

## DP Digital Differential Pressure transmitter, part of PT600 series transmitters



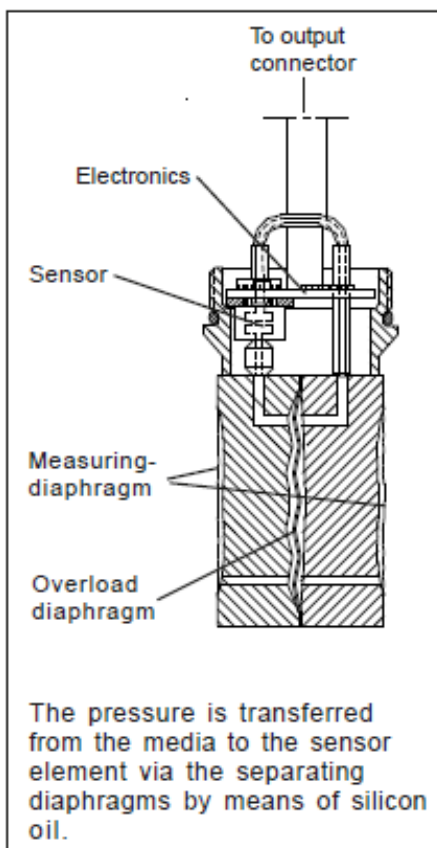
### PT600RSH has many advantages:

- Modular built to suit different needs. Different process connections, different houses, cable connection, M12 connection, display etc.
- High single-side and double-side overload protection, up to 150 bar.
- Triple output/input: 4-20 mA, MODBUS communication and HART communication.
- High accuracy 0,075% and low temperature drift (total 0,1% of max range for -10 to +70 degrees C).
- Innovative Autozero function. Just press a button, done.
- Range turndown 100:1. One type fits most applications.
- Well tested and approved for CE (EMC and PED), ATEX (pending), IEC Ex (pending).
- Embossed diaphragm. Insensitive to particles and contact. Easy to clean without deformation.
- Lightning protected (option). Fulfills the demands for Class 1 testing according to IEC 61643-1, 5 kA (10/350 uS). This means that the transmitter can withstand a stroke of lightning close to the supply/signal cables.
- Different stainless steel, IP67, housings protect the electronics and electrical connection from dust and moisture. All housings are designed to hygienic demands, no dirt collecting gaps or pockets. Easy to clean and minimal risk for corrosion.



## Description:

The transmitter has a central piezo-resistive sensor connected to the membrane chambers via two capillary tubes. Each of the two process media pressures act on a separating membrane that have a small spring constant. An overload membrane with adapted spring constant is located between the two separating membranes. The membrane chambers and the sensor are filled with silicon oil. The pressure on both sides of the overload membrane is transferred to the sensor by means of



the silicon oil.

At a pressure difference between the two separating membranes within the measuring range of the transmitter, all three membranes will move freely. At overload exceeding the measuring range one of the separating membranes will however lay against the profiled surface while the overload membrane still can move freely. The differential pressure across the sensor can in that way not increase further even if the differential pressure across the separating membranes increases. This protects the sensor against overload and transient pressure surges. The electronics perform compensation for temperature drift of the sensor by means of compensation values entered

at factory calibration, and at the same time the temperature measurement is also calibrated. Compensation for the non-linearity in the sensor is done in the same manner.

### Display

The transmitter can also be equipped with a local display. The display can show the signal in optional engineering units, for example mbar or mH<sub>2</sub>O. Unit and limits can be set by customer on the display.

The display can also be used for configuring the transmitter.

Display type D10RS is used for displaying pressure values and to configure the transmitter.

Display type D10RSH is for the same purpose but is also used to connect a remote sensor and to calculate the differential pressure between the transmitter pressure and the remote sensor pressure.

### Intrinsic safety, Exia

PT600RSH can as an option be delivered in intrinsic safe design, Exia IIC T4, according to ATEX and IEC Ex (pending). The transmitter will then have the code PT600RSH E where E indicates "Exia".

This option can not be combined with the lightning protected option (see below).



### Approvals

PT600RSH is CE approved according to the EU directives for pressure equipment, PED, and EMC. PT600RSH fulfills all requirements for RoHS, REACH and WEEE directives.

The pressure intermediate oil is a FDA approved silicon oil.



### Accessories and services:

Different accessories, as valve block, wall mount etc can be delivered on request. Contact customer service for information.

Services like special configuration, TAG numbers etc can be delivered on request. Contact customer service for information.

### Lightning protection

As an option PT600RSH can be equipped with lightning protection. The transmitter will then have the code PT600RSH L where L indicates "Lightning protected". This option can not be combined with the intrinsic safe option.

The lightning protection is built in at the factory. No external changes or external components are needed.

The protection is designed to withstand a lightning stroke close to the probe cable and connection cables but can not withstand a direct stroke. The protection is designed to meet the demands for Class 1 testing according to IEC61643-1 5 kA (10/350 μs).

This protection is normally enough in most applications. In specially exposed installations, where there is high risk for direct strokes, the protection ought to be reinforced (for example by using the connection box, BOX100).

The lightning protection is built up as a three step protection.

The pulse that enters the transmitter is caught by two varistors, three transient protection diodes and a double surge arrester.

The cables shield must be appropriately grounded for the protection to fulfill its purpose.



### Autozero function

PT600RSH has an innovative solution to eliminate the problem of zero shift (due to for example mounting orientation, covering, corrosion or mechanical damage of the diaphragm). Just place PT600RSH in correct mounting position with the pressure that shall represent 4 mA on the diaphragm and just press a button or shorten two cables (pin 7-8 in M12-8 pin contact) for ten seconds.

This action resets the 4 mA (and also makes the communication to send correct pressure/level in engineering units).

Autozero can also be done via communication, both HART and MODBUS, and also from any of the displays.

### MODBUS Communication

MODBUS communication can be used for transfer of measured values, for example the pressure and the media temperature (etc.). Several units can be connected in parallel and addressed to communicate its values (addresses from 1-255). Standard address at delivery is 10.

The communication can also be used for configuration of all PT600RSH parameters direct from a suited control system or from a PC (with appropriate software, for example MEP7 Modbus Tool or a generic MODBUS tool). The MODBUS communication is fully registry based (see the manual for PT600RSH for more information).

Physical interface for MODBUS is RS485, 4 lines. Supply voltage (11-48 VDC) use the 4-20 mA lines and the communication use two separate lines A and B.

A standard RS485 dongle can be used (but it is optimal to use an optoisolated RS485 dongle).



### HART Communication

PT600RSH can communicate via HART, both for signaling values and for configuration.

HART is a standard communication protocol that can be used for signaling of measured values and for full configuration of all PT600RSH parameters.

The HART protocol have three levels of commands, Universal, Common Practice and Transmitter Specific commands.

A HART modem must be used.

The physical interface use FSC (Frequency Shift Communication) signaling. This is done by overlaying a 1200 Hz or 2400 Hz full sine wave on the current loop. The 4-20 mA signaling is fully unaffected by this.



### Hand terminal

Universal and most Common Practice commands can be handled by standard hand held terminals (for example ABB DHH805, Fluke 709H or Martel LC-110H) and by generic HART PC software.

### PI200PS/PSD

PI200PS is a PC package for configuration of MODBUS Pressure, Differential and Level Transmitters.

This battery powered modem box with mA display can be used with optional MODBUS software.

Included in the package is a PC program, MEP7 Modbus Tool, dedicated for configuration of Pondus Instruments pressure, differential and level transmitters.

To PI200PS a low resistance mA meter easily can be connected to show the mA output signal.

PI200PSD has an inbuilt display to show the transmitters mA output signal (see picture below).



Differential pressure range input <small>(Applies for code 3 in the code PT600RSH-ABCD-1234)</small>	Code 3 Range	4-20 mA/HART Span	HART maximum operating pressure MAWP	MODBUS measuring range	MODBUS maximum operating pressure	Maximum static pressure dependence, %	Lower measuring limit of max measuring range
<b>Range (code 3)</b>							
0-60 mbar	1	0,6-60 mbar	150 bar	60 mbar	150 bar	0,2/ 1 MPa	-100%
0-350 mbar	2	3,5-350 mbar	150 bar	350 mbar	150 bar	0,25/ 15 MPa	-100%
0-2000 mbar	4	20-2000 mbar	150 bar	2000 mbar	150 bar	0,1/ 15 MPa	-100%
0-8000 mbar	5	80-8000 mbar	150 bar	8000 mbar	150 bar	0,1/ 15 MPa	-100%

# Code table: Pressure connection, Diaphragm and Pressure range (code –1234)

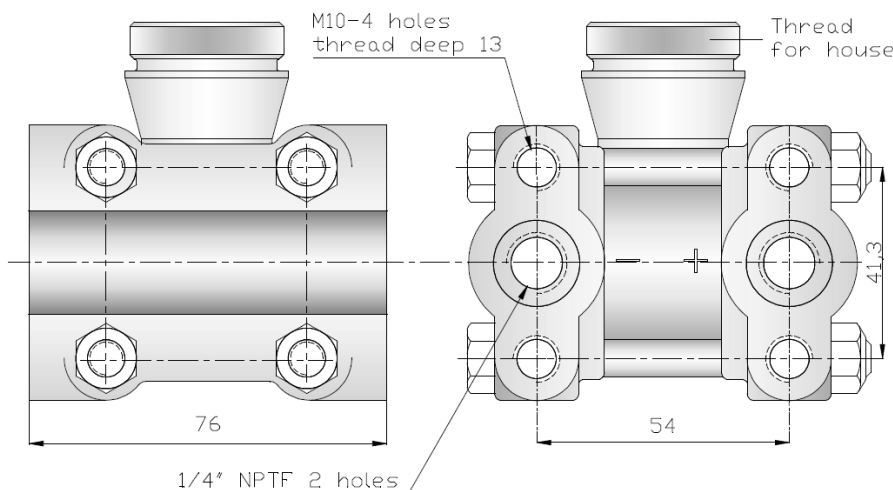
**Ordering example:** Differential transmitter, NPT 1/4", range 0,8 MPa, Hastelloy C276 diaphragm, M12-8pin electric connection, lightning protected, low display house and display D10RS will have the code **PT600RSH-MLMD-4G53**

<b>PT600RSH-ABCD-1234</b> (for code –ABCD Electronics Housing and Electric connection see table on next page)	<b>Code 1 Diaphragm</b>	<b>Code 3 Range</b>	<b>Code 4 Design</b>	Differential NPT1/4" int.	Differential Flange 80/3"	Differential Flange 50/2"	Differential with capillary tube + side*	Differential with capillary tube—side*	Differential with capillary tube +/- side*	<b>Comments</b>
<b>Code 2 Process Connection</b>				G	H	I	Jx	Kx	Mx	
<b>Diaphragm (code1)</b>										
SAF2205 Duplex	2			X	X	X	X	X	X	
Stainless steel 316L	3			X	X	X	X	X	X	
Hastelloy C276	4			X	X	X	X	X	X	Standard diaphragm material.
Gold plated	8			X	X	X	X	X	X	Used if hydrogen ions can exist in media.
<b>Range (code 3)</b>										
0-60 mbar		1		X	X	X	X	X	X	
0-350 mbar		2		X	X	X	X	X	X	
0-2000 mbar		4		X	X	X	X	X	X	
0-8000 mbar		5		X	X	X	X	X	X	
<b>Design (code 4)</b>										
Differential pressure			3	X	X	X	X	X	X	

\* Jx, Kx and Mx: x indicates optional process connections on capillary tube, see pricelist for possible combinations.

## Drawings:

Process connections H, I, Jx, Kx, Mx, not shown.  
(Contact customer service for information.)



## Example:

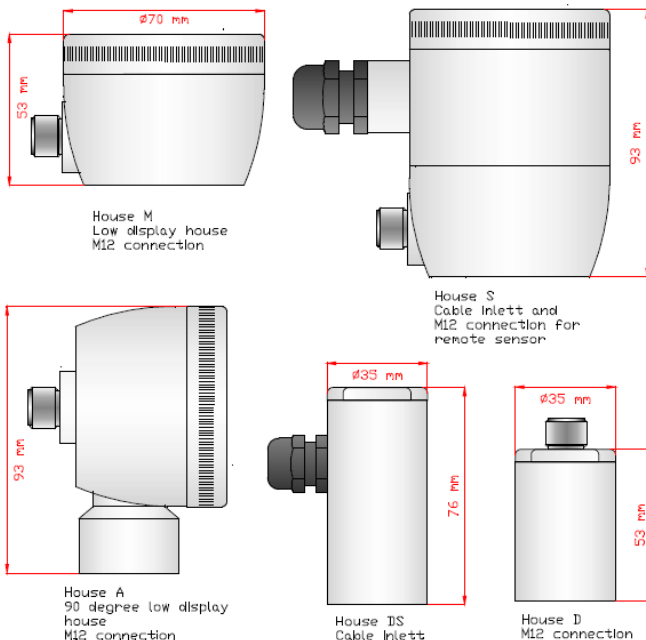
Differential pressure transmitter with process connection G 1/4" internal, intrinsic safe, M12-8 pin electric connection 90 degree house and display will have the code **PT600RSH-MEAD-4G43**.  
Pressure range for this code (4) is 2 bar.



# Code table: Electronic Housing and Electric connection (code –ABCD)

**Ordering example:** Differential pressure transmitter, flange 50/2", range 35 kPa, Hastelloy C276 diaphragm, M12-8pin electric connection, lightning protected, compact house, no display, will have the code **PT600RSH-MLDx-4I23**

PT600RSH-ABCD-1234  (for code –1234 Pressure connection, Diaphragm and Pressure range, see table on previous page)	Suffix A Electric connection	Suffix B Protection	Suffix C House type	Suffix D Display type	Comment
<b>Electric Connection</b>					
M12-8 pin male connector	M				
M12-4 pin male connector	R				Not with house M, A, S
Cable connection	S				Only with house S and DS
<b>Protection</b>					
No protection		x			
Intrinsic safe		E			Can not be combined with L
Lightning protected		L			
<b>House type</b>					
Low display house			M		
Low display house 90 degrees			A		
High house with cable gland			S		
Compact house with M12 (PT06 type)			D		
Compact house with cable gland (PT06 type)			DS		
<b>Display type</b>					
No display				x	
D10RS				D	Not with house D, DS
D10RSH (must be used if remote sensor)				DH	Not with house D, DS



## House types:

All house types can be used with DP process connection to obtain the most suitable combination depending on application.

If a remote sensor application is needed house S must be used on the DP process connection. For the other process connection it is recommended to use house D and a moulded M12-8 pin cable (female contact in both ends) of suitable length.

If cable connection is needed only house type S and DS can be used. House type M and A can only be equipped with M12-8 pin connector. House type D can be equipped with M12-8 pin or M12-4 pin connector.

All house material is stainless steel, 304 or better.

House types S, D, DS have Autozero button.

## Technical data PT600RSH-DP

<b>Type:</b>	Electronic process transmitter with digital electronics	<b>Supply voltage dependence:</b>	Better than +/-0,1 %
<b>Function:</b>	Differential pressure transmitter with overload diaphragm. Piezoresistive sensor	<b>Temperature dependence:</b>	Better than +/-0,1 % of max range (For -10 C to +70 C)
<b>Operation range:</b>	From 0% to 100% of range	<b>Long time stability:</b>	Better than 0,08% per year
<b>Span:</b>	Adjustable between upper range and 1/100 of this. See table on page 3	<b>Vibration dependence:</b>	
<b>Zero:</b>	Adjustable between -100% and 100% of upper sensor limit.	Perpendicular to the diaphragm:	Max 0,3 kPa/G
<b>Pressure range/ Overload:</b>	See table on page 3	Parallell to the diaphragm:	Max +0,2 kPa/G
<b>Maximum static pressure:</b>	See table on page 3	<b>Vibration test:</b>	Test according to IEC770
<b>Static pressure dependence:</b>	See table on page 3	<b>Repeatability:</b>	Better than +/- 0,075 % of max range
<b>Material : Diaphragm:</b>	See table on page 4	<b>Accuracy:</b> (including non-linearity, hysteresis, repeatability).	Better than +/-0,075 % of max range
Other media touched parts:	Stainless steel SS2353	<b>Mounting:</b>	Direct on process connection
Housing:	Stainless steel SS2333	<b>Electrical connection:</b>	Screw terminal/ M12 8-pin/M12 4-pin connector, optional.
<b>Ambient temperature:</b>	-20 to +80 degrees C	<b>Encapsulation:</b>	IP67 (all house types)
<b>Damping:</b>	0,1 to 10 sec. Adjustable via HART and MODBUS communication	<b>Intrinsic safety (option):</b>	Exia IIC T4 Ga according to ATEX and IECEx (pending)
<b>Media temperature:</b>	Max +90 C. Some types up to +275 C.	<b>Electrical safety:</b>	According to EN60204-1
<b>Output:</b>	4-20 mA. Signal proportional to the pressure. HART and MODBUS communication	<b>EMC:</b>	According to EN61326-1-2-3
<b>Supply:</b>	11-55 V DC	<b>PED:</b>	According to 97/23/EC
<b>Series resistance:</b>	$R_{kohm} = (\text{Supply} - 11) / 20$	<b>Filling oil:</b>	AK100, food approved silicon oil (FDA approval)
<b>Series resistance dependence:</b>	Better than +/- 0,1 %	<b>Weighth:</b>	2200-2500 g depending on process connection