

**ABSOLUTE AND RELATIVE PRESSURE TRANSMITTER  
WITH FLUSH DIAPHRAGM  
Process purpose version  
TPa-161, TPr-161**



- Piezoresistive silicon pressure sensor developed and fabricated in MTM
- Ranges 0-50mbar to 0-200 bar.
- User-defined changes and adjustments of measurement range
- Standard outputs 4-20mA or 0-20mA
- Rugged process-purpose design
- Twin unit housing, dividing electric connections from amplifier
- Application in very dirty, corrosive and unstable fluids
- High accuracy, repeatability, long term stability and reliability
- Ex protection

**APPLICATION**

Measurement of absolute and relative pressure in plants with very dirty or viscous measuring fluids, as well as with fluids which must be heated during transport or storage (mazout, plastics, etc). Measurement chamber is fabricated as a compact, fully welded unit with screw connection for direct mounting in process equipment, without a separating valve.

Transmitter design allows cleaning and flushing of reservoirs or tubing of the process plant without removing the measurement unit.

Rugged process-purpose design, IP65 mechanical protection and Ex protection, standardized process flanges, quality of material in contact with process fluid and excellent technical and measurement characteristics provide reliable application in control and measurement circuits, with full compatibility with standard automatic regulation and control systems.

### STRUCTURE

Diaphragm type central section which is at the same time the measuring chamber, consists of diaphragm, section housing and sensor chip. The diaphragm is fabricated in special stainless steel and its purpose is to separate process fluid from oil fill and the sensor. All the parts of the central section are fully welded to each other and the interior is filled with high quality silicon oil. A circuit for passive temperature compensation of zero and span is also housed in the central section. Process flange with screw connection, on whose flushed part the diaphragm is mounted, is built into central section. It is produced with flush membranes  $\varnothing 15$ ,  $\varnothing 19$  or  $\varnothing 25$ .

Electronic amplifier, fabricated in the surface mount technology, supplies sensors and converts its output signal into the standard electric signal. Two or three wire electrical connection at the transmitter output is intended simultaneously for supply and measurement. Zero and range potentiometers fitted in electronic amplifier provide output signal correction within the factory preset range.

### OPERATION

Pressure affects separating diaphragms and oil fill, creating internal pressure in central section which deflects the sensor diaphragm. The deflection causes an unbalance of the Wheatstone bridge (four piezoresistors integrated into the diaphragm edge). The bridge unbalance is detected electronically, the obtained signal is further processed in the electronic amplifier and finally sent to the transmitter output. The output signal is linearly dependent on measured pressure.

### CHARACTERISTICS

- Available ranges (0.. 100... 500)mbar and (0... 400... 1000) mbar, and (0... 0,8... 2), (0.. 1... 5), (0... 4... 10), (0... 8... 20), (0... 15... 50), (0... 40... 100), (0... 80... 200) bar.
- Two-wire (4-20)mA or three-wire (0-20mA) connection
- Electric output via screw terminals, through cable conduit PG-13,5.
- Zero suppression: 100% of range
- Elevation: standardly 20% of range
- The measurement range is manufacturer-preset, and the user may perform additional corrections during transmitter operation in the range  $\pm 5\%$ .
- Materials: electronic unit housing Al.Cu5.Mg1.55, diaphragm 316 Stainless Steel, central section housing and process flange stainless steel. Other materials upon request.
- Flush diaphragm diameter  $\varnothing 15$ ,  $\varnothing 19$  or  $\varnothing 25$ .
- Process connection 1/4"R-M for  $\varnothing 15$ , 1/2"R-M for  $\varnothing 19$  or 3/4"R-M for  $\varnothing 25$ .
- Mechanical protection IP65
- Exia IIC T4/T5

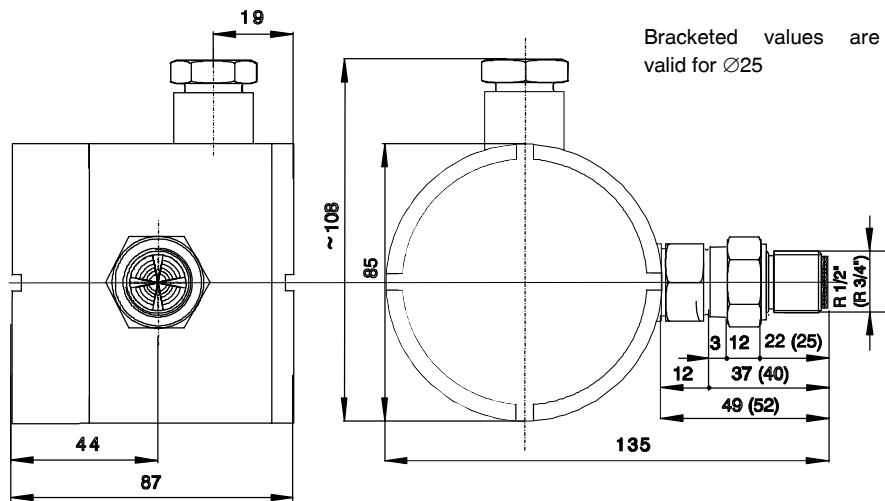


TABLE 1: GENERAL AND OPERATING CONDITIONS

Parameter	Units	Reference conditions	Normal conditions	Limit conditions	Transport conditions
Ambient temperature	°C	20±1	-30 to +80	-40 to +80	-50 to +100
Chamber temperature	°C	20±1	-30 to +80	-40 to +80	-50 to +100
Relative humidity	%	10 to 50	0 to 100	0 to 100	0 to 100
Vibration frequency	Hz			≤500	≤500
Vibration acceleration	9.81 m/s <sup>2</sup>			≤2 <sup>1)</sup>	≤2 <sup>1)</sup>
Vibration amplitude	mm			≤0.21 <sup>2)</sup>	≤0.21 <sup>2)</sup>
Shock	9.81 m/s <sup>2</sup>			≤100	≤100
Supply voltage	V	24±1	24±1	12 to 36	
Line resistance	Ω	600	600	0 to 1100	

1) Frequency range 60 to 500Hz; 2) Frequency range 10 to 60Hz

## MEASUREMENT CHARACTERISTICS

- In accordance with IEC 770/84
- Accuracy (linearity, hysteresis, repeatability), table 2; independent on measuring range.
- Additional effects for minimum (4mA) and maximum (20mA) signal:
  - Power supply effect  $\pm 0.01\%$  FS/1V,
  - Line resistance effect,  $\pm 0.01\%$ FS/100 $\Omega$ .
  - Long term stability  $\pm 0.2\%$ FS/1 year.

These effects are independent on measurement range.

- Effects of overload and ambient temperature are dependent on measurement range. They are measured for each transmitter separately and the data are enclosed in the data sheets. For the given measurement range these effects are calculated by multiplying the obtained value with the transmission ratio.

TABLE 2: MEASURING ACCURACY ( $\pm\%$  FS)

Class	0.20	0.40	0.60	1.00
Linearity	0.10	0.30	0.40	0.60
Hysteresis	0.05	0.05	0.10	0.20
Repeatability	0.05	0.05	0.10	0.20