

ELPRT 100ERH

RADIATION QUALIFIED PRESSURE TRANSMITTER

FOR NUCLEAR APPLICATION



Silent Features

- Analog Output with Adjustable Damping
- Qualified for 4.1 MRad
- Two wire system 4-20mA DC
- Capacitance type Sensor
- Rangeability 6:1
- 20 Years Service Life
- Conforming to IEEE-323 Environmental Conditions
- Conforming to IEEE-344 Seismic Conditions
- Loss of Coolant Accident (LOCA) Qualified



Description

Electronet's Series ELPRT-100 ERH is Indigenously developed Nuclear Grade Analog Type Pressure Transmitter suitable for operation during Normal & abnormal Severe Conditions in Nuclear Power Plants. These transmitters have undergone testing conforming to IEEE-323 and IEEE-344 standards. These transmitters use Capacitance type sensor and are suitable for Pressure / Differential Pressure / Absolute pressure measurement applications.

Features

- Analog type Design
- 20 Years of Service Life
- 4.1 MRad TID Gamma Radiation Qualified for Severe and Harsh Environment
- Qualified for LOCA conditions as per unsaturated condition test profile.
- Seismic Qualified for 1-100 Hz for all 3 axis as per IEEE-344
- High accuracy
- Zero suppression upto 500 %, Zero elevation upto 600 %
- Span and Zero continuous and adjustable.
- Adjustable Damping.

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Functional Specifications

Transmitter Type	Analogue, 2 Wire
Output	4-20 mA (Standard) / 20-4 mA DC
Range	As per Table
Sensor Type	Capacitance Type
Power Supply	28 V DC $\pm$ 4 V DC
Electrical Connection	3 Pin Allied Connector
Reverse Supply Voltage Protection	Provided
Rangeability	6:1
Damping	0 to 5 sec adjustable
Zero Elevation & Suppression	Zero Suppression adjustable upto 500 % of Calibrated Span Zero Elevation adjustable upto 600 % of Calibrated Span
Span & Zero Adjustment	External Zero & Span adjustment with potentiometer
Static Pressure	4, 10, 25, 32 MPa as per range
Body Rating	Maximum 40 MPa
Fill Fluid	Silicon Oil
Power Supply Connection	2 / 3 Pin MS Circular Connector
Test Terminal	Provided to monitor the current signal output without breaking the load circuit
Grounding	Provided through external bolt for body grounding.
Process connection	1/4" NPT (Female) / Other with adapter
"O" Ring / Gasket	Buna- N, Ethylene -Propylene, Teflon, Silicon Rubber
Max. Process Temperature	5-120°C
Max. Operating Temperature	5-55°C (Electronics)
Humidity	0 to 100 % RH
Vent & Drain	Provided
Vent & Drain Plug Position	Opposite to Pressure inlet Process connection
Mounting	Suitable for Horizontal / Vertical, Wall or Stand mounting
Weight	Approx. 11.5 Kg (Max)
Service	Suitable for Liquid (Heavy Water, Light water), Gas & Vapor Applications
Housing	SS-316 for both Mild & Harsh Environments
Ingress Protection	IP-68 as per IEC-60529
Isolating Diaphragm	SS-316L / Hastelloy C / Other
Drain Vent Valves	SS-316L / Hastelloy C / Monel
Process flanges & adapters	SS-316L / Hastelloy C / Monel
Nut & Bolts	SS-316
Optional Accessories :	1. Part No. ELPRT-100ERH 3-Valve manifold, 316 SST 2. Part No. ELPRT-100ERH-003 5-Valve manifold, 316 SST 3. SS-316 Mounting Bracket

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Performance Specifications

Accuracy	± 0.25 % of Calibrated Span under normal operating conditions
Dead band	± 0.1 % of Calibrated Span under normal operating conditions
Hysteresis	± 0.1 % of Calibrated Span under normal operating conditions
Repeatability	± 0.1 % of Calibrated Span under normal operating conditions
Linearity	± 0.1 % of Calibrated Span under normal operating conditions
Load Resistance	Load Resistance < 1KΩ
Over pressure Effect	± 0.25 % of URL for Over pressure events less than the (Max pressure as per range) transmitter's Over Pressure limit
Mounting Position Effect	Zero shift of upto ± 25 mmH ₂ O which can be calibrated out. No Span Shift.
Static Pressure Effect	Zero error ± 0.20 % of URL per 50 Kg/cm ² Span error ± 0.10 % of URL per 50 Kg/cm ²
Over Range	1.2 times of the Maximum service pressure or URL
Temperature Effect	± 0.005 % of URL per °C
Short term drift	± 0.1 % of Calibrated Span for over a period of 30 Days
Long term drift	± 0.25 % of Upper Range Limit for over a period of 4 Years
Vibration Effect	± 0.05 % of URL per g for 100 Hz in all 3 axis
Power supply Effect	± 0.015 % of Span / volt
Stability	± 0.1 % of URL for 12 months
Recalibration Frequency	> 2 Years
Insulation Resistance	> 100 MΩ @ 100 V DC
Hydrostatic Pressure	150 Kg/cm ²
Leak tightness	Air leak at minimum pressure of 4 kg/cm ² (g) Helium leak rate < 10 ⁻⁶ std. cc/sec at 1 kg/cm ² (g)
DP Reversal	LP side pressure higher than HP by 2 to 6 kg/cm ² (g) (for DP transmitters only)
Zero & Span Adjustment	Provided
Service Life	20 Years
Dynamic Frequency Response	0.001 Hz to 5 Hz with an amplitude of 1.6 mA (P-P) about 12 mA
Response time	< 300 mSec
Enclosure Test	IP-67 type as per IEC-60529
Over Pressure Limits	300 % F.S (< 100Kpa) / 200 % F.S (<25 Mpa) / 150 % F.S (25 Mpa)
Qualification Test Performed	
Environmental Condition Test	Dry Heat Test as per IS 9000 part-III Damp Heat Test as per IS 9000 part-V
EMI/EMC Test	IEC 61000-4-4, IEC61000-4-12, IEC61000-4-3, IEC 61000-4-5, CISPR11 class A
Operational Cycling Ageing	Input Pressure Fluctuation Test Over Pressure Fluctuation Test (only for differential pressure transmitter) Power ON/OFF cycling Test Power Supply Fluctuation test Above test carried out as per NPCIL specifications
Accelerated Thermal Ageing	According to ARRHENIUS Equation for 20 years service life
Radiation Ageing	4.1 MRad TID
LOCA	Temperature & Pressure Generic Test Profile with Unsaturated Steam
Seismic Vibration	1-100 Hz Frequency with peak acceleration of 3.5 g for X,Y,Z axis

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Table A. Differential Pressure Transmitter Ranges

Range Code	Lower Range Limit (LRL)	Upper Range Limit (URL)	Minimum SPAN
3	0 kPa (0 Bar)	7.5 kPa (0.075 Bar)	1.3 kPa (0.013 Bar)
4	0 kPa (0 Bar)	40 kPa (0.4 Bar)	6.2 kPa (0.062 Bar)
5	0 kPa (0 Bar)	186 kPa (1.86 Bar)	31 kPa (0.31 Bar)
6	0 kPa (0 Bar)	690 kPa (6.9 Bar)	117 kPa (1.17 Bar)
7	0 kPa (0 Bar)	2068 kPa (20.68 Bar)	345 kPa (3.45 Bar)
8	0 kPa (0 Bar)	6000 kPa (60 Bar)	1170 kPa (11.70 Bar)

Table B. Absolute Pressure Transmitter Ranges

Range Code	Lower Range Limit (LRL)	Upper Range Limit (URL)	Minimum SPAN
4	0 kPa (0 Bar)	40 kPa (0.4 Bar)	6.2 kPa (0.062 Bar)
5	0 kPa (0 Bar)	186 kPa (1.86 Bar)	31 kPa (0.31 Bar)
6	0 kPa (0 Bar)	690 kPa (6.9 Bar)	117 kPa (1.17 Bar)
7	0 kPa (0 Bar)	2068 kPa (20.68 Bar)	345 kPa (3.45 Bar)
8	0 kPa (0 Bar)	6000 kPa (60 Bar)	1170 kPa (11.70 Bar)

Table C. Gauge & Vacuum Pressure Transmitter Ranges

Range Code	Lower Range Limit (LRL)	Upper Range Limit (URL)	Minimum SPAN
2	0 kPa (0 Bar)	1.5 kPa (0.015 Bar)	0.125 kPa (0.00125 Bar)
3	0 kPa (0 Bar)	7.5 kPa (0.075 Bar)	1.3 kPa (0.013 Bar)
4	0 kPa (0 Bar)	40 kPa (0.4 Bar)	6.2 kPa (0.062 Bar)
5	0 kPa (0 Bar)	186 kPa (1.86 Bar)	31 kPa (0.31 Bar)
6	0 kPa (0 Bar)	690 kPa (6.9 Bar)	117 kPa (1.17 Bar)
7	0 kPa (0 Bar)	2068 kPa (20.68 Bar)	345 kPa (3.45 Bar)
8	0 kPa (0 Bar)	6000 kPa (60 Bar)	1170 kPa (11.70 Bar)
9	0 kPa (0 Bar)	20000 kPa (200 Bar)	3480 kPa (34.80 Bar)

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Assembly Overview

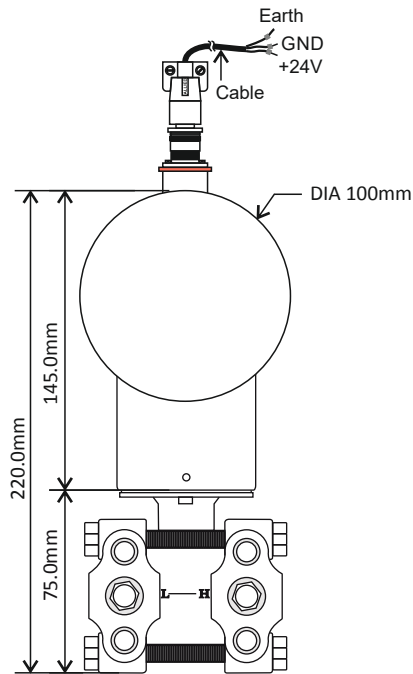


Fig.1 Front View

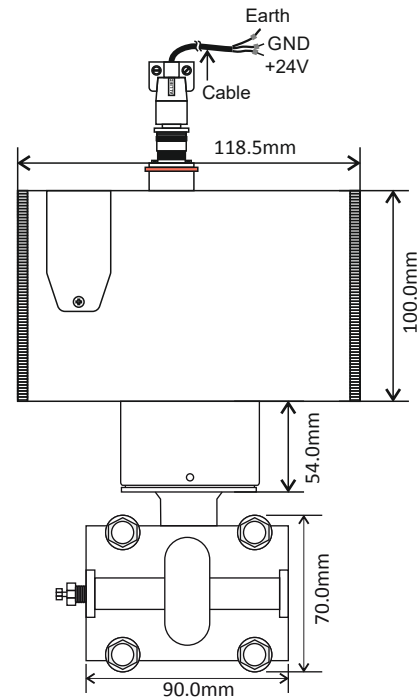
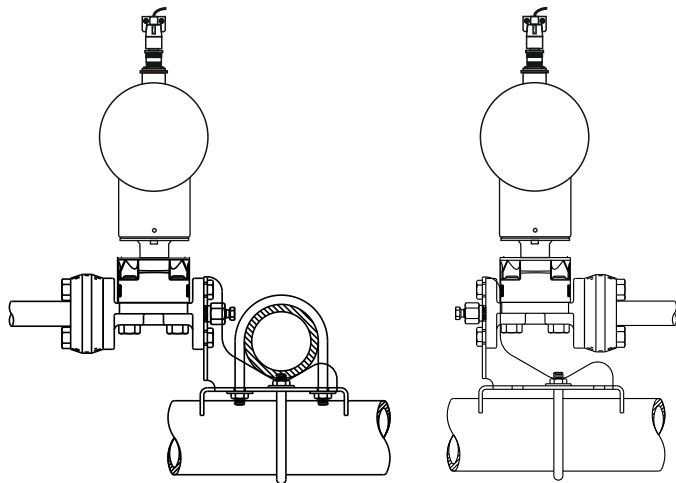
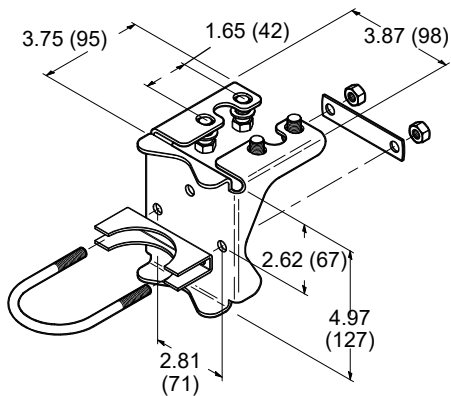


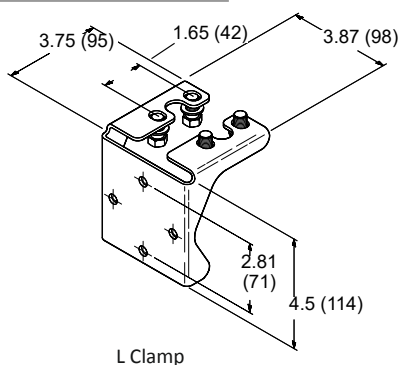
Fig.2 Side View

Installation Drawing & Dimensions

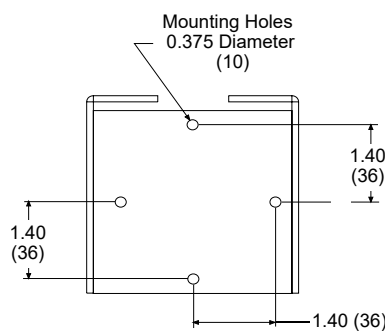
Pipe Mounting



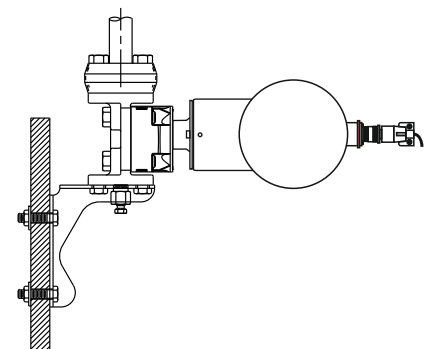
Panel Mounting



L Clamp



L Clamp Mounting drill



Panel Mounting View

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Ordering Information

Sample Order Code : ELPRT 100ERH-A1-B1-C1-D1-E1-F1-G1-H1

	Parameter	Code	Description		Parameter	Code	Description		
A	Measurement Type	A1	AP	F	MOC of Sensor, Flange, Adapter & Drain Vent Valve	F1	SS-316		
		A2	GP			F2	Hastelloy C		
		A3	DP			FY	Other		
B	Pressure Range	B2	1.5 kPa	G	O Ring Material	G1	Buna - N		
		B3	7.5 kPa			G2	Ethylene - Propylene		
		B4	40 kPa			G3	Teflon		
		B5	186 kPa			G4	Viton		
		B6	690 kPa	H	Process Connection (In SS-316)	H1	¼" NPT (M)		
		B7	2068 kPa			H2	½" NPT (M)		
		B8	6000 kPa			H3	¼" BSP (M)		
		B9	20000 kPa			H4	½" BSP (M)		
C	Radiation Total Dose	C1	68 K RAD			H5	¼" NPT (F)		
		C2	1 MRAD			H6	½" NPT (F)		
		C3	4.7 MRAD			H7	¼" BSP (F)		
D	Diaphragm Material	D1	SS-316L			H8	½" BSP (F)		
		D2	Hastelloy C			H9	Flush Diaphragm (Triclover)		
		DY	Other			H10	Flush Diaphragm (1" BSP)		
E	Sensor Fill Fluid	E1	Silicon Oil (DC 300)			H11	Diaphragm Seal 1" (SS-316)		
		EY	Other			H12	Diaphragm Seal 2" (SS-316)		
Note : ■ Due to our continuous product revisions, design specification and model numbers are subject to change without notice.						H13			Diaphragm Seal 3" (SS-316)
■ Accuracy defined at Lab Conditions.						H14			5 Mtr Capillary (1" Flange)
■ For other requirement please consult factory.						H15			5 Mtr Capillary (2" Flange)
■ This product is meant for laboratory/Process application only and not for custody transfer application.						H16			5 Mtr Capillary (3" Flange)
						HY			Other

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