MEASUREMENT AND CONTROL

800 Series Pressure Transmitters

SOR® Pressure Transmitters are versatile, rugged products designed for industrial process monitoring and control. This catalog contains application and ordering data for compact styles of pressure transmitter. Pressure ranges for applications requiring measurement of gauge, or differential pressure are all available.

SOR pressure transmitters can be ordered with a multitude of options and accessories offering the best solution for your unique application.

815PT
with "IN" LCD Display

815DT

Table of Contents

Model	**815PT** Compact Smart Pressure Switch-Transmitter		
Pressure Ranges	**Gauge (psi)**	**Over Pressure (psi)**	**Absolute (psia)**
	0 to 5	15	
	0 to 15	45	0 to 15
	0 to 50	150	0 to 50
	0 to 100	300	0 to 100
	0 to 250	500	
	0 to 500	1,000	
	0 to 1,000	2,000	
	0 to 2,500	5,000	
	0 to 5,000	10,000	
	0 to 10,000	20,000	
	0 to 15,000	21,000	
	0 to 30,000	42,000	
Analog Output	4-20mA / 1-5VDC (Low Power) Output is field configurable.		
Communication Protocol	HART® 7 / Modbus RTU Output is field configurable.		
Accuracy	± 0.25% URL		
Built in Switch	Yes 9 Switch Output Modes		
Switch Accuracy	± 0.25% URL		
Response Time	< 70ms		
Supply Voltage	10-36VDC		
Field Calibration	External Magnetic Targets HART 7 / Modbus RTU		
Agency Approvals	FM (U.S. and Canada)	Explosion Proof	Class I, II, III; Division 1 Groups A-G; T5; Type 4X
		Non-incendive	Class I, II, III; Division 2 Groups A-G; T5; Type 4X
	ATEX/IECEx or INMETRO	Flameproof	Ex db IIC T5 Gb; IP66
Warranty	3 years		

Please consult Product Specifications Table and Model Tree for the complete details of each model.

Pressure Transmitters

Differential Model Overview

Model	**815DT** Compact Smart Differential Pressure Switch-Transmitter		
Pressure Ranges	**Range**	**Max Static Pressure**	
	0 to 5 psid	1,000 psi	
	0 to 15 psid	1,000 psi	
	0 to 50 psid	1,000 psi	
	0 to 100 psid	1,000 psi	
	0 to 300 psid	1,000 psi	
	0 to 500 psid	1,000 psi	
HI & LO Side Over Pressure Ratings	**Range**	**HI Side**	**LO Side**
	0 to 5 psid	15 psid	15 psid
	0 to 15 psid	45 psid	45 psid
	0 to 50 psid	150 psid	150 psid
	0 to 100 psid	300 psid	300 psid
	0 to 300 psid	900 psid	900 psid
	0 to 500 psid	1,500 psid	1,500 psid
Analog Output	4-20mA / 1-5VDC (Low Power) Output is field configurable.		
Communication Protocol	HART® 7 / Modbus RTU Output is field configurable.		
Output Signal Characteristic	Linear (Default) Square Root Strapping Table		
Accuracy	± 0.25% URL		
Built in Switch	Yes		
Switch Accuracy	± 0.25% URL		
Response Time	< 70ms		
Supply Voltage	10-36VDC		
Field Calibration	External Magnetic Targets HART® 7 / Modbus RTU		
Agency Approvals	FM (U.S. and Canada)	Explosion Proof	Class I, II, III; Division 1 Groups A-G; T5; Type 4X
		Non-incendive	Class I, II, III; Division 2 Groups A-G; T5; Type 4X
	ATEX/IECEx or INMETRO	Flameproof	Ex db IIC T5 Gb; IP66
Warranty	3 years		

Please consult Product Specifications Table and Model Tree for the complete details of each model.

815 Smart Pressure Switch-Transmitters

The 815 Smart Pressure Switch-Transmitters are rugged, compact, loop-powered instruments that are ideally suited for hazardous locations and hostile environments where space is limited. The 815 offers many industry standard outputs to meet applications where low-cost, discrete and continuous monitoring is required or preferred. This versatile instrument may be used to safely monitor and control many process applications, but is specifically designed for upstream, midstream, and downstream oil & gas applications. Its stainless-steel construction and three-year warranty dramatically reduces the total cost of ownership.

The 815 is easily configured using HART®7 Communication Protocol and Modbus RTU Serial Communications; it is also very easy to set the zero and span set points with a magnet, as the zero and span magnetic targets are clearly identified on the casting. The SOR 815 is a feature rich, low cost, compact transmitter that sits at the top of its class.

Features

- HART®7 communication protocol with 4-20 mA output
- 1-5 VDC (low-power) mode of operation
- Modbus RTU (RS-485) serial communications
- Configurable normally-open solid-state switch output (SPST)
- ±0.25% (URL) continuous output accuracy
- Zero balance & URL: ±0.25% URL (each)
- Compact, 316 stainless steel, explosion proof housing
- NACE MRO 175/ISO 15156 certification option available
- Hermetically sealed leads
- Pressure ranges: 0-5 psi to 0-30,000 psi for 815PT, 0-5 psid to 0-500 psid for 815DT
- Zero and span magnetic targets located on casting
- LCD display option available
- EMC (EMI/RFI) protection
- NEMA 4X, IP66 housing
- FM and ATEX/IECEx certified for hazardous locations in U.S., Canada and Europe
- Dual Seal approval
- 3 year warranty

HART COMMUNICATION PROTOCOL

815PT Smart Pressure Switch-Transmitter

815DT Smart Differential Pressure Switch-Transmitter

Product Specifications

Continuous Output	
Accuracy	±0.25% URL (BFSL) (Linearity, Hysterisis and Repeatability)
Zero Balance & URL	±0.25% URL (Each)
Output	4-20mA HART® 7 Communications Protocol Modbus RTU (RS-485) Serial Communications 1-5VDC (Low Power) Mode of Operation (36mW ± 5mW @ 10VDC)
Temperature Effect	±1% URL/100°F @ -40 to 176°F
Switch Output	
	1: Off 2: Windowed, Normally-Open 3: Windowed, Normally-Closed 4: Single Point, Normally-Open 5: Single Point, Normally-Closed 6: PWM (Pulse Width Modulation), Pulsed Low 7: PWM (Pulse Width Modulation), Pulsed High 8: Dead Band, Normally-Open 9: Dead Band, Normally-Closed
Accuracy	±0.25% URL
Type	Normally Open Solid State Relay (SPST)
Electrical Rating	30V, 120mA
Temperature Effect	±1% URL/100°F @ -40 to 130°F
Temperature Range	
Compensated	-40 to 176°F (-40 to 80°C)
Ambient	-40 to 176°F (-40 to 80°C)
Process	-40 to 194°F (-40 to 90°C)
Storage	-40 to 194°F (-40 to 90°C)
Long Term Stability	≤ ±0.5% URL per year
Response Time	≤ 70 ms
Supply Voltage	10-36VDC
Loop Resistance	667 ohms @ 24VDC
Circuit Protection	Reverse polarity and EMC (EMI/RFI) protected
Construction	316SS housing (CF8M)
Process Connection	
815PT	1/2" NPT(M) with 1/4" NPT(F) or Autoclave F250C (F) for 1/4" OD Tubing
815DT	(H & L side) 1/4" NPT(F)
Electrical Connection	
Size	1/2" NPT(M)
Termination	18 AWG shielded cable, 72-inch length
Wetted Materials	
815PT	316/316L-SST (for 0-5 psi thru 0-15 psi & psia pressure ranges) 17-4SST (for pressure ranges above 0-15 psi)
815DT	316/316L-SST
Max Static Line Pressure	
815DT	1,000 psi
Over Pressure	
815PT	
0-5 thru 0-100 psi	3 times FSPR
0-250 thru 0-10,000 psi	2 times FSPR
Up to 30,000 psi	1.4 times FSPR
815DT	3 times FSPR
Burst Pressure	
815PT	
0-5 thru 0-100 psi	4 times FSPR
0-250 psi	40 times FSPR
0-500 thru 0-1000 psi	20 times FSPR
0-2500 psi	10 times FSPR
0-5000 psi	8 times FSPR
0-10,000 thru 0-15,000 psi	4 times FSPR
0-30,000 psi	1.8 times FSPR
815DT	4 times FSPR
Weight	1.8 lb (0.8 kg)
Warranty	3 years

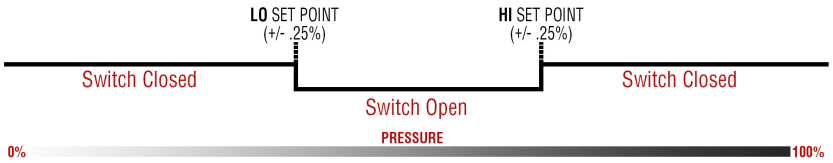
Design and specifications are subject to change without notice. For latest revision, see SORInc.com.

The switch output of the 815 is a Normally Open Solid State Relay rated for 30V, 120mA. It can be configured 9 ways; as shown in the following diagrams. Switch set point(s) and continuous output zero and span points are set at the factory as specified by the customer.

In all nine configurations, the fail-safe state for the 815 switch output will be open (i.e., if power is removed from the 815, the switch contacts will open automatically).

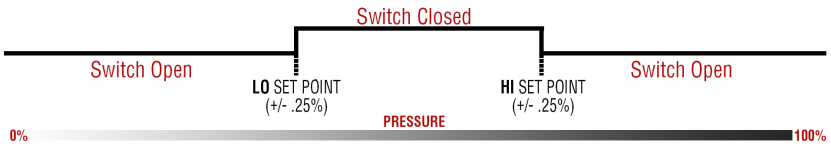
❶ Off
❷ Windowed, Normally-Open
❸ Windowed, Normally-Closed
❹ Single Point, Normally-Open
❺ Single Point, Normally-Closed
❻ PWM (Pulse Width Modulation), Pulsed Low
❼ PWM (Pulse Width Modulation), Pulsed High
❽ Dead Band, Normally-Open
❾ Dead Band, Normally-Closed

❷ Windowed, Normally-Open



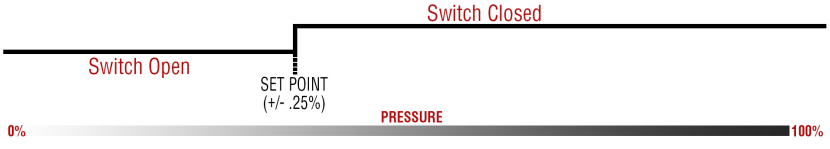
In this configuration, the switch output will be open when the process pressure is within a user selectable range and closed when the pressure is outside of these boundaries. This is designed for applications where there is a known acceptable operating pressure range.

❸ Windowed, Normally-Closed



In this configuration, the switch output will be closed when the process pressure is within a user selectable range and open when the pressure is outside of these boundaries. This is designed for applications where there is a known acceptable operating pressure range.

❹ Single Point, Normally-Open (Close on Rise/ Open on Fall)

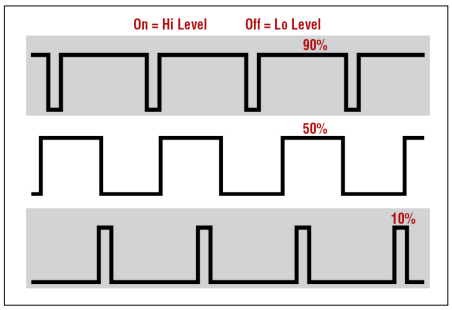


In this configuration, the switch output will be open for pressures less than the selected setpoint. The switch output would then be closed for pressures greater than the setpoint.

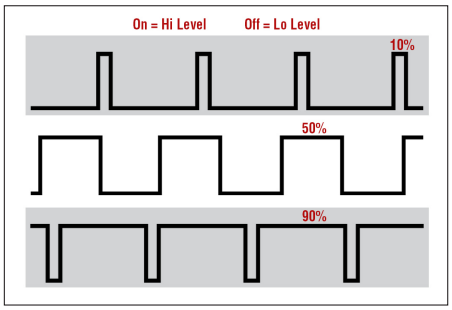
❺ Single Point, Normally-Closed (Open on Rise/ Close on Fall)

In this configuration, the switch output will be closed for pressures less than the selected setpoint. The switch output would then be open for pressures greater than the setpoint.

❻ Pulse Width Modulation - Pulsed Lo



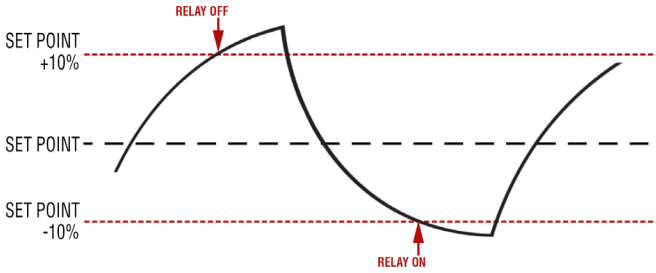
❼ Pulse Width Modulation - Pulsed Hi



❽&❾ Dead Band

This diagram depicts an adjustable dead band. Dead band is the range through which an input can be varied without initiating an observable response. Dead band is usually expressed in percent of span.

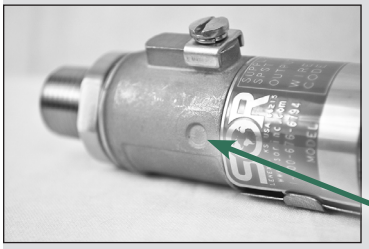
EXAMPLE: A 20% total dead band is applied to the setpoint of a monitored parameter. The relay will turn on and off as indicated in the graph above.

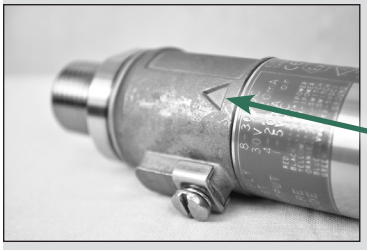


Note: The continuous zero and span points and the Switch Configuration Mode and set point(s) must be specified. Refer to switch configuration diagrams on page 6.

Example: ***815PT-Z07-A-RR,*** *which has a range of* ***0-2500 psi*** *could be ordered with zero and span of 200 psi and 2300 psi. The window mode switch configuration could have a LO set point of 210 psi and a HI set point of 2290 psi.*

External Magnetic Zero & Span





The 815PT and 815DT can be easily configured externally with a magnet. Simply place a magnet to the targets located on the housing for 3 seconds and set the zero and span.

To set the Zero, simply follow the steps below:

Step 1: Bring the pressure to the desired Zero value.
Step 2: Place the magnet on the circle target located on the housing and hold for 3 seconds.
Step 3: After zero value is set, remove the magnet.

To set the Span, follow the same steps except place the magnet on the triangle on the housing for 3 seconds. Using this method requires a power and a pressure source. Almost any magnet can be used, and SOR can provide the magnetic tool if needed.

How to Order

Below is the SOR quick select model number tree that provides you with all the options to configure and order a product for your application.

- You must select a designator for each component
- Reference tables, charts and additional information are provided throughout the catalog to help you make your selections, see pages noted in the tree.

1 Model

Smart Gauge Pressure Transmitter	815PT
Smart Differential Pressure Transmitter	815DT

2 Protocol/Output

HART® 7 and ModBus RTU 4-20 mA and 1-5 VDC[1]	Z

3 Range

815PT	
0-5 psi	00
0-15 psi	01
0-50 psi	02
0-100 psi	03
0-250 psi	04
0-500 psi	05
0-1000 psi	06
0-2500 psi	07
0-5000 psi	08
0-10000 psi	09
0-15000 psi	10
0-30000 psi	11
0-15 psia	13
0-50 psia	14
0-100 psia	15
815DT	
0-138 in H_2O (0-5 psid)	21
0-415 in H_2O (0-15 psid)	22
0-50 psid	23
0-100 psid	24
0-300 psid	25
0-500 psid	26

4 Process Connection Size

815PT

A — 316/316L SS, 1/2"NPT(M) with 1/4"NPT(F) Process Connection (316SS for ranges 0-15 psi and below, 17-4SS for ranges above 0-15 psi)

S — 316L SS 1/2"NPT(M) Flush-Mount, Liquid-Filled, Diaphragm Seal, Process Connection[2]

H — 17-4SS, Autoclave F250C Female (For 1/4" OD Tubing), Process Connection[3]

815DT

D — 316/316L SS, 1/4"NPT(F) Differential Process Connection (HI & LO side)

See page 11 for more information.

5 Accessories

IN	LCD Display for local indication (see page 12 for more information)
BB	Cleaned for industrial oxygen service
DS	Dual Seal approval (FM)[4]
NC	Compliance to NACE Certification MR0 175/ISO 15156 (Only available with S process connection. Consult factory for other ranges.)
NM	INMETRO approved (not available for ranges 13-15)
PK	Pipe mounting kit
RR	SS tag wired to housing with customer specified information
HA	High Accuracy±0.1% URL
	Certificates
C1	Calibration
C2	Hydrostatic Pressure Test (not available with range option 11)
C3	Inspection Report
C4	Compliance/Conformance
C8	Typical Material of Wetted Parts
D1	Certificate of Origin
D2	Manufacturer's Certification

Example Model No. 815PT- Z 07 - A - RRINC1

[1] 4-20mA and 1-5V output are software selectable using Modbus or HART as detailed in the general instructions. Units ship with 4-20mA output active unless otherwise requested. Both outputs are not active at the same time.

[2] Only available for Range options 04 thru 08

[3] For pressure Ranges above 0-10,000 psi (Range options 10 and 11)

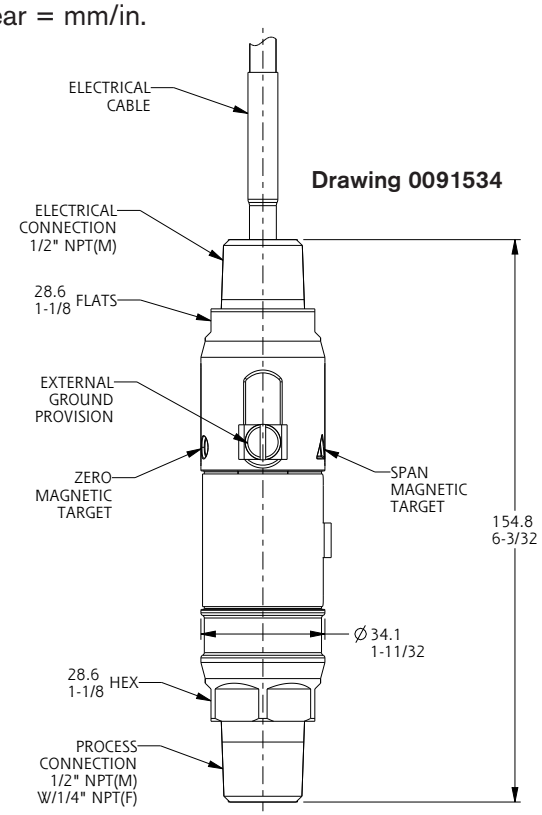
[4] Dual Seal version is not hermetically sealed. Only available for Range options 00 thru 09 and 21 thru 26.

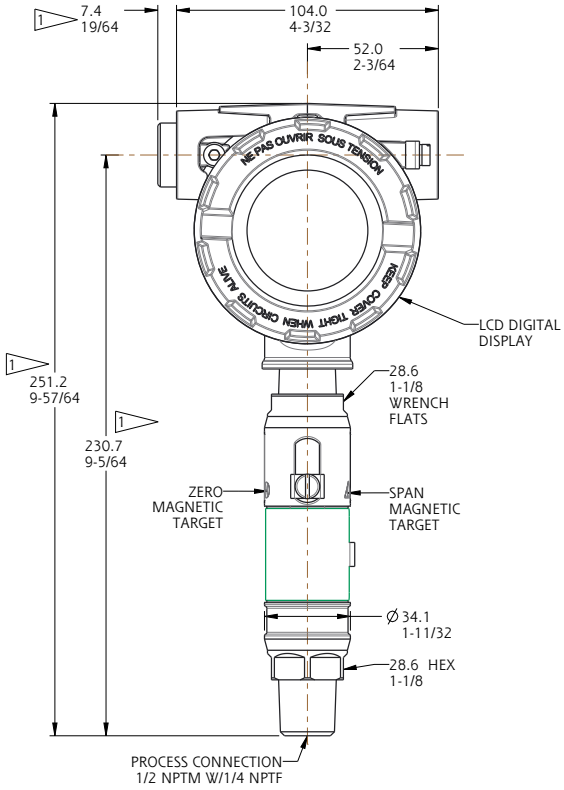
See page 11 for agency and options.

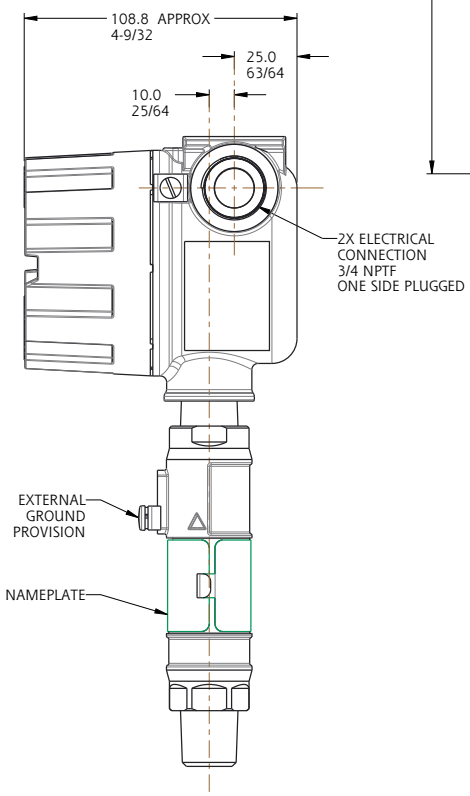
Dimensions shown are for reference only. Contact the factory for certified dimension drawings.
Linear = mm/in.

815PT Smart Pressure Switch-Transmitter

Drawing 0091534







Drawing 0098750

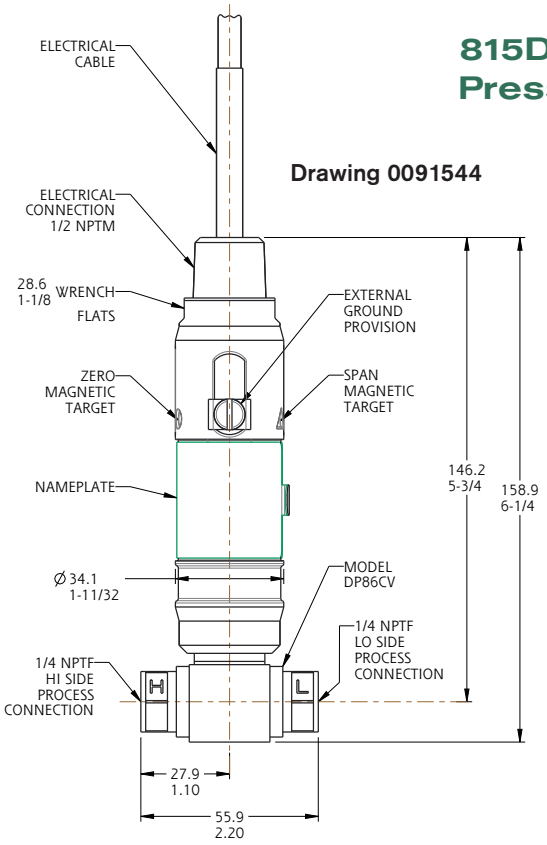
1. DIMENSION APPROXIMATE AND BASED ON A FIVE THREAD ENGAGEMENT.
2. TRANSMITTER ORIENTATION MAY VARY IN RELATION TO THE LCD DIGITAL DISPLAY. VARIATION WILL NOT AFFECT FUNCTIONALITY.

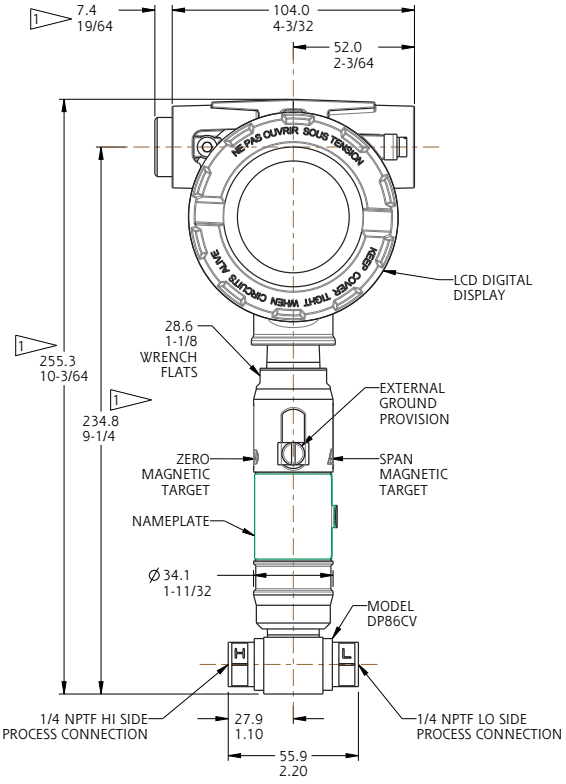
Design and specifications are subject to change without notice. For latest revision, see SORInc.com.

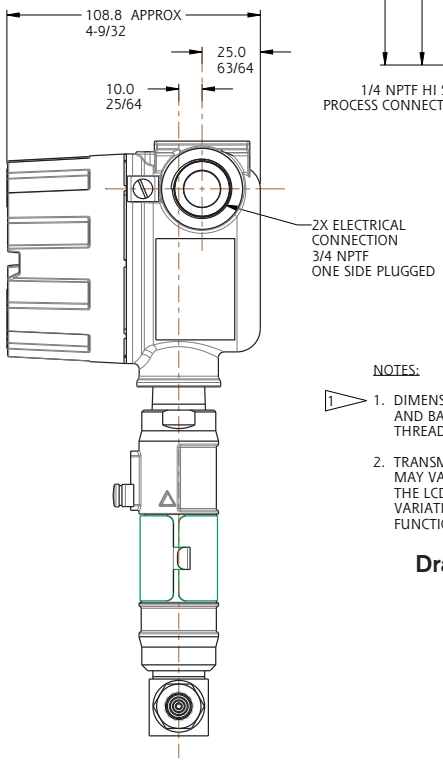
Dimensions shown are for reference only. Contact the factory for certified dimension drawings.
Linear = mm/in.

815DT Smart DIfferential Pressure Switch-Transmitter

Drawing 0091544







NOTES:

1. DIMENSION APPROXIMATE AND BASED ON A FIVE THREAD ENGAGEMENT.
2. TRANSMITTER ORIENTATION MAY VARY IN RELATION TO THE LCD DIGITAL DISPLAY. VARIATION WILL NOT AFFECT FUNCTIONALITY.

Drawing 0098752

Design and specifications are subject to change without notice. For latest revision, see SORInc.com.

805/815 Process Connections

Designator	A	S	H	Alternate
Description	Stainless Steel, 1/2"NPT(M) with 1/4"NPT(F), (316/316L SS for ranges 0-15 psi and below) (17-4SS for ranges above 0-15 psi)	316L SS, 1/2" NPT(M) flush-mount, liquid filled, diaphragm seal.	17-4SS, Autoclave F250C Female (For 1/4" OD Tubing)	If alternate process connection is required, please consult the factory.
Application	General applications with process materials not containing heavy particulates that could induce clogging of pressure port.	Use when applications contain dirty, sticky or high particulate process material such as paraffin.	Use for applications where pressures are greater than 10,000 psi, Standard NPT threads are not suitable at these high pressures.	SOR can provide many other process connections including: ▪ Thread & port size adapters ▪ Direct & remote mount diaphragm seals ▪ Tri-clamp/sanitary fittings ▪ Flanged ▪ Other
Photo				

Agency Approvals

Approved*	Safety Method	Approval
FM (U.S. and Canada)	Explosion Proof Hazardous Locations	Class I, II, III; Division 1 Groups A-G; T5; Type 4X
	Non-incendive	Class I, II, III; Division 2 Groups A-G; T5; Type 4X
ATEX/IECEx or INMETRO	Flameproof	Ex db IIC T5 Gb; IP66

* Product holds a Canadian Registration Number (CRN) in all provinces, only available for Range options 04 thru 09.

800 Series
Pressure Transmitters

LCD Display "IN" Option

The "IN" LCD display is a low cost option for when simple local indication is needed. The "IN" option provides a 5-digit backlit loop powered LCD display enclosed in an explosion proof housing with terminal block connections inside. For configuring the display, push buttons are provided on the front of the housing. Configuration of the display and transmitter are done separately.

Display Specifications

Analog Signal	2 wire: 4-20mA
Power Supply (with 805 series transmitter)	16-30 VDC
Permissible Temperature	-20 to +70°C
Accuracy	≤0.25% F.S.
Digits	4½ neg; 5 pos
Units	Blank, kPa, MPa, Pa, bar, mbar, psi, mH20, mmH20, cmH20, mmHg, Torr, atm, kg, g, mg, N, kN, °C, °F, K, %RH, %VOL, PPM, %LEL, pH, m, cm, mm, inch, m/s, Ω (ohm), k Ω (kohm), mV, V, L/min, M3/hr
Instrument Connection	½" NPTF
Electrical Conduit Connection	¾" NPTF
Housing Material	Die-casting Aluminum with chromating and chemically resistant paint
Window Material	Glass
Housing Agency Approvals	FM (US and Canada) CSA ATEX IEC Ex d IP68
Weight (Display only)	≈2.0 lbs

Display option can be sold separately without transmitter installed and will work with any 4-20mA two-wire device. Part number 9231526.

MEASUREMENT AND CONTROL

Lenexa, KS USA | 913-888-2630 | Fax 913-888-0767 | SORInc.com