

PT600 Digital transmitter for Gauge pressure, Differential Pressure and Level



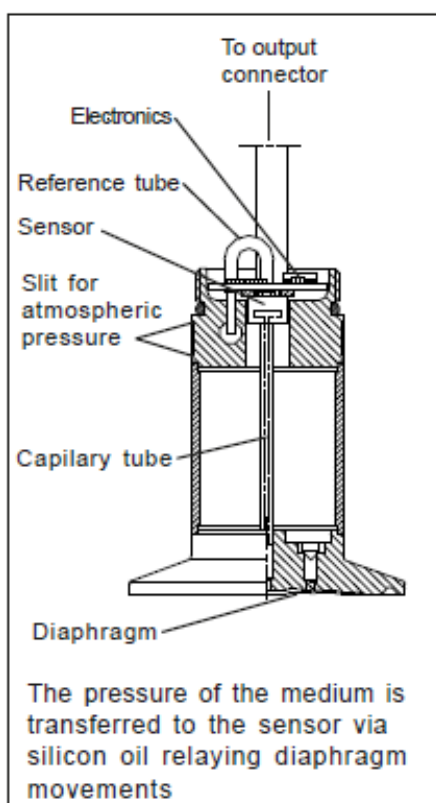
PT600 has many advantages:

- Modular built to suit different needs. 25 different process connections, different houses, cable connection, M12 connection, display etc.
- Directly connected process connections without pressure intermedia, eliminates temperature influence and provide a robust design.
- Withstands media up to 150 °C continuously. Very little effect from temperature due to extremely small oil filling volume. Excellent CIP (Clean In Process) performance.
- Tripple output/input: 4-20 mA, MODBUS communication and HART communication.
- High accuracy 0,1% (option 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), 3A (pending), ATEX (pending), IEC Ex (pending).
- Embossed diaphragm. Insensitive to particles and contact. Easy to clean without deformation.
- Lightning protected (option). Fullfills 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 protects the electronics and electrical connection from dust and moisture. All housings are designed to hygienic demands, nor dirt collecting gaps or pockets. Easy to clean and minimal risk for corrosion.

Description:

Transmitter for pressure and level:

PT600 has a piezo-resistive pressure sensor which is connected to the pressure of the medium via a capillary tube and a diaphragm. Media pressure applied to the diaphragm is transferred via silicon oil to the pressure sensor. The oil completely fills the cavity in the sensor, the capillary tube and the cavity above the diaphragm. This means that the diaphragm movement is very small at pressure changes. The capillary tube protects the pressure sensor from transient pressure surges. To ensure that the sensor has the correct reference pressure, the rear side is



connected to ambient atmospheric pressure, via a tube, designed in order that air passes "cold surfaces" closest to the pressure connection of the transmitter. Any humidity in the air will condense on these surfaces. The condensate flows out and the remaining air in the tube stays dry. Additionally, the reference pressure connection is designed to prevent flushing water from entering.

PT600 has microcomputer-based electronics, which communicate with the outside world with 4 to 20 mA signal as well as HART and MODBUS communication. The electronics measure and converts the output signal from the

pressure dependent sensor bridge to digital values. Furthermore, the total resistance of the sensor bridge is measured and these values are converted to digital temperature values. The electronics perform compensation for temperature drift of the sensor by means of compensation values entered at the 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.

Different kinds of transfer functions, such as linear, square root, curves..., can be selected. The electronics perform the calculation for the selected transfer function and then the digital value is converted to analogue for the 4 to 20 mA current loop. The digital value can also be read via HART and MODBUS communication in optional engineering units, percentage or current.

PT600 can be configured/calibrated via any of the displays, D10RS or D10RSH, and also by means of a Hart hand terminal or a PC via HART or MODBUS communication.

Transmitter for Differential Pressure:

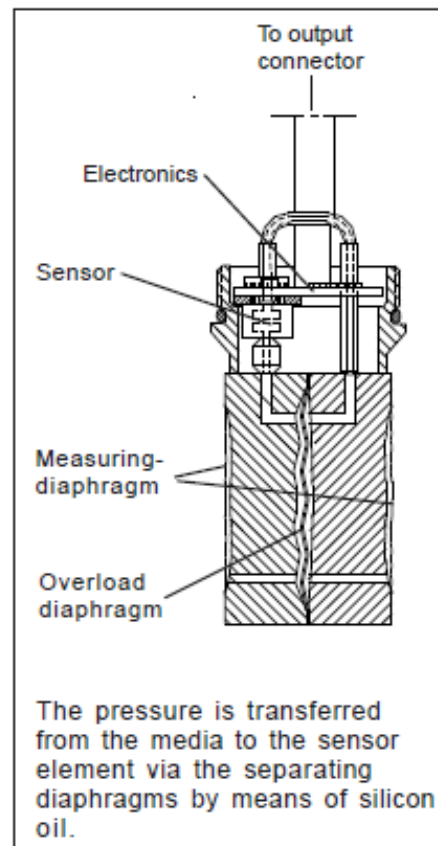
The transmitter has a central piezo-resistive sensor connected to the membrane chambers via two capillary tubes.

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 mWc or mH₂O. 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.

Lightning protection

As an option PT600RSH can be equipped with lightning protection. The transmitter will then have the code PT600RSHL where L indicates "Lightning protected". This option can not be combined with the intrinsic safe option (see below).

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 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 uS).

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

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 probe cables shield must be appropriately grounded for the protection to

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 PT600RSHE where E indicates "Exia".

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



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.

MODBUS Communication

MODBUS communication can be used for transfer of measured values, for example the level 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).

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 use (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 PC software.

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 from any of the displays.



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).



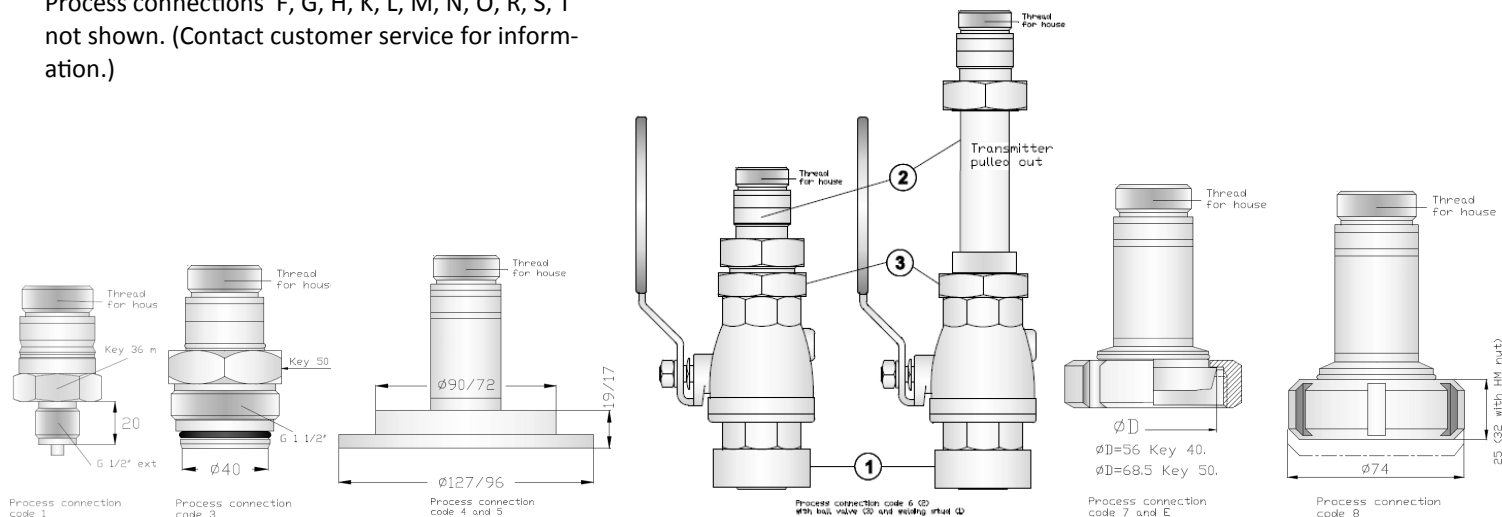
Code table (code –1234):

Ordering example: Hygienic transmitter, SMS nut, range 200 kPa, gauge pressure, Hastelloy C276 diaphragm, M12-8pin electric connection

PT600RSH-ABCD-1234 (for code –ABCD see table on next page)	Code 1 Diaphragm	Code 3 Range	Code 4 Design	G 1/2" External	NPT 1/2" External	G 1 1/2" External	Flange 80/3"	Flange 50/2"	Removable during operation	Hygienic DIN11851/40	Hygienic SMS Rd60-6	Clamp 38	Clamp 51	Hygienic RJT nut	DRD Flange	Hygienic DIN11851/50
Code 2 Process Connection				1	2	3	4	5	6	7	8	9	A	C	D	E
Diaphragm (code1)																
Titanium	1			X	X	X										
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	X	X	X	X	X	X	X
Tantalum	5						X	X								
Gold plated	8			X	X	X			X							
Range (code 3)																
0-7 kPa		1		X	X	X	X	X	X	X	X	X	X	X	X	X
0-35 KpA		2		X	X	X	X	X	X	X	X	X	X	X	X	X
0-200 kPa		4		X	X	X	X	X	X	X	X	X	X	X	X	X
0-2 MPa		6		X	X	X	X	X	X	X	X	X	X	X	X	X
0-4 MPa		7										X	X			
0-8 MPa		7									X					
0-15 MPa		8		X												
0-40 MPa		9		X												
Design (code 4)																
Gauge			0	X	X	X	X	X	X	X	X	X	X	X	X	X
Absolute pressure			2	X	X	X	X	X	X	X	X	X	X	X	X	X
Differential pressure			3													

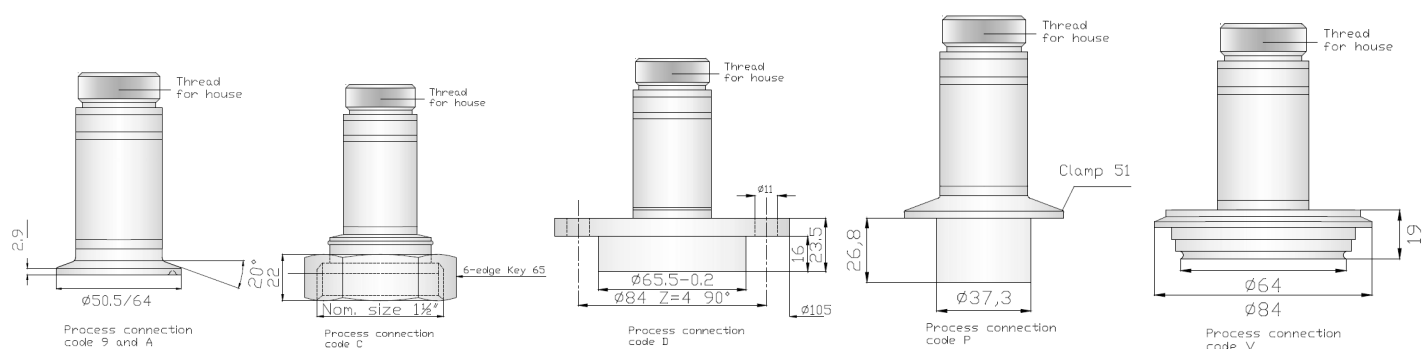
Drawings:

Process connections F, G, H, K, L, M, N, O, R, S, T not shown. (Contact customer service for information.)



on, lightning protected, low display house and display D10RS will have the code **PT600RSH-MLAD-4840**

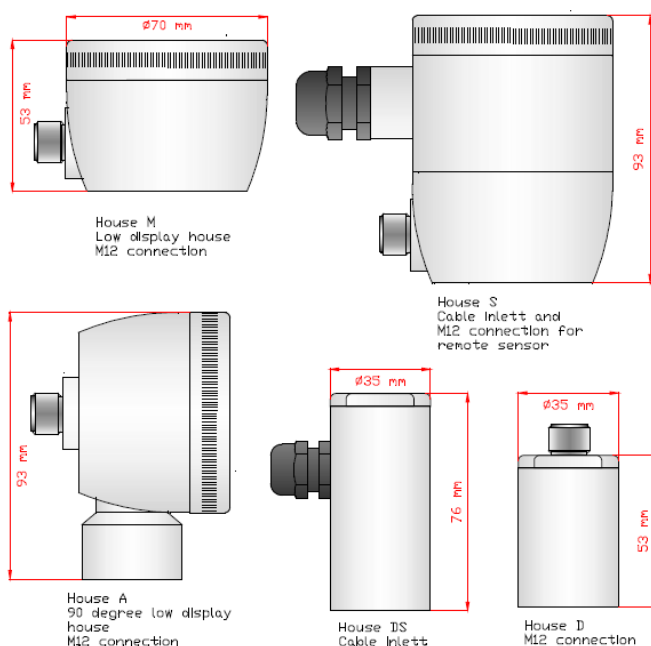
Comments (different exceptions for combinations may apply, contact Customer service for information)	Varient flange	Hygienic differential with capillary tube *2	Electric differential pressure *3	G 1/4" external	Hygienic with front diaphragm	G 1/2" External flush	Tranmitter with capillary tube *3	Differential Flange 80/3" capillary tube +/-	Differential Flange 80/3" capillary tube -	Differential Flange 80/3" capillary tube +	Differential Flange 80/3"	Differential Flange 50/2"	Differential NPT1/4" int.	PASVE
	V	T	S	R	P	O	N	M	L	K	I	H	G	F
				X	X	X	X	X	X	X	X	X		X
				X	X	X	X	X	X	X	X	X		X
Standard diaphragm material.	X	X	X	X	X	X	X	X	X	X	X	X	X	X
				X	X		X	X	X	X	X	X		X
Used if hydrogen ions can exist in media.														
Not available as absolute pressure	X	X	X	X	X		X							X
	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Only for clamp (9, A) connection.														
Only for hygienic (8) connection.														
				X		X	X						X	
	X			X	X	X	X						X	
	X		X	X	X	X	X						X	
		X	X			X		X	X	X	X	X	X	



Code table (code –ABCD):

Ordering example: Hygienic transmitter, SMS nut, range 200 kPa, gauge pressure, Hastelloy C276 diaphragm, M12-8pin electric connection, lightening protected, low display house and display D10RS will have the code **PT600RSH-MLAD-4840**

PT600RSH-ABCD-1234 (for code –1234 see table on previous page)	Suffix A Electric connection	Suffix B Protection	Suffix C House type	Suffix D Display type	Comment
Electric Connection					
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
Protection					
No protection		x			
Intrinsic safe		E			Can not be combined with L
Lightning protected		L			
House type					
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		
Display type					
No display				x	
D10RS				D	Not with house D, DS
D10RSH (must be used with remote sensor)				DH	Not with house D, DS



House types:

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

If a remote sensor application is needed house S must be used for one of the process connections. 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.

Example 1:

Differential pressure transmitter with hygienic SMS connection (code 8) on transmitter side and hygienic SMS connection (code 8) on remote side, display D10RSH (for remote sensor). This transmitter will have the code **PT600RSH-SxSDH-4840-4840** . Pressure range for this code (4) is 2 bar.



Example 2:

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.



Example 3:

Pressure transmitter with process connection G 1/2" external, no protection, cable connection, small house will have the code **PT600RSH-SxDS-4120**. Pressure range for this code (2) is 0,35 bar.



Example 4:

Pressure transmitter with process connection flange 50 mm (4), intrinsic safe, M12-4 pin electric connection, small house will have the code **PT600RSH-REDx-4420**. Pressure range for this code (2) is 0,35 bar. Note: The flange showed is an accessorie.



Accessories and services:

Different accessories as, flange rings, ball valve, 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.

Technical data PT600

Type:	Electronic process transmitter with digital electronics	Series resistance dependence:	Better than +/- 0,1 %
Function:	Directly process connected without pressure intermedia. Piezoresistive sensor with capillary tube.	Supply voltage dependence:	Better than +/-0,1 %
Operation range:	From 0% to 100% of range.	Temperature dependence:	Better than +/-0,1 % of max range (For -10 C to +70 C)
Span:	Adjustable between upper sensor limit and 1/100 of this.	Long time stability:	Better than 0,08% per year.
Zero:	Adjustable between -100% and 100% of upper sensor limit.	Vibration dependence:	
Overload:	For different process connections there are mechanical limits.	Perpendicular to the diaphragm:	Max 0,3 kPa/G
7 kPa	Max 100 kPa	Parallel to the diaphragm:	Max +0,2 kPa/G
35 kPa	Max 100 kPa	Vibration test:	Test according to IEC770
200 kPa	Max 600 kPa	Repeatability:	Better than +/- 0,1 % of max range.
4/8/15 MPa	Max 30 MPa	Accuracy: (including non-linearity, hysteresis, repeatability).	Better than +/-0,1 % of max range. Option 0,075%. *1
Material : Diaphragm:	Hastelloy C276 or 316L (certain coatings on request)	Mounting:	Direct on process connection.
Other media touched parts:	Stainless steel SS2353	Electrical connection:	Screw terminal/ M12 8-pin/M12 4-pin connector.
Housing:	Stainless steel SS2333	Encapsulation:	IP67 (all house types)
Ambient temperature:	-20 to +80 degrees C	Intrinsic safety (option):	Exia IIC T4 Ga according to ATEX (pending)
Damping:	0,1 to 10 sec. Adjustable via communication.	Electrical safety:	According to EN60204-1
Media temperature:	150 C (short time 200 C). Special types 275 C.	EMC:	According to EN61326-1-2-3
Output:	4-20 mA. Signal proportional to the pressure. Hart and MODBUS com-	PED:	According to 97/23/EC
Supply:	11-55 V DC	Filling oil:	AK100, food approved silicon oil (FDA approval).
Series resistance:	R kohm=(Supply-11/20)	Weigh:	300-1000 g depending on process connection.

Data for some connection types may differ. Contact customer service for information.