Smart Pressure Transmitter

for Differential / Gauge / Absolute Pressure Measurement

BONT®

Bont Technologies GmbH

MODEL 31

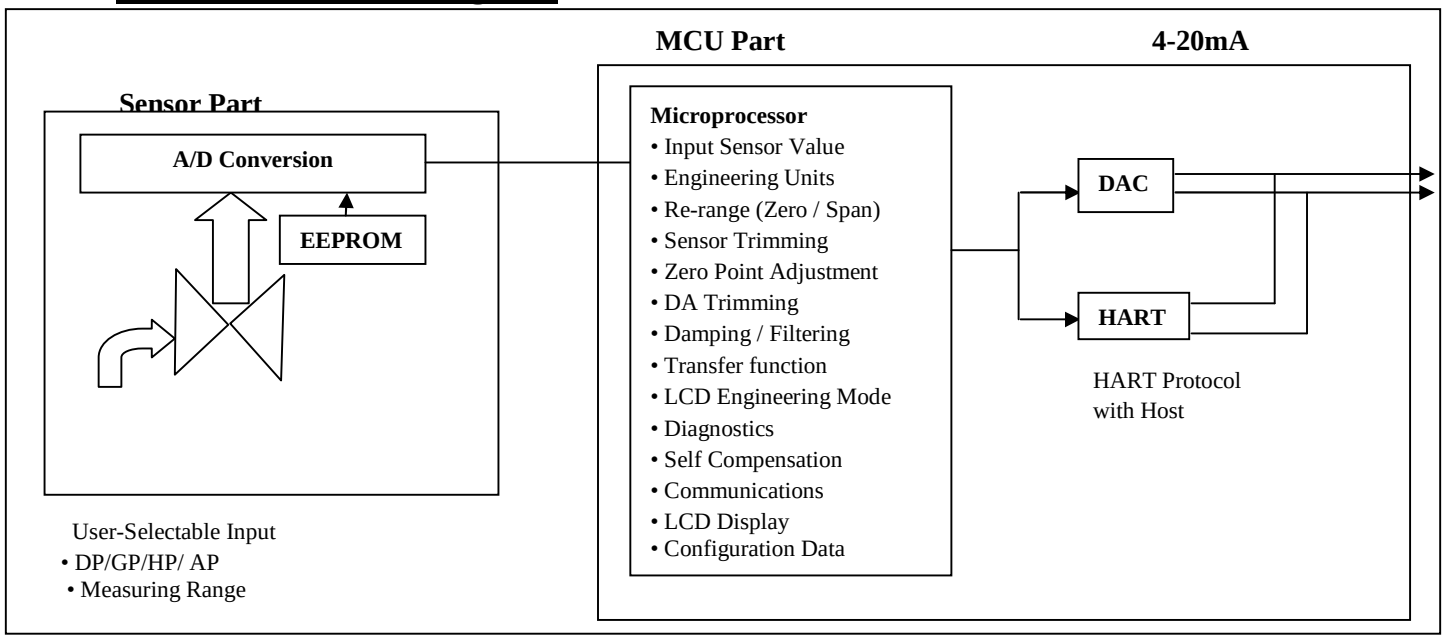
Description of Product

The 31 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 storedin EEPROM.

Function

» Flexible Sensor Input : DP, GP, AP, HP
» 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.
» Marine Certificate: ABS, LR, BR, DNV

Functional Block Diagram



Features

» Superior Performance

- High Reference Accuracy : ±0.075% of Calibrated Span
  (The option : ***±0.04% of Calibrated Span***)
- for range 2
  ±0.25% of Span for 0.1URL ≤ Span ≤ URL
  ±[0.24 + (0.008 x (URL/span))]% of Span
  for 0.05URL ≤ Span < 0.1URL
- for range 3
  ±0.075% of Span for 0.1URL ≤ Span ≤ URL
  ±[0.025 + (0.005 x (URL/span))]% of Span
  for 0.02URL ≤ Span < 0.1URL
- for ranges 4 to 0
  ±0.075% of Span for 0.1URL ≤ Span ≤ URL
  ±[0.025+(0.005 x (URL/span))]% of Span
  for 0.01URL ≤ Span ≤ 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

31 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 to 45 Vdc
- Voltage Rating : 24 Vdc ±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 to 85 (without condensing)

» Process Temperature Limits

(Range codes and approval codes may effect limits)

- -40 to 120 (-104 to 248)

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*
G8~9 *50 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)

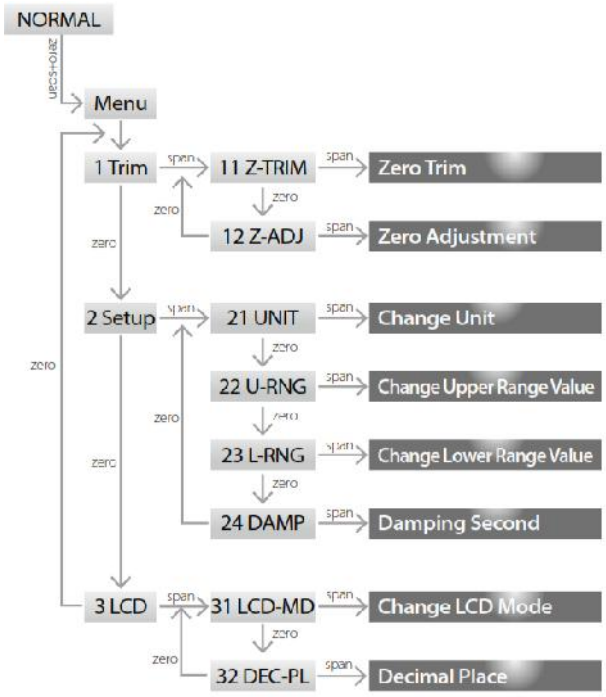
» User define unit function

» 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 :

» 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 304SST

» Electrical connections

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

» Process Connections

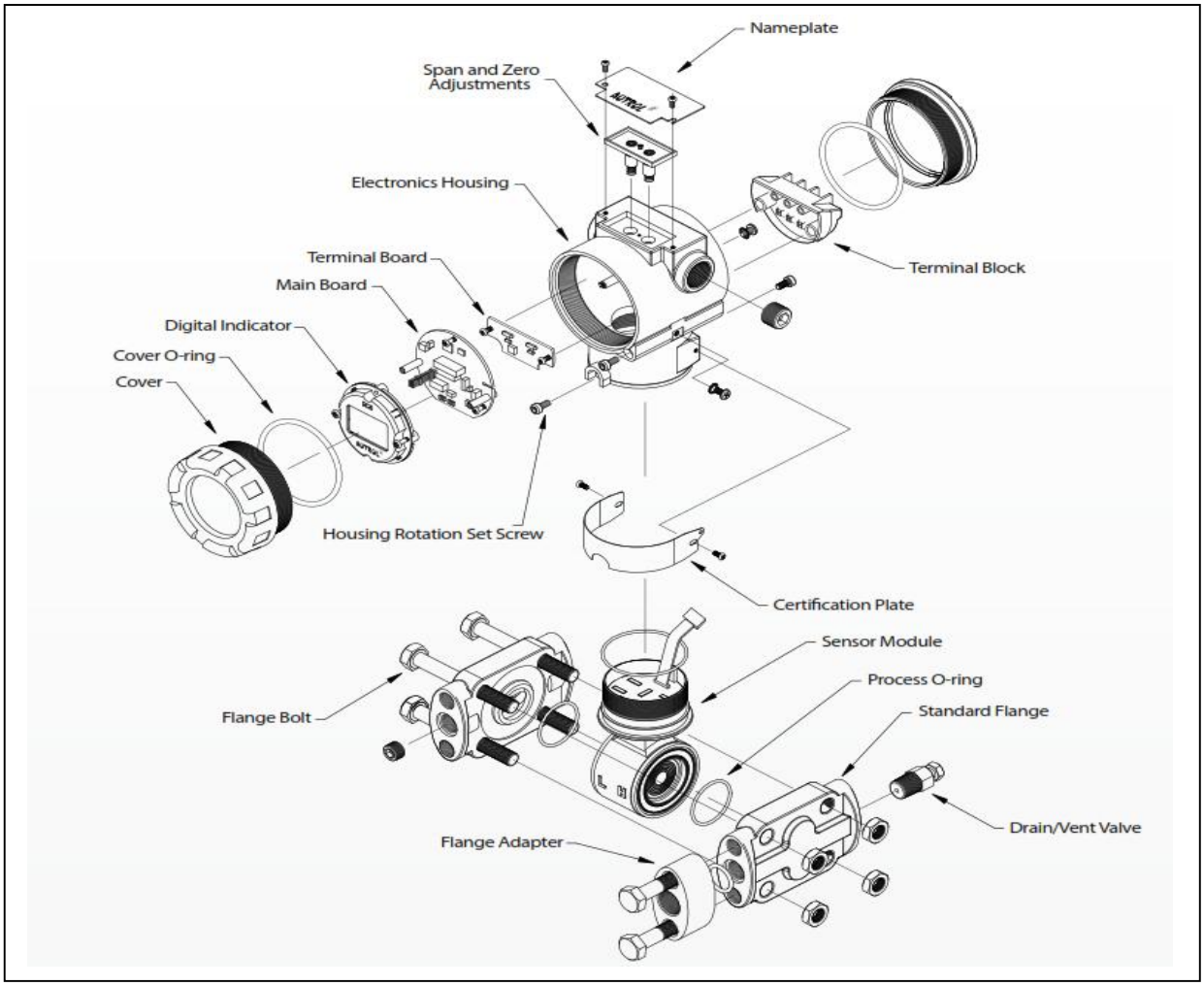
- 1/4-18 NPT on 2.126 inch (54.0 mm) centers on flanges for Standard
- 1/2-14 NPT on Process Adapter (option)

** Refer to drawing in the last page*

» Weight

- 3.9 kg (Standard - excluding options)
  5.35kg (SST Housing- excluding options) *304 SST*

Exploded drawing of Model 31



Hazardous Location Certifications (option)

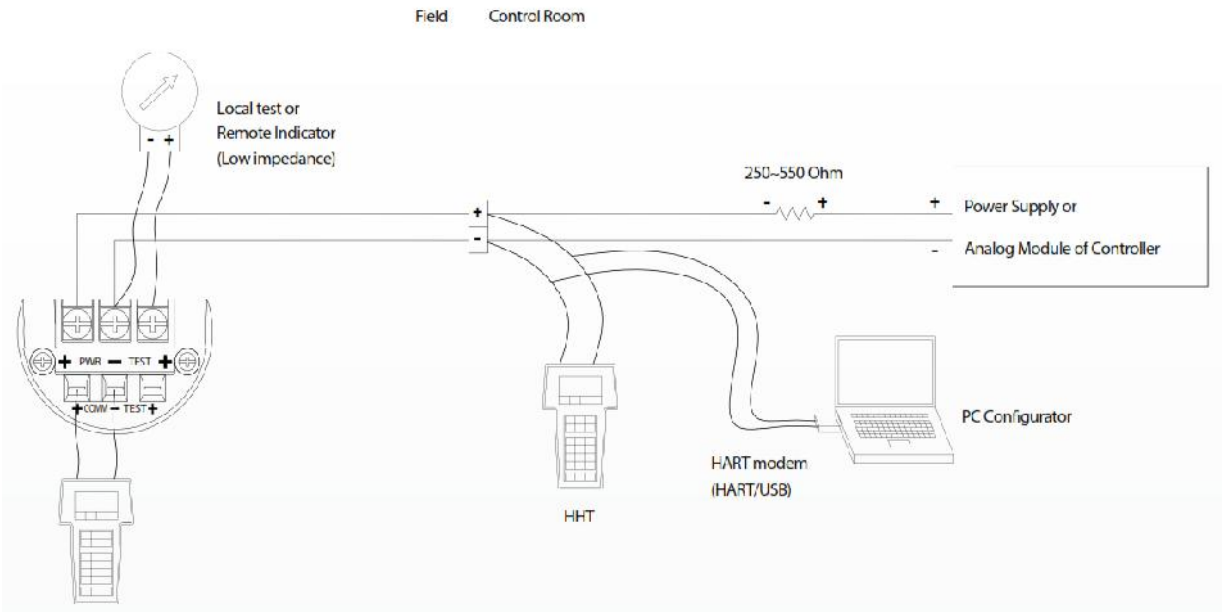
» KOSHA Approvals K1 Code :
* *KOSHA: Korea Occupational Safety & Health Agency*
Flameproof for Class I, Zone 1 : Ex d C T6, IP67
Ambient Temperature : -20 to 60 °C
Max. Process Temperature : 80 °C
Power Supply : Max. 45 Vdc
Output : 4 to 20 mA + HART, Max. 22 mA

» ATEX ApprovalsE1 Code :
CE 0344 II 2 G Ex d IIC T6, T5 or T4
Operating Temperature: -200C ≤ Tamb ≤+60 °C
T6 for process ≤ 850C ; T5 for process ≤ 100 °C
T4 ≤ 1300C
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=30Vdc, Ii=200mA, Pi=0.9W, Ci=47nF, Li=94μH

» 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: 24Vdc ± 30%

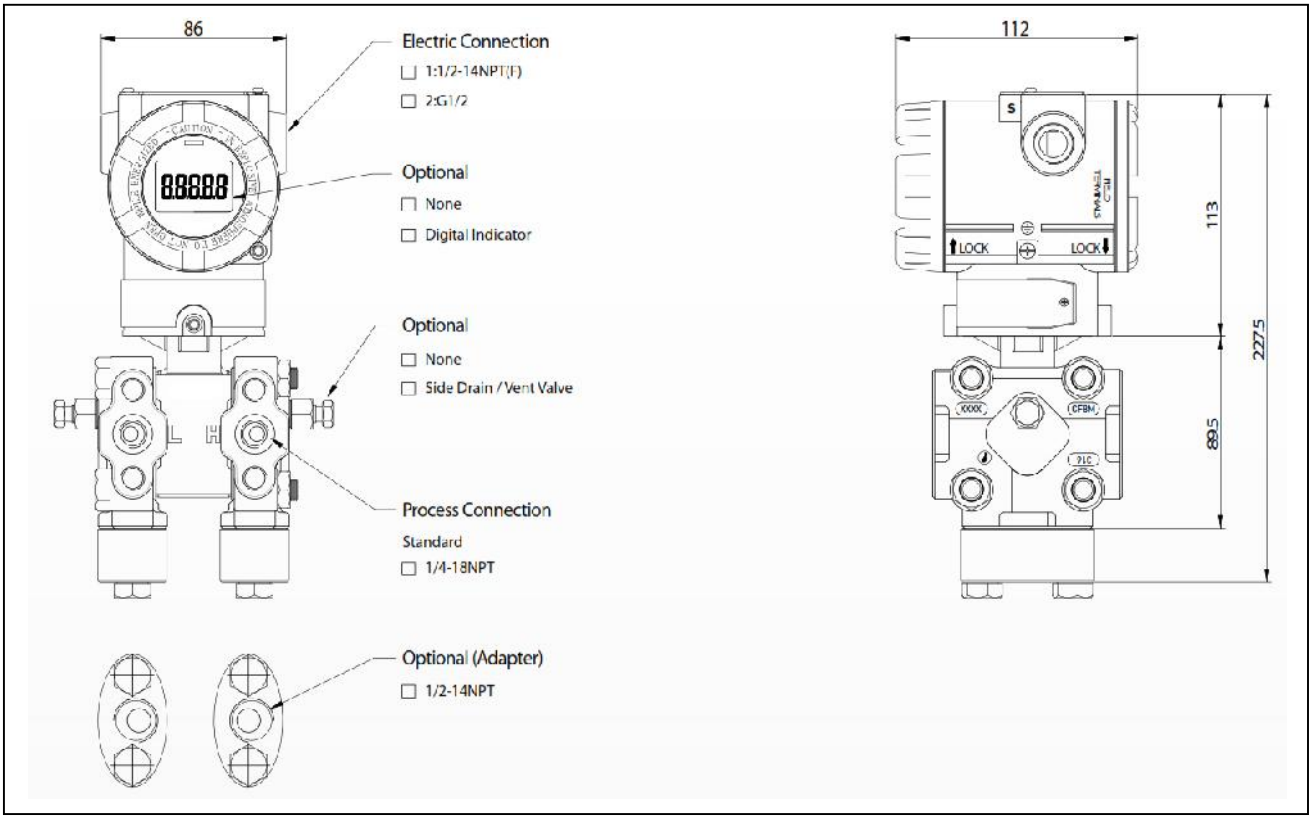
MODEL 31
MP Option

Easy installation regarless 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



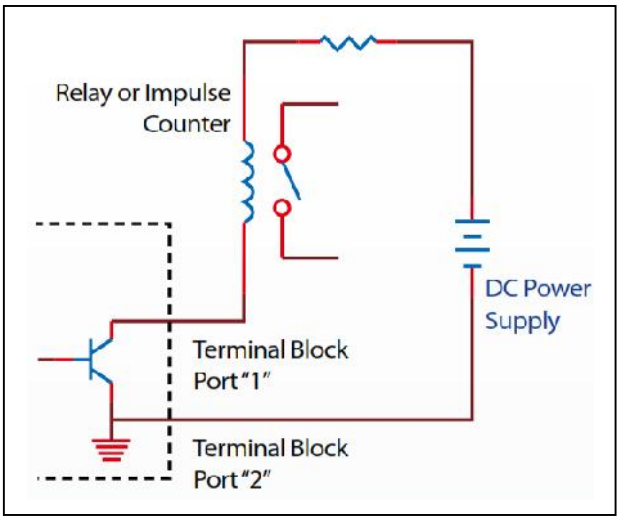
MODEL 31F

Description

31F is added the totalizing function in 31 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
» 31F 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

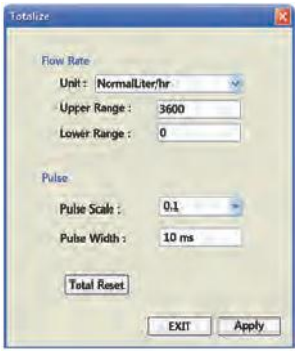
External Appearance

31F is same shape with 31 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.



GENERAL SPECIFICATIONS

1. 31 Pressure Sensor Range & URL

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/cm2	bar	psi	inH2O@40C	mmH2O@40C	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	12 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+0.005x(URL/Span)]% of Span (0.01URL≤Span<0.1URL)	**Ambient Temperature**	-40 ~ +850C
		LCD Meter Ambient Temp	-30 ~ +800C
		Humidity Limits	5% ~ 100% RH
Ambient Temp. Effect	±[0.019%URL+0.125% Span] / 28 °C	**Process Temperature Limits**	-400C ~ +1200C
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

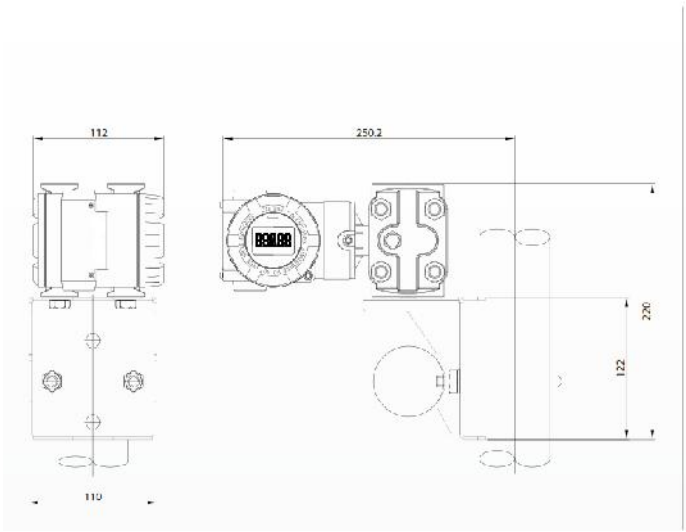
Isolating Diaphragm	316L SST	**Process Connection Size**	1/4 - 18 NPT
Drain & Vent Valve	316 SST	**(Adapter – Option)**	1/2 – 14 NPT
Flange & Adapter	316 SST	**Electrical Connections**	1/2 – 14 NPT with M4
O-ring	Viton, PTFE	**Weight (excluding Option Items)**	3.9 Kg (Standard) 5.35Kg(SST Housing)
Electronic Housing	Aluminum (Option:316L SST)	**2" Pipe Stanchion Type bracket**	Angle or Flat type
Bolts & Bolting Flange	304 SST	**Housing Class**	Waterproof (IP67), 4X

ORDERING INFORMATION

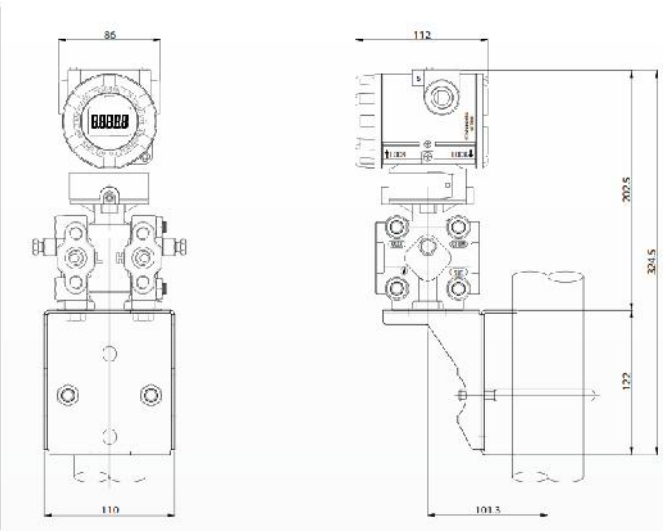
MODEL	Code	Description							
31	-D	Differential Pressure Transmitter (Static Pressure 13.79 MPa / 2000psi)							
	-F	Flow Transmitter (on the principle of Differential Pressure Use and only for Head)							
	-G	Gauge Pressure Transmitter							
	-H	Differential Pressure Transmitter for High Line Pressure (Static Pressure 31.02MPa / 4500psi)							
	-A	Absolute Pressure Transmitter							
Ranges		DP/GP/HP						*AP	
		Calibrated Span Min. to Max	Lower Range Limit			Upper Range Limits		Range	
			APT3100-D	APT3100-G	APT3100-H			APT3100-A	
	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)		0~1500 KPa	
	6	6.9 ~ 690 KPa	-690 KPa	-100KPa	-690 KPa	690 KPa (100 psi)		0~2500 KPa	
	7	20.68 ~ 2068 KPa	-2068 KPa	-100KPa	-2068 KPa	2068 KPa (300 psi)		NA	
	8	68.95 ~ 6895 KPa	-6895 KPa	-100KPa	NA	6895 KPa (1000 psi)		NA	
	9	206.8 ~ 20680 KPa	NA	-100KPa	NA	20680 KPa (3000 psi)		NA	
	0	413.7 ~ 41370 KPa	NA	-100KPa	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	Maker Standard (Waterproof : IP67)							
	K1	KOSHA Flameproof Approval			K2	KTL Intrinsic Safety Approval			
	E1	ATEX(KEMA) Flameproof			E2	ATEX(KEMA) Intrinsic Safety			
	F1	FM & FM Canada Explosion proof			F2	FM & FM Canada Intrinsic Safety			
Fill Fluid	1	Silicone (DC200)			2	Inert fill fluid (Halocarbon oil)			
Process Connection	S	1/4 - 18 NPT (Standard)			0	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			6WF	Flange Type			
	BA	Stainless Steel Bracket (Angle type) with SST							
	BF	Stainless Steel Bracket (Flat type) with SST							
	ST	Stainless Steel Housing							
	T	Teflon O-Ring (Wetted Part)							
	X	Special							

Installation With Mounting Bracket

2” Pipe Mounting Bracket Model Angle Type

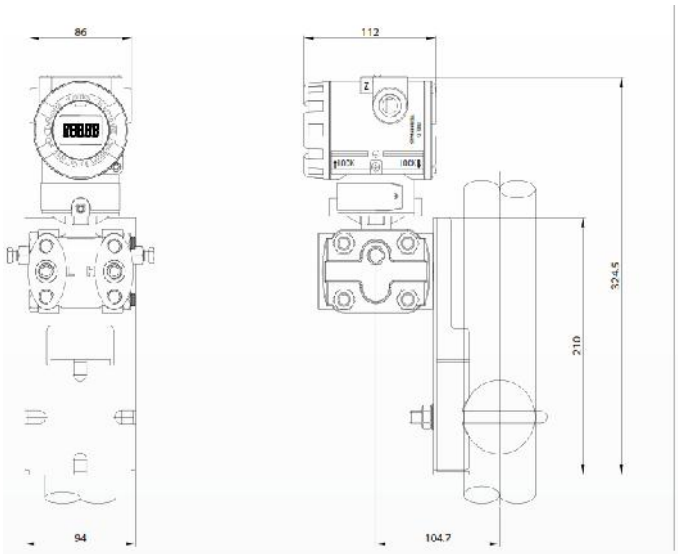


Standard Model

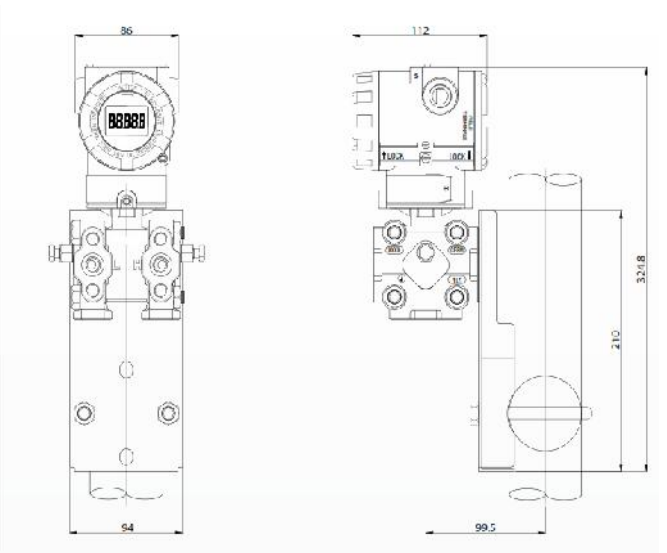


MP Model

2” Pipe Mounting Bracket Model Flat Type



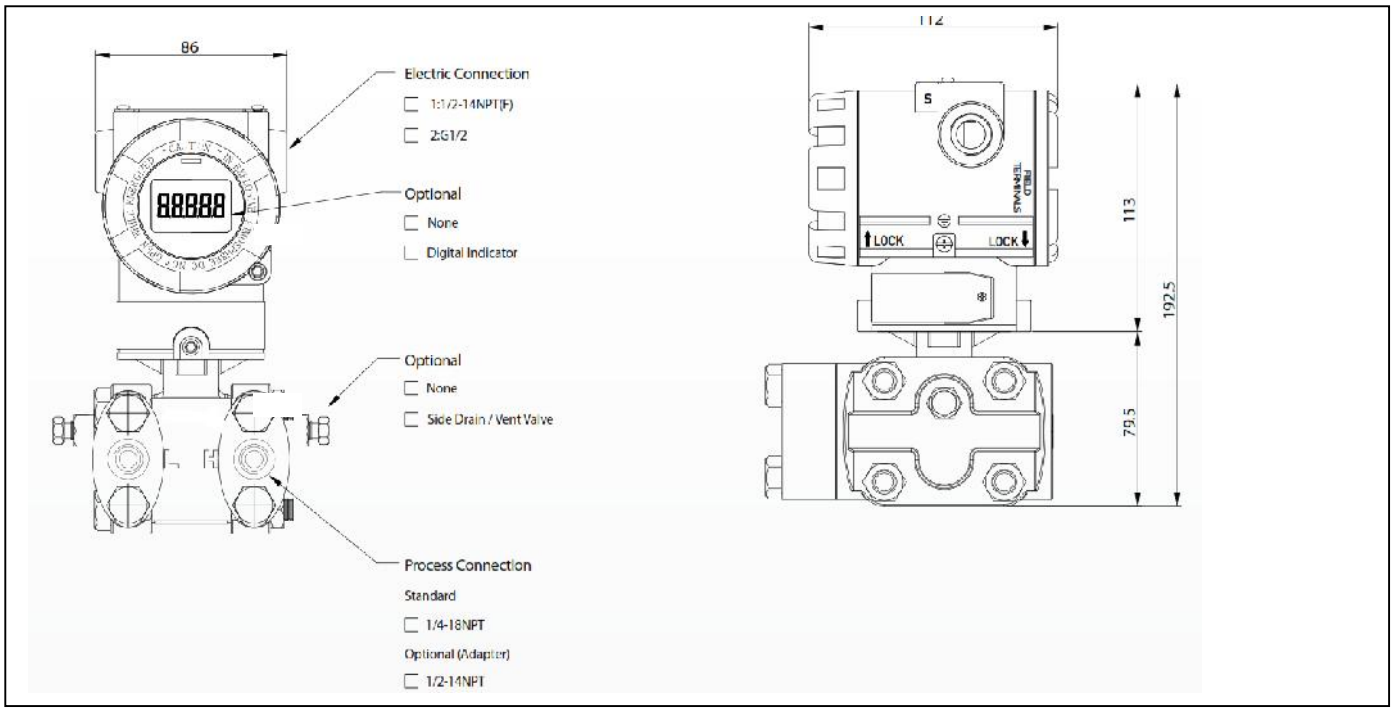
Standard Model



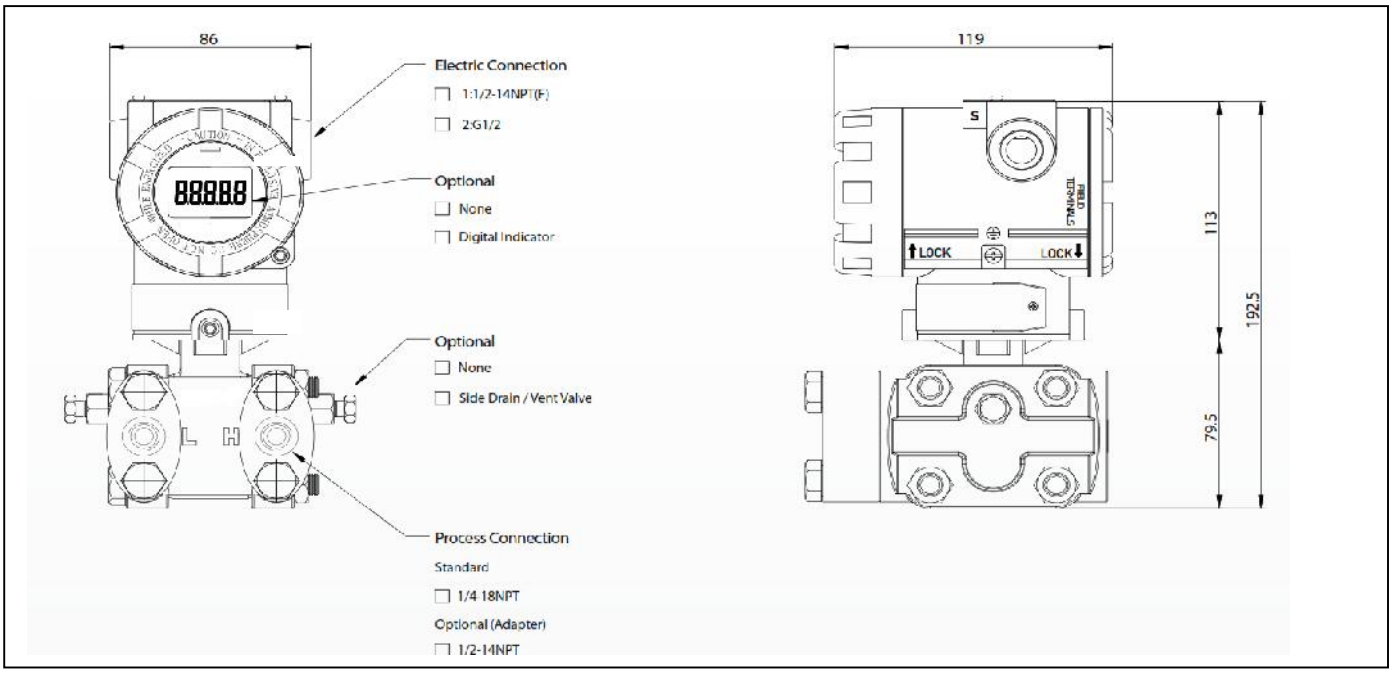
MP Model

Dimensions of Transmitter (mm)

Standard Model



Intrinsically Safe Model



Smart Pressure Transmitter with Diaphragm Seal

MODEL 31L

Smart Pressure Transmitter with Diaphragm Seal

MODEL 31L

Description of Product

The 31L 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. All Data of Sensor(Tag No., Type, Range) is to be input, modified and stored in EEPROM.

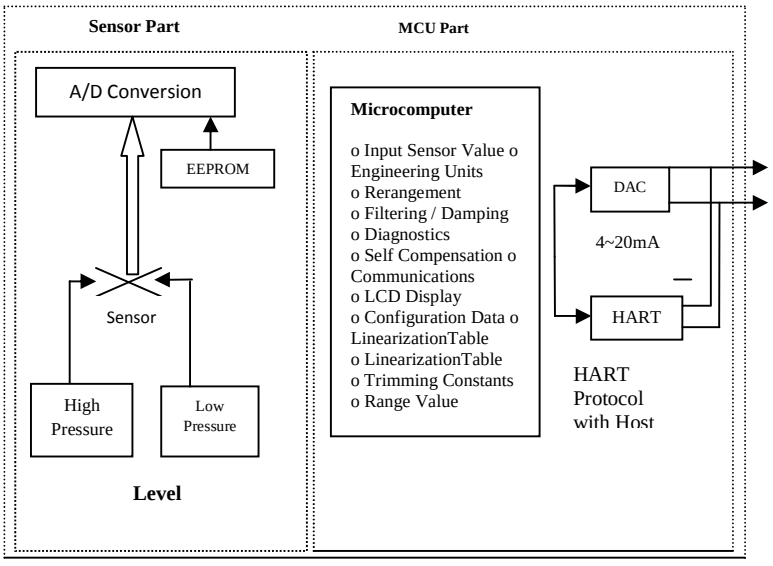
Function

» Flexible Sensor input : Measuring hydrostatic pressure head and transmitting liquid level
»Various output: 4 ~20mA(Analog),Digital Signals
» Automatic Compensation of Ambient Temperature
» Setting Various Parameters : Zero/Span, Fail-mode, Unit, Trim, etc.
» Self Diagnostic Function : Sensor, A/D Converter, Memory, Power, etc
» Digital Communication with HART protocol, Command.
» Explosion-proof Approval & Intrinsic Safety Approval : KOSHA, KTL,CSA, FM & ATEX

Features

- Superior Performance
  - High Reference Accuracy : ±0.075% of Calibrated Span (without seal)
  - Long-Term Stability
  - High Rangeability (20 : 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)

Functional Block Diagram



Type of Sensor & Configure Tools

- Selection of Various Pressure
  - Using Capacitive Pressure Sensor
  - Screw type. Diaphragm Seal as to process connection method.
  - User can select measuring sensor for DP, GP.

- Transmitter Output
  - Analog : 4 ~ 20mA DC
  -Digital : HART Digital Data.

- Configure Tools
  - Hand-Held Terminal : portable use in job-site, convenient input, change, review, up-down loading
  - The Configurator Software Package can be loaded on PC for users convenience

General Specificatons

1. Diaphragm Sealed Sensor Range (Rangeability : 20 : 1)

Class	Code	mmH2O	KPa
Low Level	4	0 ~ 194 to 0~ 3800	0 ~ 1.9 to 0 ~37.3
Medium Level	5	0 ~ 960 to 0 ~ 19000	0 ~ 9.4 to 0 ~ 186.5
High Level	6	0 ~ 3518 to 0 ~ 70000	0 ~ 34.5 to 0 ~ 690

2. Electrical Specifications

Power Supply	11.9 ~ 45 V dc	**Output Signal**	4 ~ 20 mA dc /HART
HART loop resistance	250 ~550 ohm	**Isolation**	500 Vrms (707V DC)
Update Time	0.25 Sec.	**Turn-on Time**	5 Sec.

3. Performance Specifications (without seal)

Reference Accuracy	± 0.075% of Span (0.2URLFSpan FURL) ± [0.05+0.005x(URL/Span)]% of Span (0.05URLFSpan<0.2URL)	**Operating Temp.**	-40 ~ +85°C
		LCD Meter Operating Temp.	-30 ~ +80°C
		Humidity Limits	5% ~ 98% RH
Ambient Temp. Effect	± [0.025%URL+0.125% Span]/28°C	**Process Temp. Limit**	-40 ~ +205°C
Stability	± 0.1% URL for 12 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**	1/2" - 14 NPT
Drain & Vent Valve	316 SST	**Diaphragm Seal(Flush/Extended)**	2" or 3" / 3" or 4"
Flange & Adapter	316 SST	**Electrical Connections**	1/2" – 14 NPT with M4
O-ring	Viton, PTFE	**Weight (only transmitter)**	3.9 Kg
Electronic Housing	Aluminum	**2" Pipe Stanchion Type bracket**	Angle or Flat type
Bolts & Bolting Flange	304 SST	**Housing Class**	Waterproof (IP67)

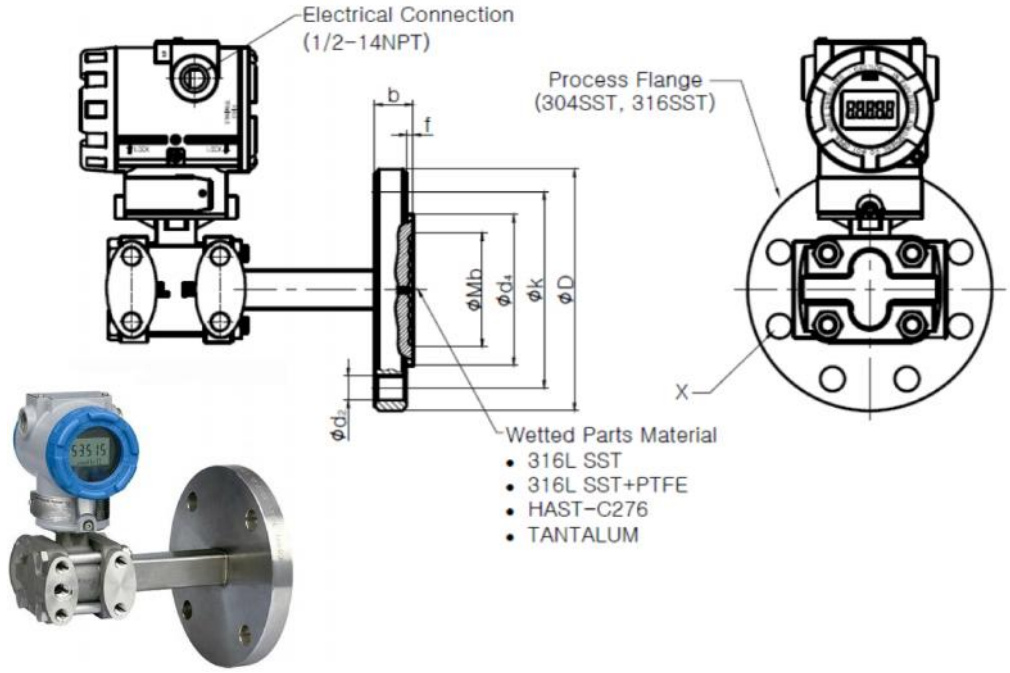
5. Hazardous Location Certifications – Option

Korea Standards Approval	Overseas Standards Approval
Flameproof Approval : Ex d IIC T6 (KOSHA) Intrinsic Safety Approval : Ex ia IIC T5 (KTL)	CSA Explosion proof Approval FM Explosion proof Approval ATEX Flame proof Approval

Dimensional Drawing (mm)

MODEL 31LFD

For Flush Diaphragm Seal and Direct Mount Type Transmitter



Flange Size : 80mm (3 inch)

Flange Rating	Mb	D	b	d2	k	f	D4	x
ANSI Class150	89	190	24	20	152.5	2	127	4
ANSI Class300		210	29	22	168.5		127	8
JIS 10K	89	185	18	19	150	2	126	8
JIS 20K		200	22	23	160		132	
DIN PN 10/16	89	200	20	18	160	2	138	8
DIN PN 25/40			24					

Flange Size : 50mm (2 inch)

Flange Rating	Mb	D	b	d2	k	f	d4	x
ANSI Class150	59	150	20	20	120.5	2	92	4
ANSI Class300		165	22.5		127			8
JIS 10K	59	155	16	19	120	2	96	4
JIS 20K			18					8
DIN PN 10/16	59	165	20	18	125	2	102	4
DIN PN 25/40								

Ordering Information

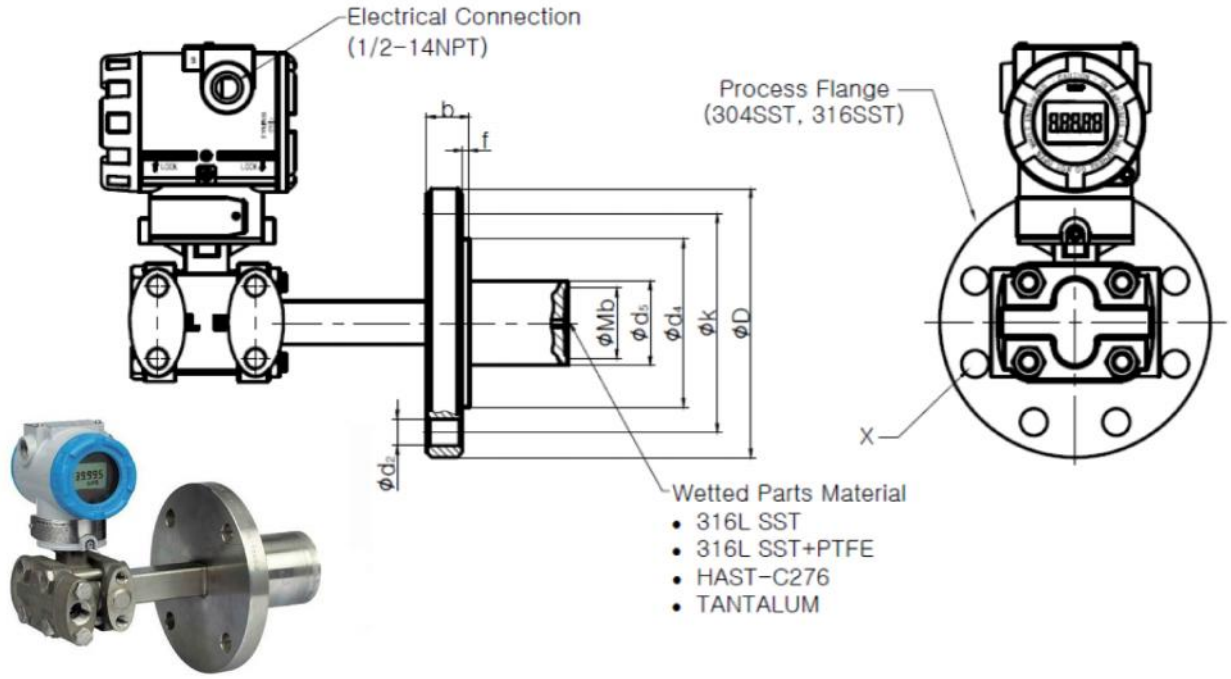
MODEL NO.	Code	Description		
31	LFD	Flush Diaphragm Seal and Direct Mount Type Transmitter		
Ranges	4	0-194 to 0-3800mmH2O (0-1.9 to 0-37.3 KPa)		
	5	0-960 to 0-19000mmH2O (0-9.4 to 0-186.5 KPa)		
	6	0-3518 to 0-70000mmH2O (0-34.5 to 0-690 KPa)		
	X	Special		
Mounting Flange Size/Material	C2	2-inch (50mm)	C.Steel	
	S2	2-inch (50mm)	SST	
	C3	3-inch (80mm)	C.Steel	
	S3	3-inch (80mm)	SST	
	XX	Special		
Mounting Flange Rating	A1	ANSI Class 150		
	A2	ANSI Class 300		
	J1	JIS 10K		
	J2	JIS 20K		
	D1	DIN PN 10/16		
	D2	DIN PN 25/40		
	XX	Special		
Wetted Parts Material Diaphragm/Others		**DIAPHRAGM**	**OTHERS**	
	S	316L SST	316L SST	
	PT	PTFE + 316L SST	316L SST	
	H	Hastelloy C-276	316L SST	
	T	Tantalum	316L SST	
	X	Special	Special	
Fill Fluid		**FILL FLUID**	**TEMPERATURE LIMITS**	
	2	D.C Silicone 200	-40 to 205 ℃ (-40 to 400 ℉)	
	7	D.C Silicone 704	0 to 315 ℃ (32 to 600 ℉)	
	X	Special		
Materials of Construction		**FLANGE**	**VENT/DRAIN VALVE**	
	CS	C.Steel	316 SST	
	SS	316 SST	316 SST	
Low Side	W	without Process Adapter (1/4-18 NPT on the cover flange)		
	N	with 1/2-14 NPT Process Adapter (316 SST)		
	X	Special		
Electrical Connection		**ELECTRICAL CONNECTION**	**MATERIAL**	
	1	1/2-14NPT	Epoxy Coated-Aluminum	
	2	G1/2	Epoxy Coated-Aluminum	
	X	Special		
Hazardous Locations Certifications	K0	Maker Standard (Waterproof : IP67)		
	K1	KOSHA Flameproof Approval : Ex d IIC T6.		
	K2	KTL Intrinsic Safety Approval : Ex ia IIC		
	E1	ATEX(KEMA) Flameproof		
	*E2	ATEX(KEMA) Intrinsic Safety		
	C1	CSA Explosion proof		
	*C2	CSA Intrinsic Safety		
	F1	FM Explosion proof		
	*F2	FM Intrinsic Safety		
Option	M1	LCD Indicator	LP	Lighting Protector
	W	SUS 304 Bolts and Nuts	ET	External Terminal Block
	C6	Engineering Unit	ST	Stainless Steel Housing
	K	Oil Free Finish		
	X	Special Order		

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

Dimensional Drawing (mm)

MODEL 31LED

For Extended Diaphragm Seal and Direct Mount Type Transmitter



Flange Size : 80mm (3 inch)

Flange Rating	Mb	D	b	d2	k	f	D4	D5	X
ANSI Class150	72	190	24	20	152.5	1.6	127	76	4
ANSI Class300		210	29	22	168.5				8
JIS 10K	72	185	18	19	150	2	126	76	8
JIS 20K		200	22	23	160		132		
DIN PN 10/16	72	200	20	18	160	2	138	76	8
DIN PN 25/40			24						

Flange Size : 50mm (2 inch)

Flange Rating	Mb	D	b	d2	k	f	D4	D5	X
ANSI Class150	47	150	20	20	120.5	2	92	48.3	4
ANSI Class300		165	22.5		127				8
JIS 10K	47	155	16	19	120	2	96	48.3	4
JIS 20K			18						8
DIN PN 10/16	47	165	20	18	125	2	102	48.3	4
DIN PN 25/40									

Diaphragm Extension Length Code	R
5	50mm (2 inch)
10	100mm (4 inch)
15	150mm (6 inch)

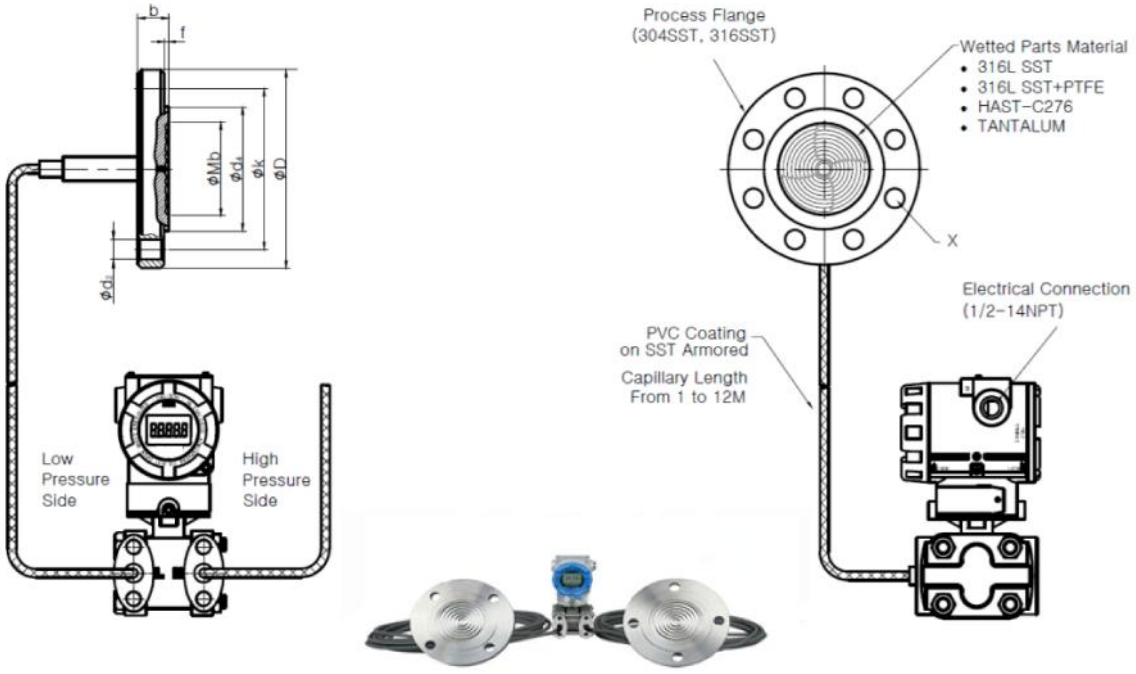
Ordering Information

MODEL NO.	Code	Description		
31	-LED	Extended Diaphragm Seal and Direct Mount Type Transmitter		
Range	4	0-194 to 0-3800mmH2O (0-1.9 to 0-37.3 KPa)		
	5	0-960 to 0-19000mmH2O (0-9.4 to 0-186.5 KPa)		
	6	0-3518 to 0-70000mmH2O (0-34.5 to 0-690 KPa)		
	x	Special		
Mounting Flange Size/Material	C2	2-inch (50mm)	C.Steel	
	S2	2-inch (50mm)	SST	
	C3	3-inch (80mm)	C.Steel	
	S3	3-inch (80mm)	SST	
	XX	Special		
Mounting Flange Rating	A1	ANSI Class 150		
	A2	ANSI Class 300		
	J1	JIS 10K		
	J2	JIS 20K		
	D1	DIN PN 10/16		
	D2	DIN PN 25/40		
	XX	Special		
Extension Length	05	50mm (2in.)		
	10	100mm (4in.)		
	15	150mm (6in.)		
	XX	Special		
Wetted Parts Material Diaphragm/Others		**DIAPHRAGM**	**OTHERS**	
	S	316L SST	316L SST	
	PT	PTFE + 316L SST	316L SST	
	H	Hastelloy C-276	316L SST	
	T	Tantalum	316L SST	
	X	Special	Special	
Fill Fluid		**FILL FLUID**	**TEMPERATURE LIMITS**	
	2	D.C Silicone 200	-40 to 205 ℃ (-40 to 400 °F)	
	7	D.C Silicone 704	0 to 315 ℃ (32 to 600 °F)	
	X	Special		
Materials of Construction		**FLANGE**	**VENT/DRAIN VALVE**	
	CS	Plated C.Steel	316 SST	
	SS	316 SST	316 SST	
Low Side	W	without Process Adapter (1/4-18 NPT on the cover flange)		
	N	with 1/2-14 NPT Process Adapter (316 SST)		
	X	Special		
Electrical Connection		**ELECTRICAL CONNECTION**	**MATERIAL**	
	1	1/2-14NPT	Epoxy Coated-Aluminum	
	2	G1/2	Epoxy Coated-Aluminum	
	X	Special		
Hazardous Locations Certifications	K0	Maker Standard (Waterproof : IP67)		
	K1	KOSHA Flameproof Approval : Ex d IIC T6.		
	K2	KTL Intrinsic Safety Approval : Ex ia IIC		
	E1	ATEX(KEMA) Flameproof		
	*E2	ATEX(KEMA) Intrinsic Safety		
	C1	CSA Explosion proof		
	*C2	CSA Intrinsic Safety		
	F1	FM Explosion proof		
	*F2	FM Intrinsic Safety		
Option	M1	LCD Indicator	LP	Lighting Protector
	W	SUS 304 Bolts and Nuts	ET	External Terminal Block
	C6	Engineering Unit	ST	Stainless Steel Housing
	K	Oil Free Finish		
	X	Special Order		

Dimensional Drawing (mm)

MODEL 31LFC

For Flush Diaphragm Seal and Capillary Type Transmitter



Flange Size : 80mm (3 inch)

Flange Rating	Mb	D	b	d2	k	f	d4	x
ANSI Class150	89	190	24	20	152.5	2	127	4
ANSI Class300		210	29	22	168.5		127	8
JIS 10K	89	185	18	19	150	2	126	8
JIS 20K		200	22	23	160		132	
DIN PN 10/16	89	200	20	18	160	2	138	8
DIN PN 25/40			24					

Flange Size : 50mm (2 inch)

Flange Rating	Mb	D	b	d2	k	f	d4	x
ANSI Class150	59	150	20	20	120.5	2	92	4
ANSI Class300		165	22.5		127			8
JIS 10K	59	155	16	19	120	2	96	4
JIS 20K			18					8
DIN PN 10/16	59	165	20	18	125	2	102	4
DIN PN 25/40								

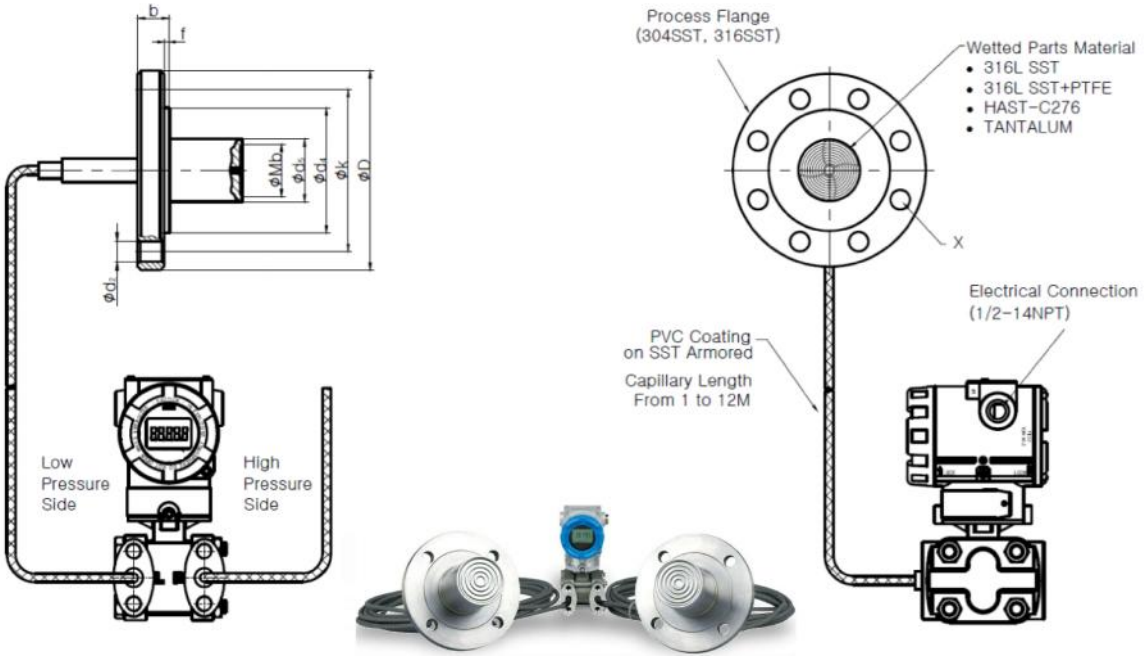
Ordering Information

MODEL NO.	Code	Description		
31	-LFC	Flush Diaphragm Seal and Capillary Type Transmitter (Two remote Seal)		
Ranges	4	0-194 to 0-3800mmH2O (0-1.9 to 0-37.3 KPa)		
	5	0-960 to 0-19000mmH2O (0-9.4 to 0-186.5 KPa)		
	6	0-3518 to 0-70000mmH2O (0-34.5 to 0-690 KPa)		
	x	Special		
Mounting Flange Size/Material	C2	50mm (2-inch)	C.Steel	
	S2	50mm (2-inch)	SST	
	C3	80mm (3-inch)	C.Steel	
	S3	80mm (3-inch)	SST	
	XX	Special		
Mounting Flange Rating	A1	ANSI Class 150		
	A2	ANSI Class 300		
	J1	JIS 10K		
	J2	JIS 20K		
	D1	DIN PN 10/16		
	D2	DIN PN 25/40		
	XX	Special		
Wetted Parts Material Diaphragm/Others		**DIAPHRAGM**	**OTHERS**	
	S	316L SST	316L SST	
	PT	PTFE + 316L SST	316L SST	
	H	Hastelloy C-276	316L SST	
	T	Tantalum	316L SST	
	X	Special	Special	
Fill Fluid		**FILL FLUID**	**TEMPERATURE LIMITS**	
	2	D.C Silicone 200	-40 to 205 ℃ (-40 to 400 ℉)	
	7	D.C Silicone 704	0 to 315 ℃ (32 to 600 ℉)	
	X	Special		
Capillary Length (m)	☐☐	Capillary Length from 1 to 12mm (Example for 3m : 03)		
Materials of Construction		**FLANGE**	**VENT/DRAIN VALVE**	
	CS	Plated C.Steel	316 SST	
	SS	316 SST	316 SST	
Electrical Connection		**ELECTRICAL CONNECTION**	**MATERIAL**	
	1	1/2-14NPT	Epoxy Coated-Aluminum	
	2	G1/2	Epoxy Coated-Aluminum	
	X	Special		
Hazardous Locations Certifications	K0	Maker Standard (Waterproof : IP67)		
	K1	KOSHA Flameproof Approval : Ex d IIC T6.		
	K2	KTL Intrinsic Safety Approval : Ex ia IIC		
	E1	ATEX(KEMA) Flameproof		
	*E2	ATEX(KEMA) Intrinsic Safety		
	C1	CSA Explosion proof		
	*C2	CSA Intrinsic Safety		
	F1	FM Explosion proof		
	*F2	FM Intrinsic Safety		
Option	M1	LCD Indicator	LP	Lighting Protector
	W	SUS 304 Bolts and Nuts	ET	External Terminal Block
	C6	Engineering Unit	ST	Stainless Steel Housing
	K	Oil Free Finish		
	P	PVC Coating on SST Armored		
	BA	Stainless Steel Bracket (Angle type) with SST Bolts		
	BF	Stainless Steel Bracket (Flat type) with SST Bolts		
	CA	Painted Steel Mounting Bracket (Angle Type) with SST Bolts		
	CF	Painted Steel Mounting Bracket (Flat Type) with SST Bolts		
	X	Special Order		

Dimensional Drawing (mm)

MODEL 31LEC

For Extended Diaphragm Seal and
Capillary Type Transmitter



Flange Size : 80mm (3 inch)

Flange Rating	Mb	D	b	d2	k	f	d4	d5	x
ANSI Class150	72	190	24	20	152.5	1.6	127	76	4
ANSI Class300		210	29	22	168.5				8
JIS 10K	72	185	18	19	150	2	126	76	8
JIS 20K		200	22	23	160		132		
DIN PN 10/16	72	200	20	18	160	2	138	76	8
DIN PN 25/40			24						

Flange Size : 50mm (2 inch)

Flange Rating	Mb	D	b	d2	k	f	d4	d5	x
ANSI Class150	47	150	20	20	120.5	2	92	4	4
ANSI Class300		165	22.5		127			8	8
JIS 10K	47	155	16	19	120	2	96	4	4
JIS 20K			18					8	8
DIN PN 10/16	47	165	20	18	125	2	102	4	4
DIN PN 25/40									

Diaphragm Extension Length Code	R
5	50mm (2 inch)
10	100mm (4 inch)
15	150mm (6 inch)

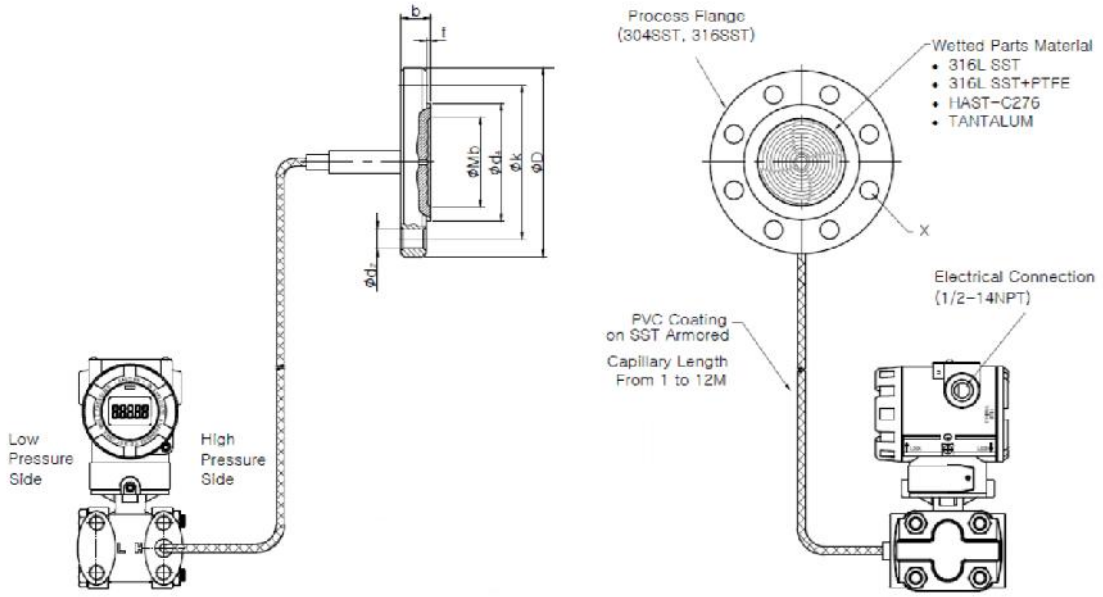
Ordering Information

MODEL NO.	Code	Description		
31	-LEC	Extended Diaphragm Seal and Capillary Type Transmitter (Two Remote Seal)		
Ranges	4	0-194 to 0-3800mmH2O (0-1.9 to 0-37.3 KPa)		
	5	0-960 to 0-19000mmH2O (0-9.4 to 0-186.5 KPa)		
	6	0-3518 to 0-70000mmH2O (0-34.5 to 0-690 KPa)		
	x	Special		
Mounting Flange Size/Material	C2	50mm (2-inch)	C.Steel	
	S2	50mm (2-inch)	SST	
	C3	50mm (2-inch)	C.Steel	
	S3	50mm (2-inch)	SST	
	XX	Special		
Mounting Flange Rating	A1	ANSI Class 150		
	A2	ANSI Class 300		
	J1	JIS 10K		
	J2	JIS 20K		
	D1	DIN PN 10/16		
	D2	DIN PN 25/40		
	XX	Special		
Extension Length	5	50mm (2in.)		
	10	100mm (4in.)		
	15	150mm (6in.)		
	XX	Special		
Wetted Parts Material Diaphragm/Others		**DIAPHRAGM**	**OTHERS**	
	S	316L SST	316L SST	
	PT	PTFE + 316L SST	316L SST	
	H	Hastelloy C-276	316L SST	
	T	Tantalum	316L SST	
	X	Special	Special	
Fill Fluid		**FILL FLUID**	**TEMPERATURE LIMITS**	
	2	D.C Silicone 200	-40 to 205 ℃ (-40 to 400 ℉)	
	7	D.C Silicone 704	0 to 315 ℃ (32 to 600 ℉)	
	X	Special		
Capillary Length (m)	□	Capillary Length from 1 to 12mm (Example for 3m : 03)		
Materials of Construction		**FLANGE**	**VENT/DRAIN VALVE**	
	CS	Plated C.Steel	316 SST	
	SS	316 SST	316 SST	
Electrical Connection		**ELECTRICAL CONNECTION**	**MATERIAL**	
	1	1/2-14NPT	Epoxy Coated-Aluminum	
	2	G1/2	Epoxy Coated-Aluminum	
	X	Special		
Hazardous Locations Certifications	K0	Maker Standard (Waterproof : IP67)		
	K1	KOSHA Flameproof Approval : Ex d IIC T6.		
	K2	KTL Intrinsic Safety Approval : Ex ia IIC		
	E1	ATEX(KEMA) Flameproof		
	*E2	ATEX(KEMA) Intrinsic Safety		
	C1	CSA Explosion proof		
	*C2	CSA Intrinsic Safety		
	F1	FM Explosion proof		
	*F2	FM Intrinsic Safety		
Option	M1	LCD Indicator	LP	Lighting Protector
	W	SUS 304 Bolts and Nuts	ET	External Terminal Block
	C6	Engineering Unit	ST	Stainless Steel Housing
	K	Oil Free Finish		
	P	PVC Coating on SST Armored		
	BA	Stainless Steel Bracket (Angle type) with SST Bolts		
	BF	Stainless Steel Bracket (Flat type) with SST Bolts		
	CA	Painted Steel Mounting Bracket (Angle Type) with SST Bolts		
	CF	Painted Steel Mounting Bracket (Flat Type) with SST Bolts		
	X	Special Order		

Dimensional Drawing (mm)

MODEL 31LFS

For Flush Diaphragm Seal and
Capillary Type Transmitter



Flange Size : 80mm (3 inch)

Flange Rating	Mb	D	b	d2	k	f	d4	x
ANSI Class150	89	190	24	20	152.5	2	127	4
ANSI Class300		210	29	22	163.5		127	8
JIS 10K	89	185	18	19	150	2	126	8
JIS 20K		200	22	23	160		132	
DIN PN 10/16	89	200	20	18	160	2	138	8
DIN PN 25/40			24					

Dimensional Drawing (mm)

Flange Rating	Mb	D	b	d2	k	f	d4	x
ANSI Class150	59	150	20	20	120.5	2	92	4
ANSI Class300		165	22.5		127			8
JIS 10K	59	155	16	19	120	2	96	4
JIS 20K			18					8
DIN PN 10/16	59	165	20	18	125	2	102	4
DIN PN 25/40								

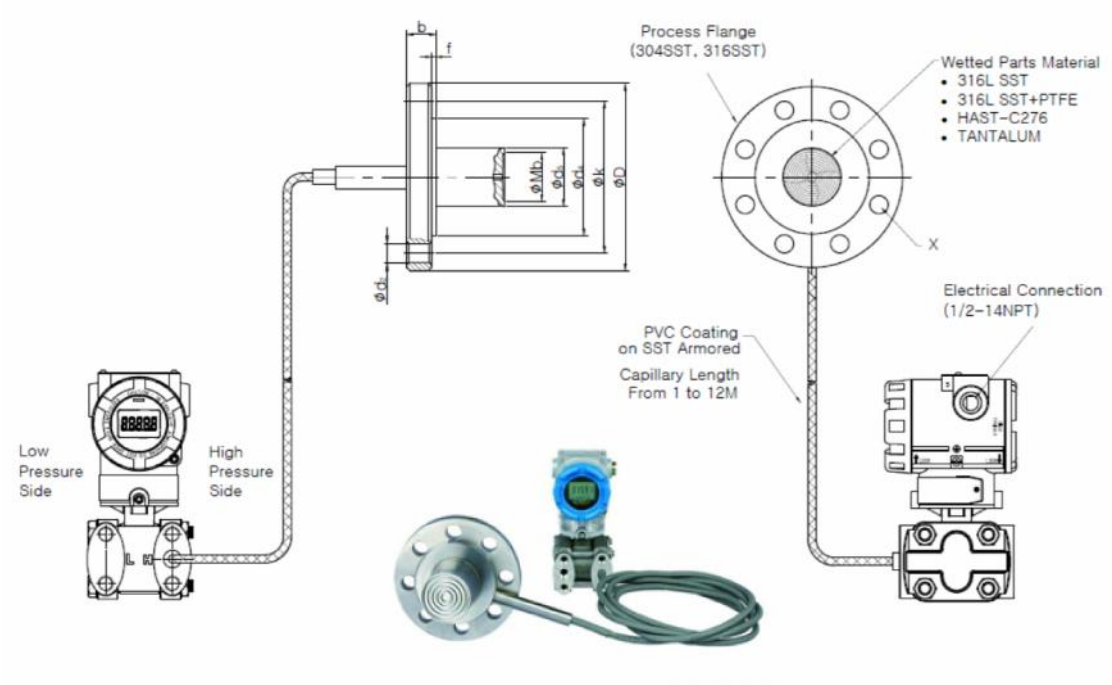
Ordering Information

MODEL NO.	Code	Description		
31	-LFS	Flush Diaphragm Seal and Capillary Type Transmitter (One Remote Seal)		
Ranges	6	0-3518 to 0-70000mmH2O (0-34.5 to 0-690 KPa)		
	7	0-10565 to 0-211300mmH2O (0-103.4 to 0-2068 KPa)		
	8	0-35217 to 0-704340mmH2O (0-344.8 to 0-6895 KPa)		
	x	Special		
Mounting Flange Size/Material	C2	50mm (2-inch)	C.Steel	
	S2	50mm (2-inch)	SST	
	C3	80mm (3-inch)	C.Steel	
	S3	80mm (3-inch)	SST	
	XX	Special		
Mounting Flange Rating	A1	ANSI Class 150		
	A2	ANSI Class 300		
	J1	JIS 10K		
	J2	JIS 20K		
	D1	DIN PN 10/16		
	D2	DIN PN 25/40		
	XX	Special		
Wetted Parts Material Diaphragm/Others		**DIAPHRAGM**	**OTHERS**	
	S	316L SST	316L SST	
	PT	PTFE + 316L SST	316L SST	
	H	Hastelloy C-276	316L SST	
	T	Tantalum	316L SST	
	X	Special	Special	
Fill Fluid		**FILL FLUID**	**TEMPERATURE LIMITS**	
	2	D.C Silicone 200	-40 to 205 ℃ (-40 to 400 ℉)	
	7	D.C Silicone 704	0 to 315 ℃ (32 to 600 ℉)	
	X	Special		
Capillary Length (m)	□	Capillary Length from 1 to 12mm (Example for 3m : 03)		
Materials of Construction		**FLANGE**	**VENT/DRAIN VALVE**	
	CS	Plated C.Steel	316 SST	
	SS	316 SST	316 SST	
Electrical Connection		**ELECTRICAL CONNECTION**	**MATERIAL**	
	1	1/2-14NPT	Epoxy Coated-Aluminum	
	2	G1/2	Epoxy Coated-Aluminum	
	X	Special		
Hazardous Locations Certifications	K0	Maker Standard (Waterproof : IP67)		
	K1	KOSHA Flameproof Approval : Ex d IIC T6.		
	K2	KTL Intrinsic Safety Approval : Ex ia IIC		
	E1	ATEX(KEMA) Flameproof		
	*E2	ATEX(KEMA) Intrinsic Safety		
	C1	CSA Explosion proof		
	*C2	CSA Intrinsic Safety		
	F1	FM Explosion proof		
	*F2	FM Intrinsic Safety		
Option	M1	LCD Indicator	LP	Lighting Protector
	W	SUS 304 Bolts and Nuts	ET	External Terminal Block
	C6	Engineering Unit	ST	Stainless Steel Housing
	K	Oil Free Finish		
	P	PVC Coating on SST Armored		
	BA	Stainless Steel Bracket (Angle type) with SST Bolts		
	BF	Stainless Steel Bracket (Flat type) with SST Bolts		
	CA	Painted Steel Mounting Bracket (Angle Type) with SST Bolts		
	CF	Painted Steel Mounting Bracket (Flat Type) with SST Bolts		
	X	Special Order		

Dimensional Drawing (mm)

For Extended Diaphragm Seal and
Capillary Type Transmitter

MODEL 31LES



Flange Size : 80mm (3 inch)

Flange Rating	Mb	D	b	d2	k	f	d4	d5	x
ANSI Class150	72	190	24	20	152.5	1.6	127	76	4
ANSI Class300		210	29	22	168.5				8
JIS 10K	72	185	18	19	150	2	126	76	8
JIS 20K		200	22	23	160		132		
DIN PN 10/16	72	200	20	18	160	2	138	76	8
DIN PN 25/40			24						

Flange Size : 50mm (2 inch)

Flange Rating	Mb	D	b	d2	k	f	d4	d5	x
ANSI Class150	47	150	20	20	120.5	2	92	48.3	4
ANSI Class300		165	22.5		127				8
JIS 10K	47	155	16	19	120	2	96	48.3	4
JIS 20K			18						8
DIN PN 10/16	47	165	20	18	125	2	102	48.3	4
DIN PN 25/40									

Diaphragm Extension Length Code	R
5	50mm (2 inch)
10	100mm (4 inch)
15	150mm (6 inch)

Ordering Information

MODEL NO.	Code	Description		
31	-LES	Extended Diaphragm Seal and Capillary Type Transmitter (One Remote Seal)		
Ranges	6	0-3518 to 0-70000mmH2O (0-34.5 to 0-690 KPa)		
	7	0-10565 to 0-211300mmH2O (0-103.4 to 0-2068 KPa)		
	8	0-35217 to 0-704340mmH2O (0-344.8 to 0-6895 KPa)		
	x	Special		
Mounting Flange Size/Material	C2	50mm (2-inch)	C.Steel	
	S2	50mm (2-inch)	SST	
	C3	50mm (2-inch)	C.Steel	
	S3	50mm (2-inch)	SST	
	XX	Special		
Mounting Flange Rating	A1	ANSI Class 150		
	A2	ANSI Class 300		
	J1	JIS 10K		
	J2	JIS 20K		
	D1	DIN PN 10/16		
	D2	DIN PN 25/40		
	XX	Special		
Extension Length	5	50mm (2in.)		
	10	100mm (4in.)		
	15	150mm (6in.)		
	XX	Special		
Wetted Parts Material Diaphragm/Others		**DIAPHRAGM**	**OTHERS**	
	S	316L SST	316L SST	
	PT	PTFE + 316L SST	316L SST	
	H	Hastelloy C-276	316L SST	
	T	Tantalum	316L SST	
	X	Special	Special	
Fill Fluid		FILL FLUID	TEMPERATURE LIMITS	
	2	D.C Silicone 200	-40 to 205 ℃ (-40 to 400 °F)	
	7	D.C Silicone 704	0 to 315 ℃ (32 to 600 °F)	
	X	Special		
Capillary Length (m)	☐	Capillary Length from 1 to 12mm (Example for 3m : 03)		
Materials of Construction		**FLANGE**	**VENT/DRAIN VALVE**	
	CS	Plated C.Steel	316 SST	
	SS	316 SST	316 SST	
Electrical Connection		**ELECTRICAL CONNECTION**	**MATERIAL**	
	1	1/2-14NPT	Epoxy Coated-Aluminum	
	2	G1/2	Epoxy Coated-Aluminum	
	X	Special		
Hazardous Locations Certifications	K0	Maker Standard (Waterproof : IP67)		
	K1	KOSHA Flameproof Approval : Ex d IIC T6.		
	K2	KTL Intrinsic Safety Approval : Ex ia IIC		
	E1	ATEX(KEMA) Flameproof		
	*E2	ATEX(KEMA) Intrinsic Safety		
	C1	CSA Explosion proof		
	*C2	CSA Intrinsic Safety		
	F1	FM Explosion proof		
	*F2	FM Intrinsic Safety		
Option	M1	LCD Indicator	LP	Lighting Protector
	W	SUS 304 Bolts and Nuts	ET	External Terminal Block
	C6	Engineering Unit	ST	Stainless Steel Housing
	K	Oil Free Finish		
	P	PVC Coating on SST Armored		
	BA	Stainless Steel Bracket (Angle type) with SST Bolts		
	BF	Stainless Steel Bracket (Flat type) with SST Bolts		
	CA	Painted Steel Mounting Bracket (Angle Type) with SST Bolts		
	CF	Painted Steel Mounting Bracket (Flat Type) with SST Bolts		
	X	Special Order		

Smart Transmitter with Diaphragm Seal

Direct Mount
MODEL 31LFD/LED

Two Remote
MODEL 31LFC/LEC

One Remote
MODEL 31LFS/LES

Smart Pressure Transmitter

for Gauge and Absolute Pressure Measurement

MODEL 3200

Standard

Flush Mount

SST Housing

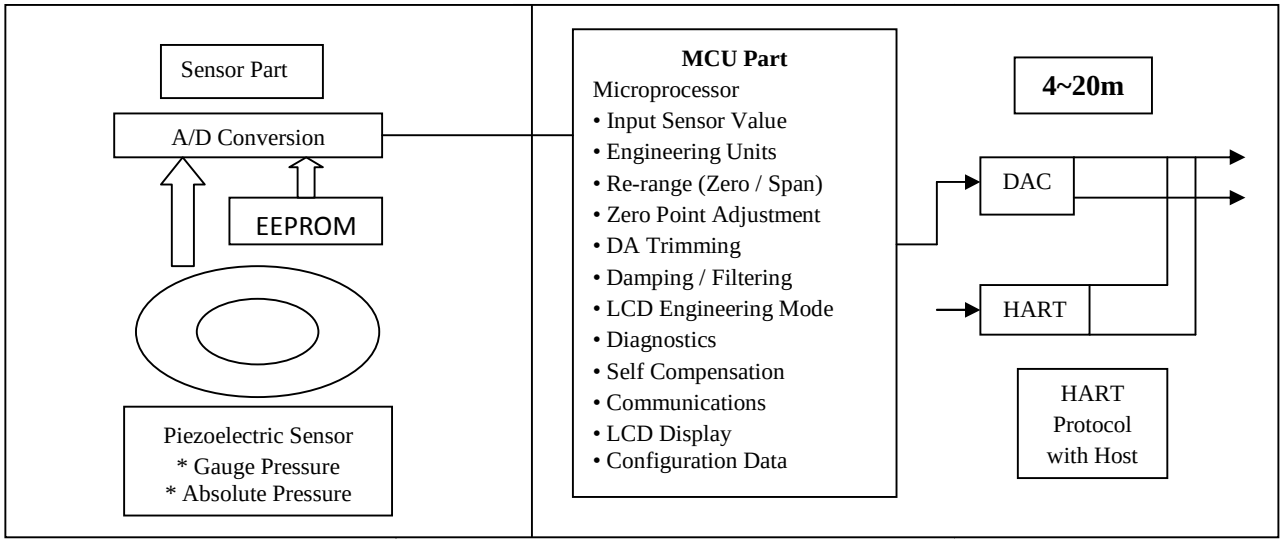
Description of Product

The 32 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.
All Data of Sensor (Tag No., type, range etc.) is to be input, modified and stored in EEPROM.

Function

» Flexible Sensor Input : GP, AP, Flush Mount
» 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, FM Canada, GOST, KOSHA, KTL, etc.
» Marine Certificate : ABS, LR, BV, DNV

Functional Block Diagram



Features

» Superior Performance

- High Accuracy : ±0.075% of Calibrated Span (option : *±0.04% of Calibrated Span*)
- Long-Term Stability
- High Rangeability (100:1)

» Flexibility

- Measuring GP, AP
- Data Configuration with HART configurator

» 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

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

» Basic Setup

- Operational Parameters.
- 4~20mA Points (Zero/Span)
- 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.
  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.
  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 12 to 45Vdc
  * 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 ±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 (-104 to 248)

» Isolation

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

» Working Pressure Limits *(silicone oil)*

- Model G *-100 ~ 300KPa - # 3*
  -100 ~ 3000 KPa - # 4
  0 ~ 10,500KPa - # 5
  0 ~ 40,000 KPa - # 6
  0 ~ 75,000 KPa - # 7
- Model A *0 ~ 525 KPa - # 4*
  0 ~ 3000 KPa - # 5
  0 ~ 5250 KPa - # 6

Physical Specifications

» Wetted Materials
- Isolating Diaphragms : 316L SST, Tantalum, HAST-C

» Non-wetted materials
- Fill Fluid : Silicone oil (DC200)
- Electronics Housing : Aluminum, SST316L(option) Flameproof and Waterproof (IP67)
- Cover O-ring : Buna-N
- Paint : Epoxy-Polyester or Polyurethane
- Mounting Bracket : 304SST with U-bolt (304SST) for 2-inch pipe
- Nameplate : 304 SST

» Process Connections
- 1/2-14 NPT Female • 1/4-18 NPT (option)

» Electrical connections
- 1/2-14 NPT conduit with M4 Screw Terminals

Hazardous Location Certifications

» KOSHA Approvals K1 Code :

* *KOSHA: Korea Occupational Safety & Health Agency*
Flameproof for Class I, Zone 1 : Ex d IIC T6, 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°C ≤ Tamb ≤+60°C
T6 for process ≤ 85°C ; T5 for process ≤ 100 °C
T4 ≤ 130°C
32 ATEX Certification is according to the below standards : EN 60079-0 : 2006
EN 60079-1 : 2007

» KTL Certification K2 Code :

* *KTL: Korea Testing Laboratory*
Intrinsic Safety: Ex ia IIC T6
Ambient Temperature : -40 to 60°C
Ui=30Vdc, Ii=200mA, Pi=0.9W, Ci=47nF, Li=94μH

» FM & FM Canada Approvals F1 Code :

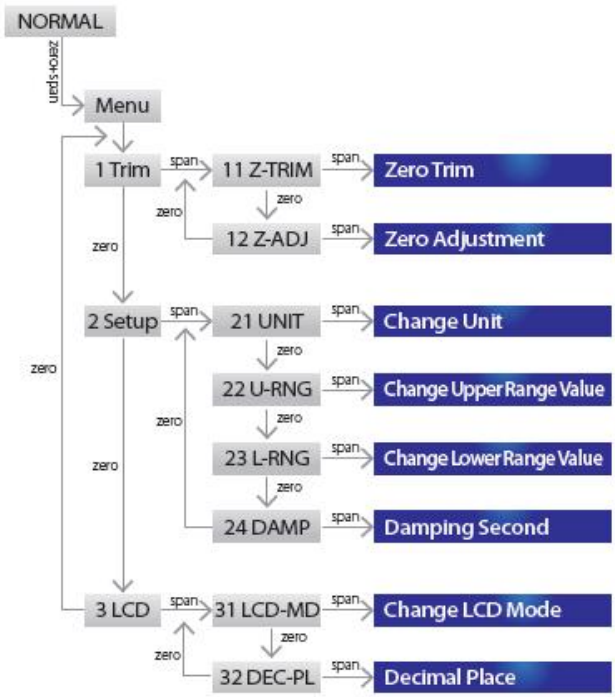
* *FM: Factory Mutual explosion proof*
* *FM Canada: Canadian requirements*
Explosion proof for Class I, Division 1
Groups A, B, C and D
Dust-ignition proof for Class II, Division 1,
Groups E, F and G
Dust-ignition proof for Class II, Division 1
"T6, see instruction for temperature code if process temperature above 85˚C"
Ambient Temperature : -20 to 60°C
Enclosure: indoors and outdoors, NEMA Type 4X
Conduit seal required within 18" for Group A only.
Nonincendive for Class I, Division 2, Groups A, B, C & D;
Class II, Division 2, Groups E, F & G; and Class III, Division 1,
Temperature Code T4
Ambient Temperature : -20 to 60°C
Enclosure: indoors and outdoors, NEMA Type 4X

Function

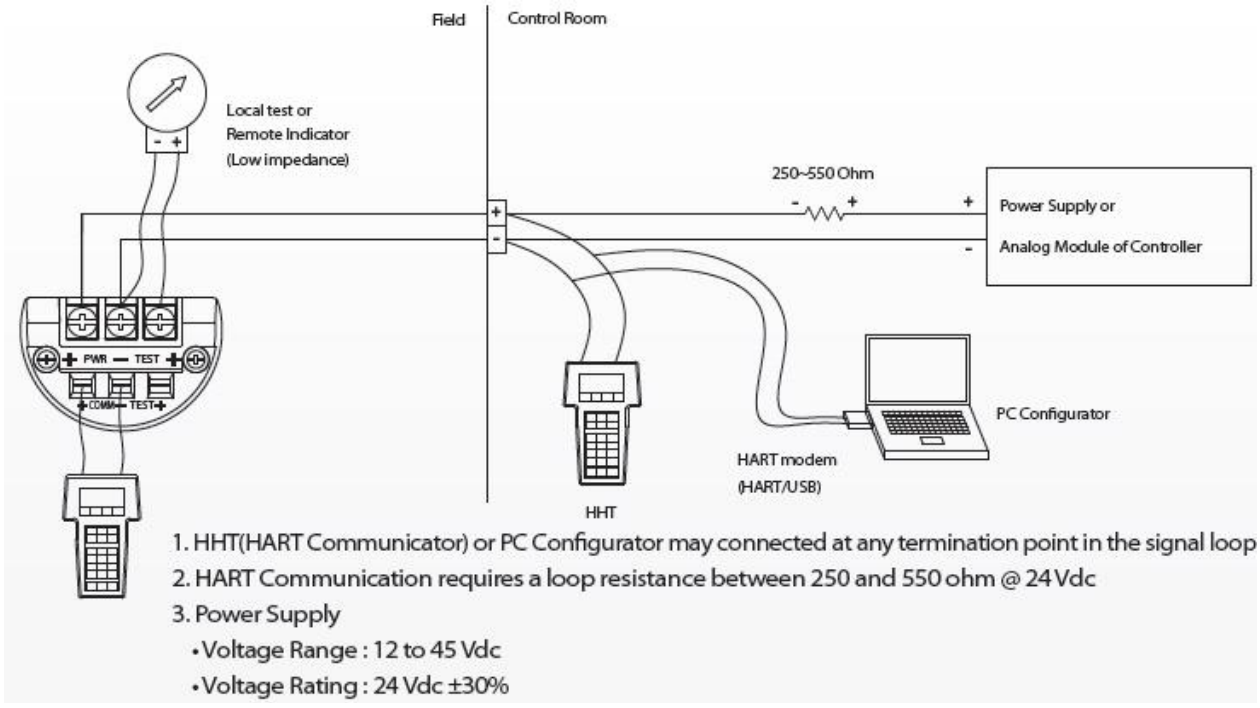
» Change main parameter by Button
- Change Unit
- Change Upper range value
- Change Lower range value
- Change the Damping Second
- Select the Decimal Place
- Zero Trim
- Zero Adjustment

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

Moving within Menu : Zero
Moving to below Menu : Span
Moving Top Menu : Zero+Span

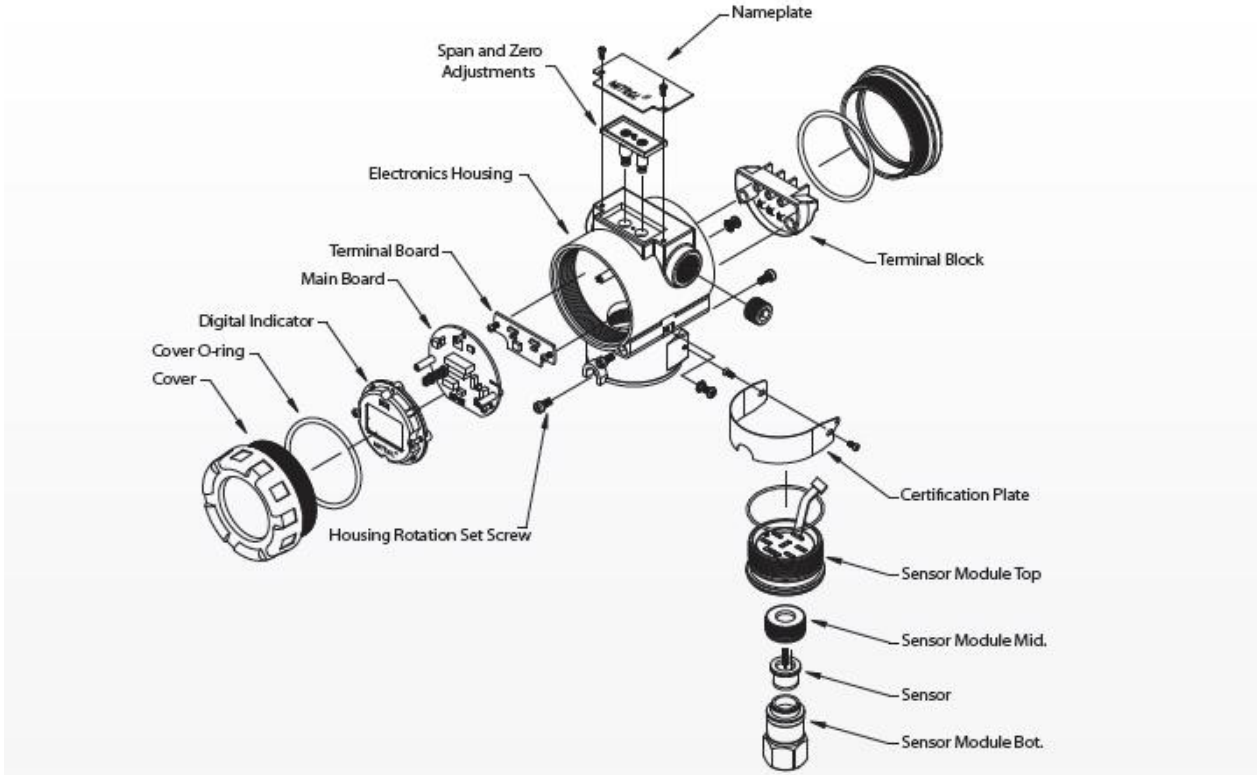


Connection Diagram of Signal, Power, HHT for Transmitter



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 ±30%

Exploded Drawing of Model 32



General Specification

1. Model 32– G/APressure Sensor Range (Rangeability = 100 : 1)

	32 – G		32 - A	
	Range (KPa)	**Calibrated Span (KPa)**	**Range**	
3	-100~150	1.5~150	NA	NA
4	-100 ~ 1,500	15 ~ 1,500	0 ~ 250	2.5 ~ 250
5	0 ~ 5,000	50 ~ 5,000	0 ~ 1,500	15 ~ 1,500
6	0 ~ 25,000	250 ~ 25,000	0 ~ 2,500	25 ~ 2,500
7	0 ~ 60,000	600 ~ 60,000	NA	NA

2. Electrical Specifications

Power Supply	12 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+0.005x(URL/Span)]% of Span (0.01URL≤Span<0.1URL)	**Ambient Temperature**	-40°C ~ +85°C
		LCD Meter Ambient Temp	-30°C ~ + 80°C
		Humidity Limits	5% ~ 100% RH
Ambient Temp. Effect	± [0.019%URL+0.125% Span] / 280C	**Process Temp. Limit**	-40C ~ +120°C
		Power Supply Effect	± 0.005 % of Span per Volt
		Stability	± [0.125%URL for 36 months

4. Physical Specifications

Isolating Diaphragm	316L SST	**Process Connection Size**	1/2 – 14 NPT Female
Electronic Housing	Aluminum	**Electrical Connections**	1/2 – 14 NPT with M4
Housing Class	Waterproof (IP67)	**2” Pipe Stanchion Type Bracket**	Angle or Flat type
		Weight (excluding options)	1.7 kg (standard) 2.83kg(SST Housing)

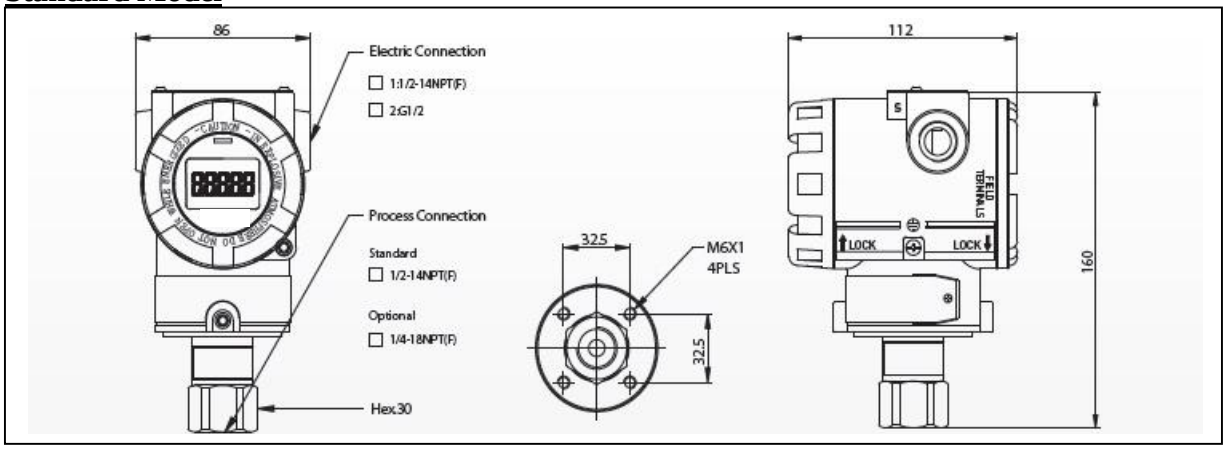
Ordering Information

MODEL	Code	Description					
3200	**-G**	Gauge Pressure Transmitter (reference accuracy : 0.075 % of span)					
	-F	Flush Mount Pressure Transmitter					
	-H	Absolute Pressure Transmitter (reference accuracy : 0.075 % of span)					
Range		**G/F**		**A**			
		Range (KPa)	**Min.Span (KPa)**	**Range (KPa)**	**Min. Span (KPa)**		
	3	-100~150	1.5	NA	NA		
	4	-100 ~ 1,500	15	0 ~ 250	2.5		
	5	0 ~ 5,000	50	0 ~ 1500	15		
	6	0 ~ 25,000	250	0 ~ 2500	25		
	7	0 ~ 60,000	600	NA	NA		
	X	Special					
Mounting Flange Material		**DIAPHRAGM**		**OTHER**			
	M11	316L SST		316 SST			
	***M12**	HAST-C		316 SST			
	***M13**	Tantalum		316 SST			
	***M21**	HAST - C		HAST-C			
Hazardous Location Certifications	**K0**	Maker Standard (Waterproof : IP67)					
	K1	KOSHA Flameproof Approval		**K2**	KTL Intrinsic Safety Approval		
	E1	ATEX (KEMA) Exposion proof		**E2**	ATEX(KEMA) Intrinsic Safety		
	F1	FM & FM Canada Explosion proof		**F2**	FM & FM Canada Intrinsic Safety		
Fill Fluid	**1**	Silicone (DC 200)					
	***2**	Inert fill (Halocarbon Oil)					
Process Connection	**S**	1/2 – 14 NPT Female (standard)					
	O	1/4 - 18 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					
	LPI	Lightening Protector (Internal)		**LPE**	Lightening Protector (External)		
	K	Oil Free Finish					
	2W	2 way manifold Remote type					
	BA	Stainless Steel Bracket (Angle type) with SST Bolts					
	BF	Stainless Steel Bracket (Flat type) with SST Bolts					
	ST	Stainless Steel Housing					
	X	Special					

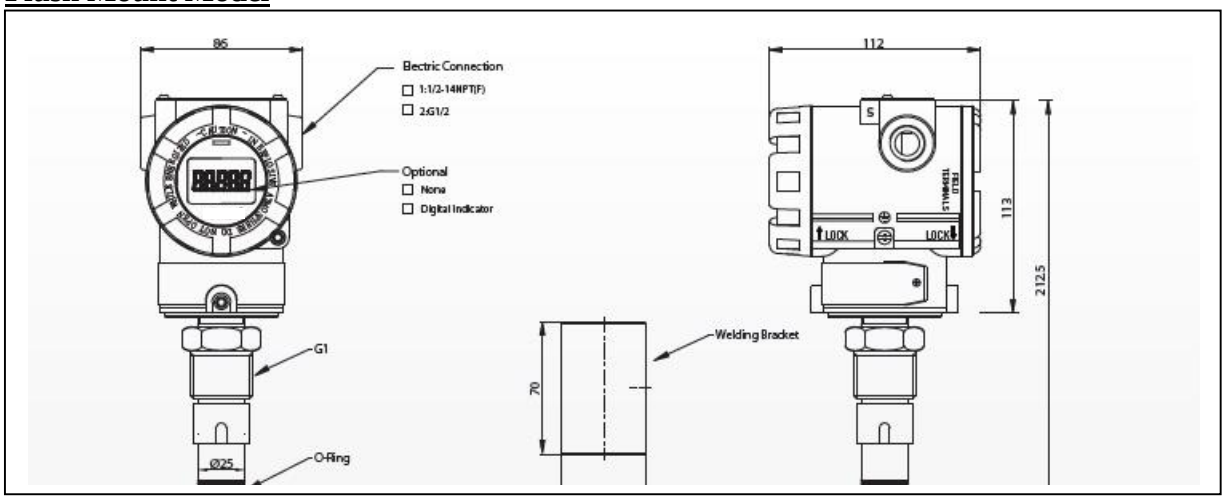
Example : 32-G5-M11-K0-1-S-1-M1
Note 1 : Request to manufacturer for Draft Range, Absolute (small pressure and vacuum) and Items marked " * " before order.

Dimension of Transmitter (mm)

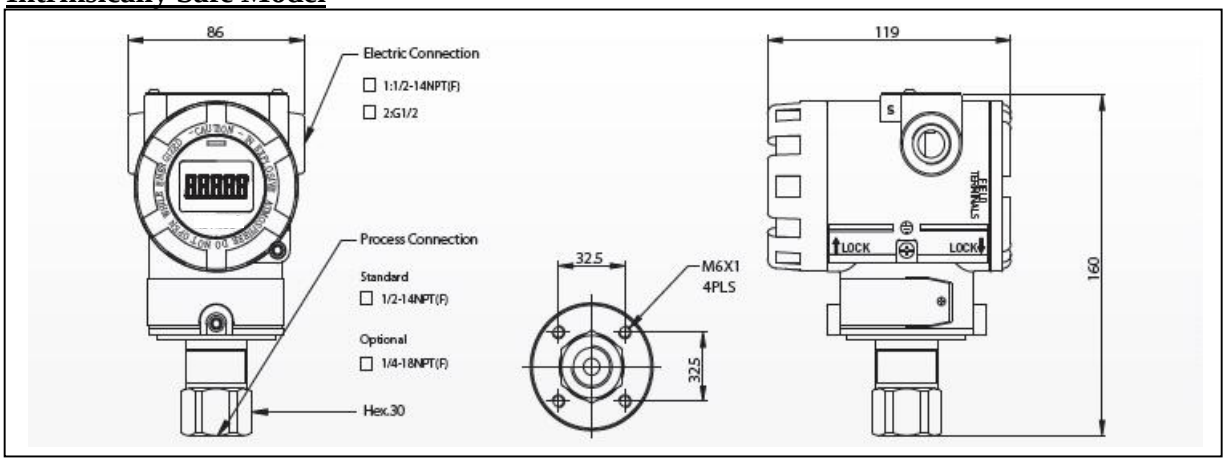
Standard Model



Flush Mount Model



Intrinsically Safe Model



Smart Temperature Transmitter

MODEL
21 & *22*

Model 21

Model 22

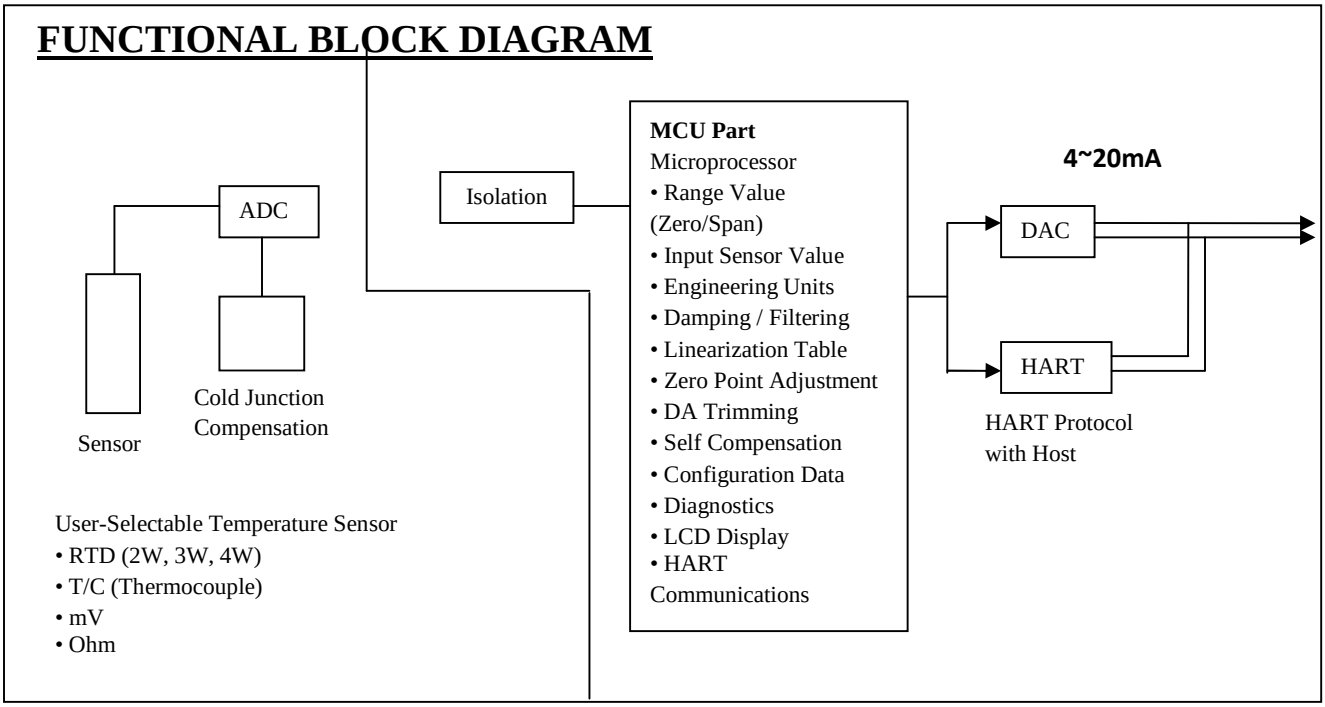
Description of Product

The Smart Temperature Transmitter is a microprocessor-based high performance transmitter, which has flexible sensor input and output, automatic compensation of ambient temperature and process parameters, configuration of various parameters, communication with HART protocol. All Data of Sensor (Tag No., type, range etc.) is to be input, modified and stored in EEPROM.

Function

»Flexible Sensor input: RTD, T/C, mV, Ohm
»Various output: 4 ~20mA(Analog), Digital Signals
»Automatic Compensation by Linearization table in which user can modify the various necessary values
»Automatic Compensation of Ambient Temperature
»Setting Various Parameters: Zero/Span, Unit, Fail-mode, Trim, etc.
»Self Diagnostic Function: Sensor, A/D Converter, Memory, Power, etc.
»Digital Communication with HART protocol
»Flameproof Approval and Intrinsic Safety Approval: KOSHA, KTL,ATEX,FM, GOST(21)
»Marine Certificate: ABS, LR, DNV, BV

FUNCTIONAL BLOCK DIAGRAM



Features

» Superior Performance

- Excellent Accuracy (Refer to Page 4)
- Long-Term Stability (Refer to Page 4)

» Flexibility

- Selection of various T/C, RTD, mV, Ohm
- Data Configuration with HART configurator

» Reliability

- Automatic Compensation: Linearization of sensor input, Ambient temperature compensation
- Continuous Self Diagnostic
- Fail-mode Process function
- EEPROM Write Protection
- I/O Isolation: Grounded Thermocouple
- CE EMC Conformity Standards (EN50081-2,EN50082-2)

Transmitter Description

» Sensor Inputs

The model 21 and 22 are compatible with a variety of temperature sensors, including 2W, 3W and 4Wire RTDs, thermocouples, and other resistance and millivolt inputs (see Page 6).

The sensor part module converts the temperature sensor into the digital value. The MCU module calculates the process temperature value based on the digital value.

The sensor type and configurationare software-selectable using the Hand-Heldterminal and PC configurator.

The sensor modules include the following features

- The software of the transmitter compensates for the thermal effects, improving performance.
- Precise input compensation during operation Is achieved with temperature and voltage or resistance correction coefficients that are characterized over the range of temperature sensor and stored in the EEPROM memory.

- Input sensor type
  - RTD (Pt-100 ohm): 2W, 3W, 4Wire
  - Thermocouple: B, E, J, K, N, R, S, T type
  - mV: -10 ~ 75mV
  - Ohm: 0 ~ 340 Ω

» Basic Setup

Temperature Transmitter can be easily configured from any host that support the HART protocol.

Configuration consists of setting the following transmitter operational parameters.

- Sensor Type
- Number of sensor input wires
- 4 and 20mA Points (Zero/Span)
- Engineering Units
- Damping Time
- Tag: 8 alphanumeric characters
- Descriptor: 16 characters
- Message: 32 characters
- Date: day / month / year

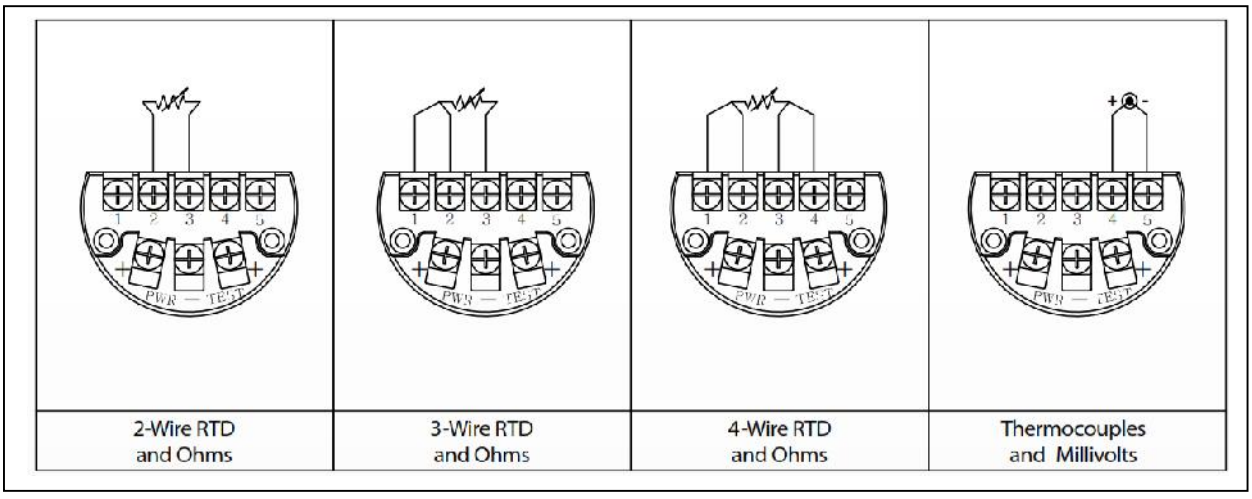
» Calibration and Trimming

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

» Self-Diagnosis and Others

- CPU & Analog Module Fault Detection
- Communication Error
- Fail-mode Handling
- LCD Indication (for model 21)

Model 21 Transmitter Field Wiring and Sensor Wiring Diagrams



Performance Specifications

» Reference Accuracy
(Refer to Table 1)

» Stability
RTDs.
±0.12% of Reading or 0.15°C, whichever is greater, for 24 months
Thermocouples
±0.12% of Reading or 0.15°C, whichever is greater, for 12 months

» Repeatability
±0.05% of span

» Ambient Temperature Effect
(per 1°C change in ambient temperature.

Sensor Type	Digital Accuracy	D/A effect
2W, 3W, 4Wire RTD		
Pt 100(a=0.00385)	0.003°C	0.002% of Span
Pt 100(a=0.003916)		
Thermocouple		
NIST Type B	0.046°C	0.002% of Span
NIST Type E, J, K, N	0.005°C+0.00054% of reading	
NIST Type R, S, T	0.015°C If reading ≥ 200°C 0.021°C - 0.0032% of reading if not	

» Power Supply Effect
Less than ±0.005% of Span per Volt

» Update Time and Turn-On Time
Update Time: 0.5 seconds
Turn-On Time: 5 seconds

» Failure Mode
The value to which the transmitter drives its output in failure is as follows
Fail High: Current ≥ 21.75 mA
Fail Low: Current ≤ 3.75 mA

Function Specifications

» 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.
- 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 , 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 ±30%

» Loop Load
0 to 1500 Ω for Operation
250 to 550 Ω for HART Communications

» Ambient Humidity Limits
5% ~ 100%RH (Relative Humidity)

» Ambient Temperature Limits
- -40°C ~ 85°C (without condensing for model 21)
- -20°C ~ 85°C (without condensing for model 22)
- -30°C ~ 80°C (with LCD module)

» Storage Temperature
- -40°C ~ 85°C (without condensing)
- -20°C ~ 85°C (without condensing for model 22)

» Isolation
Input / output isolated to 500Vrms (707 Vdc)

Physical Specifications

» Electrical connections

1/2-14 NPT conduit with M3.5 Screw Terminals

» Materials of Construction

Electronics Housing: Low-copper aluminum
Flameproof and waterproof (IP67)
Paint: Epoxy-Polyester or Polyurethane
Cover O-ring: Buna-N
Mounting Bracket: 304SST with U-bolt (304SST) for 2-inch pipe
Nameplate: 304 SST

» Weight

1.2 kg below (Standard-excluding options)
2.6kg (SST Housing-excluding options)

Hazardous Location Certifications

» KOSHA Approvals K1 Code :

** KOSHA: Korea Occupational Safety & Health Agency*
Flameproof for Class I, Zone 1 : Ex d IIC T6, IP67
Ambient Temperature: -20 to 60°C
Power Supply: Max. 45 Vdc
Output: 4 to 20 mA + HART, Max. 22 mA

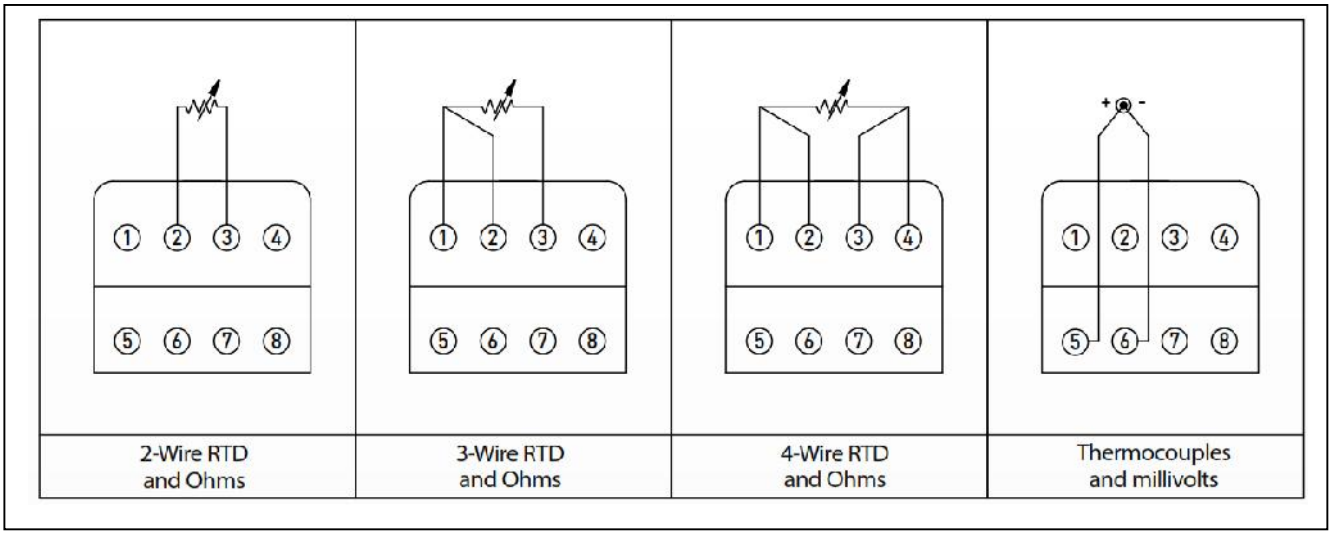
» ATEX Approvals E1 Code :

CE 0344 II 2 G Ex d IIC T6, T5 or T4
Operating Temperature: -20°C ≤ Tamb ≤ +60°C
T6 for process ≤ 85°C; T5 for process ≤ 100°C
T4 for process ≤ 130°C

FM & 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, Division 1,
Groups E, F and G
Dust-ignition proof for Class II, Division 1
"T6, see instruction for temperature code if process temperature above 85°C"
Ambient Temperature: -20 to 60°C
Enclosure: indoors and outdoors, NEMA Type 4X
Conduit seal required within 18" for Group A only.
Nonincendive for Class I, Division 2, Groups A, B, C & D; Class II, Division 2, Groups E, F & G; and Class III, Division 1, Temperature Code T4
Ambient Temperature: -20 to 60°C
Enclosure: indoors and outdoors, NEMA Type 4X
Supply Voltage:11.9~42Vdc

Model 22 Transmitter Field Wiring and Sensor Wiring Diagrams



General Specifications

1. Temperature Sensor Range & Accuracy

Sensor Type	Sensor Reference	Input Range	Minimum Span	Digital Accuracy	D/A Accuracy Of Span
RTD					
Pt-100	KSC 1603-1991 (a=0.00385) DIN	-200 ~ 650°C	15°C	±0.17°C	±0.03%
Pt-100	JISC 1604-1981 (a=0.00391)	-200 ~ 650°C		±0.16°C	
Thermocouple					
NIST Type B	KSC1602-1982	100 ~ 1,820°C	25°C	±0.77°C	±0.03%
NIST Type E		200 ~ 1,000°C		±0.20°C	
NIST Type J		200 ~ 1,200°C		±0.25°C	
NIST Type K		200 ~ 1,350°C		±0.35°C	
NIST Type N		200 ~ 1,300°C		±0.40°C	
NIST Type R		0 ~ 1,760°C		±0.60°C	
NIST Type S		0 ~ 1,740°C		±0.50°C	
NIST Type T		-200 ~ 400°C		±0.25°C	
Millivolt Input		-10 ~ 75 mV	2 mV	± 0.012 mV	
Ohm Input		0 ~ 340 Ω	20 Ω	± 0.35 Ω	

< Note > 1) RTD input: a= 0.00385: KS, JIS, DIN, IEC, a= 0.00391: US.
2) Thermocouple input: KSC 1602-1982, JISC 1602-1981, ANSI MC96.1-1982
3) Digital accuracy for Type B is ± 3.0°C from 100 to 300°C
4) Digital accuracy for Type K is ± 0.50°C from -180 to -90°C

Ambient Temperature Effects (per 1°C change in Ambient temperature)			
	Sensor Type	**Digital Accuracy**	**D/A effect per**
RTD 2w, 3w, 4-Wire	Pt 100 (a=0.00385)	0.003°C	0.002% of Span
	Pt 100 (a=0.003916)		
Thermocouple	NIST Type B	0.046°C	
	NIST Type E, J, K, N	0.005°C+0.00054% of reading	
	NIST Type R, S, T	0.015°C If reading	
		0.021°C - 0.0032% of reading if not	

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(24 Vdc)	**Isolation**	500 Vrms (707 Vdc)

3. Performance Specifications

Accuracy	Refer to item No.1	**Operating Temp**	-40 ~ +85°C
Stability for 2 year	±0.1% of Reading or 0.1°C whichever is greater	**LCD Meter Operating Tem**	-30 ~ +80°C
Ambient Temp. Effect	±0.05% of Span/10°C	**Humidity Limits**	5% ~ 100% RH(21)
Repeatability	±0.05% of Span	**Power Supply Effect**	±0.005% of Span/V

4. Physical Specifications (for model 21)

Electrical Connections	1/2-14NPT(w/M3.5)	**Weight (excluding Option Items)**	1.2Kg below (standard) 2.6Kg (SST Housing)
Electronics Housing	Aluminum	**2" Pipe Stanchion Type bracket**	Angle or Flat Type
O-rings	Buna-N	**Housing Class**	Waterproof (IP67)

Ordering Information

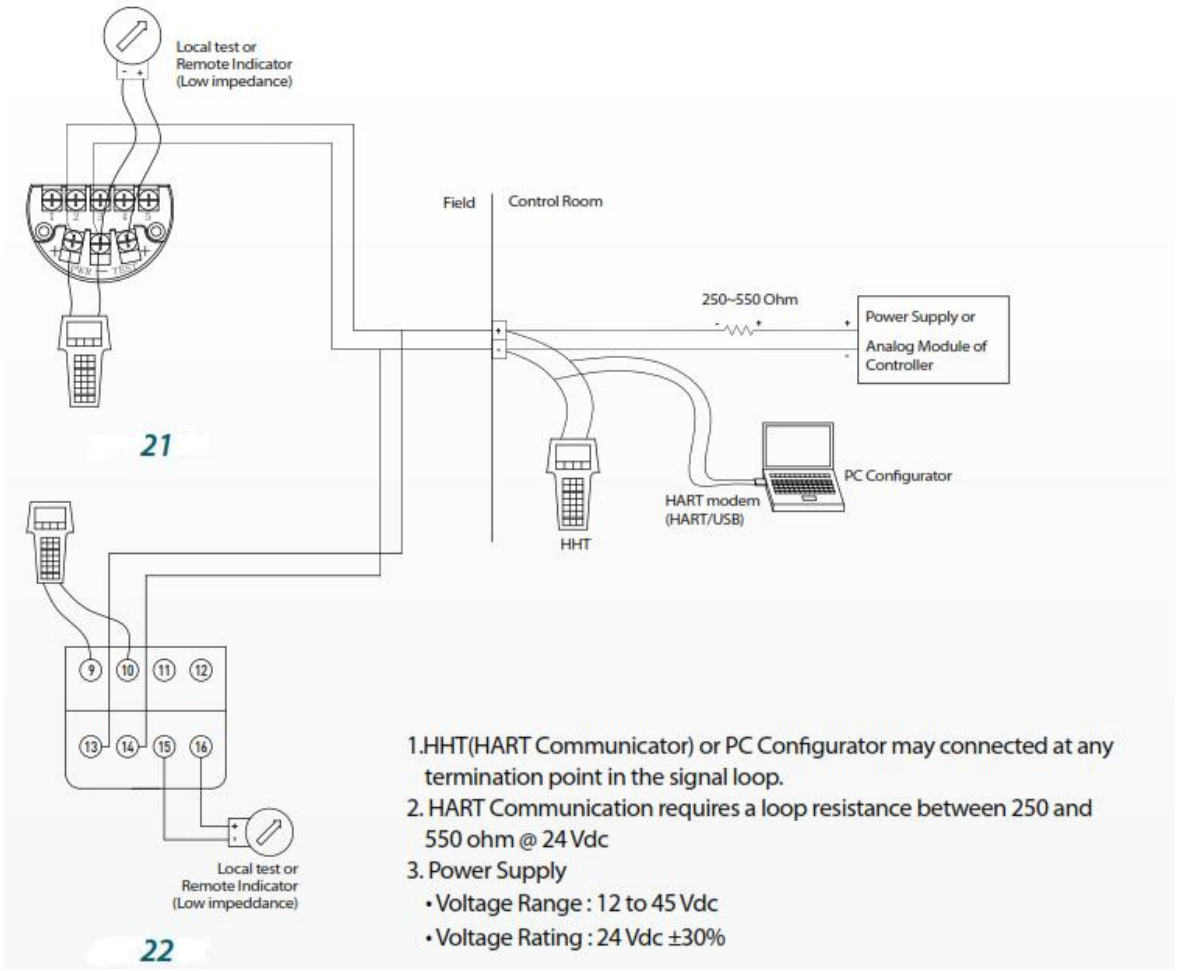
MODEL NO.	Code	Description
Model 21	-S	Single Element
	-D*	Dual Elements
Housing Materials and Electrical Connection	1	1/2 - 14 NPT Epoxy Coated-Aluminum
	2	G1/2 (Adapter) Epoxy Coated-Aluminum
	X	Special
Process Connection	1	1/2 - 14 NPT Epoxy Coated-Aluminum
	2	G1/2 (Adapter) Epoxy Coated-Aluminum
	X	Special
Sensor Position	H	Horizontal Type
	V	Vertical Type
Sensor Type	A □	RTD (PT100[Ω]) / □ (with Wires)
	T □	Thermocouple / □ (with Type)
	R	Resistor
	M	Mili-volt
Hazardous Locations Certifications	K0	Maker Standard (Waterproof : IP67)
	K1	KOSHA Flameproof Approval : Ex d IIC T6.
	K2	KTL Intrinsic Safety Approval : Ex ia IIC T5
	E1	ATEX Flameproof
	F1	FM & FM Canada Explosion proof
	*F2	FM & FM Canada Intrinsic safety
Option	M1	LCD Indicator
	BA	Stainless Steel Bracket (Angle type) with SST Bolts
	BF	Stainless Steel Bracket (Flat type) with SST Bolts
	ST	Stainless Steel Housing
	X1	Assembly Option (Element/Well)
	LPE	Lightening Protector (External)

Example : 21-S-K1-1-1-H-A3-M1-BA
Note 1 : " * " before order.

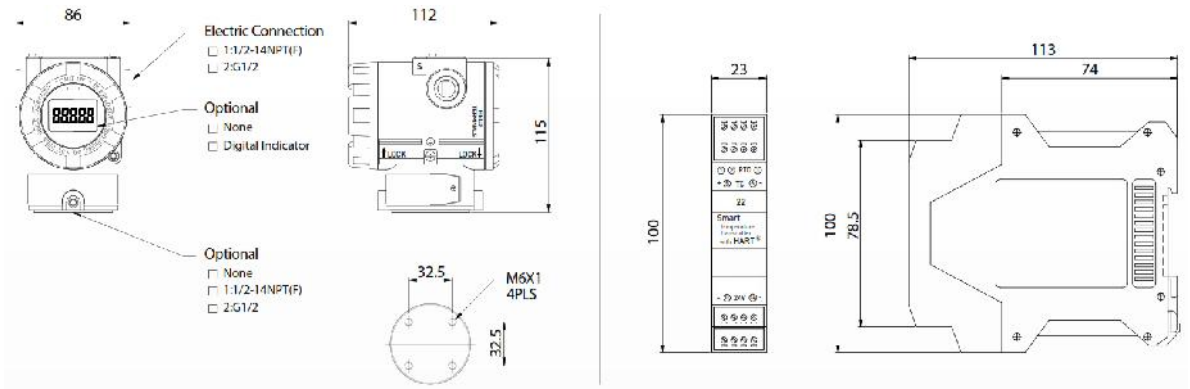
MODEL NO.	Code	Description
Model 22	-S	Single Element
	-D*	Dual Element (Special Order, Request to manufacturer if necessary)
Housing Materials	1	Plastic
	X	Special
Hazardous Locations Certifications	KO	Maker Standard
Sensor Type	A □	RTD (PT100[Ω]) / □ (with Wires)
	T □	Thermocouple / □ (with Type)
	R	Resistor
	M	Mili-volt
Sensor Fail Mode	D	Downscale
	U	Upscale

Ex) : 22-S-1-K0-A3-D
Note : " * " before order.

Connection Diagram of Signal, Power, HHT for Transmitter



Dimensions of Transmitter (mm)



Model 21

Model 22

Distributor:

Bont Technologies GmbH

Salzstr: 1

21335 Lüneburg

www.bont-tech.com info@bont-tech.com