

AUTROL®



Smart Pressure Transmitter

APT3100

- Differential / Gauge / Absolute Pressure Measurement
- SIL 2 Certificate(IEC 61508)
- Marine Certificate : ABS, BV, LR, DNV, KR



APT3100



Standard

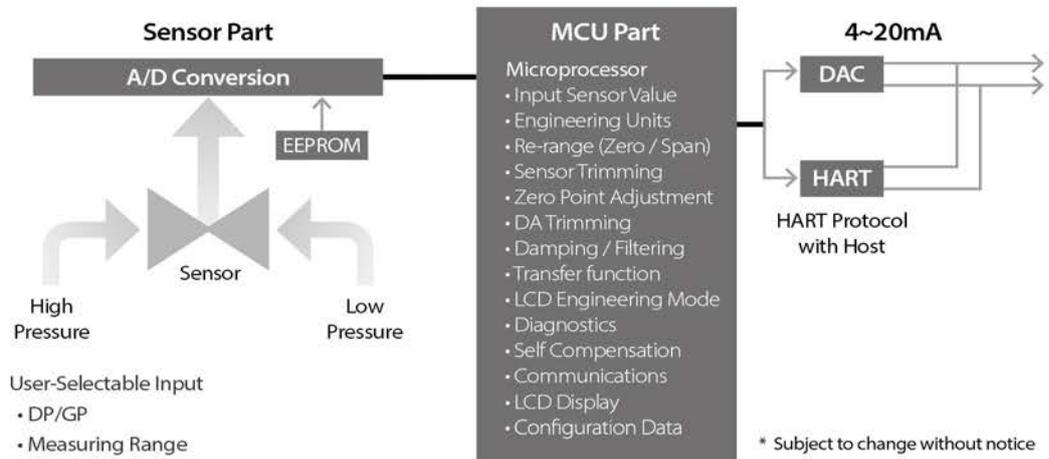
SST Housing

Description of Product

The APT3100 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.

- » Flexible Sensor Input : DP, GP, HP, 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 : KCs, ATEX, FM, IECEx, EAC (Russia, CC TR CU).
- » Waterproof : IP66/IP67.
- » Marine Certificate: ABS, BV, LR, DNV, KR.
- » SIL2 Certificate(IEC 61508).

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 $0.1URL \leq \text{Span} \leq URL$
 $\pm [0.24 + (0.008 \times (URL/\text{span}))]\%$ of Span
 for $0.05URL \leq \text{Span} \leq 0.1URL$
- for range 3
 $\pm 0.075\%$ of Span for $0.1URL \leq \text{Span} \leq URL$
 $\pm [0.025 + (0.005 \times (URL/\text{span}))]\%$ of Span
 for $0.02URL \leq \text{Span} \leq 0.1URL$
- for ranges 4 to 0
 $\pm 0.075\%$ of Span for $0.1URL \leq \text{Span} \leq URL$
 $\pm [0.025 + (0.005 \times (URL/\text{span}))]\%$ of Span
 for $0.01URL \leq \text{Span} \leq 0.1URL$
- 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

Transmitter Description

ATP3100 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)

- LCD Display & ENG Mode
- 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 : 12.5 to 45 Vdc
- Voltage Rating : 24 Vdc $\pm 30\%$
- Loop Load
 0 ~ 1,500 ohm -- Operation
 250 ~ 550 ohm -- HART Communications

» EMC Conformity Standards

- CE EMC Conformity Standards[EN61326-1, EN61326-3]

» Failure Mode

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

» Ambient Temperature

- -40°C to 85°C (without condensing)

» Process Temperature Limits

- (Range codes and approval codes may effect limits)
- -40°C to 120°C (-104 to 248°F)

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 ~ 3,000 kPa - # 5
0 ~ 5,250 kPa - # 6

» Hydrostatic Test Pressure

- Model D 3,000 psi (20.7 MPa)
- Model H 6,750 psi (46.5 MPa)
- Model G 2,000 psi (13.8 MPa) - # 3 ~ 8
11,600 psi (80 MPa) - # 9
11,600 psi (80 MPa) - # 0
- Model A 101.5 psi (700 kPa) - # 4
580 psi (4000 kPa) - # 5
1,015psi (7000 kPa) - # 6

» Burst Pressure

- Model D, G, H 68.9 MPa
G8~9 50 MPa
G0 80 MPa
- Model A4 1,050 kPa
A5 4,000 kPa
A6 7,000 kPa

» 5 Digit LCD

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

» User define unit function



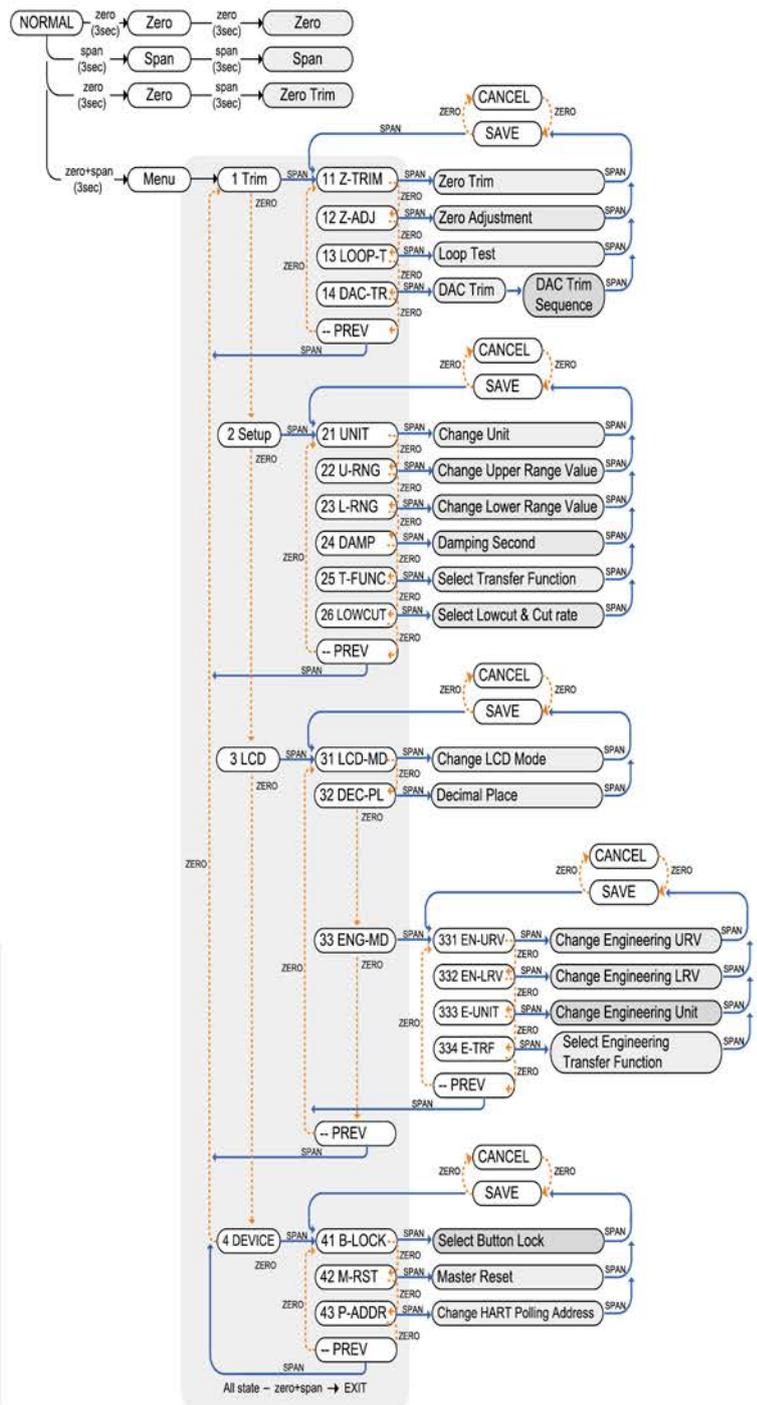
» Change main parameter by Button

- 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 Menu tree



Physical Specifications

» Wetted Materials

- Isolating Diaphragms 316L SST, HAST-C
Monel, Tantalum
- 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
- G1/2 Female Adapter(option)

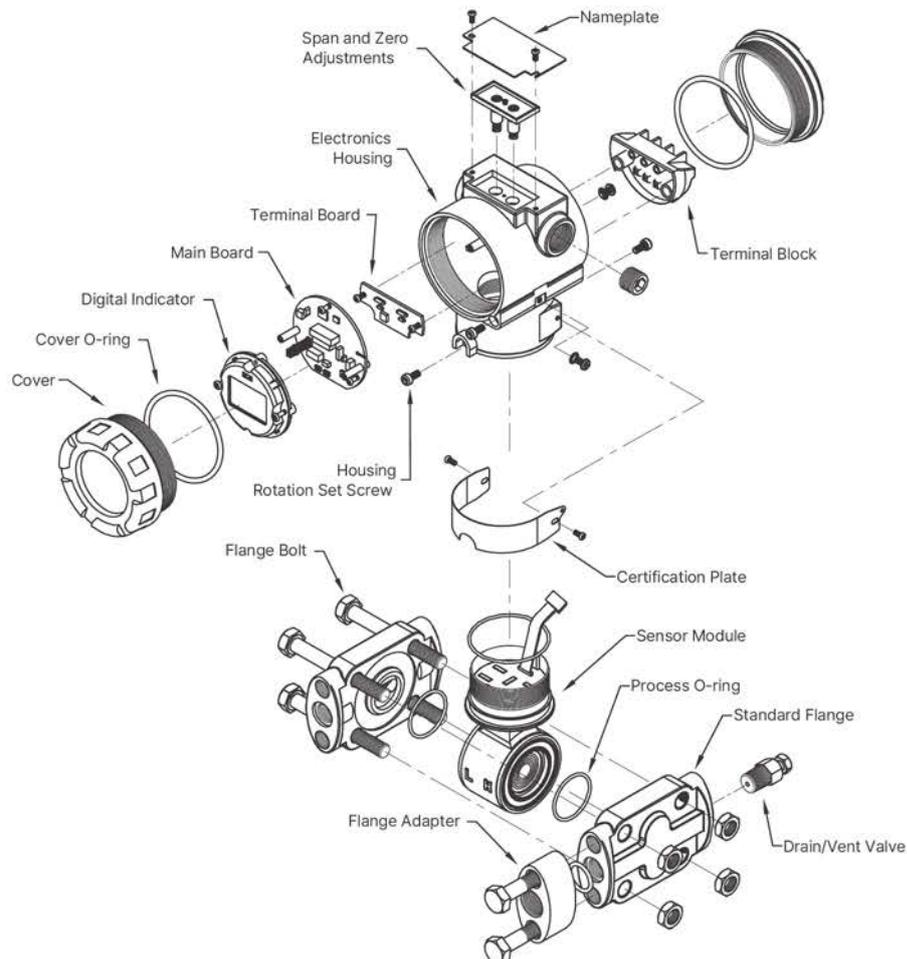
» Process Connections

- 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 APT3100



Hazardous Location Certifications (option)

» **KCs Flameproof / Dust Ignition-proof K1 Code :**

Flameproof for Class I, Zone 1: Ex d IIC T6, IP67
 Dust Ignition-proof: Ex tD A20 T85°C 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 Flameproof E1 Code :**

Ⓔ II 2 G Ex db IIC T6... T4 Gb
 Ⓔ II 2 D Ex tb IIIC T85°C... T130°C Db

» **ATEX Intrinsic Safety E2 Code :**

Ⓔ II 1 G or 2 G Ex ia IIC T5 or T4 Ga or Gb
 Ambient temperature range:
 - For T5: -30°C to +40°C
 - For T4: -30°C to +80°C

» **IECEx Flameproof I1 Code :**

Ex Protection: Ex db IIC T6... T4 Gb,
 Ex IIIC tb T85°C... T130°C Db
 Ratings: Supply: 12.5 to 45 Vdc
 Output: 4 to 20 mA

» **FM Explosion-proof F1 Code :**

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: NEMA Type 4X

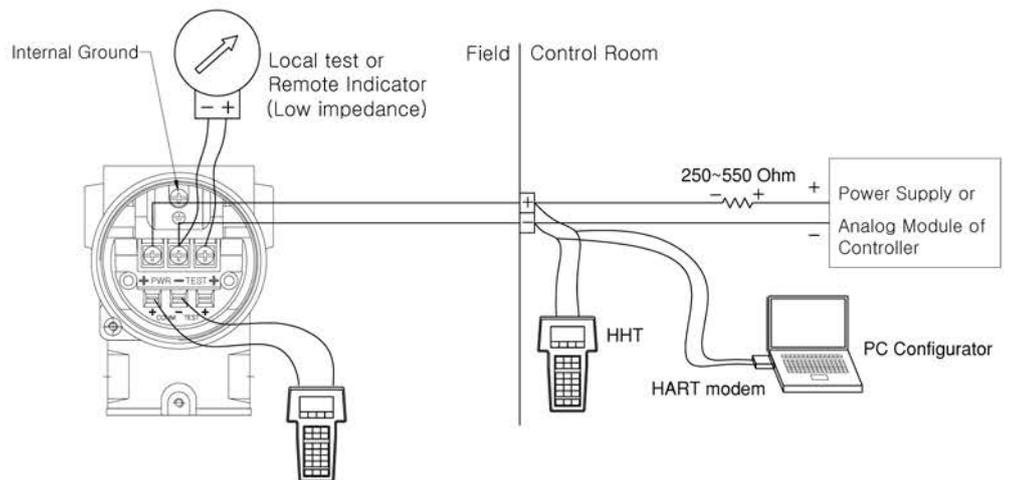
» **EAC Flameproof R1 Code :**

1Ex d IIC T6... T5 Gb X IP66/IP67
 Ambient Temperature: -60°C... 60°C
 T6 for process ≤ 85°C
 T5 for process ≤ 100°C

» **EAC Intrinsic Safety R2 Code :**

0Ex ia IIC T5... T4 Ga X IP66/IP67
 1Ex ia IIC T5... T4 Gb X IP66/IP67
 Ambient Temperature:
 T4: -60°C ... 80°C
 T5: -60°C ... 40°C

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 ~ 550 ohm @ 24 Vdc.
3. Transmitter operates at 12.5 to 45 Vdc on transmitter terminal voltage.

[Applied Power]

- 12.5 ~ 45 Vdc : General Operation
- 17.5 ~ 45 Vdc : HART Communication

APT3100 MP OPTION

Easy installation
regardless fluid line
conditions

Advantage

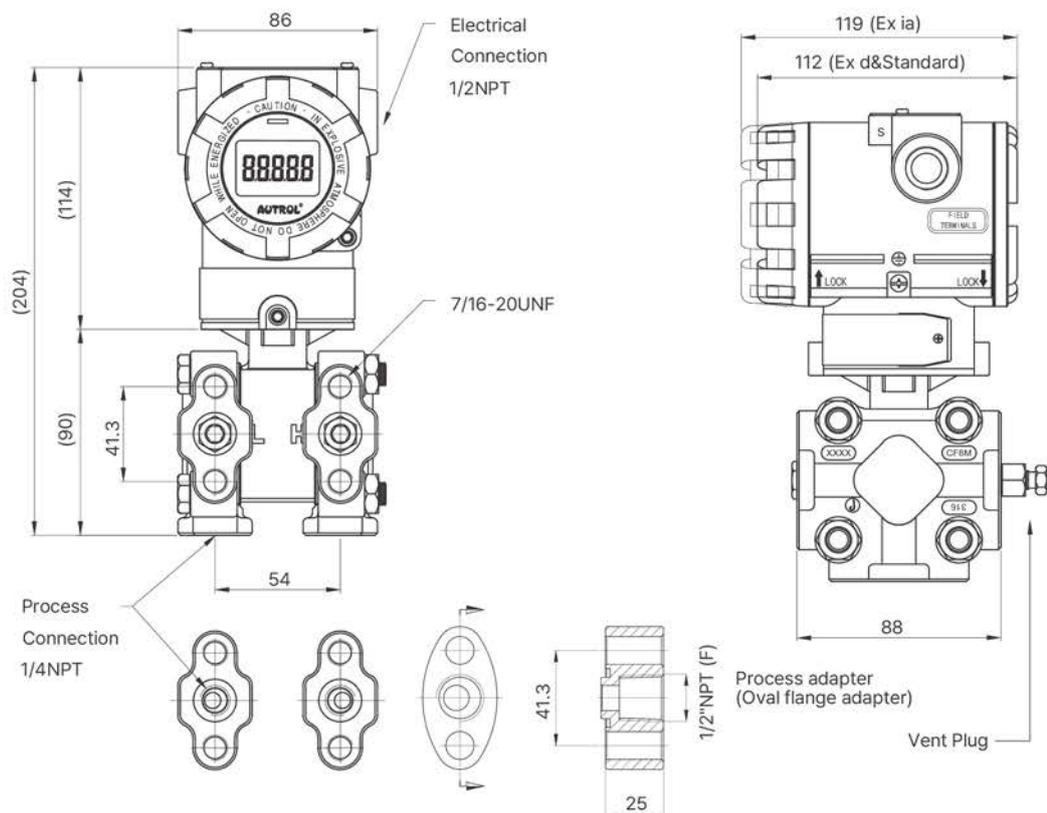
Conventionally, in the case where the pressure transmitter should be vertically installed irrespective of the orientation of the fluid inflow lines, modified flanges are required in addition to the basic flanges. As a result, the modified flanges must be additionally provided.

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 adaptor or various types of brackets regardless of the position of each fluid inflow line.**



Dimension

* Dimensions of Transmitter may vary depending on the option selected.
Please contact the production company for more details.



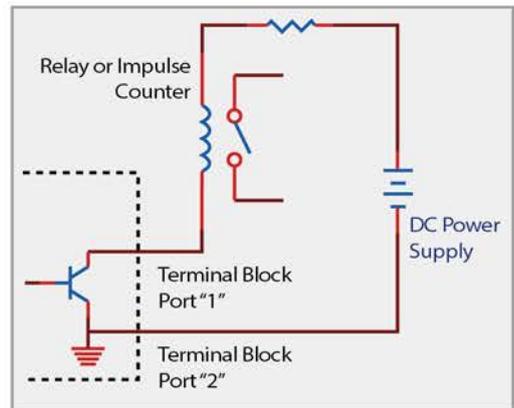
APT3100F

Description

APT3100F is added the totalizing function in APT3100 transmitter. So it is available to check the flow rate and total flo.

- » **Measuring & Express Flow rate and Total flow.**
- » **Pulse output by accumulation of total flow**
- » **APT3100F 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

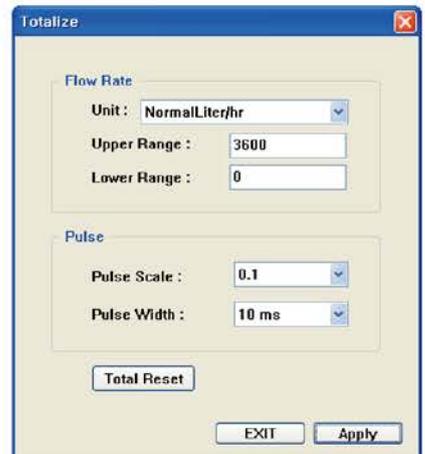
APT3100F is same shape with APT3100 but the terminal block is different.



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 (Autrol configuration program)

General Specifications

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

1. APT3100 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 ~ 1,500	0 ~ 1,500
6	6.9 ~ 690	690	-690	-100	-690	25 ~ 2,500	0 ~ 2,500
7	20.68 ~ 2,068	2,068	-2,068	-100	-2,068	NA	NA
8	68.95 ~ 6,895	6,895	-6,895	-100	NA	NA	NA
9	206.8 ~ 20,680	20,680	NA	-100	NA	NA	NA
0	413.7 ~ 41,370	41,370	NA	-100	NA	NA	NA

Range Code	kPa	kgf / cm ²	bar	psi	inH ₂ O@4°C	mmH ₂ O@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	3,804	11.014
5	186.5	1.902	1.865	27.049	749	19,018	55.072
6	690	7.036	6.9	100.073	2,773	70,361	203.75
7	2,068	21.088	20.68	299.93	8,310	210,878	610.66
8	6,895	70.309	68.95	1,000.009	27,708	703,097	2,036.025
9	20,680	210.876	206.8	2,999.303	83,105	2,108,781	6,106.597
0	41,370	421.856	413.7	6,000.211	166,085	4,218,566	12,216.55

2. Electrical Specifications

Power Supply	12.5 to 45 Vdc	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) ± [0.025 + 0.005 × (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 36 Months	Power Supply Effects	± 0.005% of Span per Volt
Static Pressure Effects	± 0.1% of URL per 7MPa (Zero Error) ± 0.2% of Reading per 7MPa (Span Error)	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 (IP66/67)

Ordering Information

MODEL	Code	Description					
APT3100	-D	Differential Pressure Transmitter (Static Pressure 13.79 MPa / 2,000psi)					
	-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 / 4,500psi)					
	-A	Absolute Pressure Transmitter					
Ranges		DP/GP/HP					*AP
		Calibrated Span Min. to Max	Lower Range Limit			Upper Range Limit	Range APT3100-A
			APT3100-D	APT3100-G	APT3100-H		
	2	0.075 ~ 1.5 kPa	-1.5 kPa	-1.5 kPa	NA	1.5 kPa (6.022 inH2O)	NA
	3	0.15 ~ 7.5 kPa	-7.5 kPa	-7.5 kPa	NA	7.5 kPa (30 inH2O)	NA
	4	0.373 ~ 37.3 kPa	-37.3 kPa	-37.3 kPa	-37.3 kPa	37.3 kPa (150 inH2O)	0~250 kPa
	5	1.865 ~ 186.5 kPa	-186.5 kPa	-100kPa	-186.5 kPa	186.5 kPa (750 inH2O)	0~1,500 kPa
	6	6.9 ~ 690 kPa	-690 kPa	-100kPa	-690 kPa	690 kPa (100 psi)	0~2,500 kPa
	7	20.68 ~ 2,068 kPa	-2,068 kPa	-100kPa	-2,068 kPa	2,068 kPa (300 psi)	NA
	8	68.95 ~ 6,895 kPa	-6,895 kPa	-100kPa	NA	6,895 kPa (1000 psi)	NA
	9	206.8 ~ 20,680 kPa	NA	-100kPa	NA	20,680 kPa (3000 psi)	NA
0	413.7 ~ 41,370 kPa	NA	-100kPa	NA	41,370 kPa (6000 psi)	NA	
X	Special						
Mounting Flange /Material		Flange			Vent Plug	Diaphragm	
	M10	316L SST			316L SST	316L SST	
	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 : IP66/ IP67)					
	K1	KCs Flameproof / Dust Ignition-proof					
	E1	ATEX Flameproof			E2	ATEX Intrinsic Safety	
	I1	IECEX Flameproof			F1	FM Explosion-proof	
	R1	EAC Flameproof			R2	EAC Intrinsic Safety	
R3	EAC Flameproof, Intrinsic Safety						
Fill Fluid	1	Silicone (DC200)			1	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(Adapter)	X Special
Option	M1	LCD Indicator(5digit)					
	MP	Multi-Planar					
	LPI	Lightening Protector (Internal)			LPE	Lightening Protector (External)	
	K	Oil Free Finish					
	F1	Side Vent / Drain Top					
	F2	Side Vent / Drain Bottom					
	2W	2 Way Manifold (SST) : Remote type type			2WF	Flange type	
	3W	3 Way Manifold (SST) : Remote type type			3WF	Flange type	
	5W	5 Way Manifold (SST) : Remote type type			5WF	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)					
	MR	Marine & Offshore Type approval by DNV-GL, LR, BV, ABS, KR (shall use LPI option) *					
SL	SIL2 (Safety certified to IEC 61508 with certificate, FMDEA)						
X	Special						

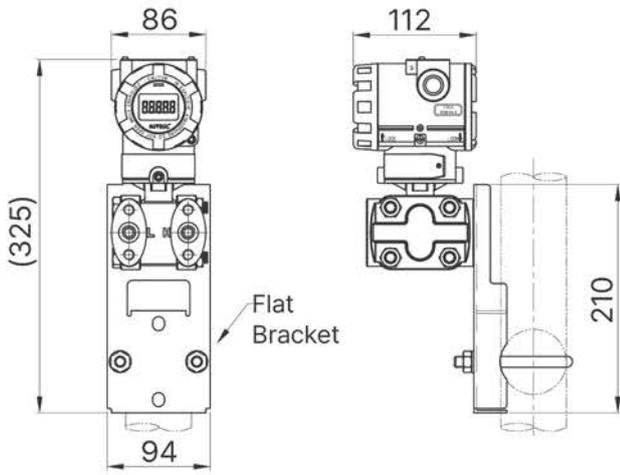
Example : APT3100-D5-M11-E1-1-S-1-M1-BA

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

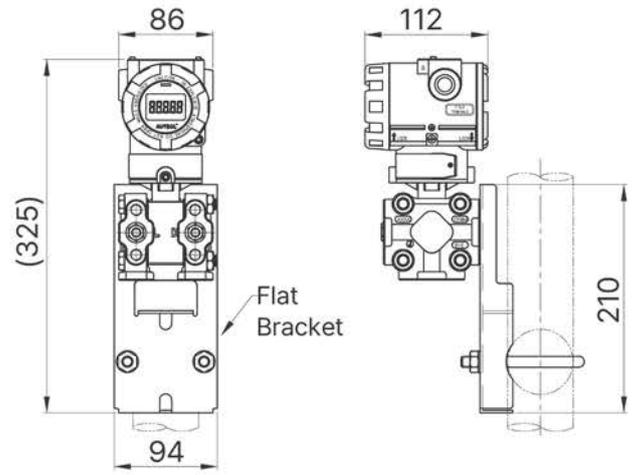
Note 2 : Depending on applications, the APT3100-L model offers various special remote diaphragm seal models. please contact the manufacturer for details.

Installation With Mounting Bracket

1 Pipe Mounting Bracket Model Flat Type

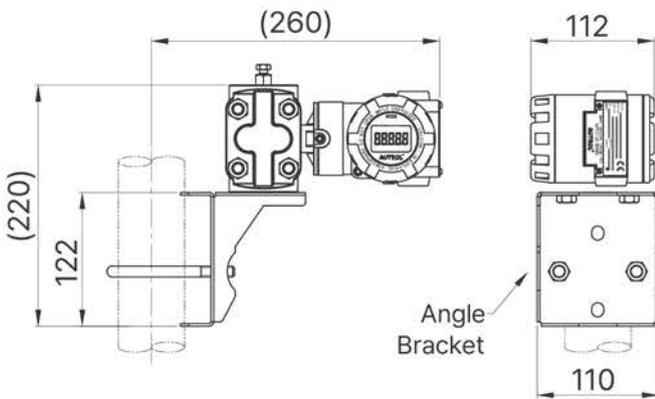


Standard Model

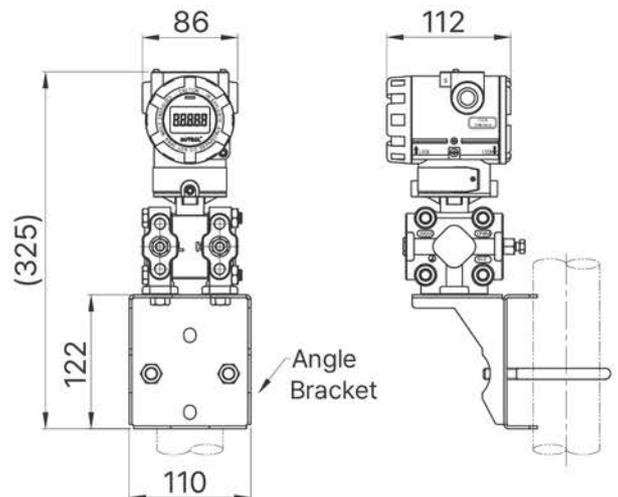


MP Type Model

2 Pipe Mounting Bracket Model Angle Type



Standard Model

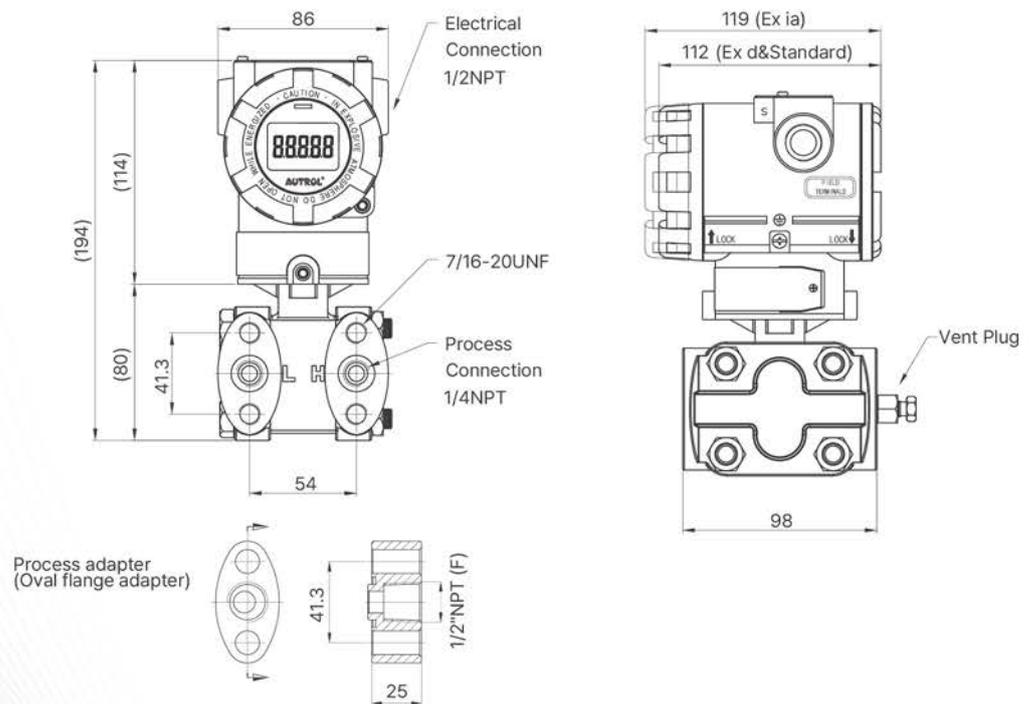


MP Type Model

Dimensions of Transmitter (mm)

* Dimensions of Transmitter may vary depending on the option selected. Please contact the production company for more details.

Standard (Intrinsically Safe) Model



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