



04.14766293

Smart Pressure Transmitter

for Differential / Gauge / Absolute Pressure Measurement



Model PT3100



PT3100

Smart Pressure Transmitter

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Description of Product

The PT3100 Smart Pressure Transmitter is a micro processor-based high performance transmitter, which has flexible pressure calibration and output, automatic compensation of ambient temperature and process variable, configuration of various parameters, communication with HART protocol. The application is very various, as measuring pressure, flow and level by application method. All data of sensor is to be input, modified and stored in EEPROM.

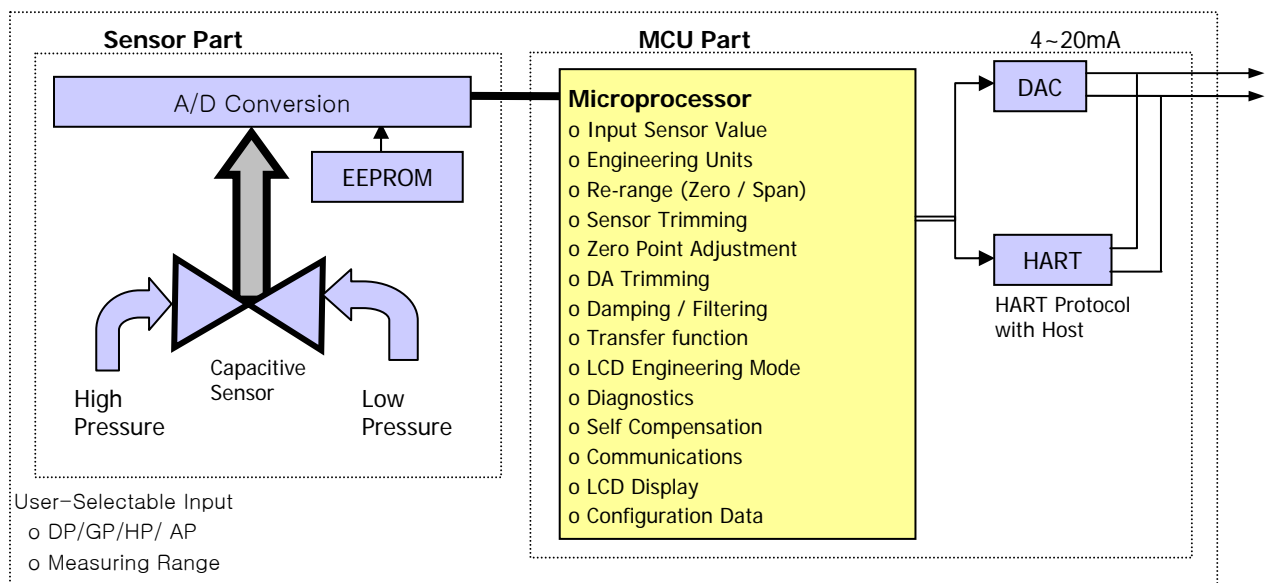
Features

- * Superior Performance
 - High Reference Accuracy : $\pm 0.075\%$ of Calibrated Span
 - Long-Term Stability
 - High Rangeability (100 : 1)
- * Flexibility
 - Data configuration with HART configurator
 - Zero point Adjustment
- * Reliability
 - Continuous Self-Diagnostic Function
 - Automatic Ambient Temperature Compensation
 - Fail-mode Process Function
 - EEPROM Write Protection
 - CE EMC Conformity Standards (EN50081-2,EN50082-2)

Function

- * Flexible Sensor input : DP, GP, AP, Vacuum
- * Various output : 4 ~20mA , Digital Signals
- * Setting Various Parameters : Zero/Span, Trim, Unit, Fail-mode, etc.
- * Self Diagnostic Function : Sensor, Memory A/D Converter, Power, etc
- * Digital Communication with HART protocol,
- * Explosion-proof Approval & Intrinsic Safety Approval: CSA

Functional Block Diagram





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PT3100**Smart Pressure Transmitter**

Transmitter Description

Electronics Module

The Electronics module consists of a circuit board sealed in an enclosure.

There are a MCU module, a power module, an analog module, a LCD module and a terminal module in a transmitter.

The MCU module acquires the digital value from the analog module and apply correction coefficients selected from EEPROM. The output section of the power module converts the digital signal to a 4~20 mA output.

The MCU module communicates with the HART-based Configurator or Control Systems such as DCS.

The Power module have a DC-to-DC Power conversion circuit and an Input/output isolation circuit.

An optional LCD module plugs into the MCU module and displays the digital output in user-configured unit.

Sensor Inputs

The model PT3100-D,G,H is available in a differential pressure sensor of a capacitance type. The capacitance pressure sensor measures differential and gauge pressure and is commonly used in flow and level applications. Both sides in the capacitance sensor transmit process pressure from the process isolators to the sensor.

The model PT3100-A is available in a absolute pressure sensor of a piezo-resistive type and measures absolute pressure.

The sensor module converts the capacitance or the resistance to the digital value. The MCU module calculates the process pressure based on the digital value.

The sensor modules include the following features

- o. 0.075% accuracy – the most accurate sensor in the industry.
- o. The software of the transmitter compensates for the thermal effects, improving performance.
- o. Precise Input Compensation during operation is achieved with temperature and pressure correction coefficients that are characterized over the range the transmitter and stored in the sensor module EEPROM memory
- o. EEPROM stores sensor information and correction coefficients separately from MCU module, allowing for easy repair, reconfiguration and replacement

Basic Setup

ATP3100 Pressure transmitter can be easily configured from any host that support the HART protocol.

- o Operational Parameters.
- o 4~20mA Points (Zero/Span)
- o Engineering Units
- o Damping Time : 0.25 ~ 60 sec
- o Tag : 8 alphanumeric characters
- o Descriptor : 16 characters
- o Message : 32 characters.
- o Date : day/month/year

Calibration and Trimming

- o Lower/Upper Range (zero/span)
- o Sensor Zero Trimming
- o Zero Point Adjustment
- o DAC Output Trimming
- o Transfer Function
- o Self-Compensation

Self-Diagnosis and Others

- o CPU & Analog Module Fault Detection
- o Communication Error
- o Fail-mode Handling
- o LCD Indication
- o Temperature Measurement of Sensor Module



PT3100 Smart Pressure Transmitter

Performance Specifications

Reference Accuracy of Calibrated Span

$\pm 0.075\%$ of Span
for $0.1\text{URL} \leq \text{Span} \leq \text{URL}$
 $\pm [0.025 + 0.005 \times (\text{URL}/\text{Span})]\%$ of Span
for $0.01\text{URL} \leq \text{Span} < 0.1\text{URL}$

for Square Root Transfer Function Output

Same as reference accuracy

for Output ≥ 0.5 Span

Reference accuracy $\times 0.5$ Span / Output
for Output < 0.5 Span

Ambient Temperature Effects

Total Effects per 28°C (50°F) Change :

$\pm [0.019\% \text{URL} + 0.125\% \text{Span}]$
for Span $\geq 0.1\text{URL}$

$\pm [0.025\% \text{URL} + 0.125\% \text{Span}]$
for Span $< 0.1 \text{URL}$

Static Pressure Effects

Zero Error (can be corrected at line pressure)

$\pm 0.1\%$ of URL per 7MPa

Span Error

$\pm 0.2\%$ of Reading per 7MPa (Span Error)

Mounting Position Effects

Zero shifts up to ± 0.35 kPa, which can be calibrated out. No effect on span

Stability

$\pm 0.125\%$ of URL per 12 months

Power Supply Effect

$\pm 0.005\%$ of Output Span per Volt

Update Time and Turn-On Time

Update Time : 0.25 seconds

Turn-On Time : 5 seconds

Failure Mode

Fail High : Current ≥ 21.75 mA

Fail Low : Current ≤ 3.75 mA

Functional Specifications

Range and Sensor Limits

(Refer to Table 1)

Zero and Span Adjustment Limits

- o. Zero and span values can be set anywhere within the range limits stated in Table 1.
- o. Span must be greater than or equal to the minimum span stated in Table 1

Output (Analog Current and Digital Data)

Two wire 4~20mA, user-configurable for linear or square root output. Digital process value superimposed on 4~20mA signal, available to any host that conforms to the HART protocol

Power Supply & Load Requirement

External power supply required.

Transmitters operate on 11.9 to 45 V dc.

With 250 ohm load, 17.4 Vdc power supply is required

With 24 Vdc Supply, up to a 550 ohm load can be used

Max. Loop Resistance = $(E - 11.9) / 0.022$
(E = Power Supply Voltage)

Supply Voltage

11.9 to 45 Vdc for operation

17.4 to 45 Vdc for HART Communications

11.9 to 42 Vdc for CSA Approval

Loop Load

0 to 1500 ohm for Operation

250 to 600 ohm for HART Communications

EMC Conformity Standards

EMI (Emission) - EN50081-2:1993

EMS (Immunity) - EN50082-2:1995

Ambient Humidity Limits

5% ~ 100%RH (Relative Humidity)

Ambient Temperature Limits

o. -40°C to 85°C (without condensing)

o. -30°C to 80°C (with LCD module)

Storage Temperature

o. -40°C to 85°C (without condensing)

Process Temperature Limits

(Range codes and approval codes may effect limits)

o. -40°C to 120°C (-40 to 248°F)



PT3100 Smart Pressure Transmitter

General Specifications

1). PT3100 Pressure Sensor Range & URL (Rangeability = 100:1)

< Table 1 >

Range Code	DP/GP/HP					AP	
	Calibrated Span (kPa)	Upper Range (URL) (kPa)	Lower Range (LRL) (kPa)			Calibrated Span (kPa)	Range (kPa)
			D.P	G.P	H.P		
3	0.15 ~ 7.5	7.5	-7.5	-7.5	NA	NA	NA
5	1.865 ~ 186.5	186.5	-186.5	-95	-186.5	10 ~ 1000	0 ~ 1000

Range Code	kPa	Kg/cm ²	bar	psi	inH ₂ O@4°C	mmH ₂ O@4°C	inHg@0°C
3	7.5	0.076	0.075	1.082	30	762	2.203
5	186.5	1.901	1.865	27.045	750	19050	55.065

2). Electrical Specifications

Power Supply	11.9 ~ 45 Vdc	Output Signal	4 ~ 20 mA dc / HART
HART loop resistance	250 ~ 600 ohm	Isolation	500 Vrms (707 Vdc)

3).Performance Specifications

Reference Accuracy	± 0.075% of Span (0.1URL ≤ Span ≤ URL) ± [0.025 + 0.005x(URL/Span)]% of Span (0.01URL ≤ Span < 0.1URL)	Ambient Temperature	-40 ~ +85 °C
		LCD Meter Ambient Temp.	-30 ~ +80 °C
		Humidity Limits	5% ~ 100% RH
Ambient Temp. Effect	± [0.019%URL + 0.125% Span] / 28 °C	Process Temperature Limits	-40 °C ~ +120 °C
Stability	± 0.125% URL for 12 Months	Power Supply Effects	± 0.005% of Span per Volt
Static Pressure Effects	± 0.1% of URL per 7MPa (Zero Error)	Mounting Position Effects	Zero Shift up to 350Pa No Span Effect
	± 0.2% of Reading per 7MPa (Span Error)		

4).Physical Specifications

Isolating Diaphragm	316L SST	Process Connection Size	1/4 - 18 NPT
Drain & Vent Valve	316 SST	(Adapter – Option)	1/2 – 14 NPT
Flange & Adapter	316 SST	Electrical Connections	1/2 – 14 NPT with M4
O-ring	Viton, PTFE	Weight (excluding Option Items)	5.5 Kg
Electronic Housing	Aluminum	2" Pipe Stanchion Type bracket	Angle or Flat type
Bolts & Bolting Flange	304 SST	Housing Class	Waterproof (IP67), 4X, IP66

5).Hazardous Location Certifications (option)

	CSA (Canadian Standards Association) Approval
	Explosion-proof / DIP for Class I, II, III Div. 1, 2 Groups A-G Flameproof for Zone 1, Ex d II C T6..T4 Type of Protection "nA" for Zone 2, Ex nA IIC T4

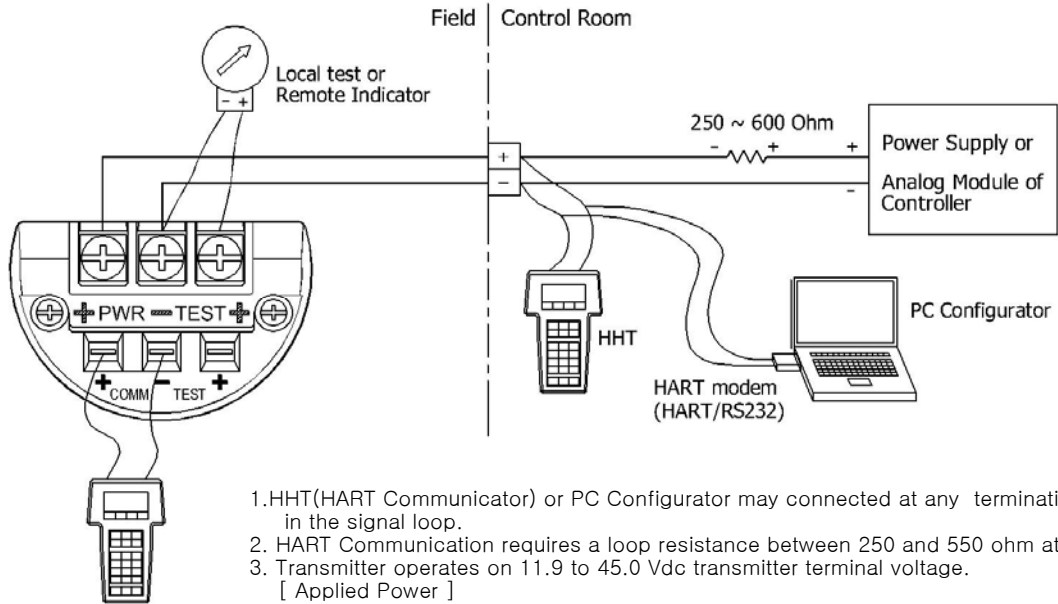


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Connection Diagram of Signal, Power, HHT for Transmitter

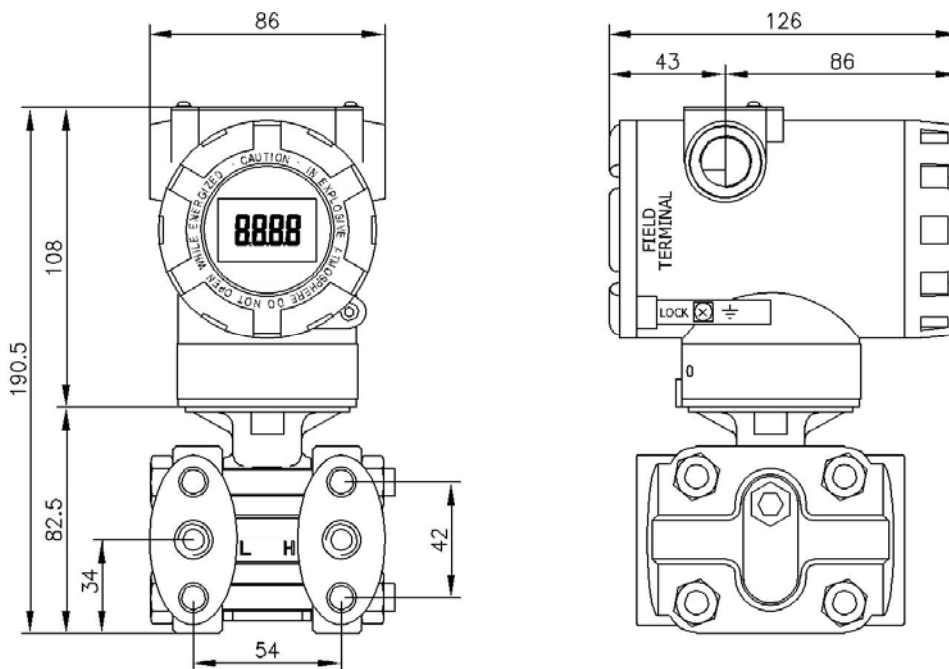


1. HHT (HART Communicator) or PC Configurator may be connected at any termination point in the signal loop.
2. HART Communication requires a loop resistance between 250 and 550 ohm at 24 Vdc
3. Transmitter operates on 11.9 to 45.0 Vdc transmitter terminal voltage.

[Applied Power]

- * 11.9 ~ 45.0 Vdc for General Operation
- * 17.4 ~ 45.0 Vdc for HART Communication
- * 17.4 ~ 42.0 Vdc for CSA Approval (Power supply must not exceed 42.0 Vdc)

Dimensions of Transmitter (mm)





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Ordering Information

MODEL NO.	Code	Description				
PT3100	- D	Differential Pressure Transmitter (Static Pressure 13.79 MPa / 2000psi)				
Ranges		DP/GP/HP				*AP
		Calibrated Span Min. to Max.	Lower Range Limit		Upper Range	Range
			APT3100-D			
	3	0.15 to 7.5 kPa (15 to 766 mmH ₂ O)	-7.5 kPa (-766 mmH ₂ O)		(766 mmH ₂ O)	
	5	1.865 to 186.5 kPa (191 to 19050 mmH ₂ O)	-186.5 kPa (-19050 mmH ₂ O)		186.5 kPa (19050 mmH ₂ O)	
Mounting Flange Size/Material		Flange/Adapters	Drain/Vent	Diaphragm		
	M11	316 SST	316 SST	316L SST		
	M12	316 SST	316 SST	HAST-C		
	M13	316 SST	316 SST	MONEL		
	M14	316 SST	316 SST	TANTALUM		
	M21	HAST-C	HAST-C	HAST-C		
	M22	HAST-C	HAST-C	MONEL		
	M23	HAST-C	HAST-C	TANTALUM		
Hazardous Location Certifications	K0	Maker Standard (Waterproof : IP67)				
Fill Fluid	1	Silicone				
Process Connection	S	1/4 - 18 NPT (Standard)				
Electrical Connection	1	1/2-14NPT	Epoxy-Polyester Painted Aluminium			
Option	M1	LCD Indicator				
	CA	Painted Steel Mounting Bracket (Angle Type) with SST Bolts				

Example : APT3100-D5-M11-C1-1-S-1-M1

Note 1 : Request to manufacturer for Draft Range, Absolute (small pressure and vacuum) and Items marked " * "