

# Gauge pressure transmitter

## Model: SMT2002

Spec. sheet no. SD02-02

### Service intended

The high performance pressure transmitter SMT2002 is suitable to measure liquid, gas, or steam flow as well as liquid level, density and pressure.

The key features include quick response, remote set-up using communications, self-diagnostics and optional status output for pressure high/low alarm.



### Degree of protection

EN60529/IEC529/IP66

EN60529/IEC529/IP67

### Standard features

#### Accuracy

±0.05 % of calibrated span

±0.075 % of calibrated span

#### Range limits

6 kPa to 40 MPa

#### Turn down

Adjustable up to 100:1 range ability

#### Temperature compensation

High sensitivity temperature sensor packaged in the sensor

#### Measured value number

Max.7-digit character string comprising letters and numbers.

#### Isolating diaphragm

Stainless steel 316L

Hastelloy C

Stainless steel 316L with Gold Plated

#### Measurement medium

Gas, steam and liquid

#### Stability

10 years stability

0.15 % of URL

#### Output

4 ~ 20 mA with HART protocol

## Principle of operation

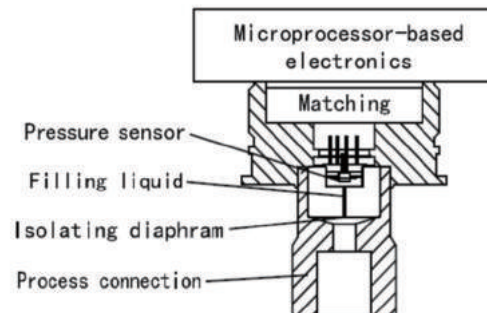
Main unit includes sensor and Process connection,  
Works as follows.

The process medium through a flexible, corrosion resistance of the isolation diaphragm and the fill fluid pressure is applied on the measuring silicon pressure chip.

A termination of the chip connected at the atmosphere (for a gauge pressure measurement) or vacuum (for absolute pressure measurement).

When the measured pressure through the measuring diaphragm and the filling liquid is transmitted to the sensor silicon chip, so that the silicon chip of the sensor resistance changes, resulting in change in output voltage of the detection system. this output voltage is proportional to the pressure change. The output is transfer into a standardized signal output by adapter unit and amplifier.

The temperature sensor as a temperature compensated reference value to compensate for the temperature drift.



## Main specification

- The gauge pressure transmitter utilize the world's leading high stability silicon sensor, the highest Reference Accuracy is  $\pm 0.05\%$
- The transmitter allowable over pressure is up to 50 MPa with GP sensor H.
- High sensitivity temperature sensor packaged in the sensor. The minimum of the temperature error is  $\leq \pm 0.05\% / 10\text{ K}$
- Stainless steel 316L and silicone oil filling welded seal structure.
- Long stability is  $\leq \pm 0.1\%$  / 3 years, 10 years of maintenance-free
- Adjustable up to 100:1 range ability
- The remote seal transmitter utilize ultra-high temperature ( $400\text{ }^\circ\text{C}$ ) patented technology.

## Standard Specifications

### Performance Specifications

Reference Accuracy of Calibrated Span (includes terminal-based linearity, hysteresis, and repeatability)  
 $\pm 0.075\%$ . If TD > 10,  $\pm(0.0075 \times \text{TD})\%$  TD = Nominal Pressure Range / Adjusted

The square root accuracy is 1.5 times of reference accuracy of calibrated span.

### Ambient Temperature Effects

-20 ~ 65 °C :  $\pm(0.2 \times \text{TD} + 0.05)\% \times \text{Span}$

Every 10 °C is  $\pm 0.08\% \times \text{Span}$  (TD=1)

-40 ~ -20 °C and 65 ~ 85 °C :  $\pm(0.3 \times \text{TD} + 0.1)\% \times \text{Span}$

### Overpressure Effects

$\pm 0.075\% \times \text{Span}$

### Stability

$\pm 0.1\% \times \text{Span} / 3 \text{ years}$

### Power Supply Effects

$\pm 0.001\% / 10 \text{ V}$  (12 ~ 42 V DC)

### Explosion protection

Ex db IIC T4 / T5 / T6 Gb

Ex tb IIIC T80 °C / T90 °C / T130 °C Db

Ta = -40°C to +60 °C

Ex d IIC T6

### Temperature class Max. process temperature

T4 T130 °C 130 °C

T5 T90 °C 90 °C

T6 T80 °C 80 °C

## Functional Specifications

### Span and Range Limits

Sensor	B	C	D	E	F	G	K	H
Pressure range (bar)	60 mbar	400 mbar	2.5 bar	30 bar	100 bar	210 bar	10 bar	400 bar
Setting limits (offset and span in this range freely adjustable)	-60 ... 60 mbar	-400 ... 400 mbar	-1 ... 2.5 bar	-1 ... 30 bar	-1 ... 100 bar	-1 ... 210 bar	-1 ... 10 bar	-1 ... 400 bar
Lowest permissible span	6 mbar	20 mbar	25 mbar	0.3 bar	1 bar	2.1 bar	0.1 bar	4 bar
Overpressure limit	2 bar	10 bar	40 bar	150 bar	200 bar	500 bar	60 bar	500 bar
Range ability turndown (with respect to the differential pressure range)	10:1	20:1	100:1	100:1	100:1	100:1	100:1	100:1

### Turn-down Accuracy

If the Accuracy is (%): 0.075

If Turn-down  $\leq 10:1$ ,  $\pm 0.075\%$  FSO

If Turn-down > 10:1,  $\pm[0.0075 \times \text{Turn-down}] \%$  FSO

With Turn-down = Nominal Pressure Range / Adjusted Range (FSO = Full Scale Output)

(Only available with sensor C~H.)

If the Accuracy is (%): 0.075

If Turn-down  $\leq 5:1$ ,  $\pm 0.075\%$  FSO

If Turn-down > 5:1,  $\pm[0.0075 \times \text{Turn-down} \times 2] \%$  FSO

Turn-down = Nominal Pressure Range / Adjusted Range (FSO = Full Scale Output)

(Only available with sensor B.)

### Zero Adjustment Limits

Zero can be fully elevated or suppressed, within the lower and upper range limits of the capsule.

## Standard Specifications

### External Zero Adjustment

External zero is continuously adjustable with 0.01 % incremental resolution of span. Re-range can be done locally using the range setting switch.

### Mounting Position Effects

Rotation in diaphragm plane has no effect. Tilting up to 90° will cause zero shift up to 0.25 kPa which can be corrected by the zero adjustment.

### Output

2 wire 4~20 mA DC output with digital communications, linear or square root programmable.  
HART FSK protocol are superimposed on the 4~20 mA DC signal. Output range: 3.9 mA to 20.5 mA.

### Failure Alarm (the mode can be selected)

Low Alarm Mode (min) : 3.7 mA  
High Alarm Mode (max) : 21 mA  
Alarm Off (Keep) : Keep the effective value before the fault.

\* Error signal (NAMUR NE43) : High/Low (Adjustable)  
\* Note : The standard setting of failure alarm is High Mode.

### Response Time

The amplifier damping constant is 0.1 sec.  
The sensor damping constant is 0.1~1.6 sec, it depends on the range and range compression ratio.  
Amplifier damping time constant is adjustable from 0.1 to 60 sec by software and added to response time.

### Warm Up Time

< 15s

### Permissible Temperatures

Environment / storage without display : -40 to 85 °C  
with display : -20 to 65 °C  
Media wetted parts / Filled oil : -40 to 100 °C  
(Info: +125°C short time, max. 30 min.)

## Standard Specifications

### HART digital communication and 4 to 20 mA output Power Supply

The transmitter operates from 12 to 42 V DC with no load and is protected against reverse polarity connection  
Minimum operating voltage increase to 12 V DC with surge protector

### Ripple

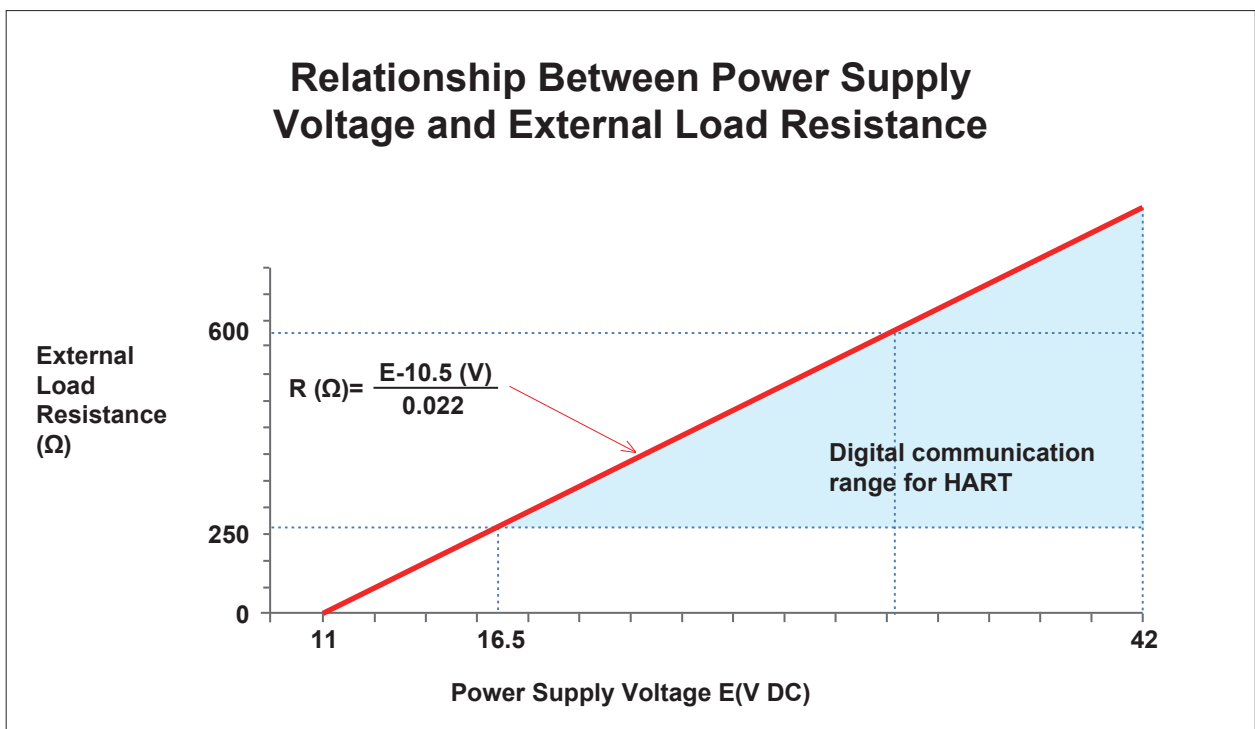
20 mV max on a 250 Ω load as per HART specifications.

### Load limitations

4 to 20 mA and HART total loop resistance :

$$R (\Omega) = \frac{\text{Supply voltage} - \text{min. operating voltage (V DC)}}{22 \text{ mA}}$$

A minimum of 250 Ω is required for HART communication.



### Supply and Load Requirements

24 VDC supply,  $R \leq (U_s - 12 \text{ V}) / I_{\text{max}}$  kΩ,  $I_{\text{max}} = 23 \text{ mA}$ .

Maximum voltage limited: 42 VDC

Minimum Voltage limited: 11 VDC without LCD display

Minimum Voltage limited: 12 VDC with LCD display

250 Ω to 600 Ω for digital communication

### Electrical protection

Short –circuit protection is permanent.

Reverse polarity protection is not damage, but also is no function.

### Electrical Connection

The electrical connection is made via cable entry ½NPT(F)

The screw terminals are suitable for wire cross-sections up to 2.5 mm<sup>2</sup>

## Standard Specifications

### Process Connection

Default Process Connection : ½ NPT female thread

### Electromagnetic field

Meets all the requirements of EN 61326 and NAMUR NE-21. It can be changed to ½ NPT, G½, M20x1.5 male thread and KF16 vacuum Connection with Union.

### Load

Within load/voltage specified limits the total effect is negligible

## Install

The transmitter housing can be rotated about 360 degrees relative to the transmitter module without affecting the performance and internal wiring.

Transmitter can be operated Through the PC machine or notebook computer via modem.

Modem can be connected in parallel to the signal circuit at arbitrary point.

The modem communicates with the transmitter through an AC signal superimposed on the 4~20 mA output signals.

This modulation does not change in the mean values, so does not affect the measurement signal.

## Physical Specifications

### Isolating Diaphragm

Stainless steel 316L

Hastelloy C

Stainless steel 316L with Gold Plated

### Amplifier Housing

Aluminium with epoxy resin coat

Stainless steel 316

### Process Connection

½" NPT (Female)

½" NPT (Male) with Union

M20 x 1.5P (Male) with Union

G ½" (Male) with Union

½" PF (Male) with Union

¼" NPT (Male) with Union

Others

### Mounting Bracket

Stainless steel 304 / 1.4301

Carbon steel galvanized

### Conduit Connection

½NPT(F)

M20 x 1.5P (Option)

### Fill fluid

Silicone oil

Fluorinated oil

### Weight

1.6 kg

### Name plate and tag

Stainless steel 304

### Degrees of Protection

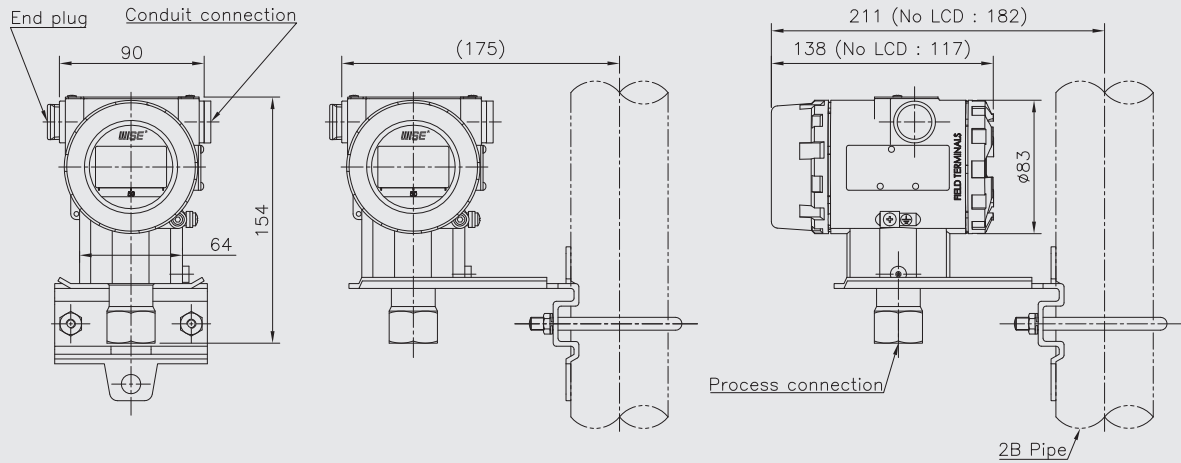
IP66/IP67

### CE conformity EMC directive

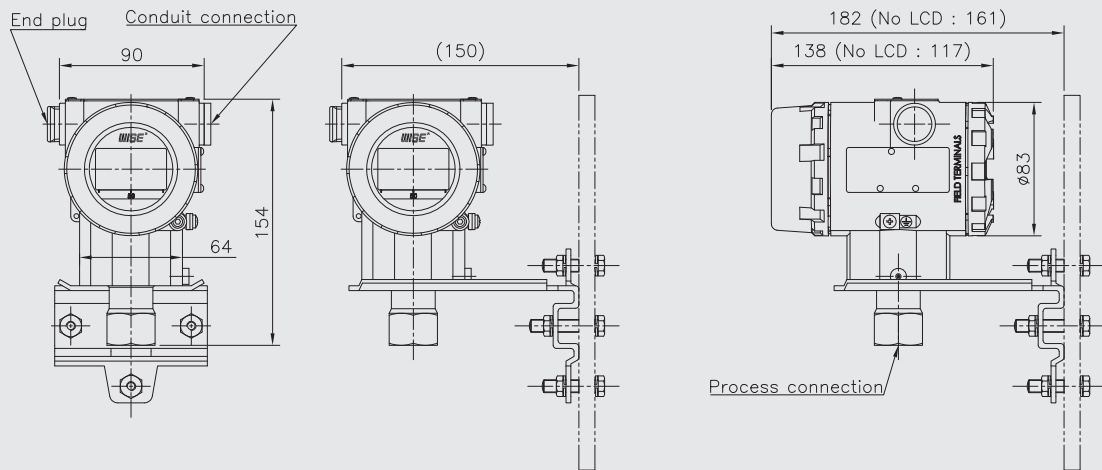
EN 61000-6-2:2005

EN 61000-6-4:2007/A1:2011

## SMT2002 : Type of Mounting



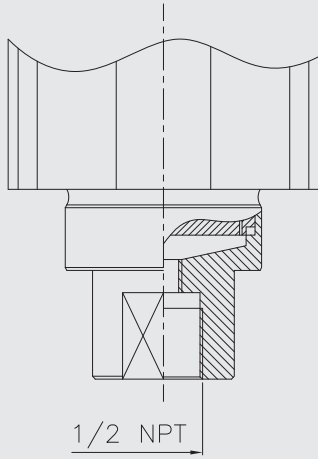
2" MOUNTING TYPE



WALL MOUNTING TYPE

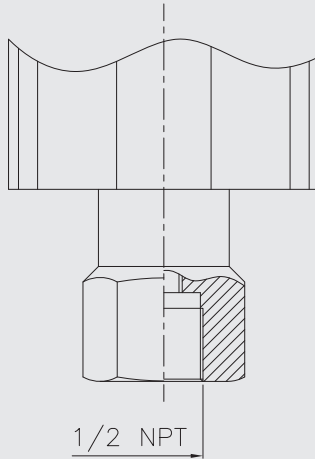
Process Connections Description Default Process Connection

B/C/D Span



SMT2002 A

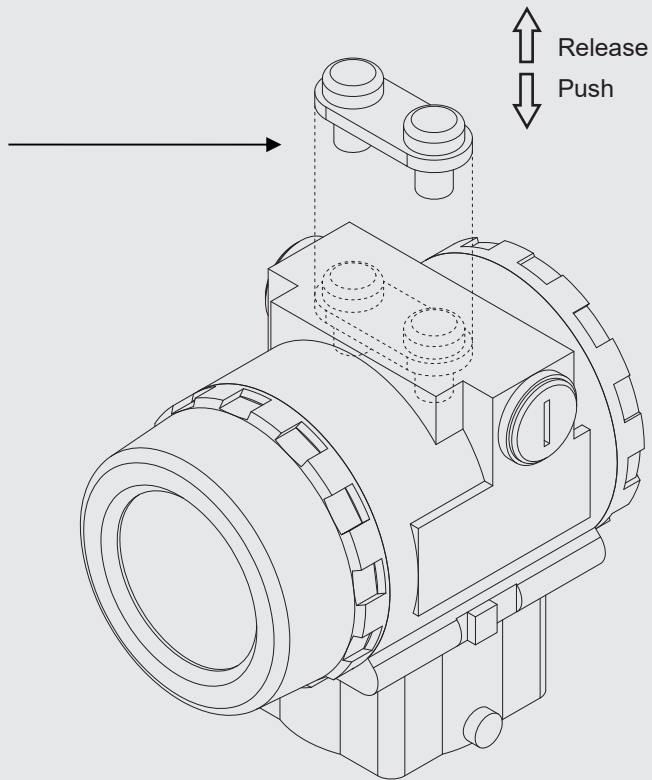
E/F/G/H Span



SMT2002 B

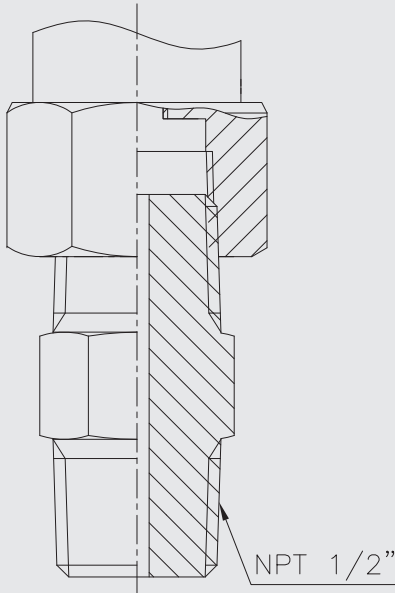
Local Set Button

Magnetic button  
Component (Two in one)

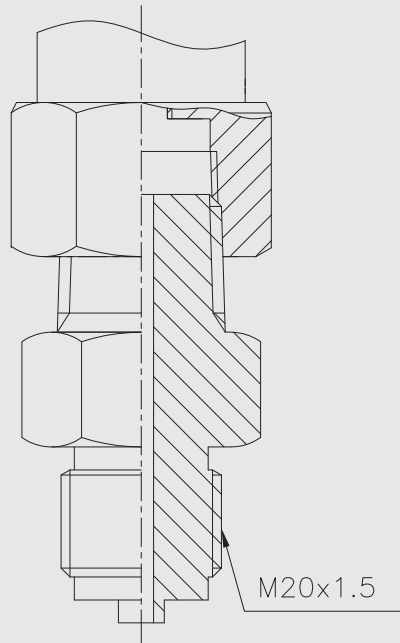




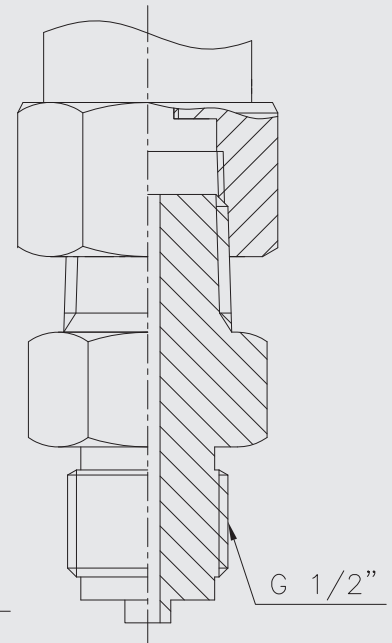
Other forms of  
Process connector  
1/2-NPT male thread



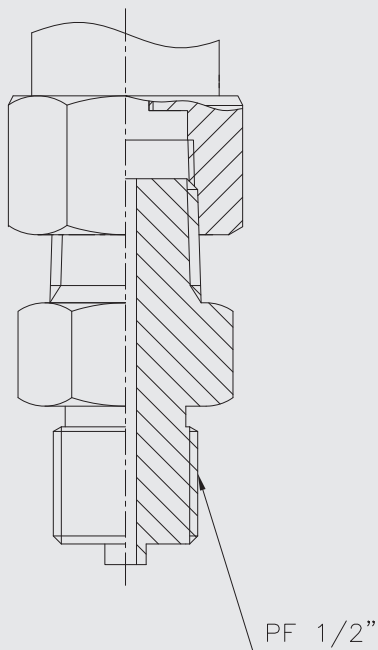
M20 x 1.5 male thread



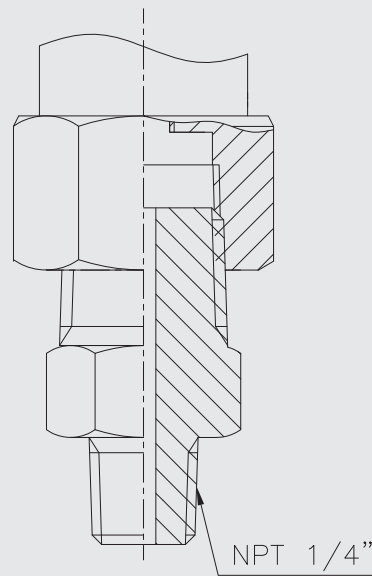
G1/2 male thread



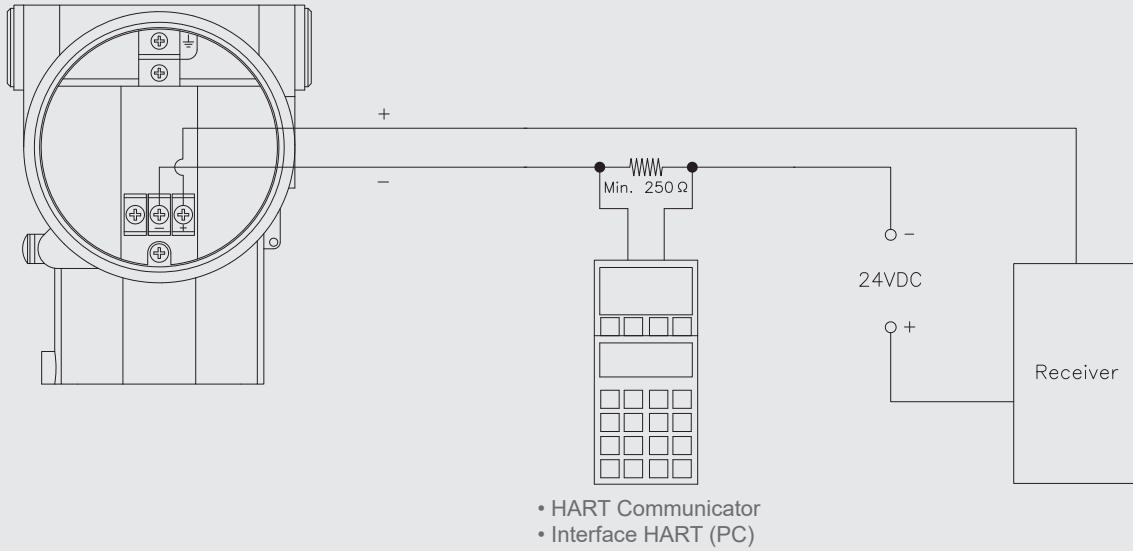
PF1/2 male thread



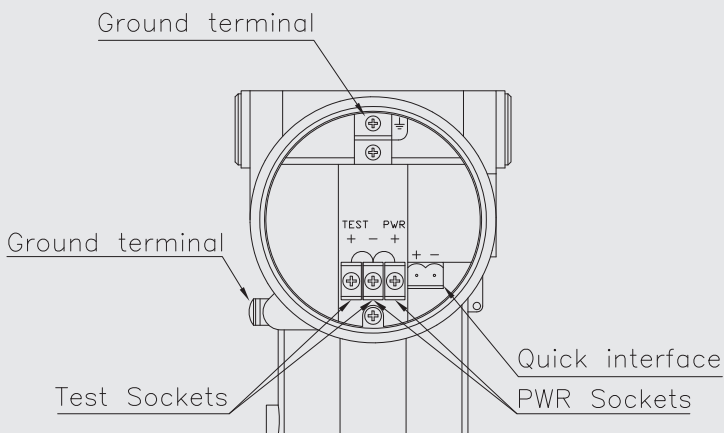
1/4-NPT male thread



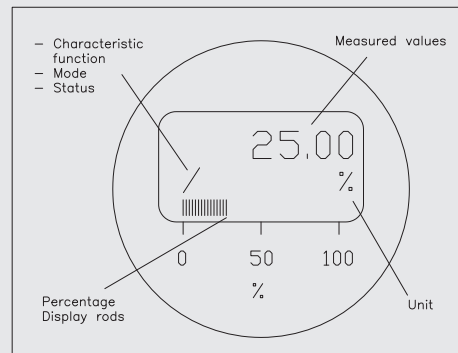
### Electrical Connection Diagram



### Terminal Configuration



### LCD Display



**1. Base model****SMT2002** Gauge Pressure Transmitter**2. Measuring Span**

<b>B</b>	6~60 mbar (Only available accuracy 0.075 %)
<b>C</b>	20~400 mbar
<b>D</b>	25~2500 mbar
<b>K</b>	0.1~10 bar
<b>E</b>	0.3~30 bar
<b>F</b>	1~100 bar
<b>G</b>	2.1~210 bar
<b>H</b>	4~400 bar

**3. Accuracy**

<b>5</b>	0.05 % (Only C~H Sensor)
<b>7</b>	0.075 % (Only B~H Sensor)

**4. Indication**

<b>N</b>	None
<b>D</b>	Display (LCD)

**5. Wetted parted materials (Seal diaphragm/Sensor body)**

<b>L</b>	316L SS / 316SS
<b>H</b>	Hastelloy C-276 / 316SS
<b>G</b>	316L SS with Gold Plated / 316SS

**6. Filled by fluid**

<b>S</b>	Silicone oil
<b>F</b>	Fluorinated oil

**7. Explosion protection**

<b>N</b>	None
<b>A</b>	Ex ia (ATEX)
<b>B</b>	Ex ia (IECEX)
<b>C</b>	Ex ia (KCS)
<b>D</b>	Ex d (ATEX)
<b>E</b>	Ex d (IECEX)
<b>F</b>	Ex d (KCS)

**8. Housing material**

<b>A</b>	Aluminium 1/2"NPT(F) (STD)
<b>B</b>	Aluminium M20*1.5P(F)
<b>S</b>	316SS 1/2"NPT(F) (STD)
<b>T</b>	316SS M20*1.5P(F)

**9. Mounting bracket material**

<b>0</b>	None
<b>5</b>	Carbon steel galvanized
<b>4</b>	304SS
<b>9</b>	Other

**10. Process connection**

<b>F</b>	1/2" NPT (Female)
<b>M</b>	1/2" NPT (Male) with Union
<b>G</b>	G 1/2" (Male) with Union
<b>S</b>	1/2" PF (Male) with Union
<b>Q</b>	1/4" NPT (Male) with Union
<b>Z</b>	Other

**11\*. Accessory**

<b>N</b>	None
<b>V</b>	Manifold valve
<b>O</b>	Other

\* Note : Refer to A080's Specification and order valve(A080) separately. It's separate option.

**12. End plug**

<b>1</b>	Plug_Ni Plated Brass (Only Ex proof)
<b>2</b>	Plug_316SS (Only Ex proof)
<b>3</b>	Plug_304SS (Without Explosion protection)

**Sample ordering code**

1	2	3	4	5	6	7	8	9	10	11	12
SMT2002	B	5	N	L	S	N	A	5	F	N	1

Large empty rectangular area for writing or drawing.