

Technical Datasheet



D-Series SMART Differential Pressure Transmitter

Models: DPR-2000

Key Features

- High accuracy $\pm 0.075\%$ (better accuracy on request)
- 4-20mA, 0-20mA or 0-5mA analogue with digital communications
- Fully HART ® compatible
- Programmable range, zero shift, characteristic and damping ratio with local panel keys
- Static pressure limit up to 420 bar
- ATEX certified (Intrinsic Safety, Flameproof)
- Gold plated diaphragm option
- Hastelloy C276 wetted parts option

Series Overview

The D-Series pressure, differential pressure and temperature transmitters offer customers cost-effective and accurate solutions to their individual process requirements. Available with a wide range of process connections and easily configurable via the D-Soft software, the D-Series can be used for a variety of applications where pressure, differential pressure, temperature, level or flow measurements are needed. Other models in this series include:

- DPR-2200 SMART Differential Pressure transmitter with 2 remote chemical seals
- DPR-2000G SMART Differential Pressure Transmitter for low ranges
- DPC-2000 SMART Pressure Transmitter
- DPT-2000 SMART Temperature Transmitter



Product Applications

The DPR-2000 is suitable for a wide range of applications for measuring:

- Differential Pressure
- Level
- Flow

The choice of models available ensures that the DPR-2000 is:

- Suitable for use in corrosive atmospheres
- Resistant to chemical attack

How can we help you?

Delta Controls offers fast, efficient and knowledgeable support when and where you need it. Please visit our website at www.delta-controls.com to find your local support centre or call us on:

+44 (0) 1252 729 140

Application & Construction

The DPR SMART Differential Pressure Transmitters are suitable for measuring differential pressure of gases, vapours and liquids. The active sensing element is a piezoresistive silicon sensor separated from the medium by a diaphragm and by a specially selected type of manometric liquid. The special design of the active sensing element ensures that it is able to withstand pressure surges and overloads of up to 250/320/420bar. The casing is made of cast aluminium alloy or 316 stainless steel with degree of protection IP66/67. The design of the casing enables the use of a local display, rotation of the display by 90°, rotation of the casing by 0–355° relative to the sensor, and a choice of cable direction.

Comms & Configuration

The communication standard for data interchange with the transmitter is the Hart protocol.

Communication with the transmitter is carried out with:

- a KAP-03, KAP-03Ex communicator,
- some other Hart type communicators, (*)
- a PC using a HART/USB/Bluetooth converter and D-Soft configuration software.

(*) .eddl files available at www.delta-controls.com

The data interchange with the transmitter enables the users to:

- ◆ identify the transmitter;
- ◆ configure the output parameters:
 - measurement units and the values of the start points and end points at the measurement range;
 - damping time constant;
 - conversion characteristic (inversion, user's non-linear characteristic);
- ◆ read the currently measured pressure value of the output current and the percentage output control level;
- ◆ force an output current with a set value;
- ◆ calibrate the transmitter in relation to a model pressure

Installation

The transmitter with **P** or **PN type** process connection is not heavy, so it can be installed without an additional mounting bracket on application. For fitting in any desired position we recommend a universal Delta mounting bracket for 2" pipe (AL mounting bracket). The version with **C type** process connections can be fitted directly to a 3- or 5- valve manifold. We recommend factory-mounted transmitters with VM type valve manifold. A transmitter without a valve manifold can be fitted in any position on a "2 pipe or on a wall using the C-2" mounting bracket. When the special process connections are required for the measurement of specific media levels in closed tanks (e.g. in the sugar and chemical industries) the transmitter is fitted with a Delta diaphragm seal.

Measuring Ranges

No.	Nominal measuring range(FSO)*	Minimum set range	Rangeability	Overpressure limit/ static pressure limit
1	0...70 bar (0...7MPa)	7 bar (700kPa)	10:1	250 bar ,320bar, 420 bar (40 bar for P type Process connection) (250 bar for PED version)
2	0...16 bar (0...1.6MPa)	1.6 bar (160kPa)	10:1	
3	0...2.5 bar (0...250kPa)	0.2 bar (20kPa)	12.5:1	
4	0...1 bar (0...100kPa)	50mbar (5kPa)	20:1	
5	0...0.25 bar (0...25 kPa)	10mbar (1kPa)	25:1	
6	-0.5...0.5 bar (-50...50kPa)	0.1 bar (10kPa)	10:1	
7	-100...100mbar (-10...10kPa)	10mbar (1kPa)	20:1	
8	-5...70mbar (-0.5...7kPa)	4mbar (0,4kPa)	18:1	
9	-20...20 mbar (-2...2kPa)	2mbar (0,2kPa)	20:1	

*special nominal ranges on request.

Technical Data

Metrological parameters

Accuracy	≤ ±0.075% of calibrated range ≤ ±0.1% of calibrated range (range no. 9)
Long term stability (for the nominal measuring range)	≤ accuracy for 3 years
Thermal error	for ranges no 1-8 ≤ ±0.05% (FSO) / 10°C for ranges no 9 ≤ ±0.08% (FSO) / 10°C
max. ±0.3% (FSO) in temperature range	-25...80°C
special version for ranges no 1-8	≤ ±0.03% (FSO) / 10°C
max. ±0.1% (FSO) in temperature range	-25...80°C
Thermal compensation range	-25...80°C
Zero shift error for static pressure	
	0.01% (FSO) / 10 bar for range 3, 4, 5, 6
	0.03% (FSO) / 10 bar for range 1, 7, 8
	0.08% (FSO) / 10 bar for ranges 2, 7
Zeroing the transmitter in conditions of static pressure can eliminate this error.	
Additional electronic damping	0...60 s
Error due to supply voltage changes	0.002% (FSO) / V

Electrical parameters

Power supply:	
model DPR-2000ALW	12...55 V DC (Ex ia 13.5...28 V) (Ex d 13.5...45V)
model DPR-2000ALE	12...36 V DC
Additional voltage drop when display illumination switched on	3V
Output signal	4...20 mA, two wire transmission DPR-2000ALE: 0...20 or 0...5, 4...20 [mA]
Loadresistance	$R[\Omega] \leq \frac{U_{sup}[V]-12V^*}{0.02A} \cdot 0.85$
*-15V when display illumination switched on	
Resistance required for communication	250...1100 Ω

Technical Data (cont.)

Materials

Wetted parts: type P, PN process connection: 316Lss
 type P(H) process connection: Hastelloy C276
 type C process connection 316ss

Diaphragms: 316Lss, Hastelloy C 276, Au

Casing: Aluminium
 Option: 316SS

Material of window: polycarbonate glass, hardened glass

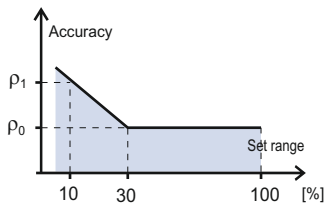
Operating conditions

Operating temperature range (ambient temp.) -25...85°C
 Exi version -25...80°C
 Exd version -25...75°C

Medium temperature range -25...120°C
 over 120°C – measurement with the use of impulse line or diaphragm seals

CAUTION: the medium must not be allowed to freeze in the impulse line or close to the process connection of the transmitter

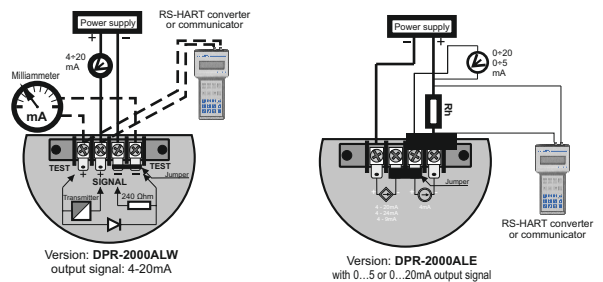
Accuracy depending on the set range



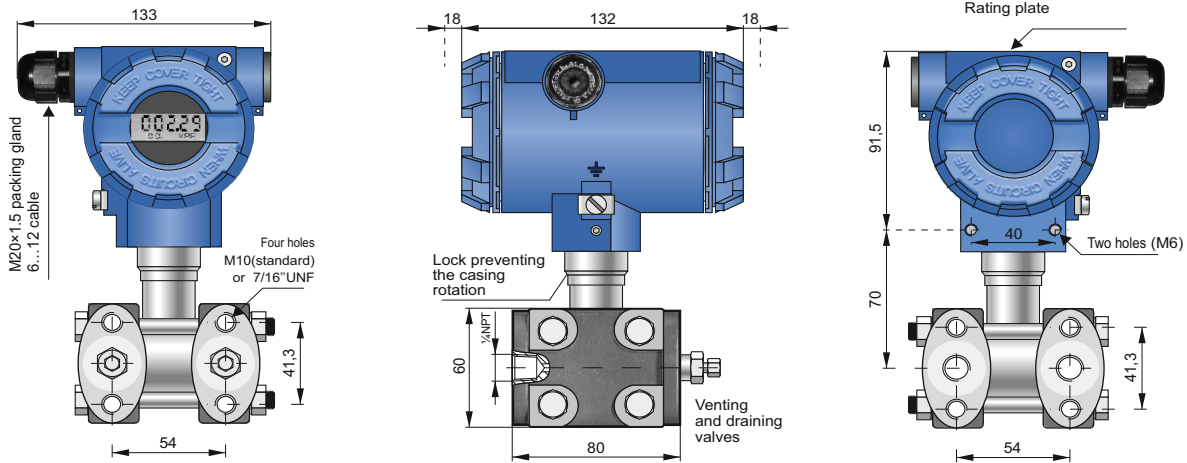
p_0 – error for nominal measuring range (0...100% FSO)
 p_1 – error for range 0...10% FSO
 $p_1 = 2 \times p_0$
 Numerical error values are given in the technical data under metrological parameters

Electrical diagrams

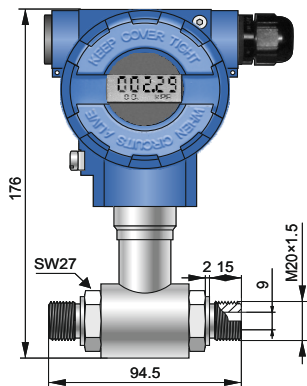
Electrical diagrams for transmitters with HART protocol



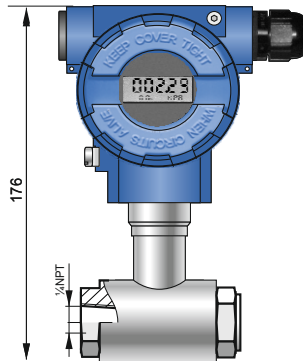
Dimensions



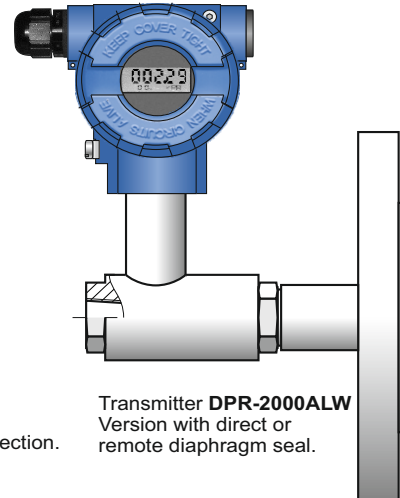
Transmitter **DPR-2000ALW** – version with **type C** process connection to be mounted together with a valve manifold



Transmitter **DPR-2000ALW**
 Version with **P type** process connection.



Transmitter **DPR-2000ALW**
 Version with **PN type** process connection.



Transmitter **DPR-2000ALW**
 Version with direct or remote diaphragm seal.

How to Order

Model	Code	Description	
DPR-2000		Smart differential pressure transmitter.	
Casing, Output signal,	ALW..... ALE..... ALW/SS.....	Aluminum housing, IP66/IP67, with display, output 4-20mA + Hart Special version 0 - 20mA+ Hart, 0 - 5mA+ Hart, Stainless steel housing, IP66/IP67, with display, output 4-20mA + Hart	
Versions, Certificates* *) more than one option is available	/EEx ia..... /EEx xd..... /Tlen..... /320bar..... /420bar.....	Ex I M1 Ex ia I Ma (steel enclosure only) Ex II 1/2G Ex ia IIC T4/T5 Ga/Gb (not available for ALE) Ex II 1/2G Ex ia IIB T4/T5 Ga/Gb (version with Teflon shielded cable) Ex II 1D Ex ia IIIC T105°C Da Ex I M2 Ex d ia I Mb (steel enclosure only) Ex II 1/2G Ex ia/d IIC T6/T5 Ga/Gb (For pressures >250mbar (not available for ALE) Ex II 1/2D Ex ia/t IIIC T85°C/T100°C Da/Db Packing gland available on request. For oxygen service (sensor filled with Fluorolube fluid) Static pressure 320bar /only for C process connection, standard is 250bar. Static pressure 420bar.	
Nominal measuring range		Range	
		min set range	
	/0+70bar.....	0+70bar (0+7000kPa)	7bar (700kPa)
	/0+16bar.....	0+16bar (0+1600kPa)	1.6bar (160kPa)
	/0+2.5bar.....	0+2,5bar (0+250kPa)	0.2bar (20kPa)
	/0+1bar.....	0+1bar (0+100kPa)	50mbar (5kPa)
	/0+0.25bar.....	0+.0.25bar (0+25kPa)	10mbar (1kPa)
	/-0.5+ +0.5bar.....	-0.5+0.5bar (-50+50kPa)	0.1bar (10kPa)
	/-0.1+ +0.1bar.....	-0.1+0.1bar (-10+10kPa)	10mbar (1kPa)
	/-5+70mbar.....	-5+70mbar (-0.5+7kPa)	4mbar (0.4kPa)
/0+70bar.....	0+70bar (0+7MPa)	7bar (700kPa)	
/-20+20mbar.....	-20+20mbar (-2 +2 kPa)	2 mbar (0.2 kPa)	
Measuring set range	/... [required units]	Calibrated range in relation to 4mA and 20mA output	
Process connections	/C.....	Thread 1/4NPT F on the cover flanges, diaphragms material 316Lss, cover flanges material SS316. Allows mounting with a valve manifold. Process connection of cover flange: M10(standard)/ 7/16UNF(option)-C(7/16)	
	/C(H).....	Thread 1/4NPT F on the cover flanges, diaphragms material Hastelloy C276, cover flanges material SS316. Allows mounting with a valve manifold. Process connection of cover flange: M10(standard)/ 7/16UNF(option)-C(H,7/16)	
	/C(Au).....	Thread 1/4NPT F on the cover flanges, gold plated diaphragm, cover flanges material SS316. Aavailable with range no.4 Allows mounting with a valve manifold. Process connection of cover flange: M10(standard)/ 7/16UNF(option)-C(Au,7/16)	
	/P.....	Thread M20x1.5 (male), wetted parts material SS316L	
	/PN.....	Thread 1/4"NPT (female), wetted parts material SS316L	
	/P.(H).....	Thread M20x1.5 (male), wetted parts material Hastelloy C276	
	/code of diaphragm seal.....	Diaphragm seal (see chapter of diaphragm seals) mounted on Hi side of transmitter, Lo side 1/4NPT Female	
Gasket (only in C process connection)	(without marking).....	FPM Viton,	
	NBR.....	NBR (for oxygen service)	
Electrical connection	(without marking).....	Packing gland M20x1.5	
	/US.....	Thread 1/2NPT Female	
Accessories ** **) more than one option is available	/C-2".....	Mounting bracket for 2" pipe (to C process conn.), mat. zincd steel	
	/C-2"(SS).....	Mounting bracket for 2" pipe (to C process conn.), mat. Stainless Steel	
	/FI25.....	Mounting bracket for 2" pipe (to P process conn.), mat. stainless steel	
	/RedSpaw P.....	Connector to weld impulse pipes dia. 12 and 14 mm material 15HM(SO) or SS 316(S) . Only process connection P type,	
	/RedSpaw C.....	Connector to weld impulse pipes dia. 12 and 14 mm, material 15HM. Only process connection C type.	
	/Red d/P. 1/2".....	Adapter for differential pressure transmitters with C type process connection, output three ad 1/2NPT F. Material 316 LSS	
	/ST.....	Stainless Steel plate riveted to the housing	
	/MT.....	Stainless Steel Tag plate mounted on wire	
Other specification	/.....	Description of required parameters	

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D-Series
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