Hygienic differential pressure transmitter PTE200

Additional datasheet for process connection T.

Type T is a hygienic differential pressure transmitter.
This type of transmitter is mainly intended to be used for level measurement on pressurised tanks (with low or medium static pressure) and similar applications.
Type T can be manufactured with different types of process connections for example hygienic nut SMS Rd60-6 or clamp 38/51 (see the selection guide for possible choices).
This type has been developed as a complement to existing products in the PTE200 series. For example this type can replace two transmitters and a subtraction modul with much better result.
Type T can also replace a traditional differential pressure transmitter in applications with low or medium static pressures.

PTE200 type T has all other advantages that the PTE200 series has, for example:

- Stainless steel IP67-housing protects from dust and moisture.
- The transmitter is directly connected to the process media without any need for pressure intermedia, this eliminates temperature drift and gives a rugged design.
- Withstands media temperatures up to 150 °C continuously (200 °C short term).
- Configuration can be performed direct on the transmitter with buttons, standard Hart handterminal, or the PC program PI100.

EUROTHERM AB
Lundavägen 143,
SE-212 24 MALMÖ.
Tfn +46 (0)40 38 45 00
Fax +46 (0)40 38 45 45.

Box 664,
SE-645 59 STRÄNGNÄS.
Nordfeldts väg 9,
Tfn +46 (0)152 241 30
Fax +46 (0)152 241 38.

EUROTHERM FINLAND
Kristiinankatu 9,
FIN-20100 TURKU.
Tfn +358 22 50 60 30
Fax +358 22 50 32 01.

www.eurotherm.se
www.eurotherm.nu

Description
PTE200 type T is designed to measure differential pressure, that is the difference between the pressure on the two separate diaphragms, plus and minus. The plus diaphragm is mounted directly on the transmitter and the minus is connected to the transmitter with a capillary tube. Both sides are connected to the media with the selected process connection for example hygienic nuts, SMS Rd60-6.
PTE200 type T is designed to meet the highest hygienic demands. The transmitter is constructed completely in stainless steel and plastics. (see technical data). The housing is designed without dirt collecting gaps, easy to clean. even with high pressure water cleaners without any risk for water ingress.

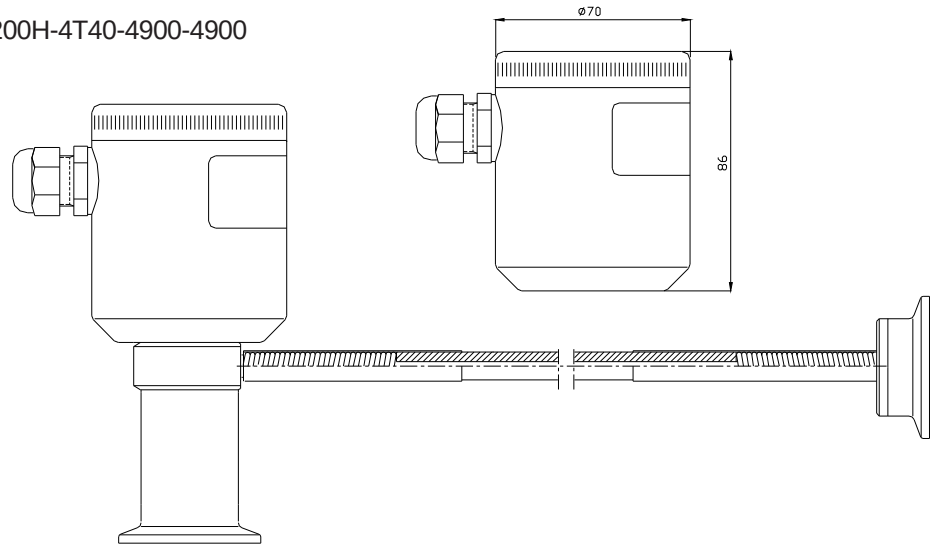
Function
PTE200 type T works in a similar way as an ordinary differential pressure transmitter.
Type T uses a piezo-resistive pressure sensor which is connected to the pressure of the media via capillary tubes and the plus and minus diaphragms. Media pressure applied to the diaphragms is transferred via silicon oil to the pressure sensor. The oil completely fills the cavities in the sensor, the capillary tubes and the cavities above the diaphragms. This means that the diaphragm movement is very small at pressure changes.
The transmitter has as standard a 2,5 m capillary tube to the minus connection (other lenghts upon request, max lenght 6 m).
The sensor measures the difference between the plus and minus pressure.
The output signal is 4-20 mA and HART-communication. (Also available with Profibus PA communication.)

To consider
Thermal influence from capillary tube:
The transmitter is temperature compensated with the transmitter and the capillary tube including connection at the same temperature. When the transmitter is installed the capillary tube and the minus connection can be exposed to a different temperature than the transmitter. This can for example happen if there are fast changes in the ambient temperature. The transmitter and the capillary tube has a very big difference in temperature constant. This means that the temperature influence from the capillary tube can effect the measurement under these circumstances. The influence for a change in ambient temperature will for example be approximately 0,2 kPa for a change of 10 degrees C if the capillary tube is 2,5 m long. For longer capillary tubes this influence will be greater.
To solve this problem the best is if the complete transmitter (including capillary tube and minus connection) has the same temperature. Therefore it is advisable to insulate the complete unit as well as possible.
It is also advisable to fixate the capillary tube to avoid vibrations that can influence the measurement.

Static pressure dependence:
The static pressure is the pressure both plus and minus are exposed to simultaneously (NOTE the transmitter must only be exposed to double sided static pressure.
Single sided static pressure above overload pressure (for respective pressure range) will damage the sensor.)
Because the minus pressure connection is connected to the transmitter with a capillary tube the time constant for pressure changes on that side will be longer than for pressure changes on the plus side. This will influence the measuement during the static pressure change. For a capillary tube of 2,5 m this influence will be approximately 0,4 kPa per 100 kP change of the static pressure.
This influence will disappear when the static pressure is stable again after a change.
NOTE This also implies that a fast change in static pressure can damage the sensor (if the change is higher than the overload pressure, for respective pressure range). This is because the static pressure will drop or rise faster on the plus side than on the minus side.

Mounting dependence:
At delivery the transmitter is calibrated and set to zero with both connections at the same level. When mounted on, for example a tank with the transmitter under the tank and the minus connection (on the capillary tube) on top of the tank, the output signal will indicate a negative differential pressure (size depends on the distance

Example: PTE200H-4T40-4900-4900

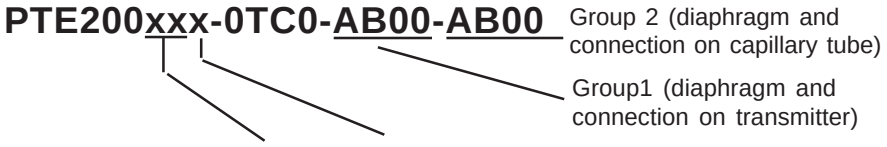


between the two connections) This means that the transmitter has a mounting dependance that is due to the placement of the plus and minus connections.
After mounting the transmitter must be set to zero in the ordinary way with the push buttons on the transmitter or via the communication. (See PTE200 manual.)

Approvals
PTE200 with connections 7, 8, 9, A, D, E, P and V are approved for 3A.
PTE200HE is approved for intrinsic safety , EEx ia IIC T4, by NEMKO (according to the EU directive ATEX) .
PTE200 are CE approved according to the EU directives for pressure equipment, PED, and for EMC.

Transmitter types, order codes:

Transmitter order codes for different configurations can be found from the table below. All combinations are not possible, see below for exceptions.



	Description	Suffix	Design	A	B	C	
Elektronik	HART 4-20 mA	H					
	Profibus PA	PA					
	Foundation Fieldbus (2)	FF					
Design	Standard		None				
	Intrinsic safe		E				
	Lightning protected		L				
Diaphragm	Stainless steel 1.44621			3			
	Hastelloy C-276			4			
	Tantalum			5			
Connection	Flange 80 mm/3"				4		
	Flange 50 mm/2"				5		
	DIN11851/40 mm				7		
	SMS Rd60-6				8		
	Clamp 38				9		
	Clamp 51				A		
	RJT 1 1/2"				C		
	DRD flange				D		
	DIN11851/50 mm				E		
	Clamp 51 with front diaphragm				P		
	Varivent				V		
Span min.-max.	1,2-35 kPa					2	
	6,7-200 kPa					4	
	0,067-2 MPa					6	
	0,14-4 MPa					7	
Filling oil	Silicon oil (1)						None

(1) Food approved (FDA approval) silicon oil.
(2) Pending.

Longer/shorter capillary tube must be ordered separately, article number 105555.
The transmitter can be equipped with a display. Ordered separately, article number P130501.

Exceptions:
Model T can not be delivered with A electronics.
Process conections 7, 8, 9, A, C, E, P and V can not be delivered with Stainless steel (3) or Tantalum (5) diaphragm.
Max pressure for process connection 4 and 5 is 4 MPa.
Max pressure for process connection 7, 8, 9, A, C, E, P and V is 2 MPa.
Model T can not be delivered in oil free design.

Ordering example:

Hygienic differential presure transmitter with process connection clamp 38 on the transmitter and connection P on the capillary tube. Measuring range -50 kPa to +50 kPa and Hart electronics (without Ex approval) will have ordering code PTE200H-4T40-4900-4P00 and calibrated measuring range -50 till +50 kPa.

Technical data. (For additional data see datasheet for PTE200.)

Type:	Electronic pressure transmitter with microcomputer based electronics.	**External series resistance:**	R kohm = (Supply voltage -11)/20. For HART communi-cation min. 250 ohm.
Function:	Directly connected transmitter with no pressure intermedium. Piezo-resistive sensor with capillary tube.	**Series resistance dependant:**	Less than +/- 0,1%
Operating range:	Adjustable from -100% to 100% of the max, pressure range value.	**Supply voltage dependant:**	Less than 0,1 %
Measuring span:	Adjustable from the max. pressure range to 1/30 of this.	**Temperature tolerance:**	Less than +/- 0,2% of max. span.
Zero point:	Adjustable from -100% to 100% of the max, pressure range value.	**Working pressure dependence:**	Max 0,1% at max measuring range (see text on page 2)
Working pressure:	Max 8 MPa, (static pressure, NOTE only single sided)	**Long time stability:**	Less than 0,08 % per year.
Overload:		**Vibration tolerance:**	
14/35 kPa:	Max 250 kPa	Perpendicular to diaphragm:	Max +0,3 kPa/G
100/200 kPa:	Max 500 kPa	Parallel to diaphragm:	Max +0,02 kPa/G
1/2 MPa:	Max 3 MPa	**Vibration test:**	Meets tests according to. IEC770 and DNV class B
10/15 MPa:	Max 30 MPa	**Repeatability:**	Less than +/- 0,1 % of measuring range.
Material: Diaphragm:	Stainless steel/Hastelloy /Tantalum (special coatings upon request).	**Accuracy:**	Less than +/- 0,1 % of max. span (includes linearity, hysteresis and repeatability).
Related parts:	Stainless steel 1.4435	**Installation:**	Direct on process connection.
Housing:	Stainless steel 1.4306	**Electrical connection:**	Internal terminal block.
Ambient temperature:	-20º to +80º C	Max wire area:	2,5 mm^2
Time constant:	Interchangeable between 0,1-10 s. (As delivered 0,1 s.)	Cable entry:	Pg11 for round cable 5-12 mm.
Media temperature:	150º C	**Protection class:**	IP67
Output signal:	4-20 mA, two wire connection, the signal proportional to pressure. Max. current at overload 22,5 mA. HART , Profibus PA or FF communication.	**Electrical safety:**	Meets EN60204-1
Supply voltage:	11-55 V DC	**Electrical interference:**	Meets EN61326-1-2-3
Filling	AK100 silicon oil FDA approved for use with food.	**Pressure safety:**	According to EU directive PED (97/23/EG)
Weight:	Between 1300-1800 g dependent on type	**Intrinsic safety (ATEX):**	EExia IIC T4 (Nemko)

For additional information, connection instructions, comissioning instructions, drawings, accesories etc see PTE200 manual (contact Eurotherm).

invensys
EUROTHERM