

Smart Pressure Transmitter

for Differential / Gauge / Absolute Pressure Measurement



MODEL
PT31

Smart Pressure Transmitter

PT31



Standard



SST Housing

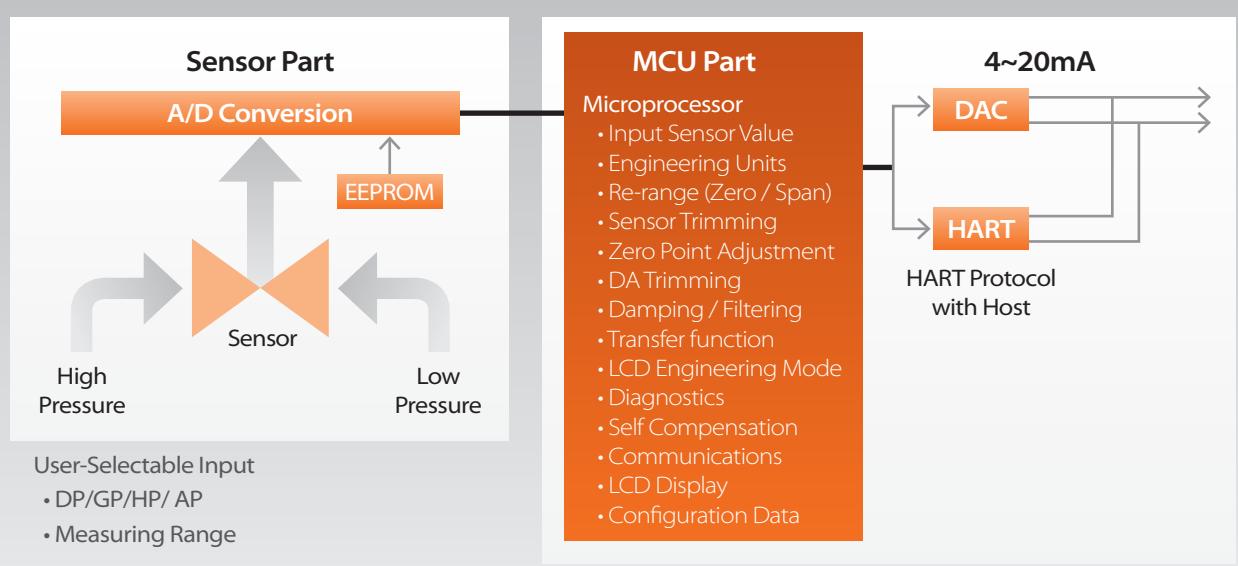
Description of Product

The PT31 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 liquid, gas or steam flow as well as pressure and liquid level by application method. All data of sensor is to be input, modified and stored in EEPROM.

Function

- » Flexible Sensor Input : DP, GP, AP
- » 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 : ATEX, FM, FMCanada, GOST, KOSHA, KTL, etc.

Functional Block Diagram



Features

» Superior Performance

- High Reference Accuracy : $\pm 0.075\%$ of Calibrated Span
(The option : **$\pm 0.04\%$ of Calibrated Span**)
- for range 2
 $\pm 0.25\%$ of Span for $0.1URL \leq Span \leq URL$
 $\pm [0.24 + (0.008 \times (URL/span))] \%$ of Span
for $0.05URL \leq Span < 0.1URL$
- for range 3
 $\pm 0.075\%$ of Span for $0.1URL \leq Span \leq URL$
 $\pm [0.025 + (0.005 \times (URL/span))] \%$ of Span
for $0.02URL \leq Span < 0.1URL$
- for ranges 4 to 0
 $\pm 0.075\%$ of Span for $0.1URL \leq Span \leq URL$
 $\pm [0.025 + (0.005 \times (URL/span))] \%$ of Span
for $0.01URL \leq Span \leq 0.1URL$
- Long-Term Stability (0.125% URL for 3year)
- High Rangeability (100 : 1)(for the range 4-0)

» 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)

Transmitter Description

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

» Basic Setup

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

» Calibration and Trimming

- Lower/Upper Range (zero/span)
- Sensor Zero Trimming
- Zero Point Adjustment
- DAC Output Trimming

- Transfer Function
- Self-Compensation

» Self-Diagnosis and Others

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

Function

» Range and Sensor Limits

- Refer to Table 1.

» Zero and Span Adjustment Limits

- Zero and span values can be set anywhere within the range limits stated in Table 1.(Page 9)
- Span must be greater than or equal to the minimum span stated in Table 1.(Page 9)

» 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.
- * 250 ohm load– 17.5 Vdc
- * up to a 550 ohm load – 24 Vdc
- Max. Loop Resistance = $(E - 12) / 0.022$
(E = Power Supply Voltage)
- Voltage Range : 12 to 45 Vdc
- Voltage Rating : 24 Vdc $\pm 30\%$
- Loop Load
- 0 ~ 1500 ohm – Operation
- 250 ~ 550 ohm -- HART Communications

» EMC Conformity Standards

- EMI (Emission) – EN50081-2:1993
- EMS (Immunity) – EN50082-2:1995

» Failure Mode

- Fail High : Current ≥ 21.1 mA
- Fail Low : Current ≤ 3.78 mA

» Storage Temperature

- -40°C to 85°C (without condensing)

» Process Temperature Limits

- (Range codes and approval codes may effect limits)
- -40°C to 120°C (-40 to 248°F)

Smart Pressure Transmitter

Function

» Isolation

- Input/output isolated to 500Vrms (707 Vdc)

» Working Pressure Limits (silicone oil)

- Model D & G 0 ~ 13.79 MPa - #3 ~ 8
- Model G 0 ~ 40.00 MPa - #9
- 0 ~ 75.00 MPa - #0
- Model H 0 ~ 31.02 MPa - #4 ~ 7
- Model A 0 ~ 525 KPa - #4
- 0 ~ 3000 KPa - #5
- 0 ~ 5250 KPa - #6

» Hydrostatic Test Pressure

- Model D 3000 psi (20.7 MPa)
- Model H 6750 psi (46.5 MPa)
- Model G 2000 psi (13.8 MPa) - #3 ~ 8
 11600 psi (80 MPa) - #9
 11600 psi (80 MPa) - #0
- Model A 101.5 psi (700 KPa) - #4
 580 psi (4000 KPa) - #5
 1015psi (7000 KPa) - #6

» Burst Pressure

- Model D, G, H 68.9 MPa
 G0 80 MPa
- Model A4 1050 KPa
 A5 4000 KPa
 A6 7000 KPa

» 5 Digit LCD

- Express all pressure unit and flow unit.
- Use 5 digit.
- Select decimal place (0 to 4)
- User define unit function



» Change main parameter by Button

- Change Unit
- Change Upper range value
- Change Lower range value
- Change the Damping Second
- Select the Decimal Place
- Zero Trim
- Zero Adjustment

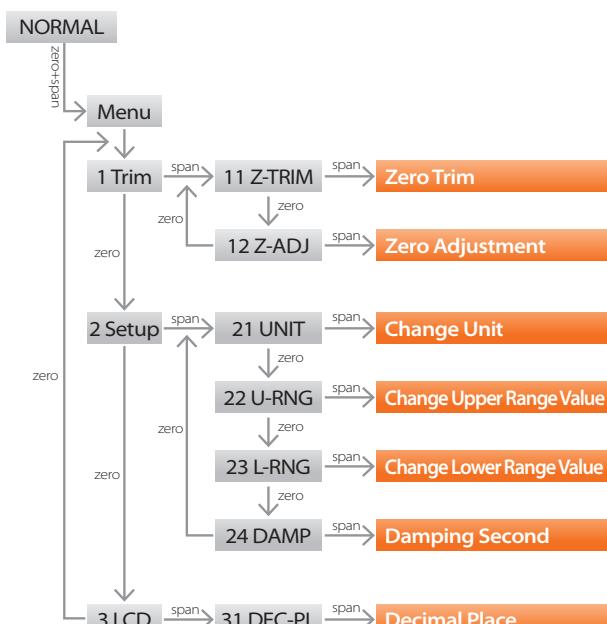


Moving within Menu : Zero

Moving to below Menu : Span

Moving Top Menu : Zero+Span

» Button Manu tree



Physical Specifications

» Wetted Materials

- Isolating Diaphragms 316L SST, Monel, Tantalum, HAST-C
- Drain/Vent Valves 316 SST, HAST-C
- Flanges and Adapters 316 SST(ASTMCF8M), HAST-C
- O-ring Viton, PTFE

» Non-wetted materials

- Fill Fluid Silicone oil or Inert fill
- Bolts 304 SST
- Electronics Housing Aluminum or 316L SST (Option)
Flameproof and Waterproof (IP67)
- Cover O-ring Buna-N
- Paint Epoxy-Polyester or Polyuret
- Mounting Bracket 304SST with U-bolt (304SST)
for 2-inch pipe
- Nameplate 304 SST

» Electrical connections

- 1/2-14 NPT conduit with M4 Screw Terminals

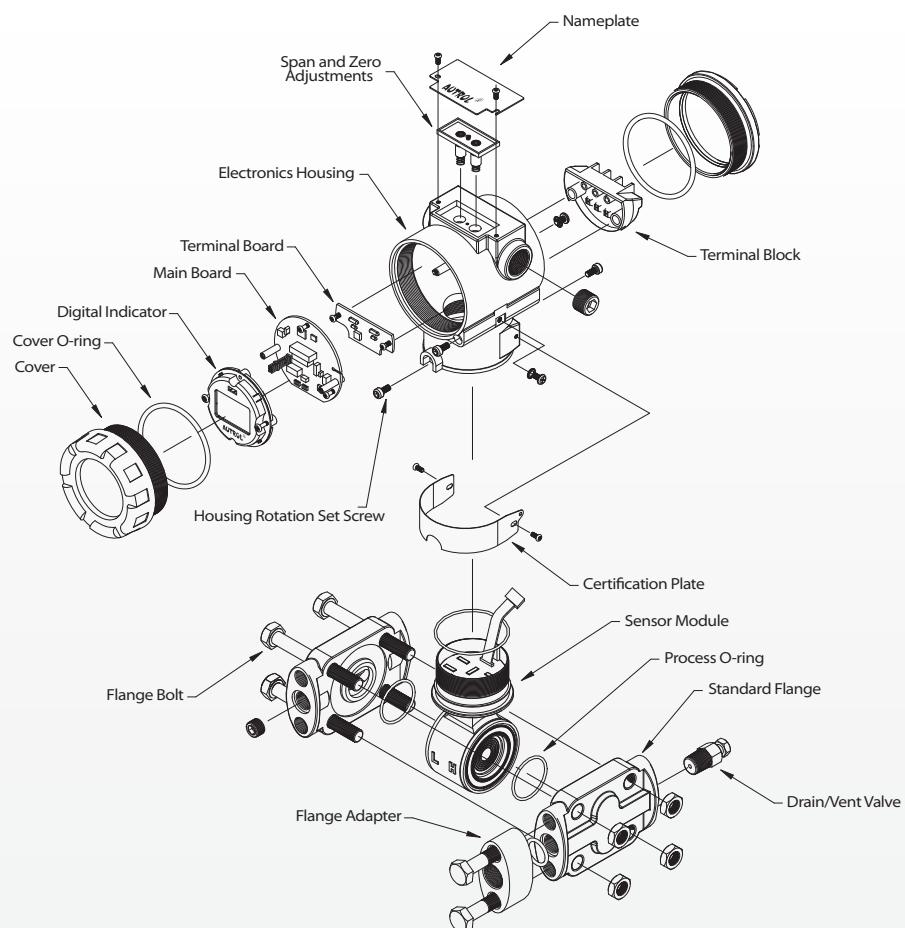
» Process Connections

- 1/4-18 NPT on 2.126 inch (54.0 mm) centers
on flanges for Standard
 - 1/2-14 NPT on Process Adapter (option)
- * Refer to drawing in the last page

» Weight

- 3.9 kg (Standard - excluding options)
- 5.35kg (SST Housing- excluding options)

Exploded drawing of PT31



Smart Pressure Transmitter

Hazardous Location Certifications (option)

» KOSHA Approvals K1 Code :

* KOSHA: Korea Occupational Safety & Health Agency
Flameproof for Class I, Zone 1 : Ex d II CT6, IP67
Ambient Temperature : -20 to 60°C
Max. Process Temperature : 80°C
Power Supply : Max. 45 Vdc
Output : 4 to 20 mA + HART, Max. 22 mA

» ATEX Approvals E1 Code :

CE 0344 II 2 G Ex d IIC T6, T5 or T4
Operating Temperature: $-20^{\circ}\text{C} \leq \text{Tamb} \leq +60^{\circ}\text{C}$
T6 for process $\leq 85^{\circ}\text{C}$; T5 for process $\leq 100^{\circ}\text{C}$
T4 $\leq 130^{\circ}\text{C}$
APT3100 ATEX Certification is according to the below standards : EN 60079-0 : 2006
EN 60079-1 : 2007

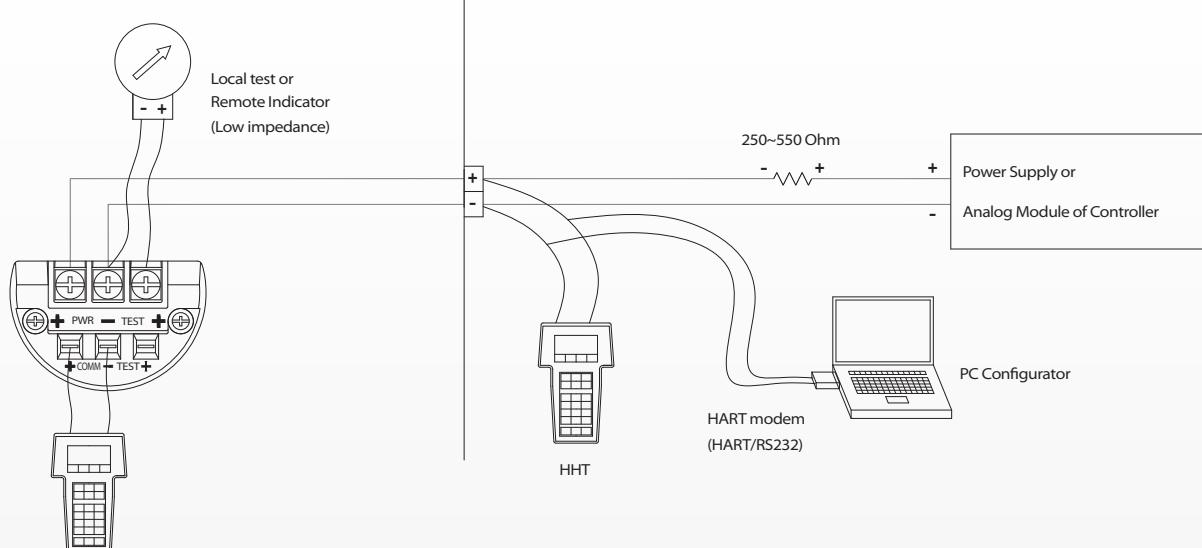
» KTL Certification K2 Code :

* Intrinsic Safety: Ex ia IIC T6
Ambient Temperature : -40 to 600C
 $Ui=30\text{Vdc}, li=200\text{mA}, Pi=0.9\text{W}, Ci=47\text{nF}, Li=94\mu\text{H}$

» FM and FM Canada Approvals F1 Code :

* FM: Factory Mutual explosion proof
* FM Canada: Canadian requirements
Explosion proof for Class I, Division 1
Groups A, B, C and D
Dust-ignition proof for Class II/III, Division 1,
Groups E, F and G
Nonincendive for Class I, Division 2, Groups A, B, C & D;
Class II, Division 2, Groups E, F & G; and Class III,
Division 1,
Enclosure: indoors and outdoors, NEMA Type 4X

Connection Diagram of Signal, Power, HHT for Transmitter



1. HHT(HART Communicator) or PC Configurator may connected at any termination point in the signal loop.
2. HART Communication requires a loop resistance between 250 and 550 ohm @ 24 Vdc
3. Power Supply
 - Voltage Range : 12 to 45 Vdc
 - Voltage Rating : 24 Vdc $\pm 30\%$

PT31

MP Option



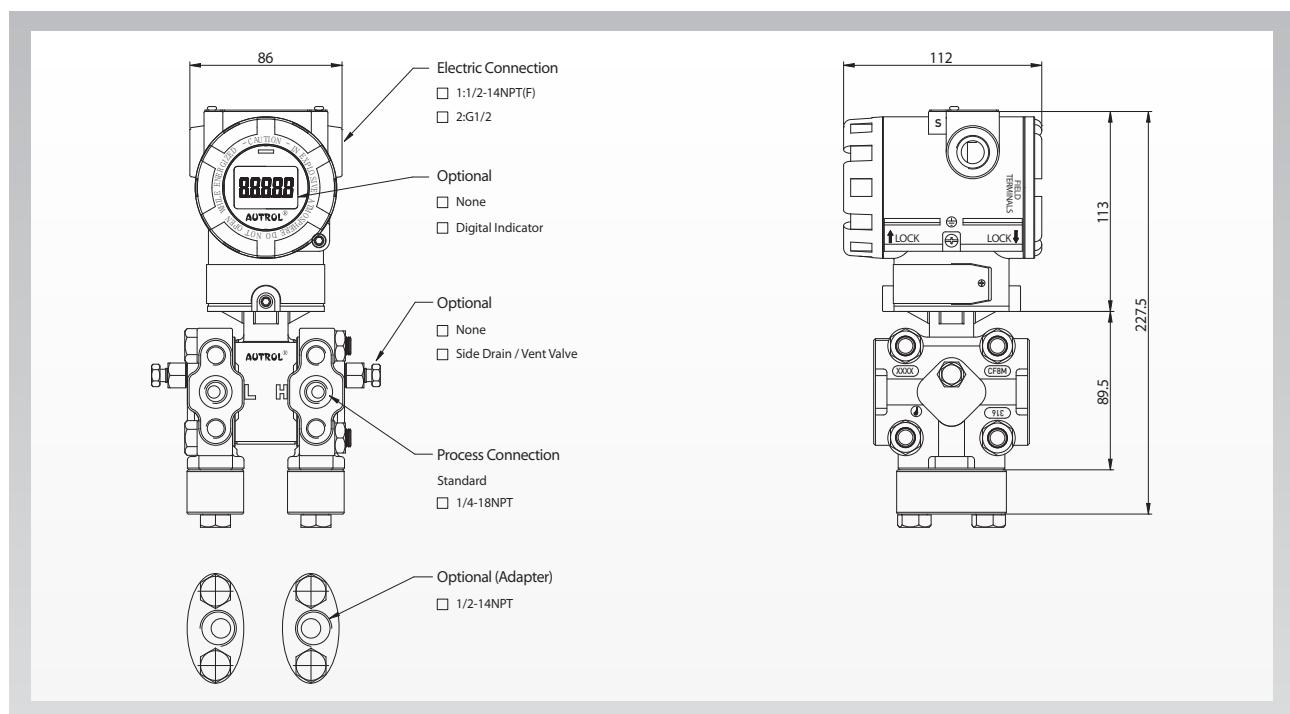
*Easy
installation
regardless
fluid line
conditions*

Advantage

Conventionally, in the case where the pressure transmitter should be vertically installed irrespective of the orientation of the fluid inflow lines, modified flanges are required in addition to the basic flanges. As a result, the modified flanges must be additionally provided.

Multi-planar pressure transmitter has been made in an effort to solve the problems occurring in the related art, and an object of this multi planar is to provide a pressure transmitter, capable of being **vertically installed without separate adapter or various types of brackets regardless of the position of each fluid inflow line.**

Dimension



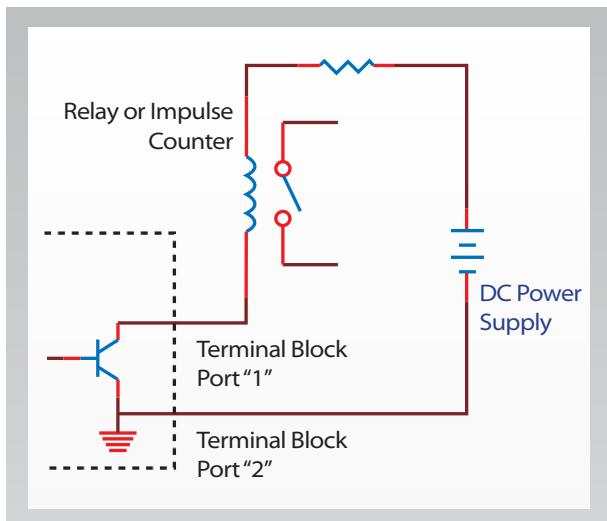
PT31F

Description

PT31F is added the totalizing function in PT31 transmitter.
So it is available to check the flow rate and total flow.

- » Measuring & Express Flow rate and Total flow
 - » Pulse output by accumulation of total flow
- PT31F measures the flow rate by using differential pressure so it is not compensated the temperature and static pressure

Wiring



In the case of connecting with Relay or Counter.

External Appearance

PT31F is same shape with PT31 but the terminal block is different.



- 1: Pulse out +
- 2: Pulse out -

Pulse specification

- » Scaled Pulse : A Single pulse is output for a specified flow amount.
- » Pulse Width : 10ms, 50ms, 100ms selectable
(Negative going pulse)
- » Duty Cycle : 49 Pulse/sec. Max.
- » Output Type : Open Collector, 30V, 500mA Max.



The picture of STT 20

General Specifications

(Rangeability : #2=20:1 / #3=50:1 / 4~0=100:1)

1. PT31 Pressure Sensor Range & URL

<Table 1>

Range Code	DP / GP / HP / F					AP	
	Calibrated Span (KPa)	Upper Range (URL) (KPa)	Lower Range (LRL) (KPa)			Calibrated Span (KPa)	Range (KPa)
			D.P	G.P	H.P		
2	0.075 ~ 1.5	1.5	-1.5	-1.5	NA	NA	NA
3	0.15 ~ 7.5	7.5	-7.5	-7.5	NA	NA	NA
4	0.373 ~ 37.3	37.3	-37.3	-37.3	-37.3	2.5 ~ 250	0 ~ 250
5	1.865 ~ 186.5	186.5	-186.5	-100	-186.5	15 ~ 1500	0 ~ 1500
6	6.9 ~ 690	690	-690	-100	-690	25 ~ 2500	0 ~ 2500
7	20.68 ~ 2068	2068	-2068	-100	-2068	NA	NA
8	68.95 ~ 6895	6895	-6895	-100	NA	NA	NA
9	206.8 ~ 20680	20680	NA	-100	NA	NA	NA
0	413.7 ~ 41370	41370	NA	-100	NA	NA	NA

Range Code	KPa	Kg/cm ²	bar	psi	inH2O@4°C	mmH2O@4°C	inHg@0°C
2	1.5	0.015	0.015	0.217	6	152	0.442
3	7.5	0.076	0.075	1.087	30	765	2.215
4	37.3	0.38	0.373	5.41	149	3804	11.014
5	186.5	1.902	1.865	27.049	749	19018	55.072
6	690	7.036	6.9	100.073	2773	70361	203.75
7	2068	21.088	20.68	299.93	8310	210878	610.66
8	6895	70.309	68.95	1000.009	27708	703097	2036.025
9	20680	210.876	206.8	2999.303	83105	2108781	6106.597
0	41370	421.856	413.7	6000.211	166085	4218566	12216.55

2. Electrical Specifications

Power Supply	Voltage Range : 12 to 45 Vdc Voltage Rating : 24 Vdc ±30%	Output Signal	4 ~ 20 mA dc / HART
HART loop resistance	250 ~ 550 ohm	Isolation	500 Vrms (707 Vdc)

3. Performance Specifications

Reference Accuracy	± 0.075% of Span (0.1URL≤Span≤URL)	Ambient Temperature	-40 ~ +85°C
	±[0.025+0.005x(URL/Span)]% of Span (0.01URL≤Span<0.1URL)	LCD Meter Ambient Temp	-30 ~ +80°C
Ambient Temp. Effect	±[0.019%URL+0.125% Span] / 28°C	Humidity Limits	5% ~ 100% RH
Stability	±0.125% URL for 36 Months	Process Temperature Limits	-40°C ~ +120°C
Static Pressure Effects	±0.1% of URL per 7MPa (Zero Error) ±0.2% of Reading per 7Mpa (Span Error)	Power Supply Effects	±0.005% of Span per Volt
		Mounting Position Effects	Zero Shift up to 350Pa No Span Effect

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)	3.9 Kg (Standard) 5.35Kg(SST Housing)
Electronic Housing	Aluminum (Option:316L SST)	2" Pipe Stanchion Type bracket	Angle or Flat type
Bolts & Bolting Flange	304 SST	Housing Class	Waterproof (IP67), 4X

Smart Pressure Transmitter

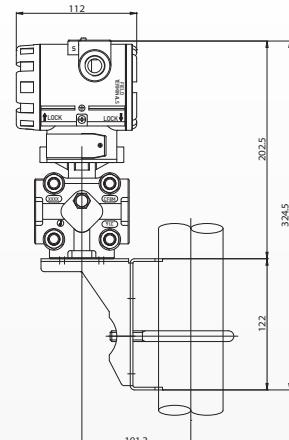
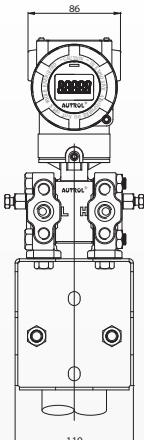
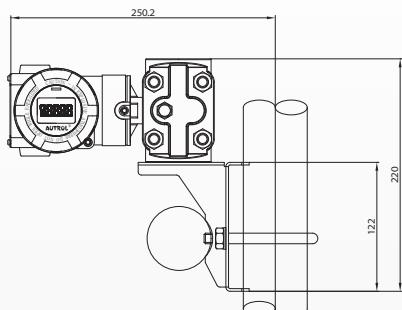
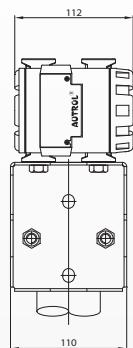
Ordering Information

MODEL	Code	Description						
PT31	-D	Differential Pressure Transmitter (Static Pressure 13.79 MPa / 2000psi)						
	-F	Flow Transmitter (on the principle of Differential Pressure Use and only for Head)						
	-G	Gauge Pressure Transmitter						
	-H	Differential Pressure Transmitter for High Line Pressure (Static Pressure 31.02MPa / 4500psi)						
	-A	Absolute Pressure Transmitter						
Ranges		DP/GP/HP						
		Calibrated Span Min. to Max	Lower Range Limit		Upper Range Limit	*AP Range		
			PT31-D	PT31-G		PT31-A		
	2	0.075 ~ 1.5 KPa (0.302~6.022 inH2O)	-1.5 KPa (-6.022 inH2O)	-1.5 KPa (-6.022 inH2O)	NA	1.5 KPa (6.022 inH2O) NA		
	3	0.15 ~ 7.5 KPa (0.6~30 inH2O)	-7.5 KPa (-30 inH2O)	-7.5 KPa (-30 inH2O)	NA	7.5 KPa (30 inH2O) NA		
	4	0.373 ~ 37.3 KPa (1.5~150 inH2O)	-37.3 KPa (-150 inH2O)	-37.3 KPa (-150 inH2O)	-37.3 KPa (-150 inH2O)	37.3 KPa (150 inH2O) 0~250 KPa		
	5	1.865 ~ 186.5 KPa (7.5~750 inH2O)	-186.5 KPa (-750 inH2O)	-100KPa (-14.6 psi)	-186.5 KPa (-750 inH2O)	186.5 KPa (750 inH2O) 0~1500 KPa		
	6	6.9 ~ 690 KPa (1~100 psi)	-690 KPa (-100 psi)	-100KPa (-14.6 psi)	-690 KPa (-100 psi)	690 KPa (100 psi) 0~2500 KPa		
	7	20.68 ~ 2068 KPa (3~300 psi)	-2068 KPa (-300 psi)	-100KPa (-14.6 psi)	-2068 KPa (-300 psi)	2068 KPa (300 psi) NA		
	8	68.95 ~ 6895 KPa (10~1000 psi)	-6895 KPa (-1000 psi)	-100KPa (-14.6 psi)	NA	6895 KPa (1000 psi) NA		
	9	206.8 ~ 20680 KPa (30~3000 psi)	NA	-100KPa (-14.6 psi)	NA	20680 KPa (3000 psi) NA		
	0	413.7 ~ 41370 KPa (60~6000 psi)	NA	-100KPa (-14.6 psi)	NA	41370 KPa (6000 psi) NA		
	X	Special						
Mounting Flange /Material		Body	Vent Plug		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	Makar Standard (Waterproof : IP67)						
	K1	KOSHA Flameproof Approval : Ex d IIC T6		K2	KTL Intrinsic Safety Approval : Ex ia IIC T5			
	E1	ATEX(KEMA) Flameproof						
	F1	FM & FM Canada Explosion proof						
Fill Fluid	1	Silicone (DC200)	2	Inert fill fluid (Halocarbon oil)				
Process Connection	S	1/4 - 18 NPT (Standard)	O	1/2 - 14 NPT Female (Adapter)	X	Special		
Electrical Connection	1	1/2-14NPT Epoxy-Polyester Painted Aluminum	2	G1/2 Epoxy-Polyester Painted Aluminum	X	Special		
Option	M1	LCD Indicator(5digit)						
	MP	Multi-Planar						
	LP	Lightening Protector						
	K	Oil Free Finish						
	F1	Side Vent / Drain Top						
	F2	Side Vent / Drain Bottom						
	2W	2 Way Manifold (SST) : Pleas let us know the type. Remote type or Flange type						
	3W	3 Way Manifold (SST) : Pleas let us know the type. Remote type or Flange type						
	5W	5 Way Manifold (SST) : Pleas let us know the type. Remote type or Flange type						
	BA	Stainless Steel Bracket (Angle type) with SST Bolts						
	BF	Stainless Steel Bracket (Flat type) with SST Bolts						
	ST	Stainless Steel Housing						
	T	Teflon O-Ring (Wetted Part)						

Example : PT31-D5-M11-E1-1-S-1-M1-BA Note 1 : Request to manufacturer for Draft Range, Absolute (small pressure and vacuum) and Items marked "*" before order.

Installation With Mounting Bracket

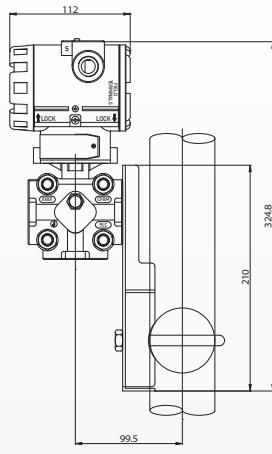
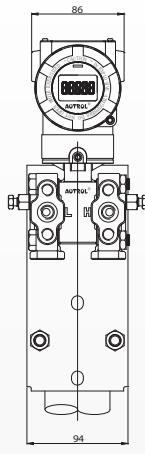
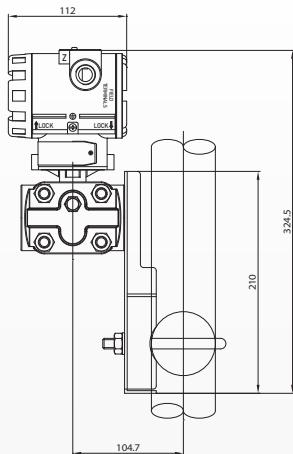
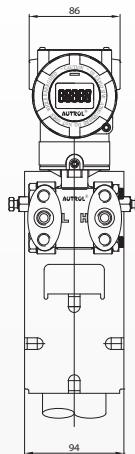
2" Pipe Mounting Bracket Model Angle Type



Standard Model

MP Model

2" Pipe Mounting Bracket Model Flat Type



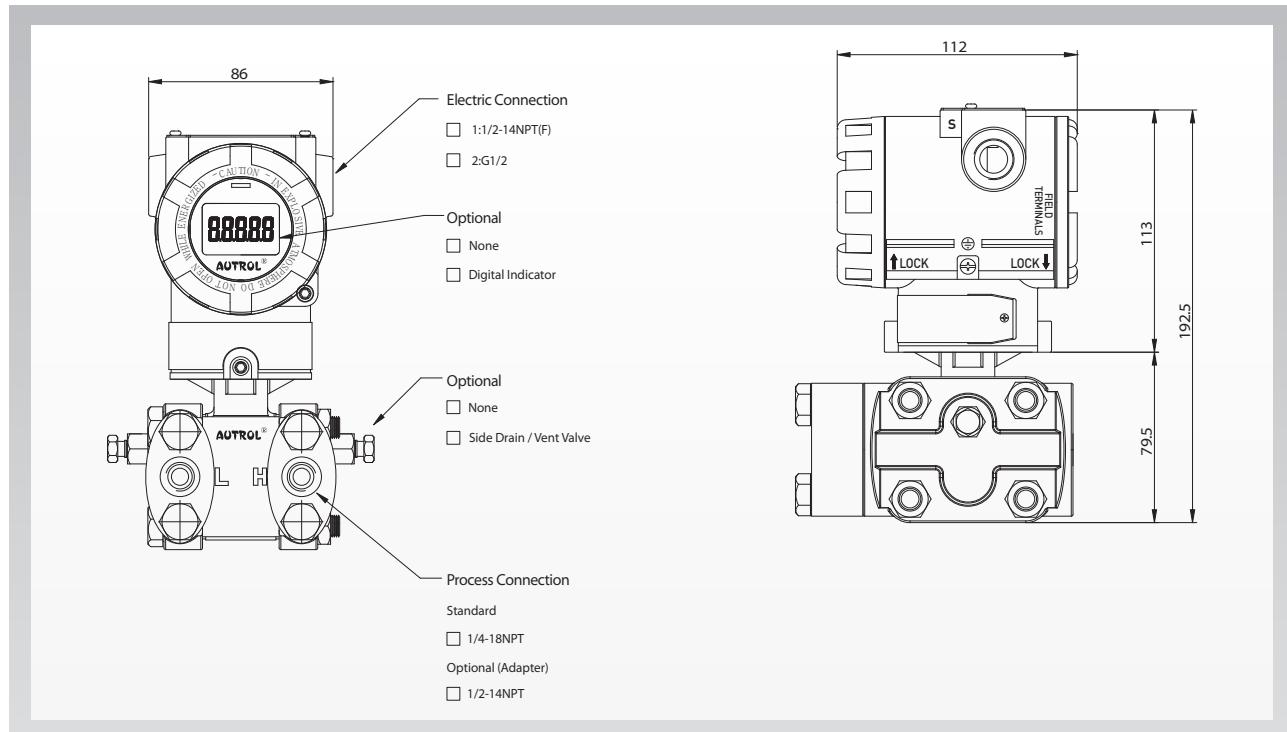
Standard Model

MP Model

Smart Pressure Transmitter

Dimensions of Transmitter (mm)

Standard Model



Intrinsically safe Model

