

# ExSense T SERIES RUGGED TEMPERATURE TRANSMITTERS

Model PD312 HART®



Model PD310 HART®



Model PD306 HART®



Model PD301



Model PD302 HART®



**EXsense**  
series



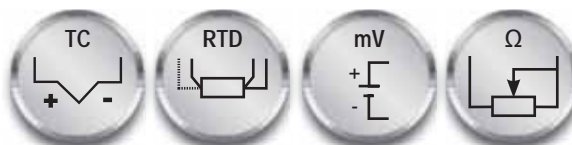
Approvals vary. See model specifications for details.

## FEATURES

- Temperature Transmitters
- Universal Input: RTD, TC, Ohm & mV Inputs
- Rugged General Purpose Models
- 330° Rotatable Backlit LCD
- Display PV, Input Type, Eng Units & Bargraph
- Galvanic Isolation Prevents Ground Loops
- Wide Voltage Range: 10.5 to 45 VDC
- Wide Operating Temperature Range
- Protection Heads & Thermowells Available
- Order Factory Configured, Ready to Install\*

\* Transmitters can also be completely configured using the ExSenseView PC software and modem. HART models can also be configured using a HART Communicator (with the exception of input Type and Units).

### Universal Input

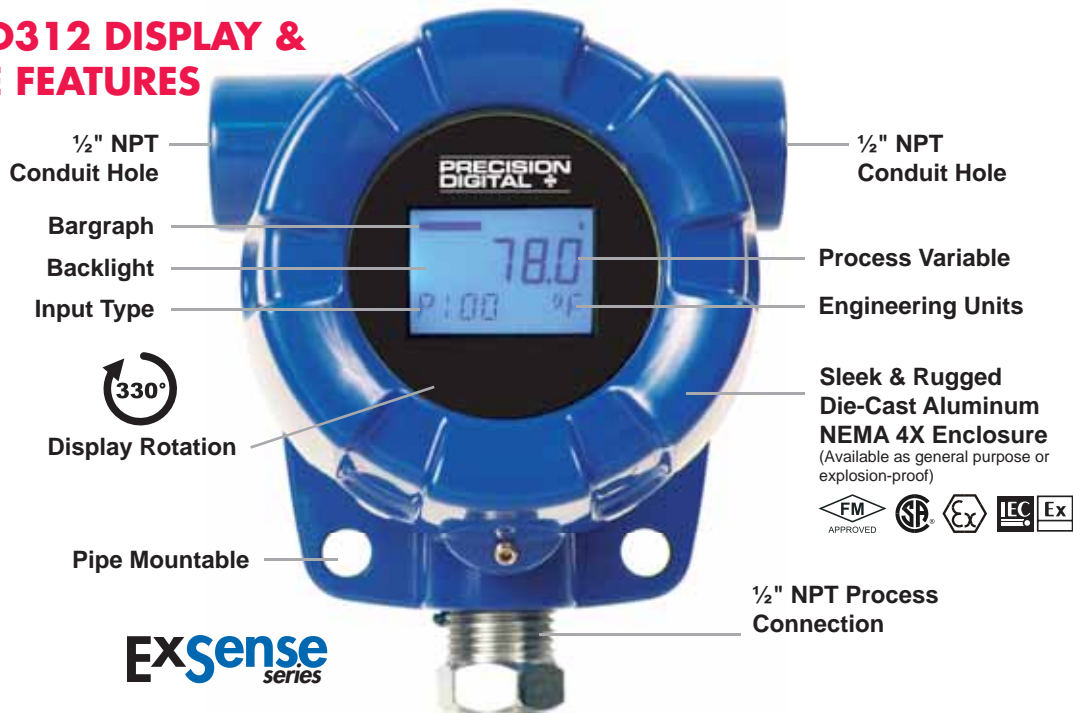


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**PD310 & PD312 DISPLAY & ENCLOSURE FEATURES**



**INTRODUCTION**

The ExSense T Series is a line of rugged temperature transmitters that includes models with HART communication capability. These models can be configured using a HART modem and a PC running the free HART software provided, or the range can be modified in the field using a handheld HART communicator. The other models can be configured using a USB modem and a PC running the free software provided. All models can be ordered with Pt100 RTD, J, K, T thermocouples; see Ordering Information for model numbers.

**PD301-PD306 Head Mount Models**

The head mount models are offered as: hockey-puck only (PD301 & PD302) which can be mounted inside a DIN Form B connection head, pre-mounted in a connection head (PD303 & PD304), and pre-mounted in a connection head with temperature probe (PD305 & PD306). The PD302, PD304, and PD306 include HART communication capability. Standard enclosed models have an aluminum connection head with a 1/2" NPT conduit hole and 1/2" NPT process opening for a probe or adaptor fitting, and are available with safe area (NEMA 4X, IP66 rated), or certified explosion-proof housings. Non-standard models with other conduit hole and process opening sizes, as well as an optional stainless steel housing are available, see [www.predig.com/ExSenseBuilder](http://www.predig.com/ExSenseBuilder).

**PD310 & PD312 Enhanced Display Models**

The enhanced display models, with standard loop-powered backlight, let the user see the display under any lighting condition, and present valuable information such as the process variable, input type, engineering units, and bargraph. The display can be configured to show the PV, mA output, or %. These models are housed in a sleek & rugged die-cast NEMA 4X enclosure that is available in general purpose and explosion-proof versions. The enclosure has two 1/2" NPT conduit holes, and one 1/2" NPT process sensor connection port for probe or adaptor fitting. Non-standard models with other conduit hole and process opening sizes are available, see [www.predig.com/ExSenseBuilder](http://www.predig.com/ExSenseBuilder). For remote mounting applications the PD310 may be ordered without the process sensor connection port.

**APPLICATIONS**

The ExSense packaging lends itself for duty in harsh environments. The good looking die-cast aluminum NEMA 4X housing affords serious protection from the elements, impact damage, corrosion, and electrical interference; it is also explosion-proof. It can be installed almost anywhere. The display models have very flexible installation options. The built-in mounting ears allow for wall, or pipe mounting, and include a rotatable meter. All ExSense systems can be also surface mounted via the thermowell.

**Rugged Packaging**



**Endures Temperature Extremes**

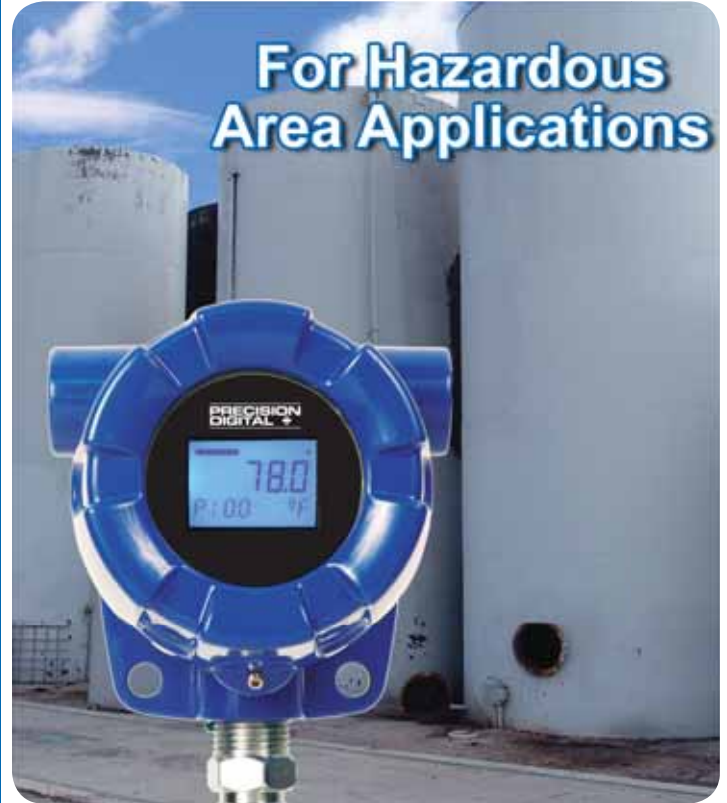


**330° Rotatable LCD Display**

Mount the product at any convenient angle and rotate the internal display for best viewing angle.



**Explosion-Proof Enclosure**



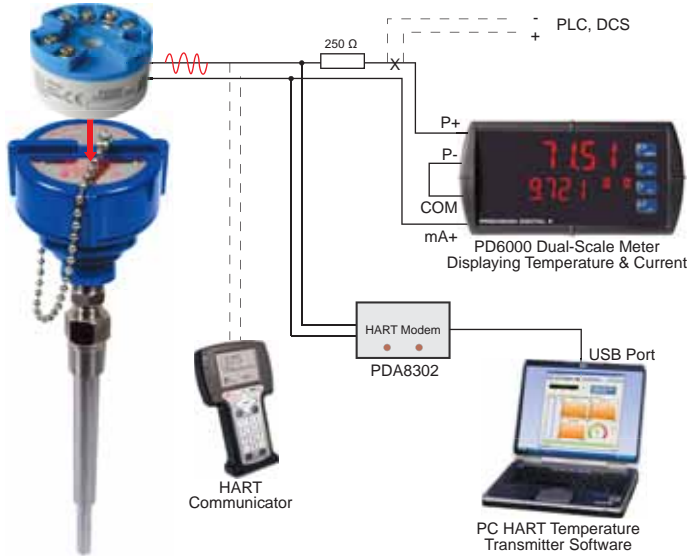
**PD312 HART Transmitter & Remote Display**

In this application the PD312 HART Explosion-Proof Temperature Transmitter is being powered by the PD6000 dual-scale meter; the meter displays the temperature on the top and the mA current on the bottom display. A PLC, DCS, or other devices could be connected in the loop as shown. The 250 ohm resistor is the minimum loop resistance needed for HART communication with a HART modem or a HART communicator.

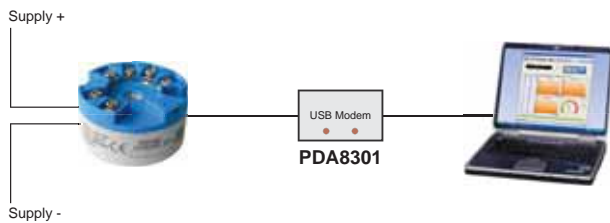


**PD306 HART Head Transmitter & Remote Display**

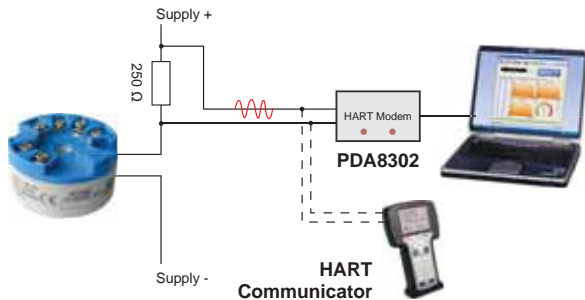
In this application the transmitter is mounted in the explosion-proof connection head and is being powered by the PD6000 dual-scale meter. The HART communicator and HART modem are used during configuration or troubleshooting.



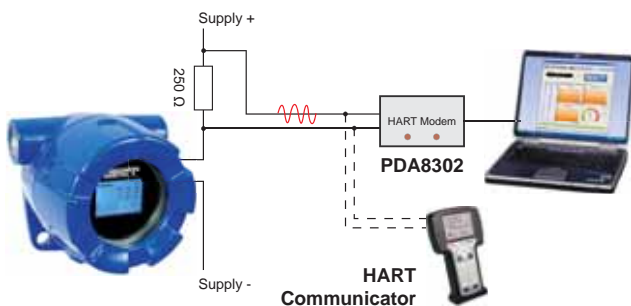
**CONFIGURATION**



**PD301, PD303, and PD305 PC Configuration**



**PD302, PD304, and PD306 HART Configuration\***



**PD310 & PD312 HART Configuration\***

\* Transmitters can be completely configured using the ExSenseView PC software and modem. HART models can also be configured using a HART Communicator (with the exception of input Type and Units).

**ExSenseView PC Software**



The Current Setup window is used to trim the analog output to match the device reading the current. Click on Read and type the values in the boxes. Click on Update to upload the new values to the transmitter. Test your loop by selecting a Fix Loop value and clicking Send.

The Parameter Setup window is used to set up the input type, range for the 4-20 mA, temp units, and other settings related to the sensor and analog output. You can also select to display PV, mA, or %.



The HART Information window allows you to configure or read the transmitter information and to modify the HART address.

The Graph Monitor window is used to monitor the PV, mA, and %. You can also monitor just one of the variables. A log data file can be saved for later viewing; it contains the time, data value, and units. The screen update rate is selectable between 2 sec and 30 min.



**TRANSMITTER INPUT TYPES, RANGES, AND ACCURACY**

Input	Input Type	Transmitter Range	Accuracy (% of Span)	Min Output Span (4-20 mA)
RTD	Pt100	-200 to 850°C (-328 to 1562°F)	±0.08% (±0.2°C min)	10°C (18°F)
	Pt500	-200 to 250°C (-328 to 482°F)	±0.2% (±0.5°C min)	10°C (18°F)
	Pt1000	-200 to 250°C (-328 to 482°F)	±0.12% (±0.3°C min)	10°C (18°F)
	Cu50	-50 to 150°C (-58 to 302°F)	±0.08% (±0.2°C min)	10°C (18°F)
	Cu100	-50 to 150°C (-58 to 302°F)	±0.12% (±0.3°C min)	10°C (18°F)
	Ni100	-60 to 180°C (-76 to 356°F)	±0.08% (±0.2°C min)	10°C (18°F)
	Ni500	-60 to 180°C (-76 to 356°F)	±0.20% (±0.5°C min)	10°C (18°F)
Potentiometer	Resistance	0 to 400 Ω	±0.08% (±0.1 Ω min)	10 Ω
		0 to 2,000 Ω	±0.12% (±1.5 Ω min)	100 Ω
TC	B	0 to 1820°C ( 32 to 3308°F)	±0.08% (±2.0°C min)	500°C (900°F)
	E	-270 to 1000°C (-454 to 1832°F)	±0.08% (±0.5°C min)	50°C (90°F)
	J	-210 to 1200°C (-346 to 2192°F)	±0.08% (±0.5°C min)	50°C (90°F)
	K	-270 to 1372°C (-454 to 2501°F)	±0.08% (±0.5°C min)	50°C (90°F)
	N	-270 to 1300°C (-454 to 2372°F)	±0.08% (±1.0°C min)	50°C (90°F)
	R	-50 to 1768°C ( -58 to 3214.4°F)	±0.08% (±2.0°C min)	500°C (900°F)
	S	-50 to 1768°C ( -58 to 3214.4°F)	±0.08% (±2.0°C min)	500°C (900°F)
	T	-270 to 400°C (-454 to 752°F)	±0.08% (±0.5°C min)	50°C (90°F)
	C	0 to 2320 °C (32 to 4208 °F)	±0.08% (±0.5°C min)	50°C (90°F)
Voltage	mV	-10 to 75 mV	±0.08% (±20µV min)	5 mV
		-100 to 100 mV	±0.08% (±20µV min)	5 mV
		-100 to 500 mV	±0.08% (±30µV min)	6 mV
		-100 to 2000 mV	±0.08% (±50µV min)	20 mV

**COMPLETE TEMPERATURE ASSEMBLY**

Simplify your ordering process by getting a complete temperature assembly from Precision Digital. Use the online ExSense Builder to select your transmitter, temperature probe, and thermowell; specify the temperature range and you will get all the parts needed for your temperature system. Avoid the headaches of getting components that do not match, from different suppliers. Order a complete temperature assembly from Precision Digital and make your life easier.



**ACCESSORIES**

**RTD Probes & Thermowells**

RTD probes are offered in 4", 6", 9", and 12" lengths and ¼" diameter; other sizes are available upon request. Spring-loaded probes and thermowells are special order; please consult the factory for details.

**Note:** Standard RTD is ¼" in diameter, stainless steel, 400°F max. For other sizes and temperature ranges, contact the factory.



**TC & RTD Connection Heads**

- General Purpose & Explosion-Proof
- Aluminum & Stainless Steel
- NEMA 4X, IP66 Rated
- Stainless Steel Ball Chain
- Spring-Loaded 2" Ceramic Block Available



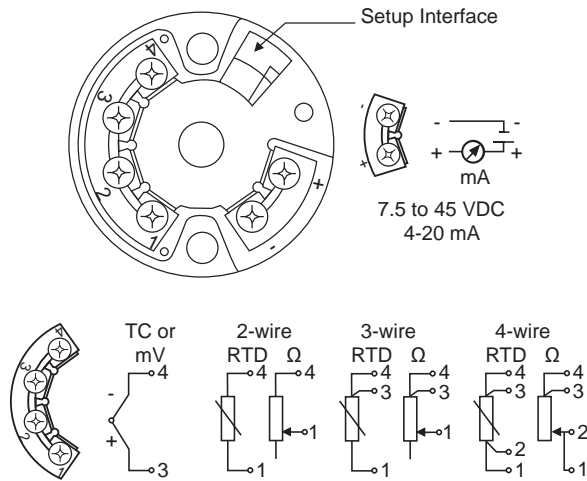
Die-Cast Aluminum



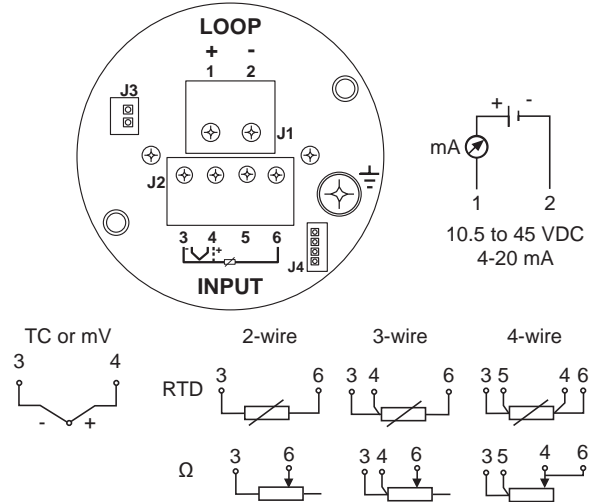
Stainless Steel

**CONNECTIONS**

**PD301-PD306**



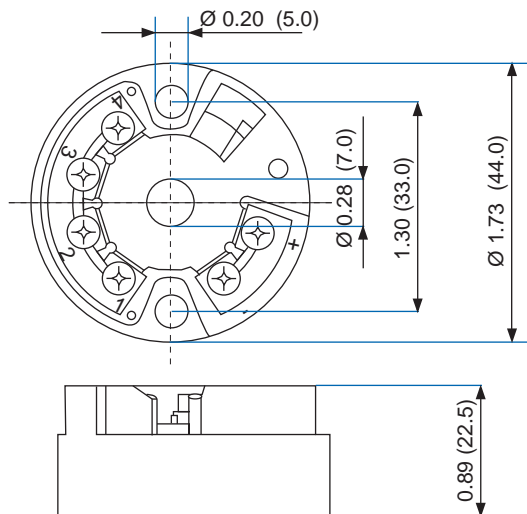
**PD310 & PD312**



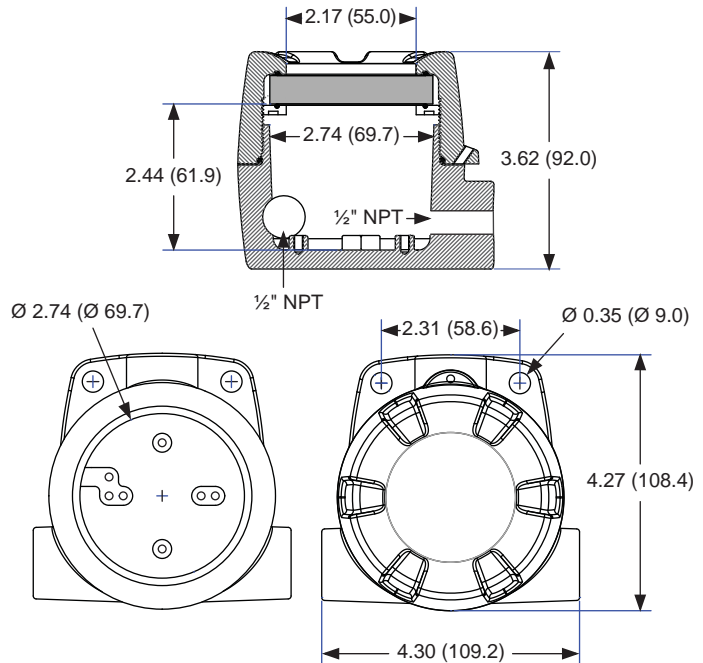
**DIMENSIONS**

**PD301 & PD302**

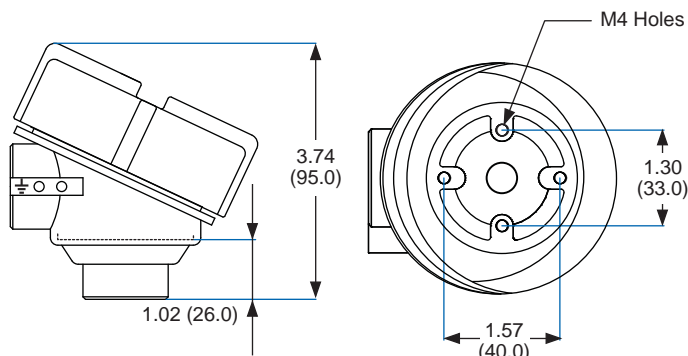
Units: Inch (mm)



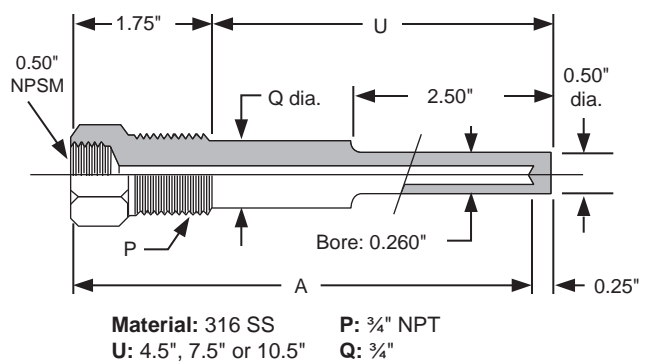
**PD310 & PD312**



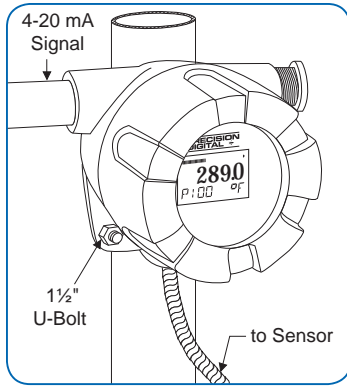
**PD303 & PD304**



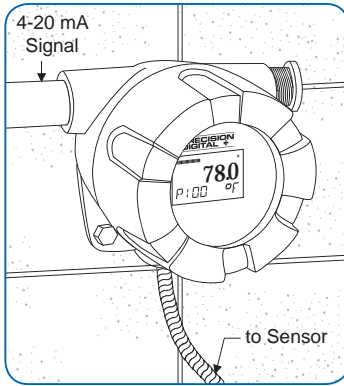
**Thermowell Type T1**



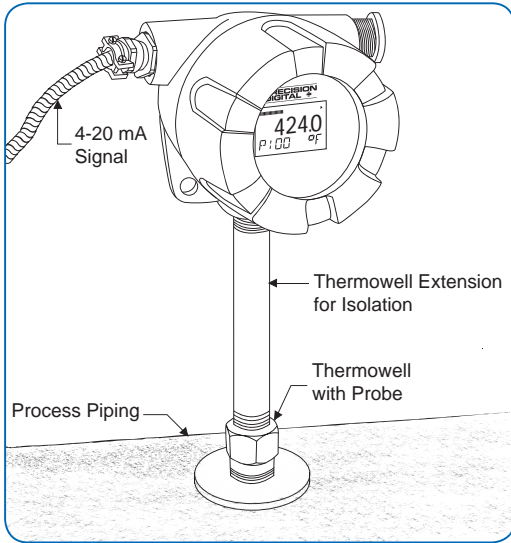
**MOUNTING**



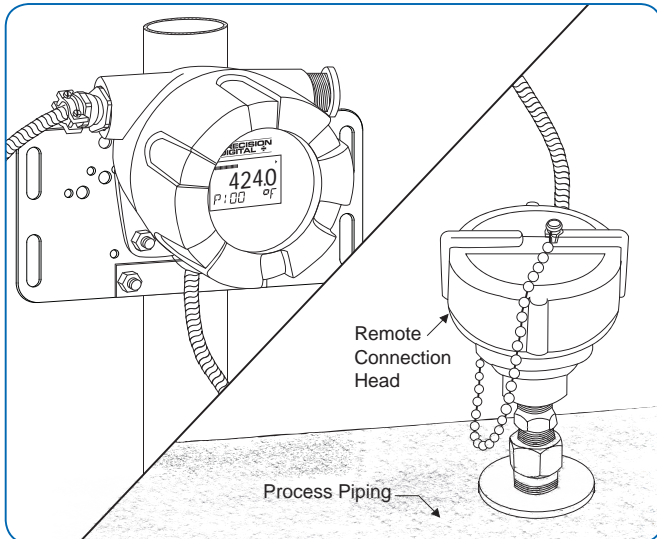
**PD310 Pipe Mounting**



**PD310 Wall Mounting**



**PD312 Surface Mounting with Thermowell Extension**



**PD310 with Remote Mounted Sensor Connection Head**  
 PD310 shown with PDA6845 2" Pipe Mounting Kit

**ORDERING INFORMATION**

ExSense T Series • HART Temperature Transmitters	
Base Model	Description
PD301	Head Mount Temperature Transmitter
PD302	HART Head Mount Temperature Transmitter
PD303	Temperature Transmitter with Connection Head
PD304	HART Temperature Transmitter with Connection Head
PD305	Temperature Transmitter with Connection Head & Temp Probe
PD306	HART Temperature Transmitter with Connection Head & Probe
PD310	HART Temperature Transmitter with Display
PD312	HART Temperature Transmitter w/ Display & Temperature Probe

Accessories	
Model	Description
PDA8301	USB Adapter for Head Mount Transmitter
PDA8302	HART to USB Modem
PDA1080WN	General Purpose Connection Head, Aluminum
PDA1080WM	Explosion-Proof Connection Head, Aluminum
PDA1080SM	Explosion-Proof Connection Head, Stainless Steel
PDA8059-04-EG	4-Terminal Ceramic Terminal Block
PDA6845	2" Pipe Mounting Kit, Zinc Plated Steel

**Note:** HART models must be configured using the ExSenseView PC software and PDA8302 HART modem. The Input Type and Units cannot be changed with HART Communicators (e.g. HC275, HC375).

▶ Go to [www.predig.com/ExSenseBuilder](http://www.predig.com/ExSenseBuilder) to build a complete model number and get pricing.

**Example 1:** PD301-C0 Head mount temperature transmitter with factory defaults

**Example 2:** PD310-G2-C1 HART temperature transmitter with display, general purpose, custom configuration

**Example 3:** PD312-G2-C1-P11S06-T106

PD312 = HART temperature transmitter with display & temperature probe

G2 = Rugged general purpose NEMA 4X enclosure

C1 = Custom configuration

P11 = 100 Pt RTD with 6" leads

S06 = Spring-loaded 6" probe for thermowell installation

T106 = Type 1 thermowell to match 6" spring-loaded probe

**Example of Other Options:**

- C0 = Factory default configuration
- A2 = Explosion-proof die-cast aluminum enclosure
- C2 = Custom configuration with Certificate of Calibration
- R06 = 6" Rigid probe



**RTD/TC Connection Head Assembly**  
 PDA1080WM head shown with PDA8059-04-EG terminal block

**Disclaimer**

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## SPECIFICATIONS

Except where noted all specifications apply to operation at 25°C.

### General

**Input:** Universal RTD, TC, Resistance, or Voltage  
**Power Supply:** 7.5 to 45 VDC, reverse polarity protected  
**Storage Temperature:** -40 to 100°C  
**Connections:** Screw terminals accept 12 to 22 AWG  
**Output:** Two-wire 4-20 mA scalable  
**Accuracy:** ±0.08% of span typical, see table on page 5 for details  
**Temperature Drift:** RTD: ±0.004°C/°C; TC: ±0.03°C/°C  
**Underrange:** 3.8 mA  
**Overrange:** 20.8 mA  
**Sensor Break:** Selectable ≤3.6 mA Low Alarm or ≥22 mA High Alarm  
**Response Time:** 1 second  
**Long Term Stability:** Better than 0.05% per year  
**Start Up Time:** Less than 5 seconds  
**Noise Filter:** Configurable from 0 to 85 µA  
**Damping Time:** Configurable from 0 to 30 sec  
**Output Resolution:** 0.3 µA  
**Non-Volatile Memory:** All configured settings are stored in non-volatile memory for a minimum of ten years.  
**Relative Humidity:** 0 to 90%, condensation allowed  
**Isolation:** 2 kV input-to-output  
**Shock & Vibration Resistance:** 4g/2 to 150 Hz as per IEC 60 068-26  
**EMC:** Immunity & emission interference according to GB/T17626.2-1998), compliance with IEC 61000-4-3:1995  
**Warranty:** 1 year parts & labor

### PD310 & PD312 Exp-Proof Transmitter

**Display:** PV: 0.3" (8 mm) 5-digit LCD, Input & Units: 0.2" (5 mm)  
**Bargraph:** 52 segments with 2% resolution  
**Backlight:** Loop-powered, always on  
**Configuration Method:** PDA8302 HART modem and PC software or range configuration with handheld HART communicator\*  
**Load Impedance:** 650 Ω @ 24 VDC max or ((V supply - 10.5 V)/0.0208 A) Ω  
**Operating Temperature:** -30 to 75°C  
**Enclosure:** Explosion-proof or general purpose die-cast aluminum with glass window, 0.3% max copper content, NEMA 4X, IP66; two ½" NPT conduit holes, one ½" NPT process connection; other sizes available upon request.  
**Weight:** 2.42 lb (1.10 Kg)  
**Overall Dimensions:** 4.30" x 4.27" x 3.62" (109.2 x 108.4 x 92.0) (W x H x D), probe and thermowell not included

### PD310-A & PD312-A Approvals

**FM:** Class I, Division 1, Groups B, C, D. Class II, Division 1, Groups E, F, G. Class III, Division 1; T6. Ta = -40°C to +75°C. Enclosure: Type 4X & IP66. Class I, Zone 1, AEx d IIC T6 Gb. Zone 21, AEx tb IIIC T85°C  
**CSA (PD310 only):** Class I, Division 1, Groups B, C, D. Class II, Division 1, Groups E, F, G. Class III, Division 1; T6. Ta = -40°C to +75°C. Enclosure: Type 4X & IP66. Class I, Zone 1, Ex d IIC T6. Certificate Number: 11 2325749  
**ATEX:** II 2 G D. Ex d IIC T6 Gb. Ex tb IIIC T85°C Db IP68.  
 Ta = -40°C to +75°C. ATEX Certificate: Sira 10ATEX1116X  
**IECEX:** IECEX SIR 10.0056X. Ex d IIC T6 Gb. Ex tb IIIC T85°C Db IP68.  
 Ta = -40°C to +75°C. IECEX Certificate: IECEX SIR 10.0056X.

### PD301 & 302 Head Mount Transmitter

**Configuration Method:**  
 PD301: PDA8301 USB modem and PC software  
 PD302: PDA8302 HART modem and PC software or range configuration with handheld HART communicator\*  
**Load Impedance:** 790 Ω @ 24 VDC max or ((V supply - 7.5 V)/0.0208 A) Ω  
**Operating Temperature:** -40 to 85°C  
**Enclosure:** Polycarbonate housing with epoxy potting, NEMA 1, IP00 (NEMA 4X, IP66 with PDA1080WM)  
**Weight:** 1.18 oz (33.5 g)  
**Overall Dimensions:** Dia. 1.73" x 0.89" (44 mm x 22.5 mm)  
**Installation Angle:** No limit  
**Installation Area:** Connection head according to DIN 43 729 Form B

### PD303 & PD304 Head-Mounted Transmitter

**Configuration Method:**  
 PD303: PDA8301 USB modem and PC software  
 PD304: PDA8302 HART modem and PC software or range configuration with handheld HART communicator\*  
**Load Impedance:** 790 Ω @ 24 VDC max or ((V supply - 7.5 V)/0.0208 A) Ω  
**Operating Temperature:** -40 to 85°C  
**Enclosure:** Aluminum or 316 SS mounting head NEMA 4X, IP66 with optional explosion-proof Certification. *Note: The Certification applies to the connection head only and not to the transmitter assembly.*  
**Weight:** 1.0 lb (453.6 g)  
**Overall Dimensions:** Dia. 3.5" x 4.0" (90 mm x 101.6 mm)  
**Installation Angle:** No limit  
**Installation Area:** Connection head according to DIN 43 729 Form B

### PD305 & PD306 Head-Mounted Transmitter with Thermowell and/or Probe

**Configuration Method:**  
 PD305: PDA8301 USB modem and PC software  
 PD306: PDA8302 HART modem and PC software or range configuration with handheld HART communicator\*  
**Load Impedance:** 790 Ω @ 24 VDC max or ((V supply - 7.5 V)/0.0208 A) Ω  
**Operating Temperature:** -40 to 85°C  
**Enclosure:** Aluminum or 316 SS mounting head NEMA 4X, IP66 with optional explosion-proof Certification  
**Weight:** 1.0 lb (453.6 g) plus probe/thermowell weight  
**Overall Dimensions:** Dia. 3.5" x 4.0" (90 mm x 101.6 mm) plus probe/thermowell length  
**Installation Angle:** No limit  
**Installation Area:** Connection head according to DIN 43 729 Form B

### Connection Heads

**Material:** Die-cast aluminum or 316 stainless steel  
**Certification:** FM/CSA/ATEX Explosion-proof Certified, NEMA 4X, IP66 or general purpose without certification  
**Connections:** Two ½" NPT for conduit and process connection; other sizes available upon request  
**Mounting Holes:** Accept M4 screws, see dimensions drawing  
**Surface Finishing:** Aluminum: Blue epoxy coated,  
 Stainless steel: Electropolished  
**O-Ring:** Buna-N  
**Weight:** Aluminum: 0.450 kg (1.0 lb), Stainless steel: 0.90 kg (2.0 lbs)  
**Features:** SS ball chain included, terminal block (Ceramic/Bakelite optional)  
**Overall Dimensions:** Dia. 3.5" x 4.0" (90 mm x 101.6 mm)

\* The Input Type and Units cannot be changed with HART Communicators (e.g. HC275, HC375).

**EXsense**  
series

Your Local Distributor is:

LDS300\_C 10/11