Display Unit:

The HDA 5500 is a microprocessor controlled display and control unit in a standard control panel module housing. A single-chip microprocessor controls all functions. A maximum of 3 analog inputs and 1 analog output is possible. The analog input signals are converted by a 10 bit A/D converter and displayed according to the measuring scale selected by the user. Each of the 4 maximum possible relays can be allocated to each of the 3 analog sensor inputs or the differential between sensor signals 1 and 2. All operating parameters such as switching points and switch-back (*i.e. hysteresis*) points can be programmed by means of the MODE and SET keys. The relays switch as soon as a pre-set switching point is reached, or after a programmed delay. This function suppresses the reaction of the relays to short-term and irrelevant variations such as pressure spikes.

Technical Details:

Output	7-Segment LED with four digit display field, red, character height of 14.2 mm 3 LED for measuring range / 4 LED for switch points
Normal range	-999 to 9999 (<i>freely adjustable</i>)
Display units with background lighting	bar, kg/cm ² , Mpa, psi, °C, °F, l/min, mA, V, Hz, kN, m, mm, l, gal, gal/min, 1/min
Analog Signal Input	
Measuring range (<i>up to 3 analogue inputs</i>)	Adjustable: 4 to 20 mA, 0 to 5 V or 0 to 10 V
Accuracy class	± 0.25% with 25°C
PT 100 – Input	
Measuring range	-25..100 °C
Accuracy class	± 0.25% with 25°C
Frequency / Counter Input	
Signal Threshold	0 to 0.6 V = LOW / 3 to 24 V = HIGH
Frequency range	10Hz to 4kHz
Initial Values	
Analog Output	adjustable: 4 to 20 mA, load ≤ 400 Ω or 0 to 10 V, load ≥ 2 k Ω
Analog output accuracy	± 0.5 % with 25°C
Rise time	70 ms
Switching Outputs	
Execution	2 or 4 Relays in each case with separate root
Bias-reducing potential	0.1 to 250 VAC
Current on contact	9 mA to 2 A
Contact rating	400 VA, 50 W (<i>use resistors with inductive load</i>)
Lifespan of switching contacts	≥ 20 Mio. with minimum load ≥ 1 Mio. With maximum load
Response time (<i>time delay = 0 ms</i>)	Approx. 20 ms
Range of adjustment on the switch points	1.5 to 100 % the adjusted normal range
Range of adjustment of the switching hysteresis (<i>reset points</i>)	1 to 99 % the adjusted normal range
Interface	Serial interface RS232 Baud rate 19200 - 8 data bits 1 start and stop bit - no parity
Ambient Conditions	
Nominal temperature range	0 to 50°C
Operating temperature range	0 to 50°C
Storage temperature range	-40 to 80°C
CE Mark	EN 50081-1 and -2, EN 50082-1, EN 61000-6-2
Other Sizes	
Housing	instrument panel dimensions 96 x 48 x 109 mm instrument panel cutout 92 (0.8) x 45 (0.6) mm front panel thickness 1 to 15 mm, maximum depth 121 mm
Electrical Connections Relays:	terminal block 6 pole
Supply voltage:	terminal block, 2 pole
input/outputs:	terminal block, 11 pole max. cross section for connection 1.5 mm ²
input/outputs:	max. cross section for connection 2.5 mm ² for supply voltage & relay
Supply Voltage	85 to 265 VAC 50 / 60 Hz or 24 VDC
Capacity	15 VA with 85..230 VAC Fuse 1 AT
Supply of the transducers	12 ± 1 % VDC max. 20 mA per analog input
Enclosure according to DIN 40050	IP 20
Weight	Approx. 320 g

Applications:



Approvals:



Model Code:

HDA 5500 - X - X XX - 000

Series

Series = HDA 5500

Inputs

- 0 = 1 analog input
- 1 = 3 analog inputs
- 2 = 1 analog + 1 frequency / Count function
- 3 = 1 analog + PT 100 - input

Outputs

- 0 = without relay option
- 1 = 2 relay outputs
- 2 = 4 relay outputs

Supply voltage

- AC = 85 to 265 VAC
- DC = 12 to 32 VDC

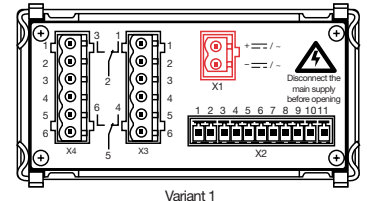
Modification number

000 = standard

Pin Connection:

Supply Voltage Connector X1

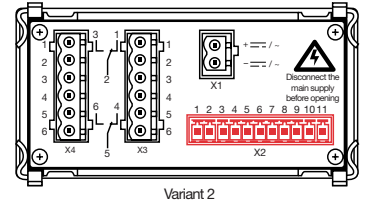
Device	X1 PIN	Description	Variant
HDA 5500-X-X-AC-000	- / -	Supply voltage 85VAC bis 265VAC 50/60Hz	1, 2 & 3
HDA 5500-X-X-DC-000	+ / -	Supply voltage 24VDC	1, 2 & 3



Variant 1

Supply Voltage Connector X2

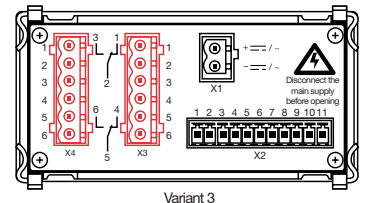
Device	1	2	3	4	5	6	7	8	9	10	11	Variant
HDA 5500-0-X-XX-000	RXD	TXD	DGND	Analog Output	AGND	+12V	Sensor 1 Input					1, 2 & 3
HDA 5500-1-X-XX-000	RXD	TXD	DGND	Analog Output	AGND	+12V	Sensor 1 Input	Sensor 2 Input	Sensor 3 Input	AGND		1, 2 & 3
HDA 5500-2-X-XX-000	RXD	TXD	DGND	Analog Output	AGND	+12V	Sensor 1 Input	Freq	Start	Stop	Clear	1, 2 & 3
HDA 5500-3-X-XX-000	RXD	TXD	DGND	Analog Output	AGND	+12V	Sensor 1 Input	Pt100	Pt100	Pt100	Pt100	1, 2 & 3



Variant 2

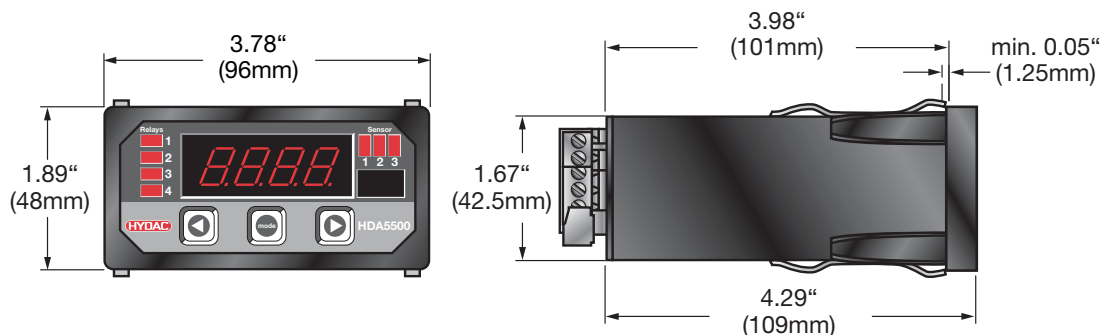
Connection of the Relays Contacts X3 / X4

Device	X3						X4						Variant
HDA 5500-X-0-XX-000													1
HDA 5500-X-1-XX-000	R1 N/C	R1 Base	R1 N/O	R2 N/C	R2 Base	R2 N/O							2
HDA 5500-X-2-XX-000	R1 N/C	R1 Base	R1 N/O	R2 N/C	R2 Base	R2 N/O	R3 N/C	R3 Base	R3 N/O	R4 N/C	R4 Base	R4 N/O	3



Variant 3

Dimensions:



EDS 3000



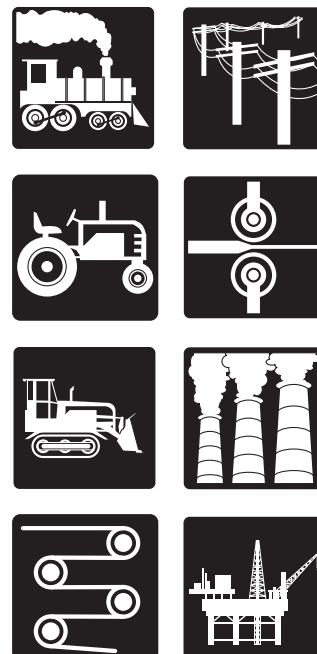
About EDS 3000 Pressure Switches:

The EDS 3000 electronic pressure switch is the result of joint development and innovation in the field of adjustable pressure switches with display. It is a compact unit which combines a pressure switch, digital display, and transducer for controlling pressure in hydraulic and pneumatic applications. The most noticeable innovation is the alignment of the serial four-digit display. After mounting, the switch may be turned as a whole. Additionally, the front panel with push buttons may be turned. This eliminates the need for mechanical adapters. Display units can be shown in bar, psi, or mpa. It is also possible to free scale the pressure range to any desired engineering unit, such as force or tonnage. Pressure ranges from vacuum to 9000 psi are available. Switching outputs in one or two switch versions with or without analog output are available when choosing model code.

Technical Details:

Input Data	
Measuring ranges (type 1) (type 3)	0 to 15, 50 psi
(type 4)	0 to 15, 30, 50, 150, 250, 500 psi -14 to 75 psi 0 to 1000, 3000, 6000, 9000 psi
Overload pressure	200%FS max. 900 bar (13000 psi)
Burst pressure	300%FS max. 2000 bar (29000 psi)
Mechanical Connection	G 1/4 A male, 1/4"-18 NPT male SAE 6 9/16-18 UNF2A male
Tightening torque	approx. 15 lb-ft (20 Nm)
Parts in contact (types 1 & 3) with media (type 4)	Stainless steel, ceramic, FPM seal Stainless steel, FPM seal
Output Data	
Accuracy (B.F.S.L.) including linearity & hysteresis	$\leq \pm 0.5 \%FS$
Temp. comp. zero point	$\leq \pm 0.017\%FS/^{\circ}F$ max.
Temp. comp. over range	$\leq \pm 0.017\%FS/^{\circ}F$ max.
Analog output signal, adjustable	4 to 20 mA, ohmic resistance $\leq 500\Omega$ 0 to 10 V, ohmic resistance $\geq 1k\Omega$
Switching Outputs	
Type	PNP transistor output
Repeatability	$\leq \pm 0.5\%FS$ max.
Switching current	max. 1.2 A
Switching cycles	≥ 100 million
Reaction time	< 10 ms
Ambient Conditions	
Nominal temperature range	-13° to 185°F (-25° to 85°C)
Ambient Temperature range	-13° to 176°F (-25° to 80°C)
Storage temperature range	-40° to 176°F (-40° to 80°C)
Fluid temperature range	-13° to 176°F (-25° to 80°C)
CE mark	EN 61000-6-1, EN 61000-6-2 EN 61000-6-3, EN 61000-6-4
Vibration resistance	$\leq 10g / 0$ to 500Hz (IEC 60068-2-6)
Shock resistance	$\leq 50g / 11ms$ (IEC 60068-2-29)
Safety type to DIN 40050	IP 67 (molded M12x1 connector is used)
Other data	
Supply voltage	9 to 35 VDC for signal 1,2 18 to 35 VDC for signal 3, 5
Electrical connection	M12x1 (4 pin or 5 pin)
Current consumption	approx. 100 mA (without switching output)
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard
Display	4 digit, 7 segment LED red
Weight	approx. 300 g

Applications:



Approvals:



Model Code:

EDS 3 X X X - X - XXXX - 400 X 1

Series

EDS 3 = 3000 Series Electronic Sensor

Sensor Type

- 1 = Ceramic absolute pressure (pressure range type 1)
- 3 = Ceramic gauge pressure (pressure range type 3)
- 4 = Thin-film gauge pressure (pressure range type 4)

Mechanical Connection

- 4 = G 1/4 BSPP male thread* (sensor types 1, 3 & 4) (pressure range rated in bar)
- 8 = 1/4" - 18 NPT male thread (sensor types 1 & 3)
- 7 = SAE-6 male thread (9/16-18 UNF2A) (sensor types 3 & 4)

Electrical Connection

- 6 = M12x1 plug, 4 pole (for output codes 1, 2, and 3) (connector not included)
- 8 = M12x1 plug, 5 pole (for output code 5) (connector not included)

Output

- 1 = 1 Switch output (only with electrical connection 6)
- 2 = 2 Switch outputs (only with electrical connection 6)
- 3 = 1 Switch with analog output (only with electrical connection 6)
- 5 = 2 Switch with analog output (only with electrical connection 8)

Pressure Ranges

Type 1 (ceramic - absolute pressure)	Type 3 (ceramic - gauge pressure)	Type 4 (thin-film, gauge pressure)
0015 = 0 to 15 psi	0015 = 0 to 15 psi	0250 = 0 to 250 psi
0050 = 0 to 50 psi	0030 = 0 to 30 psi	0500 = 0 to 500 psi
	0050 = 0 to 50 psi	0089 = -14 to 75 psi
	0150 = 0 to 150 psi	1000 = 0 to 1000 psi
		3000 = 0 to 3000 psi
		6000 = 0 to 6000 psi
		9000 = 0 to 9000 psi

Modification Number

400 = standard in psi

Sealing Material (in contact with media)

- F = FPM seal (to be used for example with hydraulic fluid)
- E = EPDM seal (to be used for example with refrigerant coolant or fluids containing ammonia)

Material for Mechanical Connection / Housing (in contact with media)

1 = Stainless Steel

Switch/Reset Point Resolution:

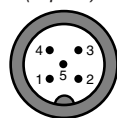
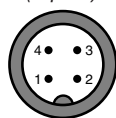
Refer to Programming Manual (which can be found at www.hydacusa.com) for the resolution values.

Plug Connection:

EDS 3XX6 (4-pole)

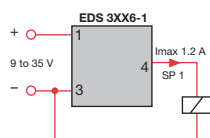
EDS 3XX8 (5-pole)

use with ZBE 06 (4-pole) & ZBE 08 (5-pole) (see page 60)

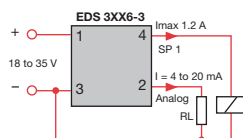


Circuit Connection:

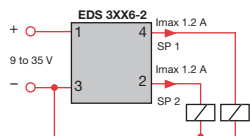
Model with 1 switch output
Plug 4-pol. M12x1



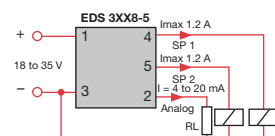
Model with 1 switch output
and signal output
Plug 4-pol. M12x1



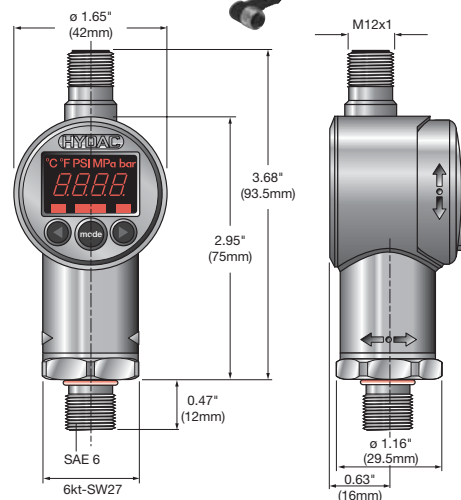
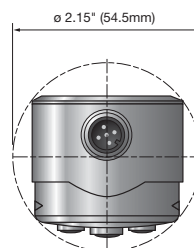
Model with 2 switch outputs
Plug 4-pol. M12x1



Model with 2 switch outputs
and signal output
Plug 5-pol. M12x1



Dimensions:



EDS 300



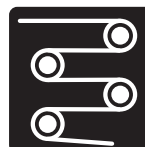
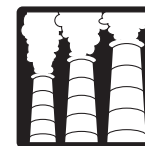
About EDS Pressure Switches:

The EDS 300 is a compact unit which combines a pressure transducer, digital display, 2 switches, and analog output for controlling pressure in hydraulic and pneumatic systems. The transducer converts system pressure into an electrical signal for the display and analog output. External adjustments allow the user to set the pressure switch points and switchback points. The 3 way functionality of this device offers a large cost savings to purchasing a gauge, transducer, and switch individually.

Technical Details:

Input Data	
Measuring Ranges	-14 to 75 psi; 0 to 150, 1000, 3000, 6000, 9000 psi
Overload Pressures	150% FS
Burst Pressure	300% FS
Output Data	
Accuracy (display, analog output)	$\leq \pm 1.0\%$ FS max.
Repeatability	$\leq \pm 0.5\%$ FS max.
Temperature Drift	zero point max: $\leq \pm 0.016\%$ / °F ($\leq \pm 0.03\%$ / °C) range max: $\leq \pm 0.016\%$ / °F ($\leq \pm 0.03\%$ / °C)
Analog Output	4 to 20 mA, ohmic resistance $\leq 400 \Omega$
Switching Outputs	
Type	PNP transistor output
Switching Current	max. 1.2 A
Switching Cycles	≥ 100 million
Reaction Time	approx. 10 ms
Ambient Conditions	
Temperature Range of Medium	-13 to 176 °F (-25 to 80 °C)
Ambient Temperature Range	-13 to 176 °F (-25 to 80 °C)
Storage Temperature Range	-40 to 176 °F (-40 to 80 °C)
Nominal Temperature Range	14 to 158 °F (-10 to 70 °C)
CE mark	EN 50081-1 and -2, EN 50082-1 and -2
Vibration Resistance	approx. 10 g / 0 to 500 Hz
Shock Resistance	approx. 50 g / 1ms
Other Data	
Supply Voltage: EDS 356-1, 2 EDS 356-3	12 to 32 VDC 20 to 32 VDC
Electrical Connection	4 pole plug M12x1
Current Consumption	approx. 100 mA (without switching output)
Safety Type	IP65
Hydraulic Connection	SAE 4 female
Parts in Contact with Medium	Stainless Steel
Material of Housing	Tube: Stainless Steel Keypad Housing: PA6.6 GF30
Display	4-digit, 7-segment LED, red
Weight	approx. 300 g

Applications:



Approvals:



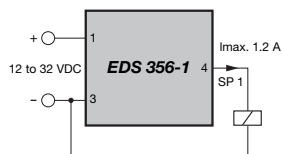
Model Code:

Series	EDS 3	X	6	-	X	-	XXXX	-	XXX
EDS 3 =	300 Series Electronic Pressure Switch								
Mechanical Connection									
4 =	G 1/4 BSPP male thread								
5 =	SAE-4 female thread (7/16-20 UNF2B)								
Electrical Connection									
6 =	M12x1 plug, 4 pole (connector not included)								
Output									
1 =	1 Switching output								
2 =	2 Switching outputs								
3 =	1 Switching output and 1 analog output								
Pressure Ranges									
0089 =	-14 to 75 psi (-1 to 5 bar) (vacuum version see also modification number)								
0150 =	0 to 150 psi (10.3 bar)								
1000 =	0 to 1000 psi (69 bar)								
3000 =	0 to 3000 psi (207 bar)								
6000 =	0 to 6000 psi (414 bar)								
9000 =	0 to 9000 psi (620 bar)								
Modification Number									
400 =	standard								
401 =	vacuum version								

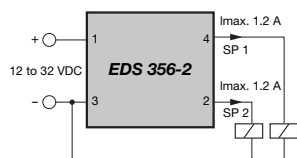
Note: Refer to Standard Stock list for popular model code combinations.

Circuit Connection:

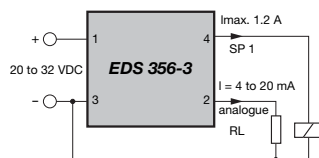
Model EDS 356-1
1 switching output



Model EDS 356-2
2 switching outputs



Model EDS 356-3
1 switching output 1 analogue output

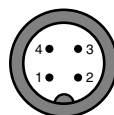


Plug Connection:

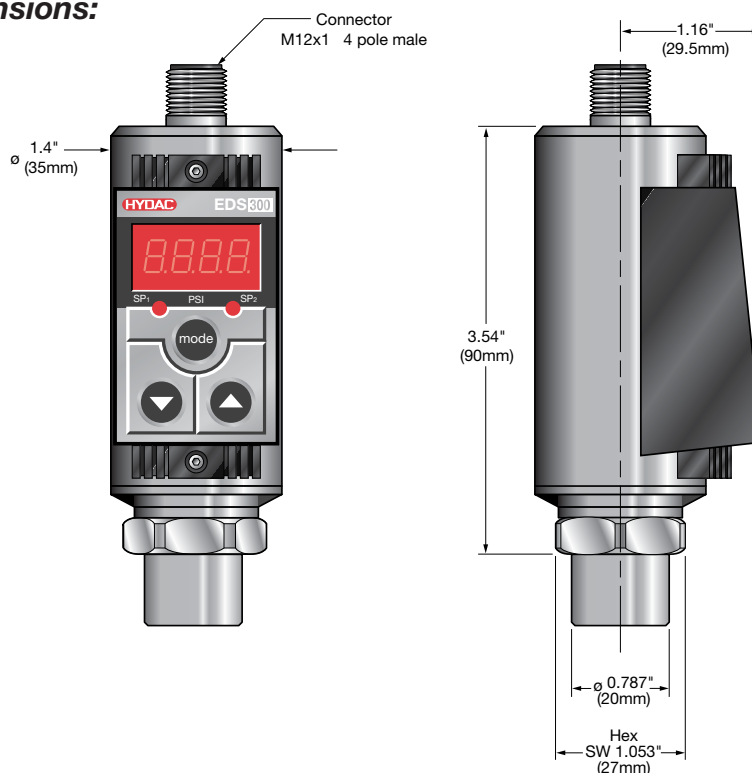
EDS 300

use with

ZBE 06 (see page 60)



Dimensions:



EDS 300 - Shipbuilding



About EDS 300 Pressure Switches:

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

Two relay switching outputs with N/O function and an additional analog output signal (4 to 20 mA) enable the pressure switch to be incorporated into the most modern control concepts. The switching points and the corresponding hysteresis can easily be adjusted via the keypad.

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

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

Technical Details:

Input Data	
Measuring ranges	-14 to 75, 150, 1000, 3000, 6000, 9000 psi -1 to 5, 006, 016, 040, 100, 250, 400, 600 bar
Overload pressure	200, 300, 3000, 7000, 11000, 13000 psi 15, 15, 32, 80, 200, 500, 800, 900 bar
Burst pressure	400% FS
Output Data	
Accuracy (display, analog output)	$\leq \pm 1\%$ FS max.
Repeatability	$\leq \pm 0.5\%$ FS max.
Temperature drift	$\leq \pm 0.3\%$ / 10 K zero point max. $\leq \pm 0.3\%$ / 10 K range max.
Analog output	4 to 20 mA, ohmic resistance $\leq 400 \Omega$
Switching Outputs	
Type	2 relay contacts (N/O)
Switching voltage	10 mV to 60 V (AC or DC)
Switching current	0.01 mA to 1A
Maximum switching output	30 W / 30 VA (for inductive load, use varistors)
Life expectancy	20 million (min. load) 0.5 million (max. load)
Reaction time	approx. 10 ms
Ambient Conditions	
Temperature range of medium	-13° to 176°F (-25° to 80°C)
Ambient temperature range	-13° to 176°F (-25° to 80°C)
Storage temperature range	-40° to 176°F (-40° to 80°C)
Nominal temperature range	-14° to 158°F (-10° to 70°C)
CE mark	EN 50081-1, EN 50081-2 EN 50082-1, EN 50082-2
Vibration resistance	5 to 25 Hz: 3.2 mm 25 to 500 Hz: 4 g
Other Data	
Supply voltage	20 to 32 VDC
Electrical connection	plug to DIN 43651 (6 pole + earth)
Current consumption	approx. 100 mA
Safety type	IP 65
Hydraulic connection	G 1/4 A male, (torque rating approx. 15 lb-ft) SAE 4 female thread (torque rating approx. 6 lb-ft)
Parts in contact with fluid	stainless steel, FPM seal
Material of housing	tube: stainless steel keypad housing: PA6.6 Gf30
Display	4-digit, 7 segment LED, red
Weight	approx. 300 g

Applications:



Approvals:



American Bureau of Shipping
No.: 00-ES 19976-X



Lloyds Register of Shipping
No.: 00/20048



Det Norske Veritas
No.: A-7710 (895.10)



Germanischer Lloyd
No.: 15519-00HH



Bureau Veritas
No.: 10343 /A0 BV

Model Code:

EDS 3 X 7 - 4 - XXX - S00 (PSI)

Series

EDS 3 = 300 Series Electronic Pressure Switch for Shipbuilding

Mechanical Connection

4 = G 1/4 A DIN 3852

5 = SAE-4 7/16-20 UNF2B female

Electrical Connection

7 = DIN43651 plug, 6 pole + ground (connector ZBE 10 not included)

Output

4 = 2 switching outputs and 1 analog output

Measuring Ranges

bar version: only in conjunction with connection thread G 1/4 A:

XXX = 006, 016, 040, 100, 250, 400, 600 with modification no. S00
for -1 to 5 bar use "006" and modification no. S13

psi version: only in conjunction with connection thread SAE 4:

XXXX = 0150, 1000, 3000, 6000 with modification no. S40
for -14 to 75 psi use "0089" and modification no. S41

Modification Numbers

S00 = bar version (except for -1 to 5 bar)

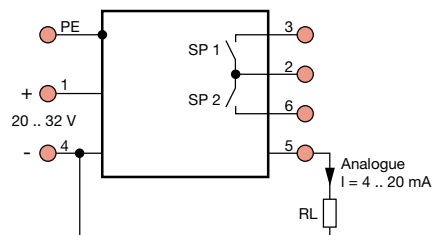
S13 = vacuum version -1 to 5 bar

S40 = psi version (except for -14 to 75 psi)

S41 = vacuum version -14 to 75 psi

Additional Clarification for PSI

Circuit Connection:



Plug Connection:

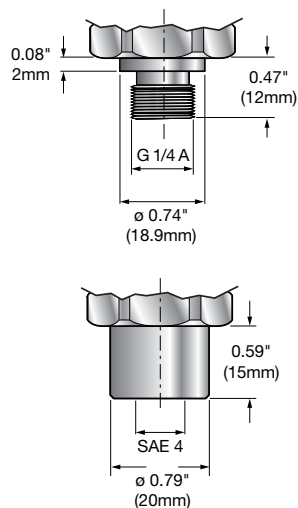
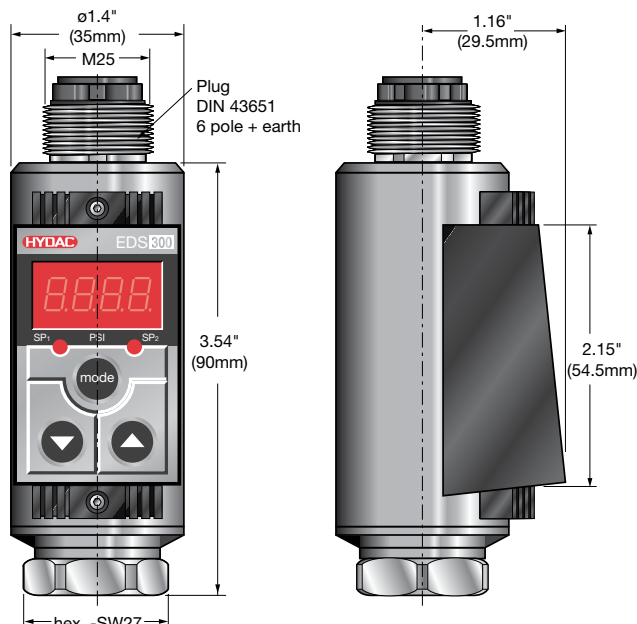
- Pin 1: + Supply
- Pin 2: SP Common Pole
- Pin 3: SP1 Contact
- Pin 4: 0V
- Pin 5: 4 to 20 mA Signal
- Pin 6: SP2 Contact

Plug Connection:

ZBE 10 (see page 60)

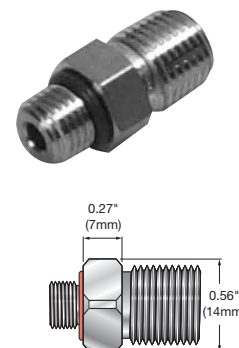


Dimensions:



Adapter Available:

Adapter SAE-4 (m) to 1/4 NPT (m) Stainless
Part Number - 02701426



EDS 410 - Fixed Settings



About EDS 410 Pressure Switches:

The electronic pressure switch EDS 410 was specially developed for use in industrial, mobile, and transit applications.

The small, compact unit has a very robust pressure sensor with thin film on a stainless steel membrane. The transistor switching output (PNP) is designed so that switching valves can be controlled directly, up to a current consumption of 1.2 Amps. The switching point and switch-back point of the EDS 410 is set by the manufacturer according to customer specification.

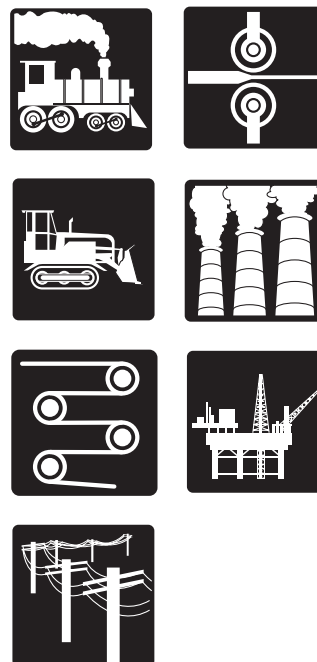
Various pressure ranges are available between 0 to 10 bar and 0 to 600 bar. The EDS 410 offers great flexibility with various options for electrical connections. Standard connections such as the DIN 43650 are available, as well as flying leads if necessary.

A minimum order of 25 pieces is usually needed.

Technical Details:

Input Data	
Measuring ranges	232 to 8700 PSI (16 to 600 bar)
Overload pressure	150% FS
Burst pressure	300% FS
Mechanical Connection	SAE 6 9/16-18 UNF2A male
Tightening torque	approx. 15 lb-ft (20 Nm)
Parts in contact with media	stainless steel, FPM seal
Output Data	
Type	1 PNP transistor output
Maximum output load	1.2 A
Switch point	to define
Switch-back point	to define
Repeatability	±0.5 %FS
Temperature compensation zero point	≤ ±0.03%FS/°C ≤ ±0.017%FS/°F
Temperature compensation over range	≤ ±0.03%FS/°C ≤ ±0.017%FS/°F
Long-term drift	≤ ±0.3%FS typ. / year
Ambient Conditions	
Nominal temperature range	-13° to 185°F (-25° to 85°C)
Operating temperature range	-13° to 185°F (-25° to 85°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)
Fluid temperature range	-40° to 212°F (-40° to 100°C)
CE mark, EMC	EN 50081-1 and EN 50081-2 EN 50082-1 and EN 50082-2
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	< 20g (196.2m/s²)
Safety type to DIN 40050	IP 65
Other Data	
Supply voltage:	12 to 32 VDC fuse: 5 A normal blow or 5 A slow blow
Residual ripple supply voltage	≤ 5%
Electrical connection	Connector DIN 43650
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard
Life expectancy	>10 mil load cycles 0 to 100% FS
Weight	145 g

Applications:



Approvals:



Model Code:

EDS 410 - XXX - X - XXX - (XXX/XXX bar or psi)

Series

EDS 410 = 410 Series Electronic Pressure Switch

Pressure Range

XXX = 232, 580, 1450, 3625, 5800, 8700 psi
= 016, 040, 100, 250, 400, 600 bar

Switch Function

0 = normally open
1 = normally closed

Modification Numbers

XXX = defined by manufacturer

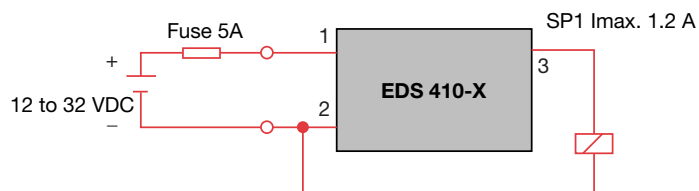
Switch Point

XXX = XXX

Switchback Point

XXX = XXX

Circuit Connection:

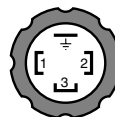


Plug Connection:

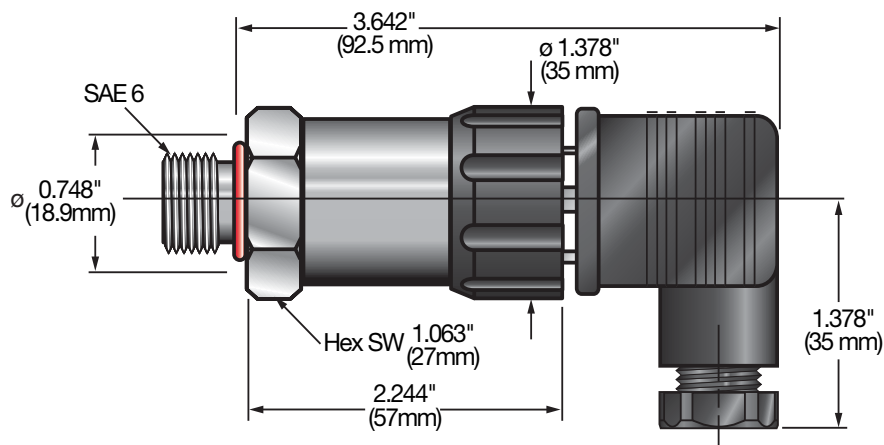
EDS 410

use with

ZBE 01 (see page 60)



Dimensions:



EDS 505 Adjustable Pressure Switch



About EDS 505 Adjustable Pressure Switches:

The EDS 505 is robust and simple to operate. Essentially, it consists of a pressure measuring cell and evaluation electronics which convert the measuring cell signal into a switching signal.

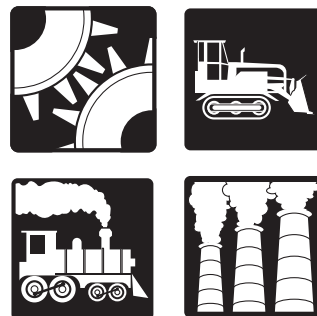
Long life and vibration resistance are guaranteed because the unit is constructed without moving parts. The EDS 505 is used in hydraulic systems, process engineering and mobile applications as a pressure monitor and two-position controller.

Accumulator charging, pressure control in chucks and compressor controls are a few examples where the mechanical pressure switch has a limited use and can be replaced by the EDS 505. An LED light on the end of the switch gives an immediate visual indication when the switches been activated.

Technical Details:

Input Data	
Measuring ranges	16, 40, 100, 250, 400, 600 bar
Overload pressure	32, 80, 200, 500, 800, 900 bar
Burst pressure	200, 200, 500, 1000, 2000, 2000 bar
Mechanical Connection	G 1/4 A male
Tightening torque	approx. 15 lb-ft (20 Nm)
Parts in contact with media	stainless steel, FPM seal
Output Data	
Repeatability	$\leq \pm 0.5\%FS$
Temp. comp. zero point	$\leq \pm 0.017\%FS/^{\circ}F$
Temp. comp. over range	$\leq \pm 0.017\%FS/^{\circ}F$
Long-term drift	$\leq \pm 0.3\%FS$ typ. / year
Switching Output	
Type	1 PNP transistor output
Maximum output load	1.2 A
Switching cycles	> 100 million
Reaction time	20 ms
Field adjustable setting ranges of the switch point	16 bar: 1 to 16 bar 40 bar: 3 to 40 bar 100 bar: 8 to 100 bar 250 bar: 15 to 250 bar 400 bar: 30 to 400 bar 600 bar: 40 to 600 bar
Setting range of the hysteresis	1.5 to 20% FS
Ambient Conditions	
Nominal temperature range	14° to 158°F (-10° to 70°C)
Operating temperature range	-13° to 185°F (-25° to 85°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)
Fluid temperature range	-40° to 212°F (-40° to 100°C)
CE mark	EN 50081-1 and EN 50081-2 EN 50082-1 and EN 61000-6-2
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	20 g
Shock resistance	50 g/ms
Safety type to DIN 40050	IP 65
Other Data	
Supply voltage:	12 to 32 VDC
Current consumption	approx. 50 mA
Electrical connection	DIN 43650 (3 pole + ground)
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard
Weight	260 g

Applications:



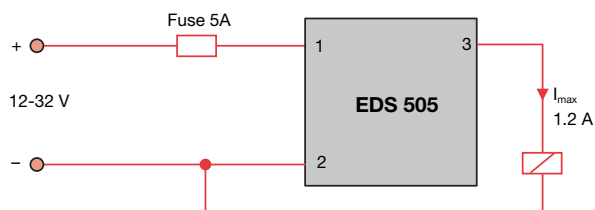
Approvals:



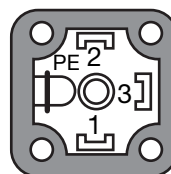
Model Code:

Series	EDS 505	-	XXX	-	4	X	-	000
Pressure Range								
016	= 16 bar (232 psi)							
040	= 40 bar (580 psi)							
100	= 100 bar (1450 psi)							
250	= 250 bar (3625 psi)							
400	= 400 bar (5800 psi)							
600	= 600 bar (8700 psi)							
Mechanical Connection								
4	= G 1/4 A male							
Switch Function								
0	= normally open							
1	= normally closed							
Modification Numbers								
000	= standard							

Circuit Connection:



Plug Connection:

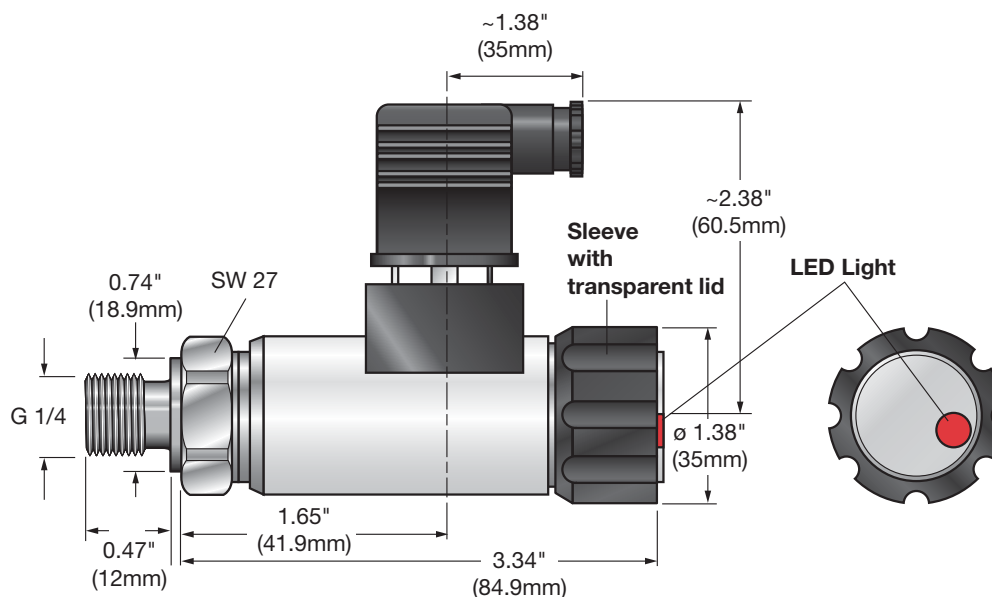


1 = 12V - 32 V DC
 2 = 0V
 3 = output (PNP) $I_{max} = 1.2$ A
 PE = ground

Accessory:

EDS 505 Switch Point Setting Cable for DC Volt Meter #00902821

Dimensions:



EDS 601



About EDS 601 Pressure Switches:

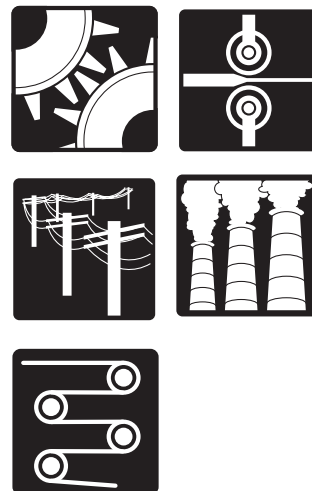
The EDS 601 is an electronic two-channel pressure switch with display and analog output. Its digitally adjustable switching points and switching hysteresis make it particularly suitable for applications requiring frequent change-overs or accurate switching point settings.

The variety of setting parameters ensures versatility for use in all control and monitoring tasks in hydraulics, pneumatics, process controls and in general test and control engineering applications.

Technical Details:

Input Data	
Measuring ranges	16, 40, 100, 250, 400, 600 bar
Overload pressure	24, 60, 150, 375, 600, 900 bar
Burst pressure	300% FS
Mechanical Connection	female port DIN 3852-G1/4
Tightening torque	approx. 15 lb-ft (20 Nm)
Parts in contact with media	stainless steel
Output Data	
Accuracy including linearity, hysteresis	$\leq 0.5\%$ FS B.F.S.L
Temp. comp. zero point	$\leq \pm 0.014\%$ FS/°F max.
Temp. comp. over range	$\leq \pm 0.014\%$ FS/°F max.
Long-term drift	$\leq \pm 0.3\%$ FS typ. / year
Signal output	0 to 10 V ohmic resistance: min 2 k Ω 4 to 20 mA ohmic resistance: max. 400 Ω
Max. frequency signal output	20 Hz
Relay Outputs	
Number / function	2 relays with change-over contacts
Repeatability	$\leq 0.5\%$ FS max.
Switching voltage	0.1 to 250 VAC / VDC
Switching current	0.025 to 2 A
Switching capacity	50 W / 400 VA (for inductive load use varistors)
Life expectancy	10 million without load / 1 million at nominal load
Reaction time	approx. 10 ms incl. electronics
Ambient Conditions	
Nominal temperature range	-13° to 158°F (-25° to 70°C)
Operating temperature range	-13° to 158°F (-25° to 70°C)
Storage temperature range	-40° to 185°F (-40° to 85°C)
Fluid temperature range	-40° to 185°F (-40° to 85°C)
CE mark	EN 50081-1 and -2, EN 50082-1 -2
Vibration resistance	25 g / 0 to 500 Hz
Shock resistance	50 g/ms
Safety type to DIN 40050	IP 65
Other Data	
Display	7 segment LED display, 4 digits, 13 mm high
Housing material	aluminum, anodized
Dimensions	approx. 72 x 72 x 110 mm (WxHxD)
Connection supply voltage	plug to DIN 43650 / ISO 4400 (3 pole + ground)
Connection relay	plug to DIN 43651 (6 pole + ground)
Supply voltage	18 to 32 VDC
Current consumption	approx. 120 mA
Switch on Current	approx. 1.5 A (0.1 sec)
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard
Weight	200 g

Applications:



Approvals:



Model Code:

EDS 601 - XXX - 000

Series

Pressure Range

- 016 = 16 bar (232 psi)
- 040 = 40 bar (580 psi)
- 100 = 100 bar (1450 psi)
- 250 = 250 bar (3625 psi)
- 400 = 400 bar (5800 psi)
- 600 = 600 bar (8700 psi)

Modification Numbers

- 000 = standard

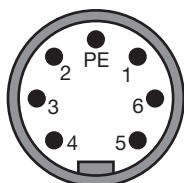
Accessories Included:

- Mating plug to DIN 43650 (supply voltage)
- Mating plug to DIN 43651 (relay contacts)

Other Accessories:

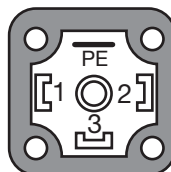
- Assembly set for front panel mounting

Circuit Connection:



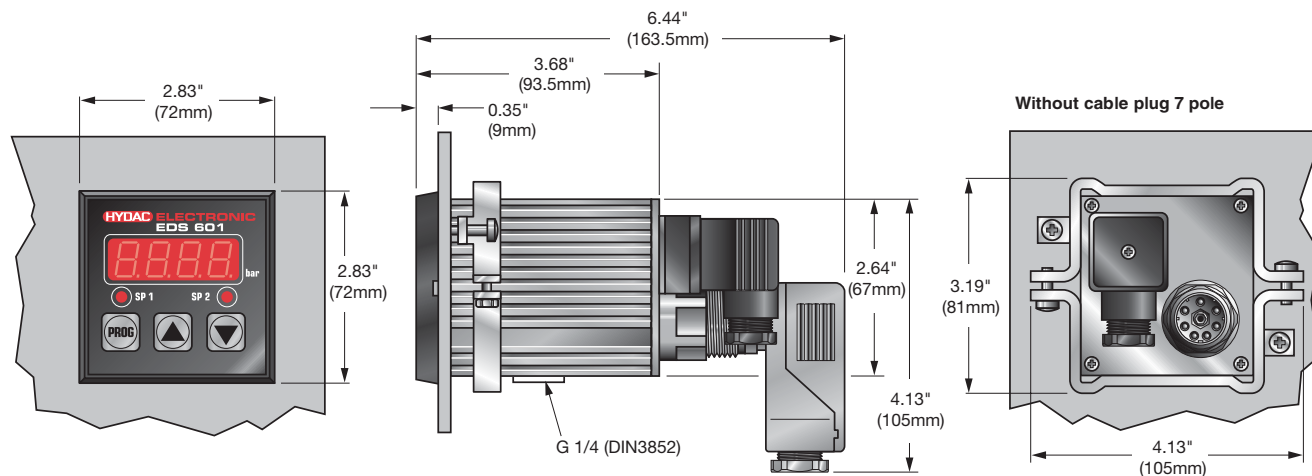
- 1 = relay 1 N/C contact
- 2 = relay 1 N/O contact
- 3 = relay 1 common supply
- 4 = relay 2 N/C contact
- 5 = relay 2 N/O contact
- 6 = relay common supply

Plug Connection:



- 1 = supply
- 2 = 0V
- 3 = analog output
- PE = ground

Dimensions:



EDS 710 - Fixed Settings



About EDS 710 Pressure Switches:

Specifically for OEM applications in mobile industry, the EDS 710 was developed as one of the smallest electronic pressure switches in the world. Switch and switch-back points are factory set as NO or NC according to customer requirements. Output load capacity of 400 mA enables connection to control units (e.g. PLC) as well as small electronic devices (e.g. relays). Featuring an M12x1 connector or flying leads alternatively as electric connection, enables flexibility regarding various wiring systems. Class of protection is IP 67 standard. In order to protect in more harsh applications, a special protective rubber cover was invented. When used, the protection class is extended to IP 69K.

A minimum order of 250 pieces per model is usually required.

Technical Details:

Input Data	
Measuring ranges	232 to 8700 PSI (16 to 600 bar)
Overload pressure	150% FS
Burst pressure	300% FS
Mechanical Connection	SAE 6 9/16-18 UNF2A male
Tightening torque	approx. 15 lb-ft (20 Nm)
Parts in contact with media	stainless steel, FPM seal
Output Data	
Type	1 PNP transistor output
Maximum output load	400 mA
Switch point	to define
Switch-back point	to define
Accuracy (B.F.S.L) including linearity, hysteresis, and repeatability	±0.5 %FS
Temp. comp. zero point	≤ ±0.017%FS/°F
Temp. comp. over range	≤ ±0.017%FS/°F
Long-term drift	≤ ±0.3%FS typ. / year
Ambient Conditions	
Nominal temperature range	-13° to 185°F (-25° to 85°C)
Operating temperature range	-13° to 185°F (-25° to 85°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)
Fluid temperature range	-40° to 212°F (-40° to 100°C)
CE mark, EMC	EN 50081-1 and EN 50081-2 EN 50082-1 and EN 50082-2
Vibration resistance to IEC 68-2-6 at 10 to 500Hz	<20g (196.2 m/s²) g
Safety type to DIN 40050	IP 67 (w/ ZBE 06 molded cable or flying lead)
Other Data	
Supply Voltage	12 to 32 D VC
Residual ripple supply voltage	≤ 5%
Electrical connection	flying leads or M12x1
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection	standard
Life expectancy	>10 mil. load cycles, 0 to 100%FS
Weight	145 g

Applications:



Approvals:



Model Code:

EDS 710 - XXX - X - XXX - (XXX/XXX bar or psi)

Series

EDS 710 = 710 Series Electronic Pressure Switch

Pressure Range

XXX = 232, 580, 1450, 3625, 5800, 8700 psi
= 016, 040, 100, 250, 400, 600 bar

Switch Function

0 = normally open
1 = normally closed

Modification Numbers

XXX = defined by manufacturer

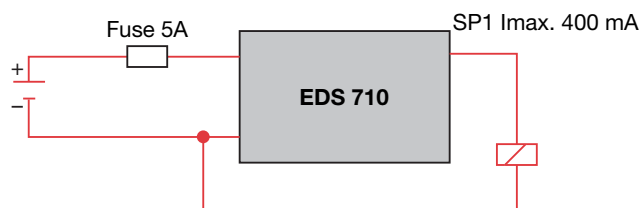
Switch Point

XXX = customer specified switch point

Switchback Point

XXX = customer specified switch back point

Circuit Connection:

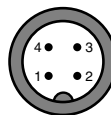


Plug Connection:

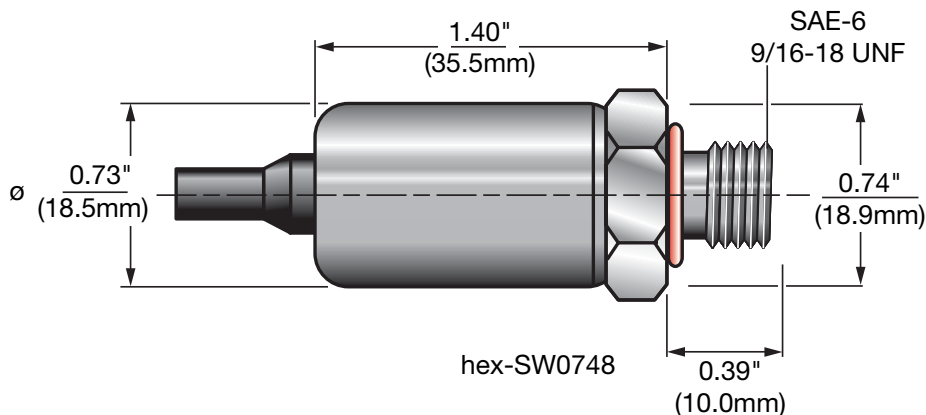
EDS 710

use with

ZBE 06 (see page 60)



Dimensions:



EDS 1700



About EDS 1700 Pressure Switches :

The EDS 1700, with its built-in pressure measuring cell, a 4-digit display and the 4 switching outputs, 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 each other via a membrane keypad. For optimum incorporation into monitoring systems (eg with PLC) an analog output is also available (4 to 20 mA or 0 to 10 V.)

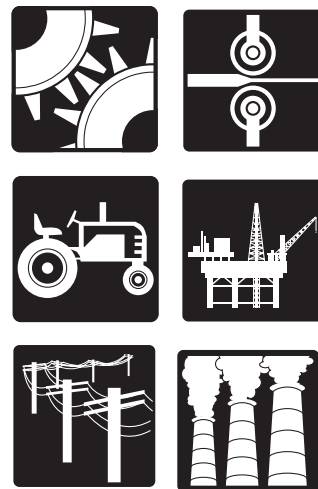
The main applications of the EDS 1700 are in hydraulics and pneumatics. The instrument is ideal for use where frequent switching cycles (several million) require permanent switching point accuracy or simple and precise adjustment.

Contact HYDAC Customer Service to upgrade from the EDS 1600 Series.

Technical Details:

Input Data	
Measuring Ranges	232, 580, 1450, 3625, 5800, 8700 psi
Overload Pressures	200%, max. 1300 psi
Burst Pressure	300% FS
Hydraulic Connection	female port DIN 3852-G1/4
Torque rating	15 lb-ft (20 Nm)
Parts in contact with media	Stainless Steel
Output Data	
Accuracy (display, analog output) max.	P = 0.5% / N = 1.0%
Temperature Drift EDS 1700...P	zero point max. $\leq \pm 0.2\%$ / 10 K
EDS 1700...N	range max. $\leq \pm 0.2\%$ / 10 K
	zero point max. $\leq \pm 0.3\%$ / 10 K
	range max. $\leq \pm 0.3\%$ / 10 K
Analog Output	4 to 20 mA, ohmic resistance $\leq 400 \Omega$ 0 to 10 V ohmic resistance $\geq 2 k\Omega$
Switching Outputs	
Type	4 relays with change-over contacts in 2 groups (common supply of each group connected)
Repeatability	EDS 1700...P $\leq \pm 0.25\%$ FS max. EDS 1700...N $\leq \pm 0.5\%$ FS max.
Switching Voltage	0.1 to 250 VAC / VDC
Switching Current	0.009 to 2 A
Switching Capacity	400 VA, 50 W (for inductive load use varistors)
Life Expectancy of Contacts	≥ 20 million (minimum load) ≥ 1 million (maximum load)
Reaction Time	approx. 20 ms
Switching Point Setting Range	1.5 to 100% FS
Setting Range of Switch-back Hysteresis / Switch-back Points	1 to 99% FS
Ambient Conditions	
Temperature Range of Medium	-13 to 176 °F (-25 to 80°C)
Ambient Temperature Range	-13 to 140 °F (-25 to 60°C)
Storage Temperature Range	-40 to 176 °F (-40 to 80°C)
Nominal Temperature Range	50 to 158 °F (10 to 70°C)
CE mark	EN 50081-1 and -2, EN 50082-1 and -2
Vibration Resistance	approx. 5 g
Shock Resistance	approx. 10 g
Safety Type	IP65
Other Data	
Supply Voltage	22 to 32 VDC (residual ripple $\leq 10\%$)
Electrical Connection	14 pole terminal block (cross-section of connection max. 1.5 mm ²)
Current Consumption	approx. 200 mA
Display	4-digit, 7-segment LED, red (digits 13mm high)
Weight	approx. 800 g

Applications:



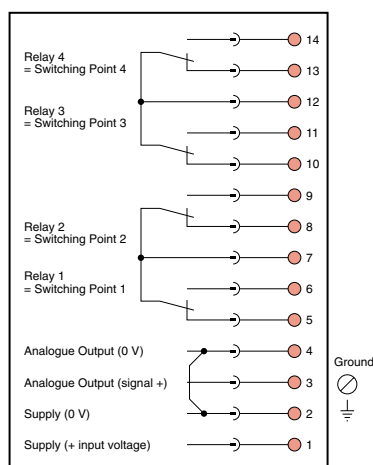
Approvals:



Model Code:

Order Code:		EDS 17	9	X	-	X	-	XXX	-	000
Series										
EDS 17 =		1700 Series Electronic Pressure Switch								
Mechanical Connection										
9 =		female port DIN 3852-G1/4								
Display (<i>units of pressure</i>)										
1 =		4 digit bar								
2 =		4 digit psi								
Accuracy										
P =		0.25% BFSL								
N =		0.50% BFSL								
Pressure Ranges										
016 =		16 bar (232 psi)								
040 =		40 bar (580 psi)								
100 =		100 bar (1450 psi)								
250 =		250 bar (3625 psi)								
400 =		400 bar (5800 psi)								
600 =		600 bar (8700 psi)								
note: vacuum version on request										
Modification Number										
000 =		standard								

Circuit Connection:



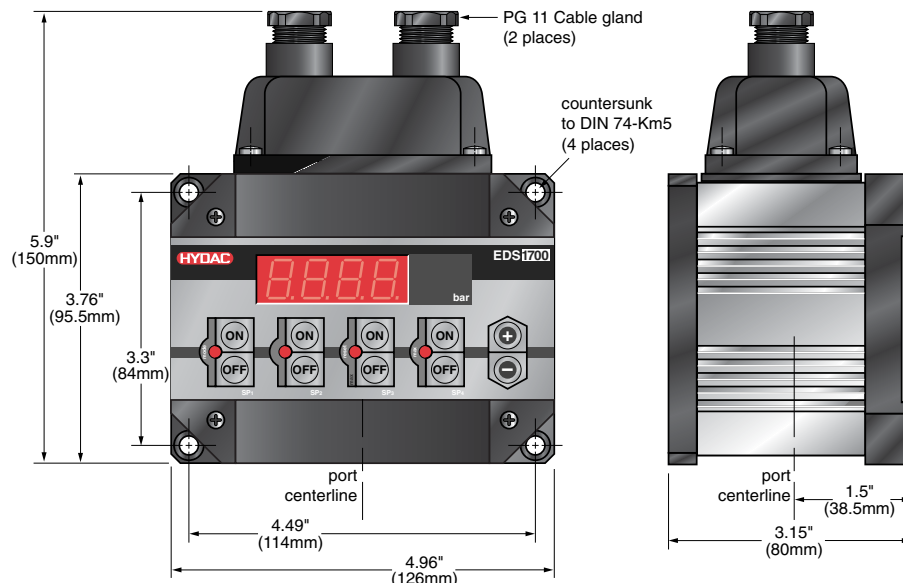
Mechanical Connection:

For other mechanical connections, refer to our 1620 series testpoint and hose accessories.

TestPoint with Hose Connection:



Dimensions:



ETS 4000



About ETS 4000 Temperature Transducers:

The temperature transducer series ETS 4000 was designed to be fitted directly to the hydraulic system to ensure direct contact with the media for the most accurate and up to date temperature reading. This unit converts the fluid temperature measurement into a usable, 4 to 20mA output signal.

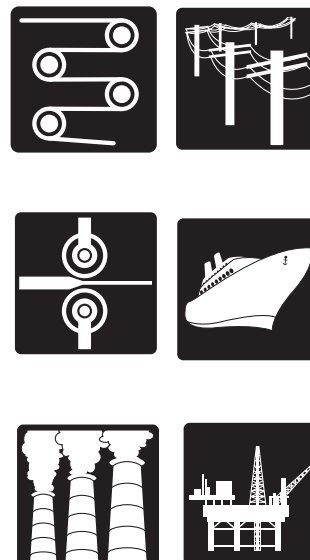
The ETS 4000 has solid construction with all stainless steel wetted parts and tube housing. The transducer hydraulic connection is rated to 8700 psi.

All units are individually calibrated on a computer-controlled test rig and subjected to a final test. The quality system is ISO 9001 certified.

Technical Details:

Input Data	
Measuring range	-25° to 100°C (-13° to 212°F)
Pressure resistance	600 bar (8700 psi)
Pressure overload	900 bar (13050 psi)
Mechanical connection	G 1/4 A male
Torque rating	approx. 15 lb-ft (20 Nm)
Parts in contact with media	Stainless steel, FPM seal
Output Data	
Output signal	2-conductor, 4 to 20 mA
Accuracy	≤ ±1°C (1.8°F) max.
Temperature drift	0.006%FS / °F
Ambient Conditions	
Ambient temperature	-30°C to 80°C (-22°F to 176°F)
Media temperature	-25° to 100°C (-13° to 212°F)
CE mark	EN50081-1, EN50081-2, EN50082-1, EN50082-2
Vibration resistance to IEC 68-2-6 at 10 to 500 Hz	≤ 20 g (196.2m/s ²)
Safety type	IP 65
Other Data	
Supply voltage	10 to 30 V DC
Electrical connection	4 pole plug M18x1
Residual ripple	max. 5%
Maximum load resistance	RL max. = (UB-10V) / 0.02 A [Ω]
Safety measures	Reverse polarity and excess voltage protection, electronic current limit

Applications:



Approvals:



Model Code:

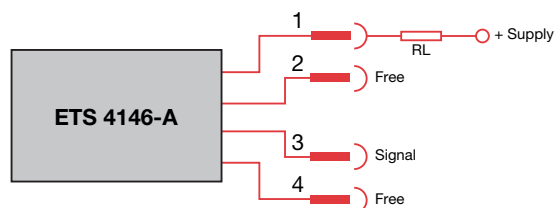
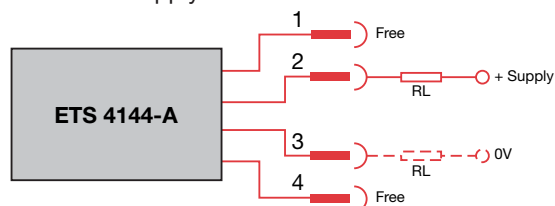
Series	ETS 4	1	X	4	-	A	-	000
ETS 4 = 4000 series temperature transducer								
Accuracy	1							
1 = 1°C (1.8°F)								
Mechanical Connection	4							
4 = G1/4 A male*								
Electrical Connection	4							
4 = 4 pole plug M18x1 (connector not included)								
6 = M12x1 plug, 4-pole (connector not included)								
Output Signal	A							
A = 2 conductor, 4 to 20mA								
Modification Number	000							
000 = standard								

* Other ports on request

*Model Codes Containing RED are non-standard items - Minimum quantities may apply
Contact **HYDAC** for information and availability*

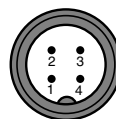
Circuit Connection:

Two Conductor 4 to 20 mA
RL max = +supply - 10V/0.02A

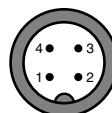


Plug Connection:

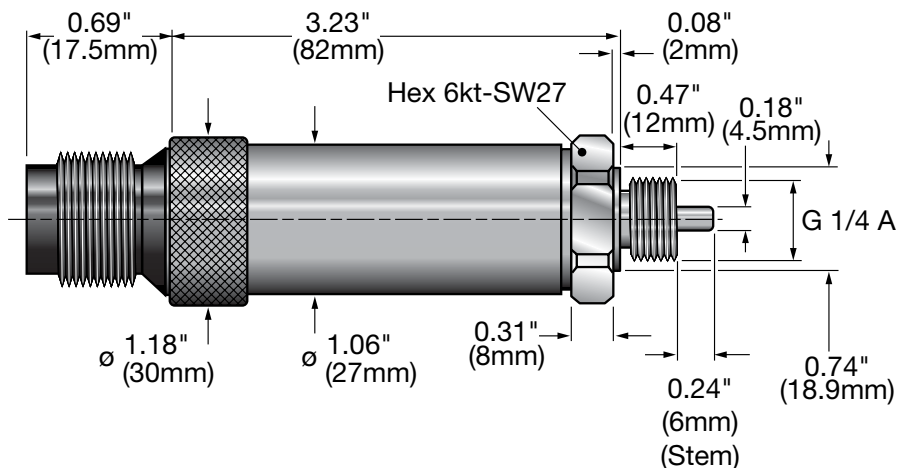
ETS 4144 use with ZBE 02 or ZBE 03 (see page 60)



ETS 4146 use with ZBE 06 (see page 60)



Dimensions:



ETS 7000



About ETS 7000 Temperature Transducers:

The ETS 7000 joins the lineup of our smallest series of transmitters. Due to its pressure resistance the small partner of ETS 4000 also is applicable to hydraulic systems up to 600 bar. Temperatures in the range of -25° to 100°C are transformed into output signal of 4 to 20 mA. As with the complete 7000 series electric connection, M12x1, or flying leads are available alternatively. Type of protection is IP 67. While using a special protective rubber cover, the type of protection is extended to IP 69K.

Technical Details:

Input data	
Measuring principle	Silicon semiconductor element
Measuring range	-13° to 212°F (-25° to 100°C)
Pressure resistance	8700 psi (600 bar)
Pressure overload	13000 psi (900 bar)
Mechanical connection	G 1/4 A male
Torque rating	approx. 15 lb-ft (20 Nm)
Parts in contact with media	Stainless steel, Seal: FPM
Output data	
Output signal	4 to 20 mA
Accuracy	≤ ±1.5%FS typ.
Rise time	≤ 15 s
Ambient conditions	
Fluid temperature range	-13° to 212°F (-25° to 100°C)
Operating temperature range	-13° to 176°F (-25° to 80°C)
Storage temperature range	-40° to 212°F (-40° to 100°C)
CE mark	EN 50081-1 and EN 50081-2 EN 50082-1 and EN 50082-2
Vibration resistance to	≤ 196.2m/s² (20g)
Safety type to DIN 40050	IP 67 (w/ ZBE 06 molded cable or flying lead)
Other data	
Supply voltage	8 to 32 V DC
Electrical connection	M12x1
Housing material	Stainless steel
Weight	approx. 145 g

Applications:



Approvals:



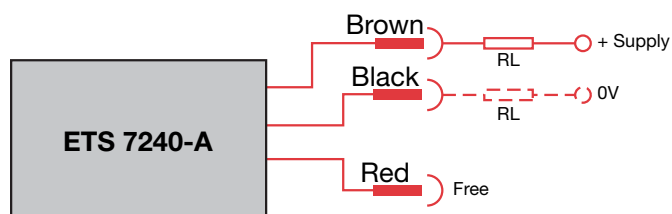
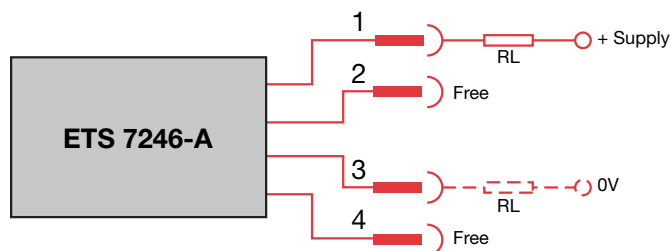
Model Code:

Product Code:		ETS 7	2	X	X	-	A	-	000
Series	ETS 7 = 7000 series temperature transducer								
Accuracy	2	= 1.5%FS							
Mechanical Connection	4	= G1/4 A male							
Electrical Connection	6	= M12x1 plug, 4 pole (connector not included)							
	0	= flying lead							
Output Signal	A	= 2 conductor, 4 to 20mA							
Modification Number	000	= standard							
	001	= flying lead							

Model Codes Containing RED are non-standard items - Minimum quantities may apply
Contact **HYDAC** for information and availability

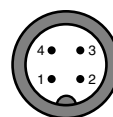
Circuit Connection:

Two Conductor 4 to 20 mA
RL max = +supply - 18V/0.02A

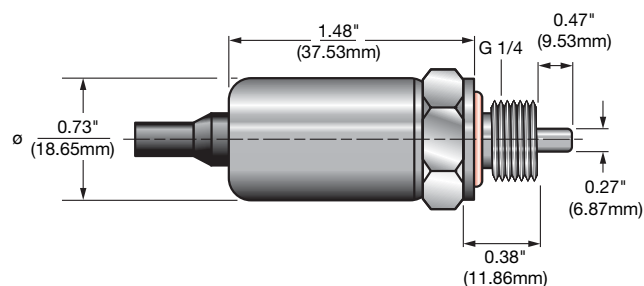
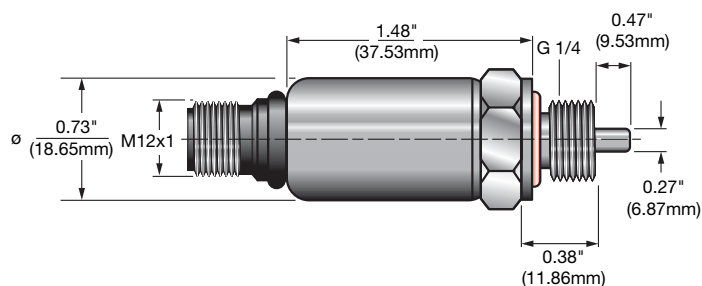


Plug Connection:

ETS 7246 use with ZBE 06 (see page 60)



Dimensions:



ETS 300



About ETS 300 Temperature Switches:

The ETS 300 is a compact, electronic temperature switch with digital display. It is used with the TFP 100 temperature sensor, which was especially developed for tank mounting, or with its own integral sensor.

The ETS 300 has a 2 temperature ranges allowing for use in a wide range of industrial applications: -13° to 212°F (-25° to 100° C) and -22° to 302°F (-30° to 150°C).

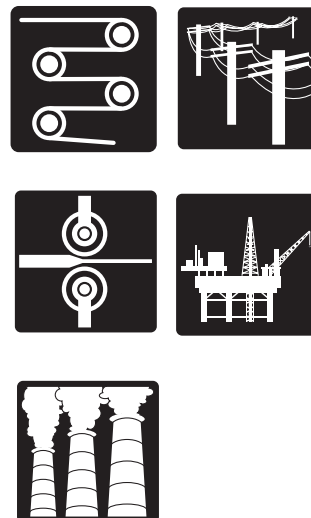
The ETS 300 is offered with one or two switching outputs with an optional 4 to 20 mA analog output signal for remote temperature monitoring.

The switching points and hysteresis are easily adjustable via the membrane keypad. Other parameters are accessible and displayed on the digital readout, then adjustable via the keypad.

Technical Details:

Input data for integral sensor	
Measuring range	-13° to 212°F (-25° to 100°C)
Pressure resistance	13000 psi (600 bar)
Hydraulic connection	G 1/2 A male
Torque rating	approx. 33 lb-ft (45 Nm)
Parts in contact with media	Stainless steel, Seal: FPM
Input data for separate sensor	
Display range	-22 to 302°F (-30° to 150°C)
Sensor connection	M 12x1, 4 pole
Output data	
Accuracy (display, analog output)	≤ ± 2.0°F (≤ ± 1.0°C)
Temperature drift (zero point and range)	≤ ± 0.0085% / °F
Reaction time (T09)	approx. 20 s
Analog output	4 to 20 mA, ohmic resistance ≤ 400 Ω
Switching outputs	
Type	PNP transistor output
Switching current	max. 1.2 A
Ambient conditions	
Temperature range of medium	-13° to 212°F (integral sensor)
Ambient temperature range	-13° to 176°F
Storage temperature range	-40° to 176°F
Nominal temperature range	-14° to 158°F
CE mark	EN 50081-1 and EN 50081-2 EN 50082-1 and EN 50082-2
Vibration resistance	approx. 10 g / 0 to 500 Hz
Shock resistance	approx. 50 g / 1ms
Other data	
Supply voltage	20 to 32 VDC
Current consumption	approx. 100 mA (without switching output)
Safety type	IP 65
Material of housing	tube: stainless steel keypad housing: PA6.6 Gf30
Display	3 digit, 7 segment LED, red, height of digits 9.2 mm
Weight	approx. 300 g

Applications:



Approvals:



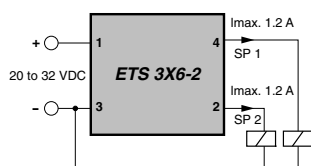
Temperature Sensor TFP 100	
Temperature range of medium	-40° to 257°F (-40° to 125°C)
Electrical connection	4 pole plug M18x1
Safety Sleeve for Tank-Mounting the TFP 100	
Parts in contact with medium	All materials compatible with nickel

Model Code:

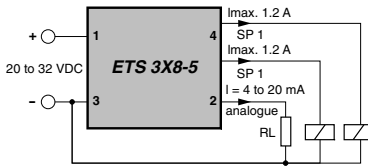
Series	ETS 3	X	X	-	X	-	XXX	-	XXX
ETS 3 =	300 series electronic temperature Switch								
Mechanical Connection									
2 =	G 1/2 A male thread with integral sensor								
8 =	electrical connection for separate sensor (TFP 100)								
Electrical Connection									
6 =	M12x1 plug, 4 pole for output codes 2 & 3 (connector not included)								
8 =	M12x1 plug, 5 pole for output codes 5 (connector not included)								
Output									
2 =	2 switching outputs (only in conjunction with electrical connection type "6")								
3 =	1 switching output and 1 analog output (only in conjunction with electrical connection type "6")								
5 =	2 switching output and 1 analog output (only in conjunction with electrical connection type "8")								
Measuring Ranges									
100 =	-25° to 100°C (-13° to 212°F) only for version with integral sensor								
150 =	-30° to 150°C (-22° to 302°F) only for version with separate sensor								
Modification Number									
000 =	display in °C								
400 =	display in °F								

Circuit Connection:

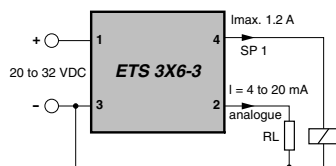
Model ETS 3X6-2
2 switching outputs



Model ETS 3X8-5
2 switching outputs 1 analogue output

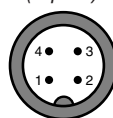


Model ETS 3X6-3
1 switching output 1 analogue output



Plug Connection:

ETS 3X6
(4-pole)



ETS 3X8
(5-pole)

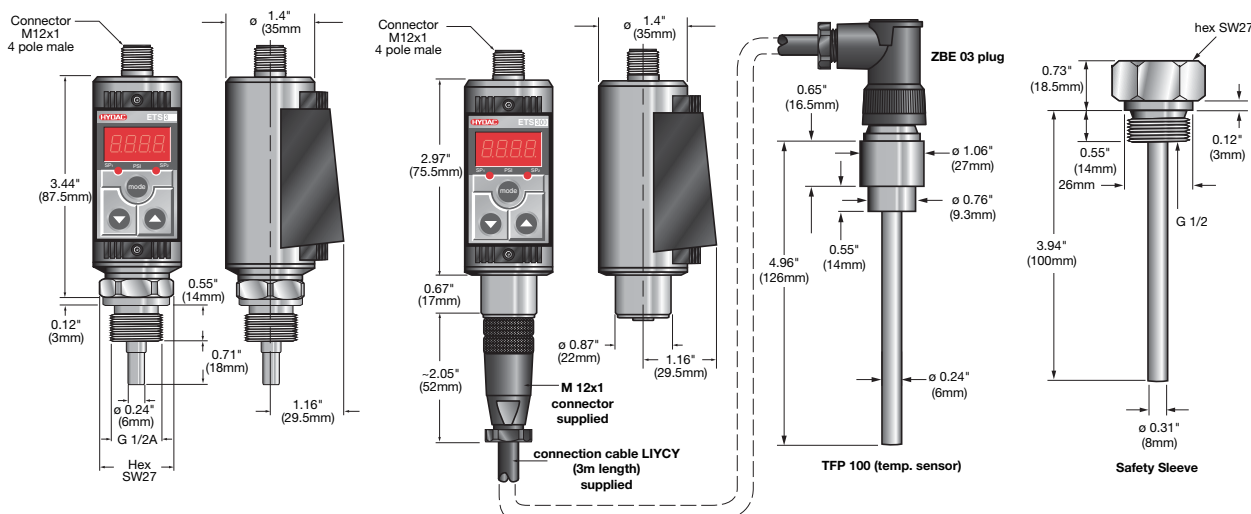


ZBE 06 (4-pole) & ZBE 08 (5-pole)
(see page 60)



Note: M12x1 connector and 3m cable included with ETS 38X model for TFP 100 sensor

Dimensions:



ETS 1700



About ETS 1700 Temperature Switches:

The electronic temperature switch ETS 1700 is used together with the temperature sensor TFP 100, which was specifically developed for tank mounting.

The 4 digit display can indicate either the actual temperature, one of the switching points, or the maximum temperature. The maximum temperature indicates the highest temperature which has occurred since the unit was switched on or last reset.

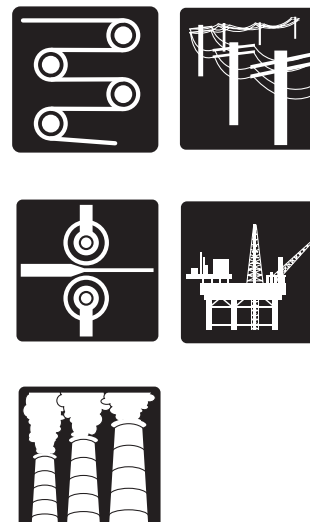
The 4 switching outputs can be used to control heating and cooling processes in hydraulic systems, as an example. All switching and switch-back points, which are independent of each other, can be adjusted very simply via a membrane keypad. For incorporation into monitoring systems (e.g. with PLC), an analog output (4 to 20 mA or 0 to 10 V) is also available.

Contact HYDAC Customer Service to upgrade from ETS 1600 Series.

Technical Details:

Input Data	
Measuring Range	32° to 212°F (0° to 100°C)
Output Data	
Output Signal	4 to 20 mA, ohmic resistance $\leq 400 \Omega$ 0 to 10 V, ohmic resistance $\geq 2k \Omega$
Accuracy (display, analog output)	$\leq \pm 1.0\%$ of the measuring range
Repeatability	$\leq \pm 0.25\%$ of the measuring range
Temperature Drift in the ambient temperature range	zero point: $\leq \pm 0.054\%/^{\circ}\text{F}$ ($\leq \pm 0.03\%/^{\circ}\text{C}$) range: $\leq \pm 0.054\%/^{\circ}\text{F}$ ($\leq \pm 0.03\%/^{\circ}\text{C}$)
Switching Output Type	4 relays with change-over contacts in 2 groups (common supply of each group connected)
Switching Voltage	0.1 to 250 VAC / VDC
Switching Current	0.009 to 2 A
Switching Capacity	400 VA, 50 W (for inductive load use varistors)
Life Expectancy of Contacts	≥ 20 million (minimum load) ≥ 1 million (maximum load)
Reaction Time (without switching delay)	approx. 20 ms
Switching Point Setting Range	1.5 to 100% FS
Setting Range of Hysteresis / Switch-back Points	1 to 99% FS
Ambient Conditions	
Ambient Temperature Range	-13 to 140 °F (-25 to 60 °C)
Storage Temperature Range	-40 to 176 °F (-40 to 80 °C)
CE mark	EN 50081-1 and -2, EN 50082-1 and -2
Vibration Resistance	approx. 5 g
Shock Resistance	approx. 10 g
Sensor Connection	5 pole DIN connector
Other Data	
Supply Voltage	22 to 32 VDC (residual ripple $\leq 10\%$)
Electrical Connection	14 pole terminal strip (cross-section of connection max. 1.5 mm ²)
Current Consumption	approx. 200 mA
Display	4-digit, 7-segment LED, red (digits 13mm high)
Safety Type	IP 65
Weight	approx. 800 g

Applications:



Approvals:



Model Code:

ETS 17 XX - 100 - 000

Type of Sensor

ETS 17 = Temperature Switch for use with TFP 100 sensor
(Temperature sensor TFP 100 must be ordered separately - see page 55)

Display (temperature unit of measure)

01 = 4 digit °C
02 = 4 digit °F

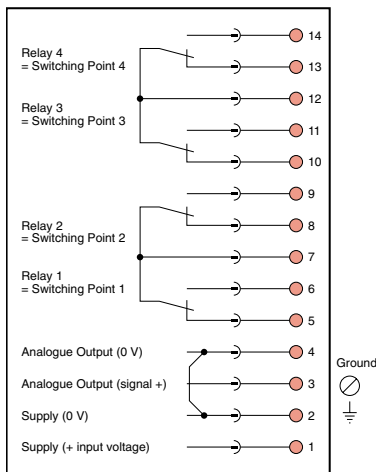
Measuring Range

100 = 32° to 212°F (0° to 100°C)

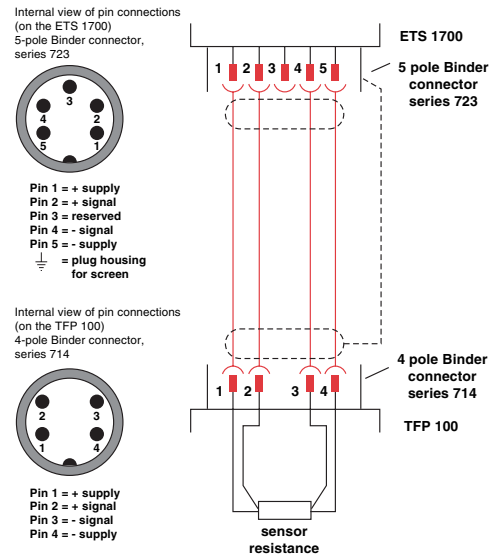
Modification Number

000 = standard

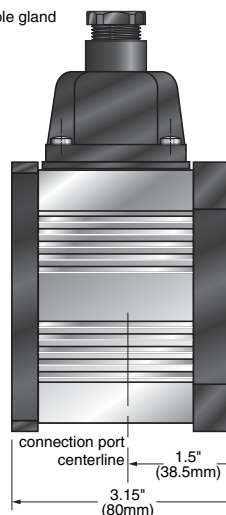
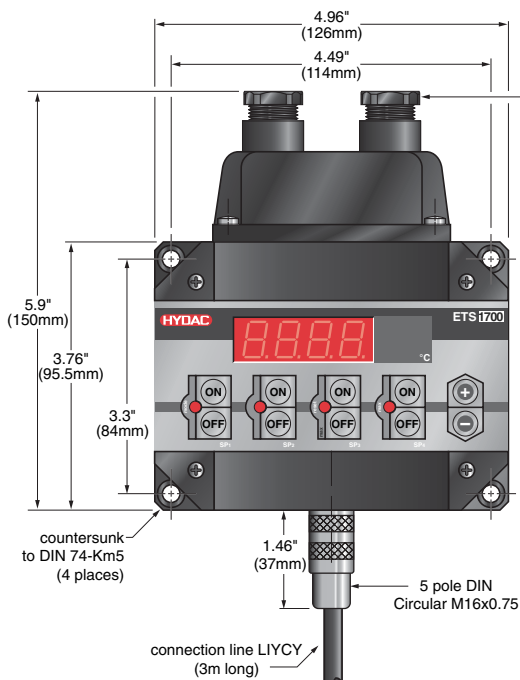
Circuit Connection:



Plug Connection:

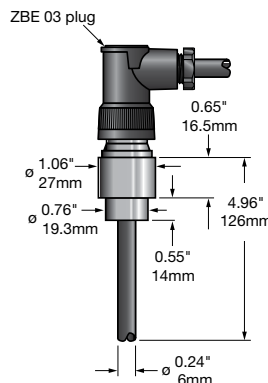


Dimensions:

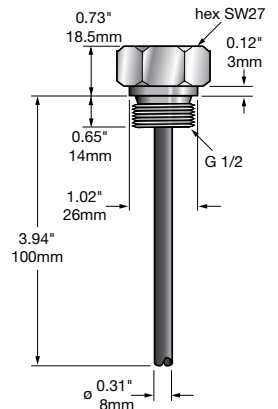


Note: 5 pole DIN plug and 3m cable included for connection to TFP 100
Replacement 5 pole DIN plug PN 02701505

TFP 100 (temp. sensor)



Safety Sleeve



ENS 3000

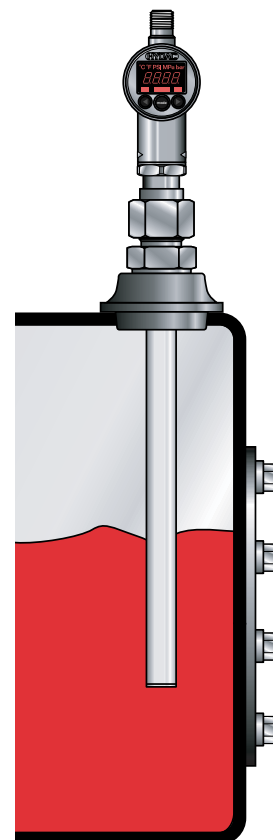


About ENS 3000 Level Sensor:

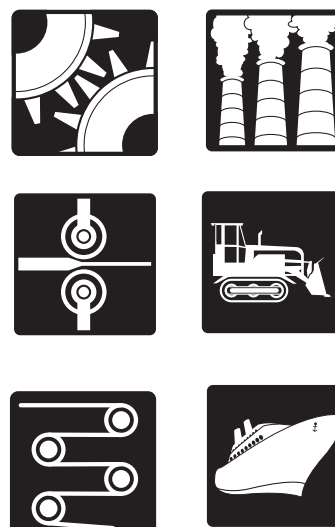
The ENS 3000 is a solid state sensor that detects fluid level and provides immediate visual and electronic feedback of level and provides for easily adjustable switch points. The sensor probe is inserted directly into the fluid and the sensor fields detect the level of the fluid. The analog signal and switch points are programmable in combination of level and/or temperature. The rotatable body and face found in it's EDS 3000 counterpart makes for easy installation.

Technical Details:

General		
Level	Length of Probe	16.14" or 20.47"
	Active Range	10.24" or 14.17"
	Inactive Range	5.91" or 6.30"
	Max. Vessel Pressure	only for application without pressure
	Temperature Range	32° to 140°/176°F (0° to 60°/80°C)*
Temperature	Principle of Sensor	semiconductor sensor
	Measuring Range	32° to 212°F (0° to 100°C)*
Output Data		
Level	Repeatability	± 2% FS
	Accuracy at Switch Point	± 2% FS (at hydraulic oil)
	Resolution	0.04" (1 mm)
Temperature	Accuracy	± 2.7°F (± 1.5°C)
Analog Output		0 to 10 V or 4 to 20 mA selectable temperature or level selectable
Switching Outputs		1 or 2
Type		PNP transistor output selectable N.O. / N.C.
Assigning of Switch Output		selectable temperature or level
Switching Current Max.		1.2 A
Switching Cycles		> 100 million
Max. Speed of Change of Levels		5.1 inches/seconds
Ambient Conditions		
Nominal temperature range		32° to 140°/176°F (0° to 60°/80°C)*
Ambient temperature range		32° to 140°/176°F (0° to 60°/80°C)*
Storage temperature range		-40° to 140°/176°F (-40° to 60°/80°C)*
Fluid temperature range		32° to 140°/176°F (0° to 60°/80°C)*
CE mark		EN 61000-6-1, EN 61000-6-2, EN 61000-6-3 and EN 61000-6-4
Vibration resistance to IEC 68-2-6 at 10 to 500Hz		approx. 10 g / 0 to 500 Hz
Safety type to DIN 40050		IP 67
Shock Resistance		approx. 50 g / 1ms
Other Data		
Supply voltage		20 to 32 V
Dielectric coefficient of medium		> 2
Residual ripple supply voltage		≤ 5%
Reverse polarity protection of the supply voltage, and short circuit protection		standard
Parts in Contact with Media		PP (polypropylene)
Display		4 digit, 7 segment LED, red, 7mm character height



Applications:



Approvals:



*Note: Level Temperature Range up to 176°F (80°C) available upon request.

Model Code:

ENS 3 X X X - X - XXXX - 400

Series

ENS 3 = 3000 series Level Sensor

Temperature Sensor

- 1 = with temperature sensor
2 = without temperature sensor

Mechanical Connection

- 1 = metric tube ø22mm for ZBM 19 & ZBM 20

Electrical Connection

- 6 = M12x1 plug, 4 pole (use ZBE 06 connector)
8 = M12x1 plug, 5 pole (use ZBE 08 connector)

Output

- 2 = 2 switch outputs
- 3 = 1 switch + 1 analog output
- 5 = 2 switch + 1 analog output

Rod Length (physical)

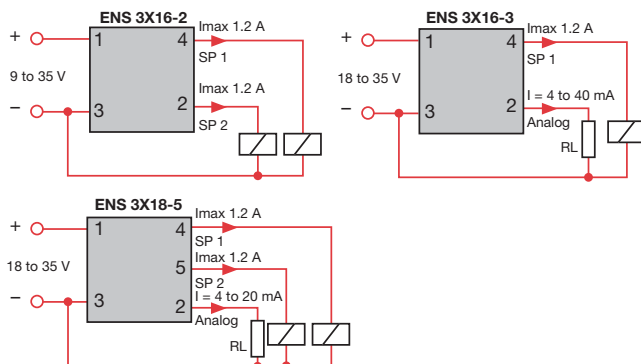
- 0100 = 9.84"
0162 = 16.2"
0205 = 20.5"
other lengths on request

Modification

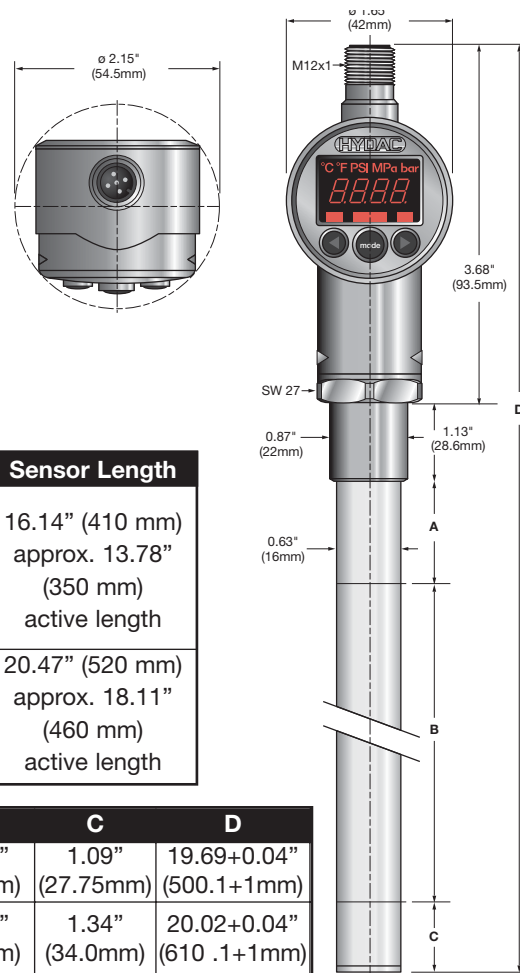
- 400 = US standard

Note: Level Temperature Range up to 176°F (80°C) available upon request.

Circuit Connection:

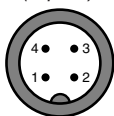


Dimensions:

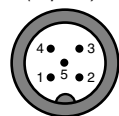


Plug Connection:

EDS 3XX6
(4-pole)



EDS 3XX
(5-pole)



use with

ZBE 06 (4-pole) & ZBE 08 (5-pole)
(see page 60)



Mounting Adapters:

ZBM 19
Fits min. 1 1/8"
tank hole
(see page 62)



ZBM 20
G3/4 BSPP
(see page 62)



ZBM 20
3/4" NPT
(see page 62)



DIN Tank	Sensor Length
63	16.14" (410 mm) approx. 13.78" (350 mm) active length
100	
160	
250	
400	
630	20.47" (520 mm) approx. 18.11" (460 mm) active length
800	
1000	
1200	

Length	A	B	C	D
16.2"	3.69" (93.65mm)	10.24" (260mm)	1.09" (27.75mm)	19.69+0.04" (500.1+1mm)
20.5"	3.83" (97.4mm)	14.17" (360mm)	1.34" (34.0mm)	20.02+0.04" (610.1+1mm)

EVS 3100 Flow Rate Sensor



About EVS 3100 Flow Rate Sensors:

The EVS 3100 series flow rate sensors are designed to accurately measure the flow-through volume of fluids in hydraulic systems. The unit uses a stainless steel turbine wheel internal to the construction, which converts the media flow into a 4 to 20mA output signal.

The in-line mounting design allows for most accurate and up to date flow measurements. The EVS 3100 also offers two additional hydraulic ports to accommodate additional sensors, ex. temperature and pressure transducers. The design of the flow meter incorporates a lightweight aluminum housing with accurate and stable measuring elements.

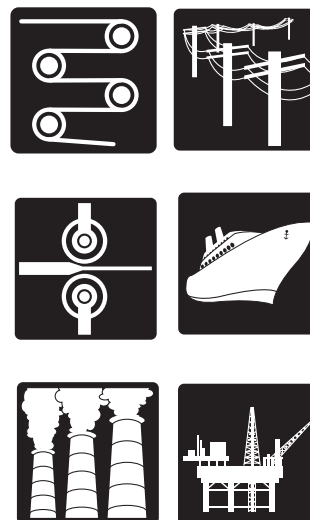
The unit uses the Woltmann Turbine principle to measure flow. The fluid enters the housing and passes through straightening blades, which assist in stabilizing the media into a laminar flow. The stainless steel turbine wheel is rotated by the media flow, which then influences the magnetic field of the inductive receiver with the passing of each turbine fin. The inductive receiver is the sensing element of this flow meter. This influence produces a voltage pulse in the receiver, which it then converts into a 4 to 20mA output signal.

This design provides precise data within the entire measurement range of the unit, and is relatively tolerant against minimal, gritty contamination. The meter also allows for exceeding flow of up to 50% of the maximum range for short periods of time.

Technical Details:

Supply Voltage	10 to 32 V DC
Signal Output	4 to 20 mA, 2 conductor
CE mark	EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2
Temperature of Media	-4° to 194°F (-20° to 90°C)
Ambient Temperature	-4° to 158°F (-20° to 70°C)
Media - EVS 3100 EVS 3110	hydraulic oil water
Permissible Viscosity Range	1 to 100 cSt
Calibrated at - EVS 3100 EVS 3110	30 cSt 5 cSt
Accuracy Class	≤ 2% of the instantaneous value
Measuring Ranges/ Operating Pressure	
EVS 31X0-1	6 to 60 l/min / 400 bar (1.6 to 15.9 gpm / 5800 psi)
EVS 31X0-2	40 to 600 l/min / 315 bar (10.6 to 159 gpm / 4567 psi)
EVS 31X0-3	15 to 300 l/min / 400 bar (4 to 79.3 gpm / 5800 psi)
EVS 31X0-5	1.2 to 20 l/min / 400 bar (0.26 to 5.28 gpm / 5800psi)
Electrical Connection	4 pole Binder plug 714 M18x1
Mechanical Connection/ Torque Rating	
EVS 31X0-1	G 1/2 female thread / approx. 130 Nm
EVS 31X0-2	G 1 1/2 female thread / approx. 600 Nm
EVS 31X0-3	G 1 1/4 female thread / approx. 500 Nm
EVS 31X0-5	G 1/4 female thread / approx. 60 Nm
EVS 31X0-1-SAE 37	Available with SAE thread using adapters.
EVS 31X0-2-SAE 37	Thread is 37° flare.
Additional Connections on Housing	2 x G 1/4 female ports for pressure or temperature sensors

Applications:



Approvals:

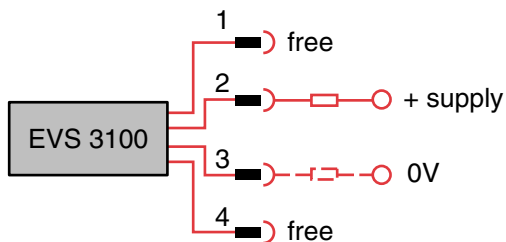


Model Code:

Series	EVS 31	X	0	-	X
EVS 31=	Flow Rate Sensor				
Series					
0	= Aluminum				
1	= Stainless Steel				
Flow Rating					
1	= 1.6 - 15.9 gpm (6 - 60 l/min)				
2	= 10.6 - 159 gpm (40 - 600 l/min)				
3	= 4 - 79.3 gpm (15 - 300 l/min)				
5	= 0.3 - 5.3 gpm (1.2 - 20 l/min)				

Circuit Connection:

Two-Conductor 4 to 20 mA



$$R_L \max = (U_B - 10V) / 0.02A [\Omega]$$

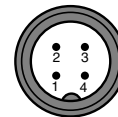
U_B = + supply voltage

Plug Connection:

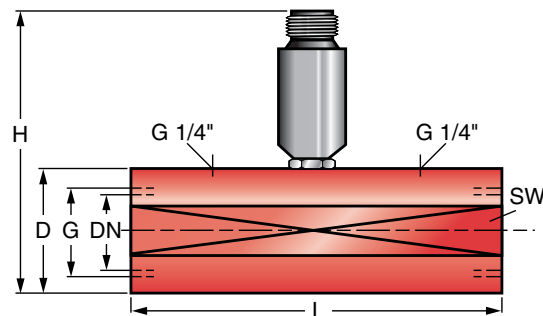
EVS 3100

use with

ZBE 02 or ZBE 03
(see page 60)



Dimensions:



Model	Meas. Range (gpm)	Material	L	H	D / SW*	G	DN	Pmax in bar ⁽¹⁾	Tmax ⁽²⁾
EVS 31X0-1	1.6-15.9	Alumin.	144	135	48.5 / 46	G 1/2	11	400	-20 to 90°C
EVS 31X0-2	10.6-159	Alumin.	181	150	63.5 / 60	G 1 1/2	30	315(A) 400(S)	-20 to 90°C
EVS 31X0-3	4-79.3	Alumin.	155	150	63.5 / 60	G 1 1/4	22	400	-20 to 90°C
EVS 31X0-5	0.3-5.3	Alumin.	117	135	47.0 / 46	G 1/4	7	400	-20 to 90°C

EHS 2042



About EHS 2042 Control Module:

The EHS 2042 module range provides the universal interface between signal and output levels in industrial controls. The modules are designed to combine operational unit and terminal strip into one.

In addition to their operational tasks, i.e. amplification of computer control signals, they also offer isolation from the unit to be controlled, which enhances the construction of the interference free robust controls. Each module can operate independently from a simple DC supply.

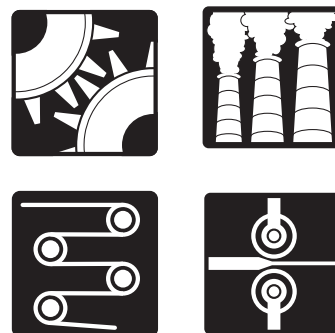
Features:

- Compact construction.
- Replaces terminal strips
- Module can be fitted to standard DIN rails

Technical Details:

Supply Voltage	20-32 V DC, residual ripple - 5%
Supply Current	approx. 40 mA + load current
Signal Input	0 to 10 V / 30 kOhm
Output Current	0 to 1.6 A regulated, short circuit proof
Min. Current	0 to 700 mA
Step Current	min. current + 0 to 600 mA
Dither Frequency	160 Hz $\pm 10\%$
Temperature Range	32° to 157°F (0° to 70°C)
Temperature Effect	$\leq 1\%$ typically 0.5% across range
When supplied via an AC bridge rectifier circuit a smoothing capacitor of approx. 2200 μ F must be connected to filter the residual ripple.	

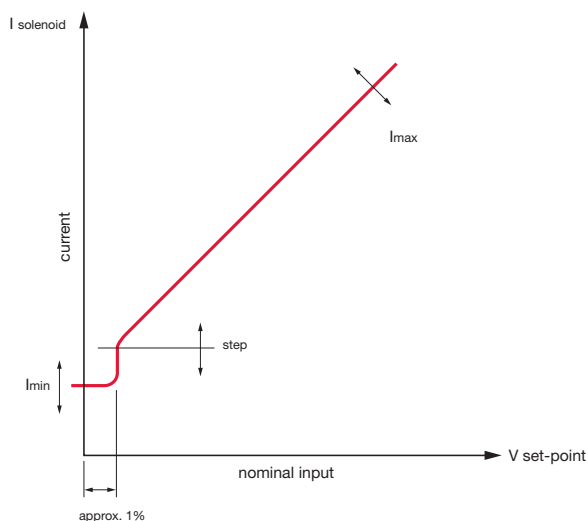
Applications:



Amplifier Module:

Module EHS 2042 is suitable for controlling proportional solenoids in all applications, eg pressure or directional valves, pumps etc. The input of the set point value is done by means of a standard signal of 0 to 10 V which is adjusted to the potential output via a differential input. The min. current, step current and max. current can be adjusted using potentiometers to suit all types of application.

The output current can be from 0 to 1.6 A and is PWM applied with fixed dither frequency, i.e. it is controlled irrespective of operating voltage and solenoid resistance.



Approvals:



Model Code: EHS 2042-10

Part Number: 00902101

Circuit Connection Examples:

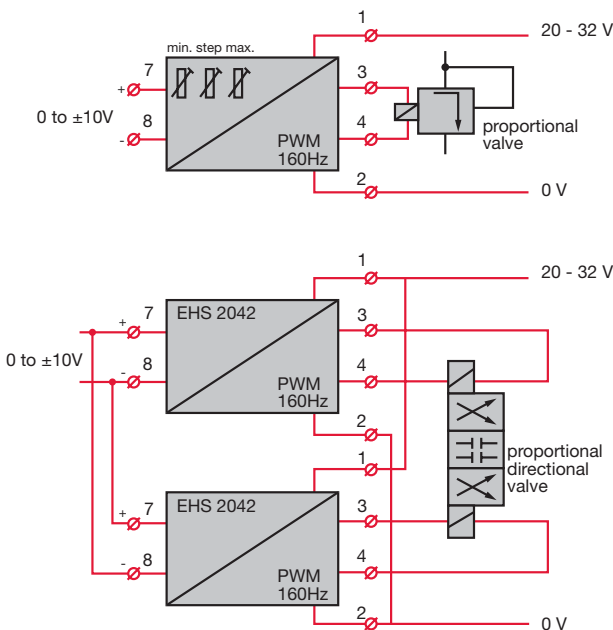
Uses a 0 to ± 10 VDC command signal to power hydraulic proportional valves. The unit is compatible with most valves containing a 24 volt solenoid and requiring up to 1.6A of Pulse Width Modulated drive current. The minimum, step, and maximum current values are adjustable to provide flexibility to valve and application requirements. Two modules may be combined for dual solenoid operation such as the directional valve illustrated.

Operation:

A reference point is established internally from which all set-point value adjustments are taken. The established set-point voltage of 0 to 10 V is separated via a different input amplifier and fed to an output generator.

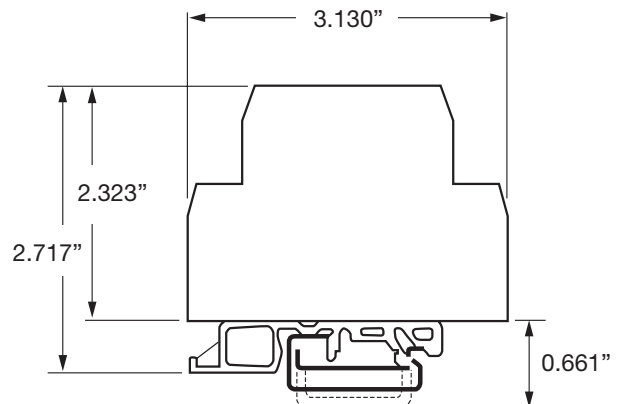
This has the effect that when the signal is zero only the minimum current flows and when a nominal value greater than 1% of the maximum set-point value is input the current jumps to the pre-set Step Current for the beginning of control. From this value onwards, the current increases proportionally to a final value of I_{\max} .

These pre-set current limits are held stable by the internal PWM regulation mechanism.



Dimensions:

Dimensions are for general information only. Critical dimensions may be obtained by requesting a certified print.



Pin Wiring:

- | | |
|------------------|--------------------|
| 1 +UB 20...32VDC | 5 N.C. |
| 2 0 V | 6 N.C. |
| 3 +M | 7 + Input 0 - 10 V |
| 4 - M | 8 - Input 0 - 10 V |

0.787"	+ N -	8	6	EHS 2042 000	4	2
		7	5		3	1

Series 1620 TestPoints



About TestPoints and Hoses:

HYDAC series 1620, guided piston design, TestPoints are compact, self sealing couplings that provide access to hydraulic and pneumatic systems for pressure measurement to 9000 psi. Mating adapters or hose connections can be connected without loss of fluid while the system is operating. TestPoints can also be used to take oil samples or to bleed air from hydraulic systems. They are available in 1620 (M16x2.0) connection threads with a variety of screw-in port configurations.

Technical:

Maximum Working Pressure

- 9000 psi (630 bar)

Fluid Compatibility

- Suitable for petroleum based fluids and gaseous media

Materials

- Zinc plated steel body are standard
- Zinc plated metal cap standard

Seals

- Buna-N standard
- Viton optional

Temperature Range

- With metal cap and Buna-N seals: -22°F to 248°F (-30°C to 120°C)

Options

- Anti-vibration seal for metal cap

Features:

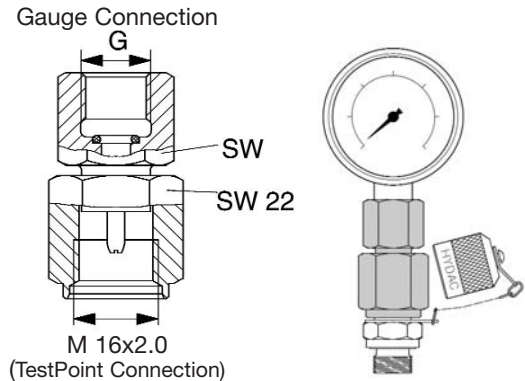
- Can be coupled and uncoupled under pressure without system shutdown or fluid loss
- Patented guided piston design for leak free performance at operating pressure to 9000 psi
- **HYDAC** guided piston design provides the following advantages over ball seal design:
 - Higher working Pressure
 - Better sealing characteristics particularly under high vibration
 - Less susceptible to fluid contamination
 - Can be used for gas as well as fluid

Applications:

- Pressure measurement with gauges or sensors
- Fluid sampling
- Air bleeding

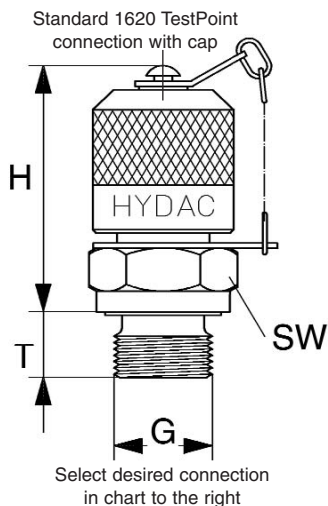
1620 Series Adapters

Direct Gauge Adapter



Thread G	Pmax	SW	Part No.
ISO 228-G 1/4	9000 psi (630 bar)	19	06003824
ISO 228-G 1/2	9000 psi (630 bar)	27	06003825
1/4 NPT	9000 psi (630 bar)	19	06003769

Dimensions:



Carbon Steel TestPoints (Zinc-Plated, Buna N Seals)

Thread G	Pmax	H(mm)	T(mm)	SW(mm)	Part no.
1/8 NPTF	5800 psi (400 bar)	33	13	17	06003734
1/4 NPTF	5800 psi (400 bar)	33	16.5	17	00639645
7/16-20 UNF	9000 psi (630 bar)	37	9	17	06003735
9/16-18 UNF	9000 psi (630 bar)	36	10	19	06003737
M 8x1	3600 psi (250 bar)	41	8.5	17	06003731
M 10x1	3600 psi (250 bar)	37.5	8.5	17	00629237
M 12x1.5	9000 psi (630 bar)	36	10	17	00632615
M 14x1.5	9000 psi (630 bar)	36	10	19	00632248
M 16x1.5	9000 psi (630 bar)	36	10	22	06003732
ISO 228-G 1/8	5800 psi (400 bar)	38	8	17	00689901
ISO 228-G 1/4	9000 psi (630 bar)	36	10	19	00680107
ISO 228-G 3/8	9000 psi (630 bar)	36	10	22	06003733
ISO 7/I-R 1/8	5800 psi (400 bar)	33	13	17	06003738
ISO 7/I-R 1/4	9000 psi (630 bar)	33	13	17	06003739

Carbon Steel TestPoints (Zinc-Plated, Fluorelastomer Seals)

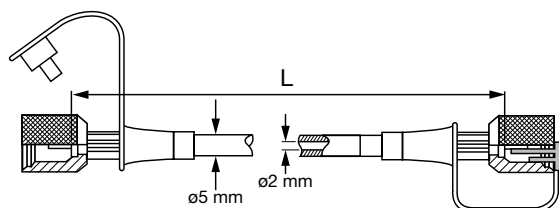
Thread G	Pmax	H(mm)	T(mm)	SW(mm)	Part no.
1/8 NPTF	5800 psi (400 bar)	33	13	17	06007199
1/4 NPTF	5800 psi (400 bar)	33	13	17	06007200
7/16-20 UNF	9000 psi (630 bar)	37	9	17	06007029
9/16-18 UNF	9000 psi (630 bar)	36	10	19	06007030
ISO 228-G 1/4	9000 psi (630 bar)	36	10	19	00606304

Stainless Steel TestPoints (Fluorelastomer Seals)

Thread G	Pmax	H(mm)	T(mm)	SW(mm)	Part no.
1/4 NPTF	5800 psi (400 bar)	33	13	17	02701487
7/16-20 UNF	5800 psi (400 bar)	33	16.5	17	02701486

Dimensions are for general information only, all critical dimensions should be verified by requesting a certified print.
* for port configuration drawings contact HYDAC.

Micro Bore Flexible Hoses



L (inches)	L (mm)	Part No.
8	200	06003723
12	300	06003724
16	400	00632633
20	500	06003725
25	630	06003726
31	800	00682857
39	1000	00632634
49	1250	06003727
59	1500	00682858
79	2000	00682859
98	2500	00682860
126	3200	06003728
157	4000	06003729
197	5000	06003730

Pressure Utilization Factor for Hoses:

Operating Temp.	Factor	Max. Pressure
122°F (50°C)	100%	9000 psi
176°F (80°C)	86%	7740 psi
212°F (100°C)	77%	6930 psi

Specifications:

- Maximum working pressure 9000 psi (630 bar) at 122°F (50°C) (see pressure utilization factor to adjust for higher temperatures)
- Suitable for petroleum based fluids
- Temperature range -4°F to 122°F (-20°C to 50°C)
- Polyamid core with polyester braid reinforcement and polyamid jacket
- Plastic dust cap
- 1620 female connection at both ends
- Bending radius: min. 20mm
- Hose ID ø 2mm
- Custom Hose Assemblies Available:
NPT Male Thread, NPT Female Thread, JIC Male Hose, JIC Female swivel hose ends

Part numbers listed in red italics are non-standard items – Minimum quantities may apply – Contact HYDAC for information and availability

TFP 100

Part # 00904696



Safety Sleeve TFP 100

Part # 00906170

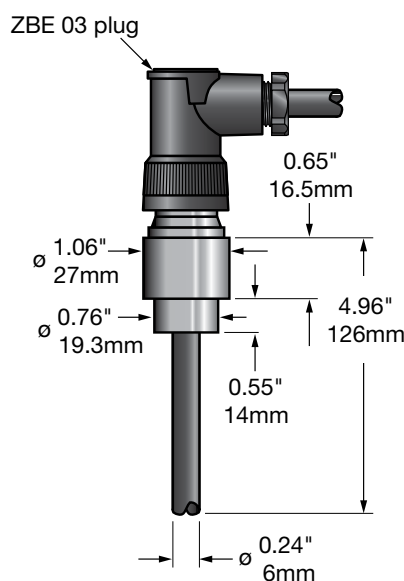


Technical Details:

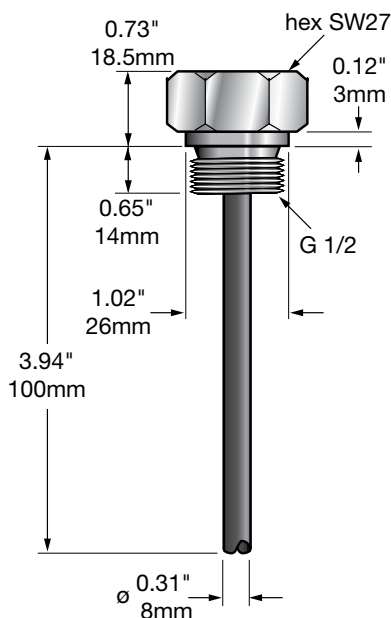
Temperature Sensor TFP 100	
Maximum pressure	145 psi (10 bar)
Temperature range of medium	-40° to 257°F (-40° to 125°C)
Electrical connection	4 pole M18x1
Safety Sleeve for Tank-Mounting the TFP 100	
Parts in contact with medium	nickel plated brass

Dimensions:

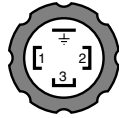
TFP 100 (temp. sensor)



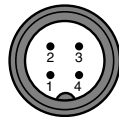
Safety Sleeve



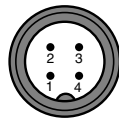
ZBE 01 Connector Part # 00905701 DIN 43650 / ISO 4400 (IP65)



ZBE 02 Connector Part # 00609479 M18x1 (IP65)



ZBE 03 Connector Part # 00609480 90° M18x1 (IP65)



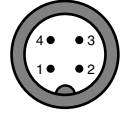
ZBE 04 Connector Part # 00258011 DIN 43650/ISO4400 to M18x1 (IP65)



ZBE 10 Connector Part # 00654527 90° DIN 43651 (IP65)



ZBE 06 Connector 4 Pole M12x1 90°



ZBE 06 = connector only (IP65)
Part # 06006788



Color Code:
1 = brown
2 = white
3 = blue
4 = black

ZBE 06-02-4 = with 2 meter Cable (IP67)
Part # 02701196

ZBE 06-05-4 = with 5 meter Cable (IP67)
Part # 02701197

ZBE 08 Connector 5 Pole M12x1 90°



ZBE 08 = connector only (IP65)
Part # 06006786



Color Code:
1 = brown
2 = white
3 = blue
4 = black
5 = gray

ZBE 08-02-5 = with 2 meter Cable (IP67)
Part # 06006792

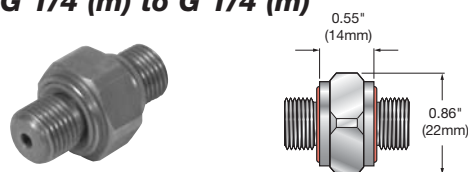
ZBE 08-05-5 = with 5 meter Cable (IP67)
Part # 06006791

ZBE 08S-02 (5 pole) with 2m screened cable
Part # 6019455

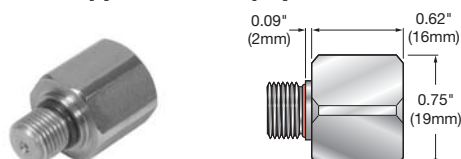
ZBE 08S-05 (5 pole) with 5m screened cable
Part # 6019456

ZBE 08S-10 (5 pole) with 10m screened cable
Part # 6023102

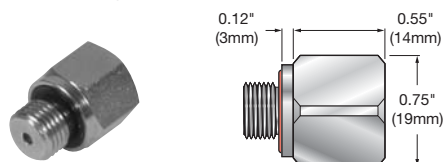
ZBM 03 Part # 00257163
G 1/4 (m) to G 1/4 (m)



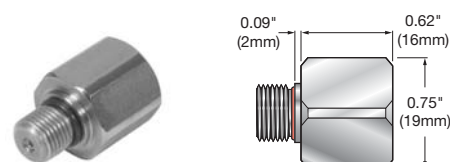
ZBM 09 Part # 00907367
G 1/4 (f) to G 1/4 (m) w/ 0.8mm Snubber



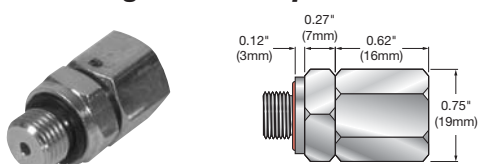
ZBM 11 Part #00258055
G 1/4 Alignment Adapter for EDS 300



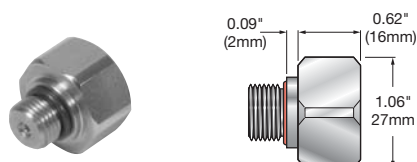
ZBM 13 Part # 00906968
G 1/4 (f) to G 1/4 (m) w/ 0.5mm Snubber



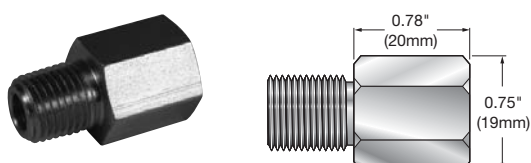
ZBM 14 Part # 00907818
G 1/4 Alignment Adapter for EDS 300



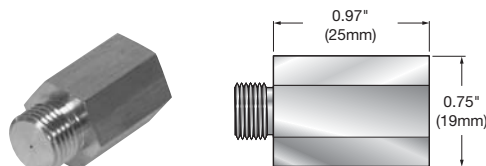
ZBM 15 Part # 00907750
SAE-6 (f) to SAE-6 (m) w/ 0.5mm Snubber



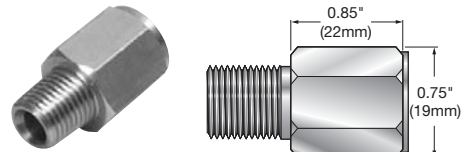
Adapter Part # 02701673
SAE-6 (f) to 1/4" (m) NPT



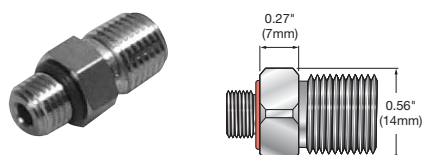
Adapter Part # 02067166
G 1/4 (f) to SAE-6 (m) w/ 0.5mm Snubber



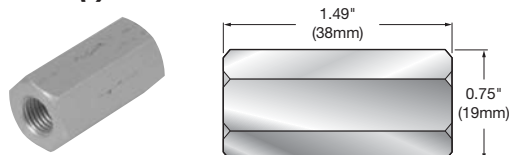
Adapter Part # 02055899
G 1/4 (f) to 1/4" NPT (m) Stainless



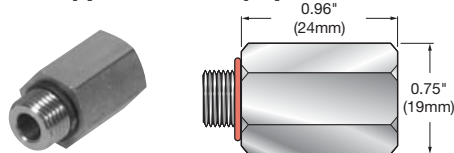
Adapter Part # 02701426
SAE-4 (m) to 1/4" NPT (m) Stainless



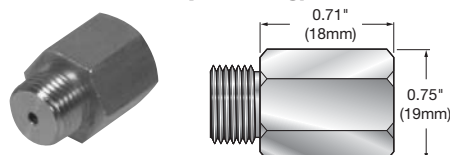
Adapter Part # 02075267
SAE-6 (f) to 1/4" Schrader



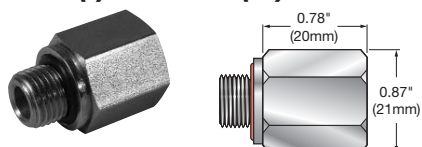
Adapter Part #02055566
G 1/4 (f) to SAE-6 (m)



Adapter Part # 02066754
G 1/4 (f) to SAE-6 (m)
Alignment Adapter (crush seal)
(for EDS 300 Shipbuilding)

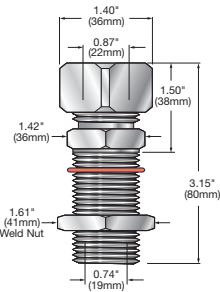


Adapter Part # 02701429
SAE-6 (f) to G 1/4 (m)



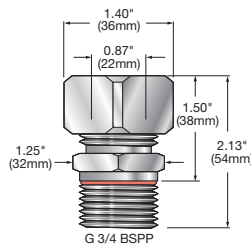
ZBM 19 - ENS 3000 Installation Kit

Part # 00908738



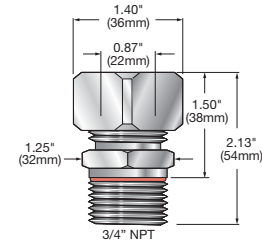
ZBM 20 - ENS 3000 Adapter G3/4 BSPP

Part # 00908739



ZBM 20 - ENS 3000 Adapter 3/4" NPT

Part # 02701568



EDS 1600/1700 and ETS 1600/1700 Mounting Kit

Part # 00257492



ZBM 300 (for EDS/ETS 300) Wall Mounting Clamp

Part # 00906385



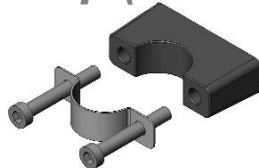
ZBM 310 (for EDS/ETS 300) Wall Mounting Clamp

Part # 06011511



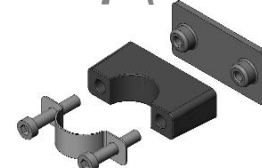
ZBM 3000 - Screw Version Mounting Clamp (for EDS 3000)

Part # 03184630



ZBM 3100 - Weld Version Mounting Clamp (for EDS 3000)

Part # 03184632



EDS 601 Mounting Kit

Part #00905404



Clamping Kit (for HDA Transducers)

Part #435812



HMG 2020



General:

The HMG 2020 is a portable data recorder for recording pressure, temperature, flow rate, rpm etc. in industrial machinery and systems (e.g. hydraulics, pneumatics). The HMG 2020 can record the measured values from up to five sensors simultaneously.

- 2 inputs for 4 to 20 mA sensors
- 2 inputs for either 4 to 20 mA or 0 to 10 V sensors
- 1 frequency input for digital signals in the range 0.3 to 30,000 Hz
- The measurement range and the unit for each sensor can be set as required (e.g. 0 to 250 bar, -25° to 100°C, 0 to 217 KN). Therefore, the majority of commercially available sensors with standard output signals can be connected and evaluated.
- As well as the current measured values, the unit also records the minimum and maximum values, in addition to the differential between two sensors of the same type.

Technical Details:

Measurement inputs Channel A and B Channel C and D	4 analog inputs / 1 digital input 4 to 20mA, Ri approx. 100 Ω 4 to 20mA, Ri approx. 100 Ω or 0 to 10V, Ri approx. 80 K Ω
Channel E	0.3 Hz to 30 KHz, 0 to 24V, switching threshold approx. 4 V
Accuracy Measuring channels A, B, C, D Measuring channel E	0.25% of the measuring range 0.02% of the instantaneous value
Measuring Rate Normal operation Fast measurement	100 ms can be reduced right down to approx. 1 ms (depending on the sensors connected)
Resolution	10 bit
Display	LCD display, 2 lines, each with 16 characters
Analog output (Channel A and B)	0.2 to 4 V
Interfaces Serial (RS 232)	300 to 38400 baud, 8 data bits, 1 stop bit, 1 start bit, no parity check, handshake with CTS on pin 5 (only for printer version) Note: The plug connection on the HMG does not correspond to the RS 232 standard.
Parallel	standard connection, compatible with Centronics
Plug connections Sensor connection Interfaces	D-sub 9-pole, socket D-sub 25-pole, socket
Voltage supply External voltage	12...30 V DC, charging current max. 500 mA constant supply possible charging time approx. 3 hours when batteries flat
Internal voltage	4 x NiMH batteries 1.2 V, Mignon
Battery life (with NiMH 1 AH batteries)	depending on the type of sensors connected e.g.: with 2 HYDAC pressure transmitters (4 to 20 mA signal) approx. 10 hours operation possible
CE mark	
Operating temperature	10° to 40°C
Air humidity	0 to 70% relative, non-condensing
Weight	approx. 500g

The HMG 2020 generally distinguishes between three measurement options:

- 1. Normal measurement**
Purely a display function where the measured values are displayed immediately.
Ex: When HMG is measuring with pressure sensors to act as a digital gauge.
- 2. Curve measurement**
The measured values are displayed and simultaneously stored continuously in the internal memory. The courses of the curves can be printed out on the printer as soon as measuring has stopped, or transferred to a PC and viewed with the software.
- 3. Log measurement**
The measured values are displayed and can be stored as log entries in the internal memory. This method of measurement is used primarily for long-term measurements (e.g. one week, one month, one year etc.). The log entries can be printed out on a printer as soon as measuring has stopped, or transferred to a PC.

The internal memory can store up to 50 different curves and logs with 250,000 measured values in total.

To optimize your measurements the unit has a wide variety of additional functions:

- **Choice of language**
The user may define which language the unit will display the data and parameters.

Model Code:

HMG 2020 - 004 - E

Series

Series = HMG 2020

Modification number

004 = standard unit

User manual and documentation

E = English

• Two trigger possibilities

Definition of events which start a curve measurement or which, on a log measurement, transfer the current measured values to memory.

Ex: A curve is to be recorded when the temperature exceeds 50°C or the system pressure falls below 25 bar. The two triggers can in addition be linked together logically (and/or following one another chronologically), so that data is recorded exactly at the required moment.

• Definable displays

Define which measured variables should appear on the unit display.

Ex: User display 1 of 5: current temperature value, peak value of the flow rate, minimum pressure value and current rpm value.

• Identification of recorded curves or logs

The user can program in a specific 'company name' and assign a specific station number to the system being presently worked on. This specifies which system each measurement was recorded from.

• Printer Options

These options enable print outs (black & white or color) to be done on commercially available printers. Additional details can be obtained from the technical information in this brochure, or simply by contacting one of our distributors.

The following are supplied:

4x NiMH rechargeable batteries, 1x power adapter for 110 VAC, 1x 2 meter A/B sensor cable (A/B cables with Binder M714 type electrical connections), 1x operating manual, 2x ZBE-04 Binder M714 to DIN 43650 adapters.

Accessories must be ordered with full details:

- Pressure Transducers
HDA 3700 & 3800 series
(available from -1 to 9 to 0 to 600 bar)
HDA 4475 series (modification 104)
(available from 0 to 150 to 0 to 9000 psi)
- Temperature sensor
ETS 4144-A-000 -25° to +100°C (-13° to 212°F)
- Flow rate sensor
- Turbine Style
EVS 31X0-1 (6 to 60 l/min, 1.6 to 15.9 gpm) @ 400 bar
EVS 31X0-2 (40 to 600 l/min, 10.6 to 159 gpm) @ 315 bar
EVS 31X0-3 (15 to 300 l/min, 4 to 79.3 gpm) @ 400 bar
EVS 31X0-5 (1.2 to 20 l/min, 0.3 to 5.3 gpm) @ 400 bar
- Measuring orifice
(determines flow rate via differential pressure)
EVS 1000-020 (5 to 20 l/min)
EVS 1000-080 (20 to 80 l/min)
EVS 1000-350 (80 to 350 l/min)
- Revolutions per minute frequency sensor
HDS 1000
- Current sensor simulator
SSS 1000
- Hydraulic adapter set (Minimess series) consisting of:
2 of adapter hoses DN 2 / 400 mm 1620/1620
2 of adapter hose DN 2 / 1000 mm 1620/1620
2 of pressure gauge direct connections 1620/G 1/4
2 of adapters 1615/1620
2 of bulkhead couplings 1620/1620
- Universal adapter set
UVM 2000
- HMGWIN PC software
With PC connection cable (for serial interface) and 9-pole to 25-pole adapter
- Analog output cable
For channels A and B
- Connection cables
(A/B cable or C/D cable) with 2 Binder plugs for pressure, temperature or flow rate sensors in the following lengths: 2m; 5m; 10m; 20m.
- ZBE 04
(Binder plug adapter, series M714, to Hirschmann DIN 43650)
Enables connection of pressure transmitters HDA 3XX5-A (2-conductor 4...20mA signal with Hirschmann plug) via the A/B or C/D connection cable
- Plastic carrying case with foam rubber insert

Deluxe HMG Diagnostic Kits

See the inside back cover for details



Regular HDA 4400 or 4700 series transducers must have pulse mode set to inactive.

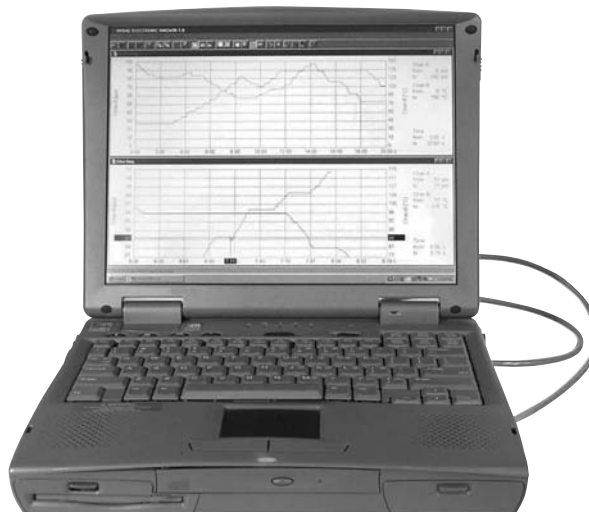
HMGWIN

The HMGWIN PC program expands the measurement options of the portable HMG 2020 data recorder. HMGWIN is compatible with Windows 95/98/NT, user friendly, an interactive software package that allows the user to download the stored data and study it in greater detail.

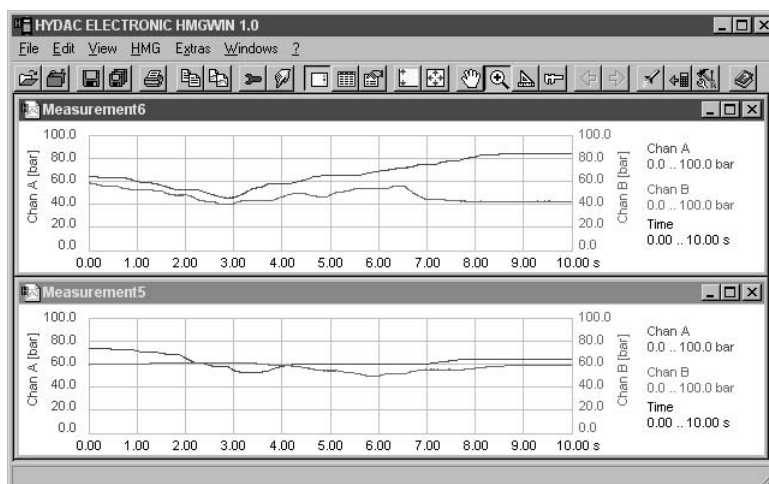
For the user who wishes to store or further evaluate the recorded measurement curves and measurement logs, this HMGWIN provides a range of useful functions.

Features:

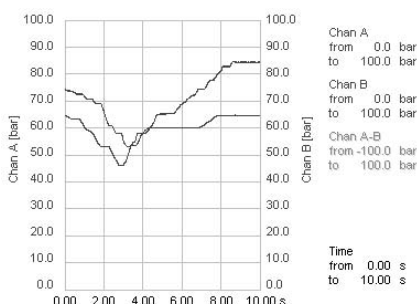
- Transfer and Storage of curves and logs from the HMG 2020 to a PC.
- Viewing of up to 4 different recorded curve or log measurement simultaneously on the monitor.
- Superimposition of curves
Parts of different curves can be superimposed in a new graph, for example to show the wear and tear of a machine (*new condition/current condition*).
- Straight edge function
As with a straight edge, you can measure the curves using the mouse (*exact time and amplitude value*). Absolute measured values and also relative measured values (*measurement in relation to a set marker*) can be displayed.
- Zoom function
Using the mouse, part of a graph can be framed. The framed area appears as a new graph, enlarged accordingly.
- Online function
The portable data recorder measures and transfers the current measured values straight onto the PC. These are then immediately displayed as a graph in realtime (*comparable with the function of an oscilloscope*). The graph displayed can be stored if there are any interesting results.
- Portable data recorder
Settings can be transferred to the PC and may be stored. The reverse is also possible, so, for example, settings for taking measurements on a particular machine can be fed into the HMG 2020 again and again.
- Data conversion
HMGWIN can convert the HMG 2020 data into some other data formats. This means, for example, that the recorded curves can be transferred to many other PC programs (*spreadsheets, database, word processing etc.*) and further processed.



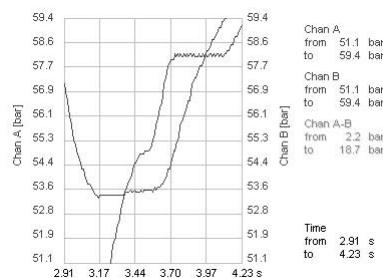
HMG 2020 connected to a PC



Screen showing multiple graphs and whole measurement curve



Overlay of two measurement curves



Zoomed section from overlay

The following are accessories available for use with the HMG 2020 Recordable Data Recorder:

1 Portable Data Recorder HMG 2020

Measurement unit for recording all sensor signals. Base unit of the complete measurement unit set including main supply units.

2 HMGWIN software

Windows based PC software program designed to extend the measurement possibilities of the HMG 2020. Compatible with Windows 95, 98, and NT.

3 Pressure transmitter

For pressure measurement we supply pressure transmitters in the accuracy classes 0.3%, 0.5% and 1%, with many different measuring ranges from 0 to 150 psi up to 9000 psi. Required output signals: 4...20 mA or 0...10 V.

4 Temperature sensor

The temperature sensor ETS 4000 has a measuring range of -25...100°C with current output 4...20 mA. It is pressure resistant up to 8700 psi.

5 Flow rate sensor

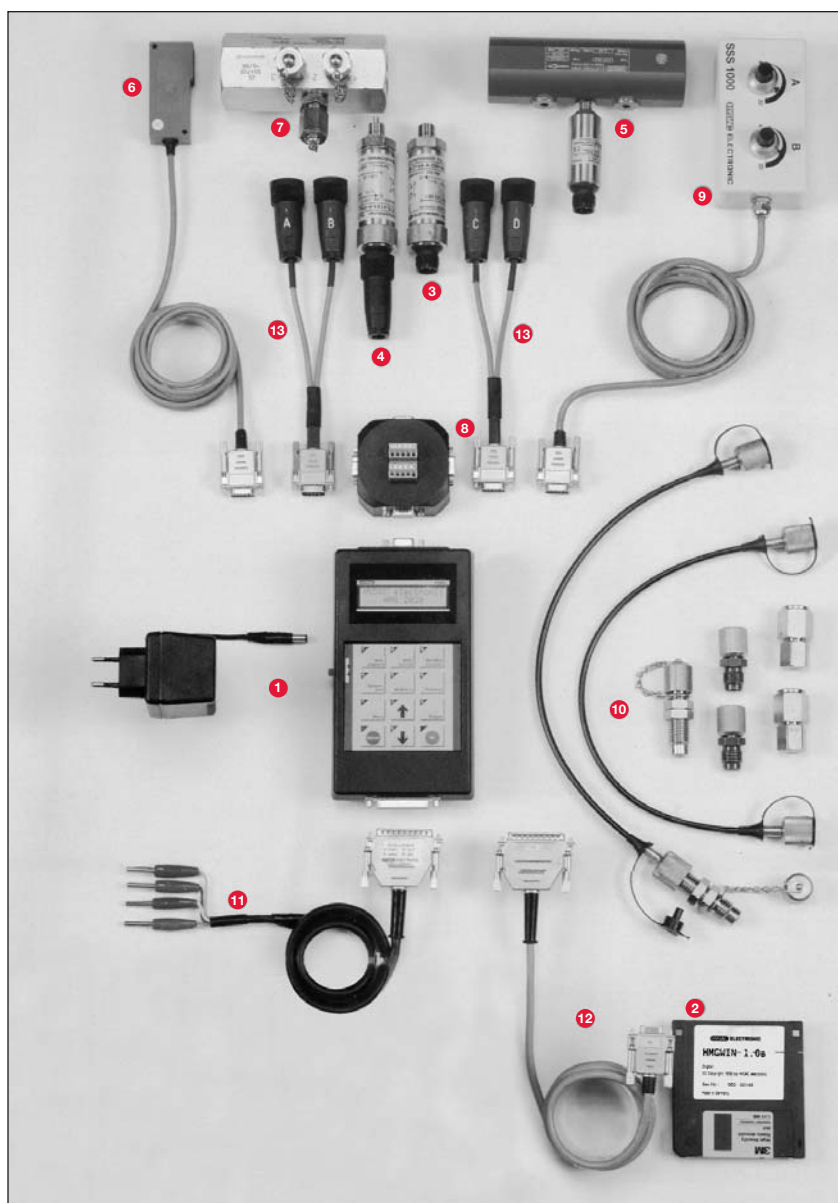
For accurate flow rate measurement ($< \pm 2\%$ of the instantaneous value) we supply aluminum turbines as standard in the measuring ranges 1.2 to 20 l/min; 6...60 l/min; 15...300 l/min and 40...600 l/min. Each supplies an output signal of 4...20 mA, and have two G 1/4" BSP threaded connections for connecting additional sensors, ex: pressure transmitters and temperature sensors. Our flow rate meters are also available in stainless steel with various measuring ranges.

6 HDS 1000

The rpm probe HDS 1000 is suitable for measuring the speed of rotating bodies. The principle is based on a reflecting light barrier with adhesive foil strips.

7 Flow rate orifice

The measuring orifice EVS 1000 enables cost-effective flow rate recording via differential pressure measurement. The following measuring ranges are available as standard 5...20 l/min, 20...80 l/min and 80...350 l/min. The measuring points of the measuring orifice are in each case Minimess connections, series 1620.



8 Universal adapter set

The universal adapter set, UVM 2000, is needed to connect more than two sensors for simultaneous measurement (*distributor function*) or if external sensors are used. These can be connected by means of screw terminals.

9 SSS 1000

The current sensor simulator SSS 1000 was designed for teaching purposes. It can be used to simulate two current sensors (4...20 mA) via rotary potentiometers. Personnel can learn how to use the HMG, or consolidate their knowledge of the unit, in the office. The current sensor simulator is particularly suitable for staff training.

10 Hydraulic adapter set

The hydraulic adapter kit allows pressure transmitters with G 1/4" A external thread to be connected to existing Minimess pressure connections, series 1620 or 1615.

11 Analog output cable

The analog output cable can be used to transfer the current measured values of channels A and B as a voltage signal to an oscilloscope or a recorder.

12 PC Cable

Connects HMG to computer

13 Sensor Connection

Cables A-B and C-D

HMG 2020 Basic Kit

Part # 02066753

Kit Includes:

- 1 - HMG 2020-004-E
- 1 - Power Supply Cord
- 1 - PC Cable
- 2 - ZBE 04 Connectors
- 1 - HMGWIN Software



HMG 2020 Upgrade Kit

Part # 02070910

Kit Includes:

- 1 - HMG 2020-004-E
- 1 - Power Supply Cord
- 1 - PC Cable
- 4 - ZBE 04 Connectors
- 1 - Case for HMG
- 1 - Cable Sensor HMG CD 2 Meter
- 1 - UVM 2000 Connector Hub (not pictured)
- 1 - HMGWIN Software



EDS Pressure Switch Kits

Pressure Switch

- 3000 psi (switch / analog)
- 3000 psi (single switch)
- 6000 psi (single switch)
- 14 to 75 psi (single switch)

Part Number

- 02071804
- 02070103
- 02071443
- 02071444

Kit Includes:

- 1 - Pressure Switch
- 1 - 4 Pole M12 Connector with Plug
- 1 - Power Supply
- 1 - Carrying Case





HMG Deluxe Diagnostic Kit

Part # 02070911

HYDAC has packaged these components to be the perfect start-up kit for performing diagnostics on mobile & industrial applications. You can add HYDAC flow sensors, different pressure & temperature transducers at any time. Also included is an extra ZBE 04 connector for connecting to existing transducers & indicators already installed on your equipment.

Kit Includes:

- | | |
|--|--|
| A - HMG 2020-004-E
(rechargeable batteries included) | F - PC Cable |
| B - Power Supply Cord | G - HMG WIN software |
| C - UVM 2000 Connector Hub | H - HDA 4475 Pressure Transducers (3)
(1000, 3000, and 6000 psi) |
| D - C & D Sensor Cable | I - ETS 4144 Temperature Transducer |
| E - A & B Sensor Cable | J - ZBE 04 Connectors (4) |

Entire kit comes neatly packaged in a durable carrying case.
(see photo on page 60.) Complete operation manual is included.

Custom kits are available.



HYDAC | **INTERNATIONAL**

The Single Source for Hydraulic Components

HYDAC Accumulators

Bladder, Piston, & Diaphragm Types; Pulsation Dampeners & Shock Absorbers;
Safety & Shut-off Blocks; Charging & Gauging Units; Mounting Components & Accessories

HYDAC Filters

Hydraulic Oil; Lube Oil; Fuel & Fuel Oil; Water; Process;
High Pressure; Return Line; Suction; Strainers; Inline; Manifold-mount; Modular Stacking;
In-tank; Inside Tank; Circuit Protectors; Spin-on; Backflush; Selectable Duplex; Clogging Indicators;
Wide Variety of Elements Including Interchanges for All Major Brands; Private Labeling for OEM's

HYDAC Fluid Service Products

Offline & Portable Filters; Online & Portable Realtime Particle Counters; Water Sensors;
Fluid Sampling Kits; Fluid Analysis Kits; Vacuum Dehydration Water Removal Units

HYDAC Valves

High & Low Pressure Ball Valves; Flow, Needle, & Check Valves;
Hydraulic/Pneumatic Actuators; Custom Valve Design

HYDAC Clamps

Hose, Tube, & Pipe Clamps; Cushion Clamps; Band Straps;
U-bolts; Fixed Cylinder Clamps; Custom Clamping Solutions

HYDAC Accessories

TestPoints & Flexible Test Hoses; Fluid Level Indicators; Gauge Isolators;
Suction Strainers; Breathers; Filler/Breathers; Desiccant Breathers

HYDAC Electronics

Pressure & Temperature Transducers & Switches; Flow Rate Meters;
Current Probes; Digital Displays; Portable Data Recorders

HYDAC Coolers

Air-Cooled & Water-Cooled Models; Cooler, Pump/Filter, & Pump/Filter/Cooler Units;
AC Industrial Models; DC & Hydraulic Drive Mobile Models

HYDAC Power Units

High Pressure & Compact Power Units;
Standard & Custom Integrated Control Units

HYDAC Cartridge Valves

Pressure Controls — Reducing & Relieving Valves; Proportional Pressure & Flow Control Valves;
Check Valves; Flow Controls; Load Controls — Counterbalance & Pilot-Op. Check Valves;
Custom Manifold Design & Manufacturing; Solenoid Directional Valves — Poppet & Spool Types;
5000 psi, up to 40 GPM; Inline Mounting Bodies

HYDAC Mobile Systems

Central Valve Blocks; Suspension Control; Steering Control;
Power Attachment Controls; Design & Application Assistance

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