



LD290 Series

LD290-LD291-LD292-LD293

PRESSURE TRANSMITTERS

- 0 ~ 125 Pa to 0 ~ 25 MPa
- 0 ~ 0.5 inH₂O to 0 ~ 3600 psi
- ± 0.075% Accuracy
- 40:1 Rangeability
- Wetted parts in 316 SS, Hastelloy
- Totally digital; including sensor, electronics and communication (Except LD290)
- Digital LCD display
- Weather proof, explosion proof and intrinsically safe
- Self diagnostics
- Three options of technology



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smar

4-20 mA

- Updating time of output current in 100 ms;
- With high performance mathematical co-processor;
- Digital electronics and sensor;
- Weather proof, explosion proof and intrinsically safe;
- FMEDA (failure Modes, Effects and Diagnostic Analysis);
- MTBF (Mean Time Between Failures) of 239 years;
- MTTR (Mean Time to Repair) of 18 minutes;
- MTTF (Mean Time to Failure) of 239 years;
- Applicable in safety areas according to SIL (Safety Integrity Level) requirements;
- Write protection by hardware;
- Designed and manufactured according to ISO 9001 standards.



HART® 4-20 mA

- Updating time of output current in 100ms;
- Improved performance due to dedicated math co-processor;
- FMEDA (Failure Modes, Effects and Diagnostic) Analysis;
- MTBF (Mean Time Between Failures) of 239 years;
- MTTR (Mean Time to Repair) of 18 minutes;
- MTTF (Mean Time to Failure) of 239 years;
- Applicable in safety areas according to SIL (Safety Integrity Level) requirements;
- Write protection by hardware;
- Designed and manufactured according to ISO 9001 standards;
- Zero, span and damping adjustment through HART® local switches (only if fitted with display);
- Easy update for FOUNDATION™ fieldbus and PROFIBUS PA technologies.



FOUNDATION™ fieldbus

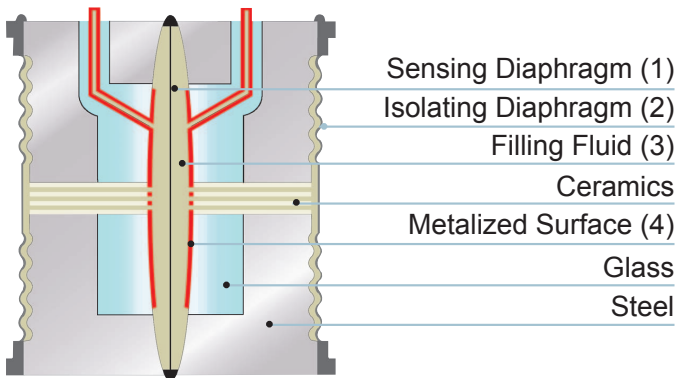
- Instantiation and deletion of function blocks;
- Network master capability;
- Easy update for HART® and Profibus PA technologies.



PROFIBUS PA

- Use of the Analog Input function;
- Easy firmware upgrade (via Flash Memory Interface);
- Easy update to FOUNDATION™ fieldbus and HART® protocol.





The **LD290 Series** are an economical alternative gauge pressure transmitter. It is based on a field-proven capacitive sensor that provides reliable operation and high performance.

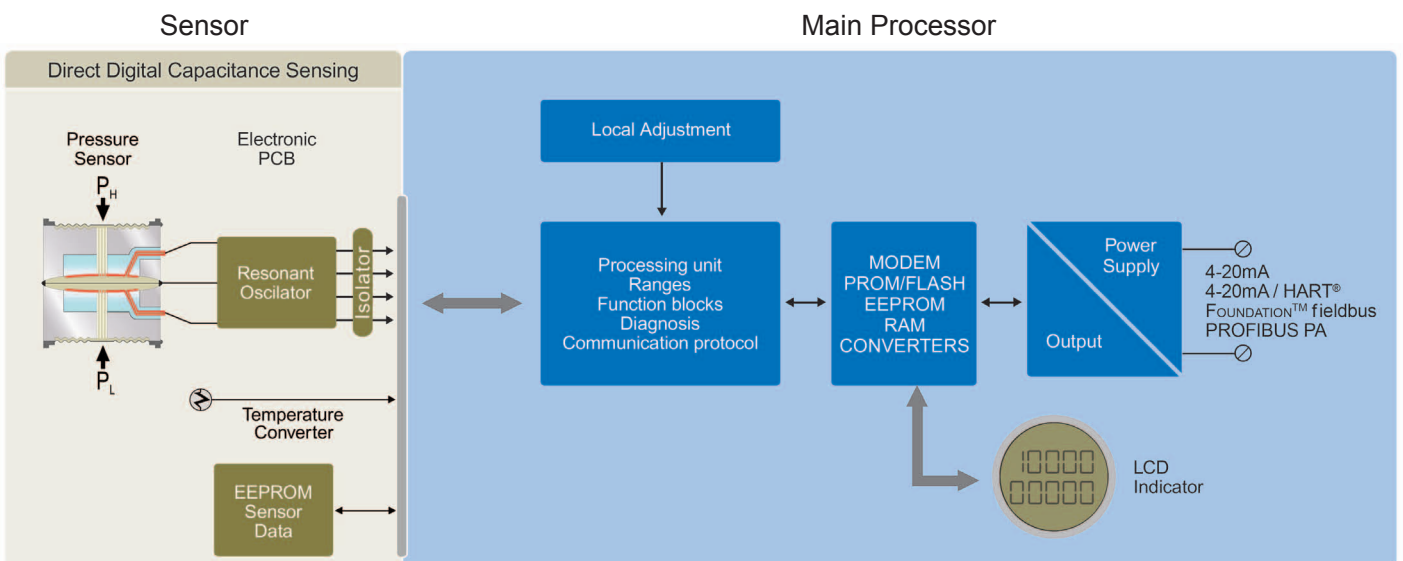
This lightweight design eliminates the need for mounting brackets and transmitter supports in many applications. Its microprocessor-based electronics allows total interchangeability with Smar capacitive sensors. It is automatically corrects sensors characteristics changes caused by temperature fluctuations.

The sensor is shown in the picture above. The sensing diaphragm (1) is at the cell center. The diaphragm deflects as a result of the difference between the pressures applied to the left and right sides of the sensor. Pressure is directly applied to the isolating diaphragms (2), which provide resistance against process fluid corrosion. The pressure is transmitted to the sensing diaphragm through the filling

fluid (3). The sensing diaphragm is a moving capacitor plate while the two metallized surfaces (4) are fixed plates. The sensing diaphragm deflection results in capacitance variations between the moving and fixed plates.

The electronic resonance circuit reads capacitance variation between the moving and fixed plates. The CPU conditions the measurement and communicates according to protocol. As there is no A/D conversion, errors and drifts during conversions are eliminated. A temperature sensor provides temperature compensations, which combined with the sensor precision, results in high accuracy and rangeability for the **LD290 Series**.

The process variable, as well as monitoring and diagnostics information, are provided by digital communication protocol. The available protocol options are: HART®, FOUNDATION™ fieldbus and PROFIBUS PA.



Gage Pressure - LD290M

The **LD290M** model is a pure 4-20 mA transmitter. Even though it has only analog input, its microprocessor-based electronics allow for total interchangeability with Smar capacitive sensors. It automatically corrects sensor characteristics changes caused by temperature fluctuations.

Gage Pressure - LD291M, LD292M and LD293M

The **LD291M**, **LD292M** and **LD293M** models offer digital communication based in HART®, FOUNDATION™ fieldbus and PROFIBUS PA - protocols, simplifying calibration and providing remote diagnostics. Their microprocessor-based electronic circuit allows for total interchangeability with Smar capacitive sensors.

Sanitary Transmitter - LD290S, LD291S, LD292S and LD293S

The **LD290S**, **LD291S**, **LD292S** and **LD293S** models are specially designed for food and other applications where sanitary connections are required. With threaded or “tri-clamp” connections, it allows for easy and quick maintenance and cleaning.

Tri-clamp and other connections are compliant to 3A-7403 standard for food grade applications. For further information, see the Smar SR301 Series Catalog.

Flanged Pressure Transmitter - LD290L, LD291L, LD292L and LD293L

The **LD290L**, **LD291L**, **LD292L** and **LD293L** models have a flange mounted unit for direct installation on vessels. Extended diaphragms are also available.

Pressure Transmitter with Extended Probe - LD290I, LD291I, LD292I and LD293I

The **LD290I**, **LD291I**, **LD292I** and **LD293I** models allow measurement of liquid level in open tanks, closed non-pressurized tanks, canals, wells etc. The measurement principle is based on measuring the column of fluid with the immersion of the hard probe into the liquid.



Manifold Valves

Smar manifold valves provide all of the necessary safety for field maintenance of **LD290 Series** transmitters. Working at pressures up to 6,000 psi, they are easy to handle and lighter than others in the market. Pressure and leakage tests carried out in 100% of the valves, also for models mounted on the transmitter. For further information, please see the Smar Manifold Valves Catalog.



Parameterization and Diagnostics

LD290 Series are available in four different technologies: 4-20 mA (**LD290**), HART® (**LD291**), FOUNDATION™ fieldbus (**LD292**) and PROFIBUS PA (**LD293**).

These instruments can be configured with Smar software and other manufacturers' configuration tools.

Local adjustment is available in all **LD290 Series**. It is possible to configure zero and span, and other functions

using the magnetic tool. Smar has developed AssetView, which is a user-friendly Web Tool that can be accessed anywhere and anytime using an Internet browser. It is designed for management and diagnostics of field devices to ensure reactive, preventive, predictive and proactive maintenance.

4-20 mA - LD290

Only configurable using magnetic tool if device is fitted with display.



HART® - LD291

LD291 (HART® protocol) can be configured by:

- Smar CONF401 for Windows;
- Smar DDCON100 for Windows;
- Smar HPC301 and HPC401 for several models of Palms*;
- Other manufacturers' configuration tools based on DD (Device Description) or DTM (Device Type Manager), such as AMS™, FieldCare™, PACTware™, HHT275 and HHT375, PRM Device Viewer. For LD291 management and diagnostics, AssetView ensures continuous information monitoring.



* Requires HPI311.

FOUNDATION™ fieldbus - LD292

LD292 utilizes the FOUNDATION™ fieldbus H1 protocol, an open technology that allows any H1 enabled configuration tool to configure this device.

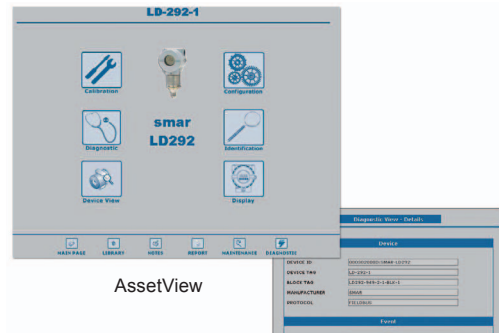
Syscon (System Configuration Tool) is a software tool used to configure, maintain and operate the field devices. Syscon offers efficient and friendly interaction with the user, using Windows NT version 4.0 or later, Windows 2000 and Windows XP.

Configuration tools such as AMS™, FieldCare™ and HHT375 can configure LD292 devices. DD (Device Description) and CF (Capability File) files can be downloaded at either the Smar or Fieldbus FOUNDATION™ website.

LD292 supports complex strategies configurations due to the high capacity and variety of dynamic instantiable function blocks. Seventeen different types of function

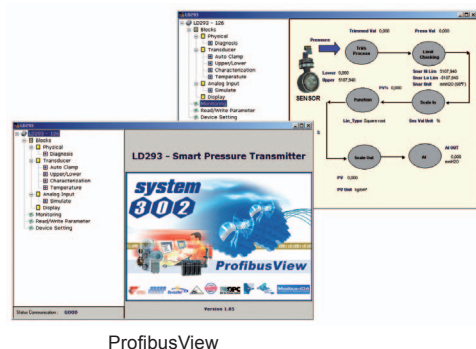
blocks are supported, and up to 20 function blocks can be running simultaneously.

Maintenance procedures with AssetView diagnostics and status information from FOUNDATION™ fieldbus result in a safe plant with higher availability.

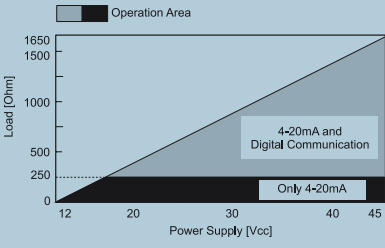


PROFIBUS PA - LD293

LD293 (PROFIBUS PA protocol) can be configured using Smar ProfibusView and Simatic PDM and by the FDT (Field Device Tool) and DTM (Device Type Manager) concept tools, such as FieldCare™ and PACTware™. It can also be integrated by any PROFIBUS System using the GSD file. PROFIBUS PA also has quality and diagnostic information, improving plant management and maintenance. The EDDL and DTM are available in Smar website. Conforms to profile 3.0.



Functional Specifications

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|----------|--------|---------------------------------------|------|-----------------|--|-----|----|------|-----------------------------------|----------|-----|----|-------|--------------------------------|--|---|----|------|---------------------------------------|--|-----|----|------|--------------------------------|--|-----|----|--------|-----------------------------------|--|-----|----|-------|-----------------------------------|----------|-----|----|-------|-----------------|----------|-----|----|------|----------------|--|-----|----|------|-----------------------------------|
| Process Fluid | Liquid, gas or steam | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Output and Communication Protocol | <p>4-20 mA Two-wire, 4-20 mA controlled according to NAMUR NE43 Specification.</p> <p>HART® Two-wire, 4-20 mA according to NAMUR NE43 specification, with superimposed digital communication (HART® Protocol).</p> <p>FOUNDATION™ fieldbus and PROFIBUS PA Digital only. Complies with IEC 61158-2:2000 (H1): 31.25 kbit/s voltage mode, bus powered.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power Supply / Quiescent Current | <p>4-20 mA and HART® 12 to 45 Vdc.</p> <p>FOUNDATION™ fieldbus and PROFIBUS PA Bus powered: 9 to 32 Vdc. Quiescent current consumption: 12 mA</p> <p>Output impedance: nonintrinsic safety from 7.8 kHz - 39 kHz should be greater or equal to 3 kOhm. Intrinsic safety output impedance (assuming an IS barrier in the power supply) from 7.8 kHz - 39 kHz should be greater or equal to 400 Ohm.</p>  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Indicator | 4 1/2 - digit numerical and 5-character alphanumeric LCD indicator (optional). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hazardous Area Certifications | Intrinsic Safe (FM, CSA, Nemko, Dekra/EXAM, Cepel and NEPSI), non-incendive (FM, CSA and Cepel), explosion proof (FM, Nemko and Cepel) and dust ignition proof (FM). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| European Directive Information | <p>Authorized representative in European Community Smar GmbH-Rheingaustrasse 9-55545 Bad Kreuznach.</p> <p>PED Directive (97/23/EC) - Pressure Directive This product is in compliance with the directive and was designed and manufactured in accordance with sound engineering practice using several standards from ANSI, ASTM, DIN and JIS. Quality Management System certified by BVQI (Bureau Veritas Quality International).</p> <p>EMC Directive (2004/108/EC) - Eletromagnetic Compatibility The EMC test was performed according to IEC standard: IEC61326-1:2006, IEC61326-2-3:2006, IEC61000-6-4:2006, IEC61000-6-2:2005. For use in industrial environment only. Keep the shield insulated at the instrument side, connecting the other one to the ground if necessary to use shielded cable.</p> <p>ATEX Directive (94/9/EC) - Equipment and protective systems intended for use in potentially explosive atmospheres This product is certified according to the European Standards at NEMKO and EXAM European Standards.</p> <p>LVD Directive (2006/95/EC) - Electrical Equipment designed for use within certain voltage limits According the LVD directive Annex II the equipment under ATEX "Electrical equipment for use in an explosive atmosphere" directive are excluded from scope from this directive.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature Limits | <table border="0"> <tr> <td>Ambient:</td> <td>-40</td> <td>to</td> <td>85°C</td> <td>(-40 to 185 °F)</td> </tr> <tr> <td></td> <td>-15</td> <td>to</td> <td>85°C</td> <td>(-59 to 185 °F) (LD290I)</td> </tr> <tr> <td>Process:</td> <td>-40</td> <td>to</td> <td>100°C</td> <td>(-40 to 212 °F) (Silicone Oil)</td> </tr> <tr> <td></td> <td>0</td> <td>to</td> <td>85°C</td> <td>(32 to 185 °F) (Inert Fluorolube Oil)</td> </tr> <tr> <td></td> <td>-25</td> <td>to</td> <td>85°C</td> <td>(-13 to 185 °F) (Viton O'Ring)</td> </tr> <tr> <td></td> <td>-40</td> <td>to</td> <td>150 °C</td> <td>(-40 to 302 °F) (LD290L)</td> </tr> <tr> <td></td> <td>-15</td> <td>to</td> <td>150°C</td> <td>(-59 to 302 °F) (LD290I)</td> </tr> <tr> <td>Storage:</td> <td>-40</td> <td>to</td> <td>100°C</td> <td>(-40 to 212 °F)</td> </tr> <tr> <td>Display:</td> <td>-20</td> <td>to</td> <td>80°C</td> <td>(-4 to 176 °F)</td> </tr> <tr> <td></td> <td>-40</td> <td>to</td> <td>85°C</td> <td>(-40 to 185 °F) (Without Damages)</td> </tr> </table> | Ambient: | -40 | to | 85°C | (-40 to 185 °F) | | -15 | to | 85°C | (-59 to 185 °F) (LD290I) | Process: | -40 | to | 100°C | (-40 to 212 °F) (Silicone Oil) | | 0 | to | 85°C | (32 to 185 °F) (Inert Fluorolube Oil) | | -25 | to | 85°C | (-13 to 185 °F) (Viton O'Ring) | | -40 | to | 150 °C | (-40 to 302 °F) (LD290L) | | -15 | to | 150°C | (-59 to 302 °F) (LD290I) | Storage: | -40 | to | 100°C | (-40 to 212 °F) | Display: | -20 | to | 80°C | (-4 to 176 °F) | | -40 | to | 85°C | (-40 to 185 °F) (Without Damages) |
| Ambient: | -40 | to | 85°C | (-40 to 185 °F) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -15 | to | 85°C | (-59 to 185 °F) (LD290I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Process: | -40 | to | 100°C | (-40 to 212 °F) (Silicone Oil) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 | to | 85°C | (32 to 185 °F) (Inert Fluorolube Oil) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -25 | to | 85°C | (-13 to 185 °F) (Viton O'Ring) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -40 | to | 150 °C | (-40 to 302 °F) (LD290L) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -15 | to | 150°C | (-59 to 302 °F) (LD290I) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Storage: | -40 | to | 100°C | (-40 to 212 °F) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Display: | -20 | to | 80°C | (-4 to 176 °F) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | -40 | to | 85°C | (-40 to 185 °F) (Without Damages) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Turn-on Time | <p>4-20 mA and HART® Performs within specifications in less than 5 seconds after power is applied to the transmitter.</p> <p>FOUNDATION™ fieldbus and PROFIBUS PA Performs within specifications of less than 10 seconds after power is applied to the transmitter.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Overpressure and Static Pressure Limits (MWP – Maximum Working Pressure) | <p>14 MPa (138 bar) for ranges 2, 3, 4. 31 MPa (310 bar) for range 5.</p> <p>For Level Ranges ANSI/DIN (models LD290L): 150#: 6 psia to 235 psi (-0,6 to 16 bar) to 199,4 °F (93 °C) 300#: 6 psia to 620 psi (-0,6 to 43 bar) to 199,4 °F (93 °C) 600#: 6 psia to 1240 psi (-0,6 to 85 bar) to 199,4 °F (93 °C) PN10/16: -60 kPa to 1,02 MPa to 212 °F (100 °C) PN25/40: -60 kPa to 2,55 MPa to 212 °F (100 °C)</p> <p>Overpressures above will not damage the transmitter, but a new calibration may be necessary.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p style="text-align: center;">WARNING</p> <p>It is described here only the maximum pressures of the materials referenced in each rule, it can not be manufactured on request.</p> <p>Temperatures above 150 °C are not available in standard models.</p> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

PRESSURES TABLE FOR SEAL AND LEVEL FLANGES DIN EN 1092-1 2008 STANDARD

| Material Group | Pressure Class | Maximum Temperature Allowed | | | | | | |
|-----------------------|----------------|--------------------------------|-------|-------|------|-------|-------|------|
| | | RT | 100 | 150 | 200 | 250 | 300 | 350 |
| | | Maximum Pressure Allowed (bar) | | | | | | |
| 10E0 AISI 304/304L | PN 16 | 16 | 13.7 | 12.3 | 11.2 | 10.4 | 9,6 | 9.2 |
| | PN 25 | 25 | 21.5 | 19.2 | 17.5 | 16.3 | 15.1 | 14.4 |
| | PN 40 | 40 | 34.4 | 30.8 | 28 | 26 | 24.1 | 23 |
| | PN 63 | 63 | 63 | 57.3 | 53.1 | 50.1 | 46.8 | 45 |
| | PN 100 | 100 | 86.1 | 77.1 | 70 | 65.2 | 60.4 | 57.6 |
| | PN 160 | 160 | 137.9 | 123.4 | 112 | 104.3 | 96.7 | 92.1 |
| | PN 250 | 250 | 215.4 | 192.8 | 175 | 163 | 151.1 | 144 |

| Material Group | Pressure Class | Maximum Temperature Allowed | | | | | | |
|-----------------------|----------------|--------------------------------|-----|-------|-------|-------|-------|-------|
| | | RT | 100 | 150 | 200 | 250 | 300 | 350 |
| | | Maximum Pressure Allowed (bar) | | | | | | |
| 14E0 AISI 316/316L | PN 16 | 16 | 16 | 14.5 | 13.4 | 12.7 | 11.8 | 11.4 |
| | PN 25 | 25 | 25 | 22.7 | 21 | 19.8 | 18.5 | 17.8 |
| | PN 40 | 40 | 40 | 36.3 | 33.7 | 31.8 | 29.7 | 28.5 |
| | PN 63 | 63 | 63 | 57.3 | 53.1 | 50.1 | 46.8 | 45 |
| | PN 100 | 100 | 100 | 90.9 | 84.2 | 79.5 | 74.2 | 71.4 |
| | PN 160 | 160 | 160 | 145.5 | 134.8 | 127.2 | 118.8 | 114.2 |
| | PN 250 | 250 | 250 | 227.3 | 210.7 | 198.8 | 185.7 | 178.5 |

| Material Group | Pressure Class | Maximum Temperature Allowed | | | | | | |
|--|----------------|--------------------------------|-----|-----|-----|-----|-----|-----|
| | | RT | 100 | 150 | 200 | 250 | 300 | 350 |
| | | Maximum Pressure Allowed (bar) | | | | | | |
| 16E0 1.4410 Super Duplex 1.4462 Duplex | PN 16 | 16 | 16 | 16 | 16 | 16 | - | - |
| | PN 25 | 25 | 25 | 25 | 25 | 25 | - | - |
| | PN 40 | 40 | 40 | 40 | 40 | 40 | - | - |
| | PN 63 | 63 | 63 | 63 | 63 | 63 | - | - |
| | PN 100 | 100 | 100 | 100 | 100 | 100 | - | - |
| | PN 160 | 160 | 160 | 160 | 160 | 160 | - | - |
| | PN 250 | 250 | 250 | 250 | 250 | 250 | - | - |

PRESSURES TABLE FOR SEAL AND LEVEL FLANGES ASME B16.5 2009 STANDARD

| Material Group | Pressure Class | Maximum Temperature Allowed | | | | | | | | |
|----------------|----------------|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | -29 to 38 | 50 | 100 | 150 | 200 | 250 | 300 | 325 | 350 |
| | | Maximum Pressure Allowed (bar) | | | | | | | | |
| Hastelloy C276 | 150 | 20 | 19.5 | 17.7 | 15.8 | 13.8 | 12.1 | 10.2 | 9.3 | 8.4 |
| | 300 | 51.7 | 51.7 | 51.5 | 50.3 | 48.3 | 46.3 | 42.9 | 41.4 | 40.3 |
| | 400 | 68.9 | 68.9 | 68.7 | 66.8 | 64.5 | 61.7 | 57 | 55 | 53.6 |
| | 600 | 103.4 | 103.4 | 103 | 100.3 | 96.7 | 92.7 | 85.7 | 82.6 | 80.4 |
| | 900 | 155.1 | 155.1 | 154.6 | 150.6 | 145 | 139 | 128.6 | 124 | 120.7 |
| | 1500 | 258.6 | 258.6 | 257.6 | 250.8 | 241.7 | 231.8 | 214.4 | 206.6 | 201.1 |
| | 2500 | 430.9 | 430.9 | 429.4 | 418.2 | 402.8 | 386.2 | 357.1 | 344.3 | 335.3 |

Overpressure and Static Pressure Limits (MWP - Maximum Working Pressure) (continuation)

| | | | | | | | | | | | | |
|--|---|----------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| Overpressure and Static Pressure Limits (MWP - Maximum Working Pressure) (continuation) | Material Group | Pressure Class | Maximum Temperature Allowed | | | | | | | | | |
| | | | -29 to 38 | 50 | 100 | 150 | 200 | 250 | 300 | 325 | 350 | |
| | Maximum Pressure Allowed (bar) | | | | | | | | | | | |
| | S31803 Duplex S32750 Super Duplex | 150 | 20 | 19.5 | 17.7 | 15.8 | 13.8 | 12.1 | 10.2 | 9.3 | 8.4 | |
| | | 300 | 51.7 | 51.7 | 50.7 | 45.9 | 42.7 | 40.5 | 38.9 | 38.2 | 37.6 | |
| | | 400 | 68.9 | 68.9 | 67.5 | 61.2 | 56.9 | 53.9 | 51.8 | 50.9 | 50.2 | |
| | | 600 | 103.4 | 103.4 | 101.3 | 91.9 | 85.3 | 80.9 | 77.7 | 76.3 | 75.3 | |
| | | 900 | 155.1 | 155.1 | 152 | 137.8 | 128 | 121.4 | 116.6 | 114.5 | 112.9 | |
| | | 1500 | 258.6 | 258.6 | 253.3 | 229.6 | 213.3 | 202.3 | 194.3 | 190.8 | 188.2 | |
| | 2500 | 430.9 | 430.9 | 422.2 | 382.7 | 355.4 | 337.2 | 323.8 | 318 | 313.7 | | |
| | Material Group | Pressure Class | Maximum Temperature Allowed | | | | | | | | | |
| | | | -29 to 38 | 50 | 100 | 150 | 200 | 250 | 300 | 325 | 350 | |
| | Maximum Pressure Allowed (bar) | | | | | | | | | | | |
| | AISI316L | 150 | 15.9 | 15.3 | 13.3 | 12 | 11.2 | 10.5 | 10 | 9.3 | 8.4 | |
| | | 300 | 41.4 | 40 | 34.8 | 31.4 | 29.2 | 27.5 | 26.1 | 25.5 | 25.1 | |
| | | 400 | 55.2 | 53.4 | 46.4 | 41.9 | 38.9 | 36.6 | 34.8 | 34 | 33.4 | |
| | | 600 | 82.7 | 80 | 69.6 | 62.8 | 58.3 | 54.9 | 52.1 | 51 | 50.1 | |
| | | 900 | 124.1 | 120.1 | 104.4 | 94.2 | 87.5 | 82.4 | 78.2 | 76.4 | 75.2 | |
| | | 1500 | 206.8 | 200.1 | 173.9 | 157 | 145.8 | 137.3 | 130.3 | 127.4 | 125.4 | |
| | 2500 | 344.7 | 333.5 | 289.9 | 261.6 | 243 | 228.9 | 217.2 | 212.3 | 208.9 | | |
| | Material Group | Pressure Class | Maximum Temperature Allowed | | | | | | | | | |
| -29 to 38 | | | 50 | 100 | 150 | 200 | 250 | 300 | 325 | 350 | | |
| Maximum Pressure Allowed (bar) | | | | | | | | | | | | |
| AISI316 | 150 | 19 | 18.4 | 16.2 | 14.8 | 13.7 | 12.1 | 10.2 | 9.3 | 8.4 | | |
| | 300 | 49.6 | 48.1 | 42.2 | 38.5 | 35.7 | 33.4 | 31.6 | 30.9 | 30.3 | | |
| | 400 | 66.2 | 64.2 | 56.3 | 51.3 | 47.6 | 44.5 | 42.2 | 41.2 | 40.4 | | |
| | 600 | 99.3 | 96.2 | 84.4 | 77 | 71.3 | 66.8 | 63.2 | 61.8 | 60.7 | | |
| | 900 | 148.9 | 144.3 | 126.6 | 115.5 | 107 | 100.1 | 94.9 | 92.7 | 91 | | |
| | 1500 | 248.2 | 240.6 | 211 | 192.5 | 178.3 | 166.9 | 158.1 | 154.4 | 151.6 | | |
| 2500 | 413.7 | 400.9 | 351.6 | 320.8 | 297.2 | 278.1 | 263.5 | 257.4 | 252.7 | | | |
| Volumetric Displacement | Less than 0.15 cm ³ (0.01 in ³) | | | | | | | | | | | |
| Damping Adjustment | 4-20 and HART® Through magnetic tool: adjustable for any value from 0 to 128 seconds, added to the sensor response time (0.2 s). FOUNDATION™ fieldbus and PROFIBUS PA From any value between 0 and 32 seconds plus intrinsic sensor response time (0.2 s). | | | | | | | | | | | |
| Configuration and Zero and Span Adjustments | 4-20 mA Only zero and span via local adjustment if device is fitted with display. HART® By digital communication (HART® protocol) using the Configuration Interface CONF301 or the Hart Pocket Configurator HPC301. Basic configuration may be done using local adjustment magnetic tool if device is fitted with display. FOUNDATION™ fieldbus and PROFIBUS PA Basic configuration may be done using local adjustment magnetic tool if device is fitted with display. Complete configuration is possible using remote, SYSCON (LD292), Smar ProfibusView and Simatic PDM (LD293). | | | | | | | | | | | |
| Humidity Limits | 0 to 100% RH (Relative Humid). | | | | | | | | | | | |

Performance Specifications

| | |
|--|---|
| Accuracy | <p>For ranges 2, 3, 4 or 5: $\pm 0.075\%$ of span (for span ≥ 0.1 URL) $\pm [0.0375 + 0.00375 \text{ URL/SPAN}] \%$ of span (for span < 0.1 URL)</p> <p>For Level Transmitter: $\pm 0.08 \%$ of span (for span ≥ 0.1 URL) $\pm [0.0504 + 0.0047 \text{ URL/span}] \%$ of span (for span < 0.1 URL)</p> <p>For Insertion Transmitter: $\pm 0.2\%$ of span</p> <p>Linearity effects, hysteresis and repeatability are included.</p> |
| Stability | $\pm 0.15\%$ of URL per 5 years |
| Temperature Effect | <p>$\pm [0.02\% \text{ URL} + 0.06\% \text{ of span}]$, per 20 °C (68 °F) for span ≥ 0.2 URL $\pm [0.023\% \text{ URL} + 0.045\% \text{ of span}]$, per 20 °C (68 °F) for span < 0.2 URL</p> <p>For LD290L: 6 mmH₂O per 20 °C for 4" and DN100 17 mmH₂O per 20 °C for 3" and DN80 Consult for other flange dimensions and fill fluid.</p> |
| Power Supply Effect | $\pm 0.005\%$ of calibrated span per volt |
| Mounting Position Effect | Zero shift of up to 250 Pa (1 inH ₂ O) which can be calibrated out. No span effect. |
| Electromagnetic Interference Effect | Approved according to IEC61326-1:2006, IEC61326-2-3:2006, IEC61000-6-4:2006, IEC61000-6-2:2005. |

Physical Specifications

| | |
|------------------------------|--|
| Electrical Connection | See options in Ordering Code. |
| Process Connection | See options in Ordering Code. |
| Wetted Parts | 316L SST, Hastelloy C276 Diaphragm for sanitary models available in Monel 400 and Tantalum too. |
| Nonwetted Parts | <p>Electronic Housing Injected aluminum with polyester painting or 316 SST. According to NEMA Type 4X or Type 4, IP66, IP66W*. <small>*The IP66W sealing test (immersion) was performed at 1 bar for 24 hours. For any other situation, please consult Smar. IP66W tested for 200h to according NBR 8094 / ASTM B 117 standard.</small></p> <p>Level Flange (LD290L): 316 SST, 304 SST and Plated Carbon Steel.</p> <p>Fill Fluid Silicone Oil or Inert Fluorolube Oil.</p> <p>Cover O-Rings Buna-N</p> <p>Mounting Bracket Plated Carbon Steel or 316 SST. Accessories (bolts, nuts, washers and U-clamps) in Carbon Steel or 316 SST.</p> <p>Identification Plate 316 SST.</p> |
| Approximate Weights | < 2.0Kg (4lb): aluminum housing without mounting bracket. |

| MODEL GAGE PRESSURE TRANSMITTERS | | | | | | | | | | |
|----------------------------------|---|--------------|------------------------------|------|--|---------|--------------------|--|--|--|
| LD290M | 4-20 mA | | | | | | | | | |
| LD291M | HART® & 4-20 mA | | | | | | | | | |
| LD292M | FOUNDATION™ fieldbus | | | | | | | | | |
| LD293M | PROFIBUS PA | | | | | | | | | |
| CODE | Type | Range Limits | | | Range Limits | | | | | |
| | | Min | Max | Unit | Min | Max | Unit | | | |
| 2 | Gage | 12.5 | 500 | mbar | 5.02 | 201.9 | inH ₂ O | | | |
| 3 | Gage | 62.5 | 2500 | mbar | 25.13 | 1005.45 | inH ₂ O | | | |
| 4 | Gage | 0.625 | 25 | bar | 157.1 | 10054.5 | inH ₂ O | | | |
| 5 | Gage | 6.25 | 250 | bar | 90.65 | 3625.94 | psi | | | |
| CODE | Diaphragm Material | | Fill Fluid | | | | | | | |
| 1 | 316L SST | | Silicone Oil | | | | | | | |
| 2 | 316L SST | | Inert Fluorolube Oil (2) | | | | | | | |
| 3 | Hastelloy C276 | | Silicone Oil (1) | | | | | | | |
| 4 | Hastelloy C276 | | Inert Fluorolube Oil (2) | | | | | | | |
| D | 316L SST | | Inert Krytox Oil (2) | | | | | | | |
| E | Hastelloy C276 | | Inert Krytox Oil (2) | | | | | | | |
| Q | 316L SST | | Inert Halocarbon 4.2 Oil (2) | | | | | | | |
| R | Hastelloy C276 | | Inert Halocarbon 4.2 Oil (2) | | | | | | | |
| CODE | Process Connections Material | | | | | | | | | |
| H | Hastelloy C276 (1) | | | I | 316L SST | | | Z | User's specifications | |
| CODE | Local Indicator | | | | | | | | | |
| 0 | Without Indicator | | | | | | | | | |
| 1 | With Indicator | | | | | | | | | |
| CODE | Process Connections | | | | | | | | | |
| 1 | 1/2 - 14 NPT - Female | | | M | 1/2 - 14 NPT - Male | | | X | 1" NPT Sealed (316L Diaphragm, DC200/20 Silicone Fill Fluid) | |
| A | M20 X 1,5 Male | | | R | Remote Seal | | | Z | User's specifications | |
| G | G 1/2 A DIN 16288 - Form B | | | U | 1/2 BSP - Male | | | | | |
| H | G 1/2 DIN 16288 - Form D | | | V | Valve Manifold integrated to the transmitter | | | | | |
| CODE | Electrical Connection | | | | | | | | | |
| 0 | 1/2 - 14 NPT (3) | | | | | | | | | |
| 1 | 1/2 - 14 NPT X 3/4 NPT (316 SST) - with adapter (4) | | | | | | A | M20 X 1.5 (5) | | |
| 2 | 1/2 - 14 NPT X 3/4 BSP (316 SST) - with adapter (11) | | | | | | B | PG 13.5 DIN (5) | | |
| 3 | 1/2 - 14 NPT X 1/2 BSP (316 SST) - with adapter (11) | | | | | | Z | User's specifications | | |
| 4 | 1/2 - 1/2 NPTF (316 SST) - with adapter | | | | | | | | | |
| 5 | 1/2 - 3/4 NPTF (316 SST) - with adapter | | | | | | | | | |
| CODE | Mounting Bracket | | | | | | | | | |
| 0 | Without Mounting Bracket | | | | | | | | | |
| 1 | Carbon Steel Mounting Bracket with Carbon Steel accessories | | | | | | 7 | Carbon Steel Mounting Bracket with 316 SST accessories | | |
| 2 | 316 SST Mounting Bracket with 316 SST accessories | | | | | | A | 304 SST Mounting Bracket with 316 SST accessories | | |
| CODE | Optional Items | | | | | | | | | |

LD290M - 2 | 1 | I | 1 | 1 | A | 0 | *

← Typical Model Number

LD291M - 2 | 1 | I | 1 | 1 | A | 0 | *

LD292M - 2 | 1 | I | 1 | 1 | A | 0 | *

LD293M - 2 | 1 | I | 1 | 1 | A | 0 | *

* Leave blank for no optional items.

| MODEL | | GAGE PRESSURE TRANSMITTER (CONTINUATION) | | | | | |
|-------------|---|--|-----------|---|---|-----------|------------------------------|
| CODE | Output Signal (10) | | | | | | |
| G0 | 4-20 mA | | | | | | |
| G4 | 4-20 mA + Output for Remote Indicator | | | | | | |
| CODE | Housing Material (8) (9) | | | | | | |
| H0 | Aluminium (IP/TYPE) | | | H3 | 316 SST for saline atmosphere (IPW/TYPEX) (7) | | |
| H1 | 316 SST (IP/TYPE) | | | H4 | Copper Free Aluminium (IPW/TYPEX) (7) | | |
| H2 | Aluminium for saline atmosphere (IPW/TYPEX) (7) | | | | | | |
| CODE | Identification Plate | | | | | | |
| I1 | FM: XP, IS, NI, DI | | I4 | EXAM (DMT): Ex-ia; NEMKO: Ex-d | | I7 | EXAM (DMT) Grupo I, M1 Ex-ia |
| I2 | NEMKO: Ex-d, Ex-ia | | I5 | CEPEL: Ex-d, Ex-ia | | ID | NEPSI: Ex-ia, Ex-d |
| I3 | CSA: XP, IS, NI, DI | | I6 | Without Certification | | IJ | NEMKO: Ex-d |
| CODE | Painting | | | | | | |
| P0 | Munsell N 6,5 Gray | | P5 | Polyester Yellow | | | |
| P3 | Polyester Black | | P8 | Without Painting | | | |
| P4 | Epoxy White | | P9 | Blue Safety Base Epoxy – Electrostatic Painting | | | |
| CODE | Display Unit 1 (10) | | | | | | |
| Y0 | Percentage | | | Y3 | Temperature (Temperature) | | |
| Y1 | Current (mA) | | | YU | User's specification (6) | | |
| Y2 | Pressure (Eng. Unit) | | | | | | |
| CODE | Display Unit 2 (10) | | | | | | |
| Y0 | Percentage | | | Y6 | Temperature (Temperature) | | |
| Y4 | Current (mA) | | | YU | User's specification (6) | | |
| Y5 | Pressure (Eng. Unit) | | | | | | |
| CODE | Tag Plate | | | | | | |
| J0 | With TAG | | | J2 | User's specification | | |
| J1 | Without TAG | | | | | | |

| | | | | | | | | |
|--------|---|----|----|----|----|----|----|----|
| LD290M | - | G0 | H0 | I1 | P0 | Y0 | Y5 | J0 |
| LD291M | - | G0 | H0 | I1 | P0 | Y0 | Y5 | J0 |
| LD292M | | | H0 | I1 | P0 | | | J0 |
| LD293M | | | H0 | I1 | P0 | | | J0 |

← TYPICAL MODEL NUMBER

Optional Items

| | |
|---------------------------|--|
| Special Procedures | C1 – Degrease Cleaning (Oxygen or Chlorine Service) |
| Burnout | BD – Down Scale BU – Up Scale |
| Optional Items | ZZ – User Specification |

NOTE

- (1) Meets NACE material recommendation per MR-01-75.
- (2) Inert fluid: safe for oxygen service.
- (3) This adapter has certified for use in Explosion Proof (CEPEL, NEPSI, NEMKO, EXAM, FM, CSA).
- (4) This adapter has certified for use in Explosion Proof (CEPEL, CSA).
- (5) This adapter has certified for use in Explosion Proof (CEPEL, NEPSI, NEMKO, EXAM).
- (6) Limited values to 4 1/2 digits; limited unit to 5 characters.
- (7) IPW/TYPEX was tested for 200 hours according to NBR 8094 / ASTM B 117 standard.
- (8) IPX8 tested for 10 meters of water column for 24 hours.

(9) Ingress Protection:

| Products | CEPEL | NEMKO / EXAM | FM | CSA | NEPSI |
|----------|--------|--------------|--------------|---------|-------|
| LD29X | IP66/W | IP66/68/W | Type 4X/6/6P | Type 4X | IP67 |

(10) Only available for **LD290** and **LD291**.

(11) Not certified for use in hazardous locations.

Note

Hastelloy is a trademark of the Cabot Corp.
Monel is a trademark of International Nickel Co.
Viton and Teflon are trademarks of E. I. DuPont de Nemours & Co.

Fluorolube is a trademark of Hooker Chemical Corp.
HART® is a trademark of HART® Communication Foundation
Foundation is a trademark of Fieldbus Foundation.
Profibus is a trademark of Profibus International.

Smar Pressure Transmitters are protected by US patent number 6,433,791

| MODEL | | PRESSURE SANITARY TRANSMITTERS | | | | | | | | | |
|--------|--|--------------------------------|-------|------|--------------|---------|---------------------------|--|--|--|--|
| LD290S | 4-20 mA | | | | | | | | | | |
| LD291S | HART® & 4-20 mA | | | | | | | | | | |
| LD292S | FOUNDATION™ fieldbus | | | | | | | | | | |
| LD293S | PROFIBUS PA | | | | | | | | | | |
| CODE | Type | Range Limits | | | Range Limits | | | | | | |
| | | Min | Max | Unit | Min | Max | Unit | | | | |
| 2 | Sanitary | 12.5 | 500 | mbar | 5.02 | 201.09 | inH ₂ O | | | | |
| 3 | Sanitary | 62.5 | 2500 | mbar | 25.13 | 1005.45 | inH ₂ O | | | | |
| 4 | Sanitary | 0.625 | 25 | bar | 157.1 | 10054.5 | inH ₂ O | | | | |
| 5 | Sanitary | 6.25 | 55.15 | bar | 90.65 | 799.89 | psi | | | | |
| CODE | Diaphragm Material | | | | | | | | | | |
| I | 316L SST | | | | | | | | | | |
| CODE | Fill Fluid | | | | | | | | | | |
| S | Silicone DC-200/20 Oil | | | | | | | | | | |
| CODE | Local Indicator | | | | | | | | | | |
| 0 | Without Indicator | | | | | | | | | | |
| 1 | With Indicator | | | | | | | | | | |
| CODE | Process Connections | | | | | | | | | | |
| B | Thread IDF - 2" (2) | | | | H | | DN40 - DIN 11851 | | | | |
| C | Thread RJT - 2" | | | | P | | Tri-Clamp - 2" HP (2) | | | | |
| D | Tri-Clamp - 2" (2) | | | | Q | | Tri-Clamp - 1 1/2" HP (2) | | | | |
| E | Thread SMS - 2" (2) | | | | Z | | User's specifications | | | | |
| F | Tri-Clamp - 1 1/2" (2) | | | | | | | | | | |
| CODE | Electrical Connections | | | | | | | | | | |
| 0 | 1/2 - 14 NPT (3) | | | | A | | M20 X 1.5 (5) | | | | |
| 1 | 1/2 - 14 NPT X 3/4 NPT (316 SST) - with adapter (4) | | | | B | | PG 13.5 DIN (5) | | | | |
| 2 | 1/2 - 14 NPT X 3/4 BSP (316 SST) - with adapter (10) | | | | Z | | User's specifications | | | | |
| 3 | 1/2 - 14 NPT X 1/2 BSP (316 SST) - with adapter (10) | | | | | | | | | | |
| 4 | 1/2 - 1/2 NPTF (316 SST) - with adapter | | | | | | | | | | |
| 5 | 1/2 - 3/4 NPTF (316 SST) - with adapter | | | | | | | | | | |
| CODE | O'Ring Material | | | | | | | | | | |
| 0 | Without O'Ring | | | | V | | Viton (2) | | | | |
| B | Buna-N (2) | | | | Z | | User's specifications | | | | |
| T | Teflon (2) | | | | | | | | | | |
| CODE | Adaptation Sleeve | | | | | | | | | | |
| 0 | Without Sleeve | | | | | | | | | | |
| 1 | With Adaptation Sleeve in 316 SST | | | | | | | | | | |
| CODE | Tri-Clamp Connection | | | | | | | | | | |
| 0 | Without Clamp | | | | | | | | | | |
| 2 | With Tri-Clamp in 304 SST | | | | | | | | | | |
| CODE | Diaphragm Material (Sanitary Connection) | | | | | | | | | | |
| H | Hastelloy | | | | | | | | | | |
| I | 316L SST | | | | | | | | | | |
| CODE | Fill Fluid (Sanitary Connection) | | | | | | | | | | |
| D | Silicone DC-704 Oil | | | | | | | | | | |
| F | Inert Fluorolube MO-10 Oil (1) | | | | | | | | | | |
| N | Propileno Glicol Neobee M20 Oil (Approved 3A) (2) | | | | | | | | | | |
| S | Silicone DC-200/20 Oil | | | | | | | | | | |
| T | Syltherm 800 Oil | | | | | | | | | | |
| Z | User's specifications | | | | | | | | | | |
| CODE | Optional Items | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|---|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|
| LD290S | - | 2 | | I | | N | | 1 | | D | | 0 | | V | | 1 | | 2 | | I | | D | | + |
| LD291S | - | 2 | | I | | N | | 1 | | D | | 0 | | V | | 1 | | 2 | | I | | D | | + |
| LD292S | - | 2 | | I | | N | | 1 | | D | | 0 | | V | | 1 | | 2 | | I | | D | | + |
| LD293S | - | 2 | | I | | N | | 1 | | D | | 0 | | V | | 1 | | 2 | | I | | D | | + |

← Typical Model Number

* Leave blank for no optional items.

| MODEL | | SANITARY PRESSURE TRANSMITTERS (CONTINUATION) | |
|-------------|---------------------------------------|---|--------------------------------|
| CODE | Output Signal (9) | | |
| G0 | 4-20 mA | | |
| G4 | 4-20 mA + Output for Remote Indicator | | |
| CODE | Housing Material (7) (8) | | |
| H0 | Aluminium (IP/TYP)E | | |
| H1 | 316 SST (IP/TYP)E | | |
| CODE | Identification Plate | | |
| I1 | FM: XP, IS, NI, DI | I4 | EXAM (DMT): Ex-ia; NEMKO: Ex-d |
| I2 | NEMKO: Ex-d, Ex-ia | I5 | CEPEL: Ex-d, Ex-ia |
| I3 | CSA: XP, IS, NI, DI | I6 | Without Certification |
| CODE | Painting | | |
| P0 | Munsell N 6,5 Gray | P5 | Polyester Yellow |
| P3 | Polyester Black | P6 | Epoxy Yellow |
| P4 | Epoxy White | | |
| CODE | Display Unit 1 (9) | | |
| Y0 | Percentage | Y3 | Temperature (Temperature) |
| Y1 | Current (mA) | YU | User's specification (6) |
| Y2 | Pressure (Eng. Unit) | | |
| CODE | Display Unit 2 (9) | | |
| Y0 | Percentage | Y6 | Temperature (Temperature) |
| Y4 | Current (mA) | YU | User's specification (6) |
| Y5 | Pressure (Eng. Unit) | | |
| CODE | Tag Plate | | |
| J0 | With TAG | J2 | User's specification |
| J1 | Without TAG | | |

| | | | | | | | |
|--------|----|----|----|----|----|----|----|
| LD290S | G0 | H0 | I1 | P0 | Y0 | Y5 | J0 |
| LD291S | G0 | H0 | I1 | P0 | Y0 | Y5 | J0 |
| LD292S | | H0 | I1 | P0 | | | J0 |
| LD293S | | H0 | I1 | P0 | | | J0 |

← TYPICAL MODEL NUMBER

Optional Items

| | |
|---------------------------|---|
| Special Procedures | C1 – Degrease Cleaning (Oxygen or Chlorine Service) C4 – Polishing of the sanitary connections according to 3A Certification (2) |
| Burnout | BD – Down Scale BU – Up Scale |

NOTE

- (1) Inert Fluid: safe for oxygen service.
- (2) Compliant with 3A-7403 standard for food and other applications where sanitary connections are required:
 - Neobee M2O Fill Fluid;
 - Wet face finishing: 0.8 µm Ra (32 µ" AA);
 - Wet O-Ring: Viton, Teflon and Buna-N.
- (3) Certificate for use in Hazardous Locations (CEPEL, NEPSI, NEMKO, EXAM, FM, CSA).
- (4) Certificate for use in Hazardous Locations (CEPEL, CSA).
- (5) Certificate for use in Hazardous Locations (CEPEL, NEPSI, NEMKO, EXAM).
- (6) Limited values to 4 1/2 digits; limited unit to 5 characters.

(7) IPX8 tested for 10 meters of water column for 24 hours.

(8) Ingress Protection:

| Products | CEPEL | NEMKO / EXAM | FM | CSA | NEPSI |
|----------|--------|--------------|--------------|---------|-------|
| LD29X | IP66/W | IP66/68/W | Type 4X/6/6P | Type 4X | IP67 |

(9) Only available for **LD290** and **LD291**.

(10) Not certified for use in hazardous locations.

| MODEL LOW COST FLANGED PRESSURE TRANSMITTER | | | | | | | | | |
|--|---|--------------|------|------|-----------------------|--|--------------------|--|--|
| LD290L | 4-20 mA | | | | | | | | |
| LD291L | HART® & 4-20 mA | | | | | | | | |
| LD292L | FOUNDATION™ fieldbus | | | | | | | | |
| LD293L | PROFIBUS PA | | | | | | | | |
| CODE | Type | Range Limits | | Unit | Range Limits | | Unit | | |
| | | Min | Max | | Min | Max | | | |
| 2 | Level | 12.5 | 500 | mbar | 5.02 | 201.9 | inH ₂ O | | |
| 3 | Level | 62.5 | 2500 | mbar | 25.13 | 1005.45 | inH ₂ O | | |
| 4 | Level | 0.625 | 25 | bar | 157.1 | 10054.5 | inH ₂ O | | |
| 5 | Level | 6.25 | 250 | bar | 90.65 | 3625.94 | psi | | |
| CODE Diaphragm Material and Fill Fluid | | | | | | | | | |
| 1 | 316L SST Silicone Oil | | | | | | | | |
| CODE Local Indicator | | | | | | | | | |
| 0 | Without Indicator | | | | | | | | |
| 1 | With Digital Indicator | | | | | | | | |
| CODE Process Connection | | | | | | | | | |
| 1 | 3" 150# (ANSI B16.5) | | | B | 2" 600# (ANSI B16.5) | | | | |
| 2 | 3" 300# (ANSI B16.5) | | | C | 3" 600# (ANSI B16.5) | | | | |
| 3 | 4" 150# (ANSI B16.5) | | | D | 4" 600# (ANSI B16.5) | | | | |
| 4 | 4" 300# (ANSI B16.5) | | | E | DN50 PN10/40 | | | | |
| 6 | DN80 PN25/40 | | | O | 1½" 150# (ANSI B16.5) | | | | |
| 7 | DN100 PN10/16 | | | P | 1½" 300# (ANSI B16.5) | | | | |
| 8 | DN100 PN25/40 | | | Q | 1½" 600# (ANSI B16.5) | | | | |
| 9 | 2" 150# (ANSI B16.5) | | | Z | User's specifications | | | | |
| A | 2" 300# (ANSI B16.5) | | | | | | | | |
| CODE Electrical Connection | | | | | | | | | |
| 0 | 1/2 - 14 NPT (3) | | | | 5 | 1/2 - 3/4 NPTF (AI 316) - with adapter | | | |
| 1 | 1/2 - 14 NPT X 3/4 NPT (AI 316) - with adapter (4) | | | | A | M20 X 1.5 (5) | | | |
| 2 | 1/2 - 14 NPT X 3/4 BSP (AI 316) - with adapter (14) | | | | B | PG 13.5 DIN (5) | | | |
| 3 | 1/2 - 14 NPT X 1/2 BSP (AI 316) - with adapter (14) | | | | Z | User's specifications | | | |
| 4 | 1/2 - 1/2 NPTF (AI 316) - with adapter | | | | | | | | |
| CODE Type and Material Flange | | | | | | | | | |
| 4 | 304 SST (slip-on flange) | | | | 6 | Carbon Steel (slip-on flange) | | | |
| 5 | 316 SST (slip-on flange) | | | | Z | User's specifications | | | |
| CODE Extension Length | | | | | | | | | |
| 0 | 0 mm (0") | | | 3 | 150 mm (6") | | | | |
| 1 | 50 mm (2") | | | 4 | 200 mm (8") | | | | |
| 2 | 100 mm (4") | | | Z | User's specifications | | | | |
| CODE Diaphragm Material / Extension (Process Connection) | | | | | | | | | |
| 1 | 316 L SST / 316 SST | | | | 5 | Titanium / 316 SST (6) | | | |
| 2 | Hastelloy C276 / 316 SST | | | | 6 | 316L SST with Teflon Lining | | | |
| 3 | Monel 400 / 316 SST | | | | L | 316L SST with Halar Lining | | | |
| 4 | Tantalum / 316 SST (6) | | | | Z | User's specification | | | |
| CODE Fill Fluid (Process Connection) | | | | | | | | | |
| S | Silicone DC-200/20 Oil | | | | H | Halocarbon 4.2 Oil | | | |
| F | Inert Fluorolube MO-10 Oil (7) | | | | N | Propileno Glicol (Neobee) Oil | | | |
| D | Silicone DC-704 Oil | | | | T | Syltherm 800 Oil | | | |
| K | Krytox Oil | | | | Z | User's specifications | | | |
| CODE Lower Housing Material | | | | | | | | | |
| 0 | Without Lower Housing | | | | 4 | Duplex (UNS 31803) | | | |
| 1 | 316L SST | | | | 5 | 304L SST | | | |
| 2 | Hastelloy C276 | | | | Z | User's specifications | | | |
| 3 | Super Duplex (UNS 32750) | | | | | | | | |
| CODE Gasket Material | | | | | | | | | |
| 0 | Without Gasket | | | | I | 316L SST | | | |
| C | Copper | | | | T | Teflon (PTFE) | | | |
| G | Grafoil (Flexible Lead) | | | | Z | User's specifications | | | |
| CODE Optional Items | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|---|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|
| LD290L | - | 2 | | 1 | | 1 | | 1 | | 0 | | 6 | | 2 | | 1 | | S | | 1 | | T | | * |
| LD291L | - | 2 | | 1 | | 1 | | 1 | | 0 | | 6 | | 2 | | 1 | | S | | 1 | | T | | * |
| LD292L | - | 2 | | 1 | | 1 | | 1 | | 0 | | 6 | | 2 | | 1 | | S | | 1 | | T | | * |
| LD293L | - | 2 | | 1 | | 1 | | 1 | | 0 | | 6 | | 2 | | 1 | | S | | 1 | | T | | * |

← Typical Model Number

* Leave blank for no optional items.

| MODEL | | LOW COST FLANGED PRESSURE TRANSMITTER (CONTINUATION) | | | | | |
|-------------|--|--|-----------|---|--|-----------|------------------------------|
| CODE | Output Signal (13) | | | | | | |
| G0 | 4-20 mA | | | | | | |
| G4 | 4-20 mA + Output for Remote Indicator | | | | | | |
| CODE | Housing Material (11) (12) | | | | | | |
| H0 | Aluminium (IP/TYPE) | | | H3 | 316 SST for saline atmosphere (IPW/TYPEX) (10) | | |
| H1 | 316 SST (IP/TYPE) | | | H4 | Copper Free Aluminium (IPW/TYPEX) (10) | | |
| H2 | Aluminium for saline atmosphere (IPW/TYPEX) (10) | | | | | | |
| CODE | Identification Plate | | | | | | |
| I1 | FM: XP, IS, NI, DI | | I4 | EXAM (DMT): Ex-ia; NEMKO: Ex-d | | I7 | EXAM (DMT) Grupo I, M1 Ex-ia |
| I2 | NEMKO: Ex-d, Ex-ia | | I5 | CEPEL: Ex-d, Ex-ia | | IJ | NEMKO: Ex-d |
| I3 | CSA: XP, IS, NI, DI | | I6 | Without Certification | | | |
| CODE | Painting | | | | | | |
| P0 | Munsell N 6,5 Gray | | P6 | Epoxy Yellow | | | |
| P3 | Polyester Black | | P8 | Without Painting | | | |
| P4 | Epoxy White | | P9 | Blue Safety Base Epoxy – Electrostatic Painting | | | |
| P5 | Polyester Yellow | | PC | Safety Base Polyester – Electrostatic Painting | | | |
| CODE | Display Unit 1 (13) | | | | | | |
| Y0 | Percentage | | | Y3 | Temperature (Temperature) | | |
| Y1 | Current (mA) | | | YU | User's specification (9) | | |
| Y2 | Pressure (Eng. Unit) | | | | | | |
| CODE | Display Unit 2 (13) | | | | | | |
| Y0 | Percentage | | | Y6 | Temperature (Temperature) | | |
| Y4 | Current (mA) | | | YU | User's specification (9) | | |
| Y5 | Pressure (Eng. Unit) | | | | | | |
| CODE | Tag Plate | | | | | | |
| J0 | With TAG | | | J2 | User's specification | | |
| J1 | Without TAG | | | | | | |

| | | | | | | | |
|--------|----|----|----|----|----|----|----|
| LD290L | G0 | H0 | I1 | P0 | Y0 | Y5 | J0 |
| LD291L | G0 | H0 | I1 | P0 | Y0 | Y5 | J0 |
| LD292L | | H0 | I1 | P0 | | | J0 |
| LD293L | | H0 | I1 | P0 | | | J0 |

← TYPICAL MODEL NUMBER

Optional Items

| | |
|---------------------------------|--|
| Special Procedures | C1 – Degrease Cleaning (Oxygen or Chlorine Service) |
| Burnout | BD – Down Scale BU – Up Scale |
| Lower Housing Connection | U0 – With 1 Flush Connection 1/4" NPT (if supplied with lower housing) U1 – With 2 Flush Connections 1/4" NPT per 180° U2 – With 2 Flush Connections 1/4" NPT per 90° U3 – With 2 Flush Connections 1/2" - 14 NPT per 180° (with cover) U4 – Without Flush Connection |

NOTE

- (1) Silicone Oils not recommendations for Oxygen (O2) or Chlorine service.
- (2) Not applicable for vacuum service.
- (3) Certificate for use in Hazardous Locations (CEPEL, NEPSI, NEMKO, EXAM, FM, CSA).
- (4) Certificate for use in Hazardous Locations (CEPEL, CSA).
- (5) Certificate for use in Hazardous Locations (CEPEL, NEPSI, NEMKO, EXAM).
- (6) Attention, check corrosion rate for the process, tantalum plate 0.1 mm, AISI 316L extension 3 to 6mm.
- (7) Fluorolube fill fluid is not available for Monel diaphragm.
- (8) Inert Fluid: Safe for oxygen service.
- (9) Limited values to 4 1/2 digits; limited unit to 5 characters.

- (10) IPW/TYPEX was tested for 200 hours according to NBR 8094 / ASTM B 117 standard.
- (11) IPX8 tested for 10 meters of water column for 24 hours.
- (12) Ingress Protection:

| Products | CEPEL | NEMKO / EXAM | FM | CSA | NEPSI |
|----------|--------|--------------|--------------|---------|-------|
| LD29X | IP66/W | IP66/68/W | Type 4X/6/6P | Type 4X | IP67 |

- (13) Only available for LD290 and LD291.
- (14) Not certified for use in hazardous locations.

| MODEL | | PRESSURE TRANSMITTER WITH EXTENDED PROBE | | | | |
|--------|--|--|------|------|--|--|
| LD2901 | 4-20 mA | | | | | |
| LD2911 | HART® & 4-20 mA | | | | | |
| LD2921 | FOUNDATION™ fieldbus | | | | | |
| LD2931 | PROFIBUS PA | | | | | |
| CODE | Type | Range Limits | | | | |
| 2 | Level | Min. | Max. | Unit | | |
| | | 12.5 | 500 | mbar | | |
| CODE | Diaphragm Material and Fill Fluid | | | | | |
| 1 | 316L SST – Silicon Oil (1) | | | | | |
| CODE | Local Indicator | | | | | |
| 0 | Without Indicator | | | | | |
| 1 | With Indicator | | | | | |
| CODE | Fixing Transmitter | | | | | |
| 1 | Bracket in L | | | | | |
| 2 | Flanged Bracket | | | | | |
| 3 | Triclamp 3" (11) | | | | | |
| Z | User's specification | | | | | |
| CODE | Electrical Connection | | | | | |
| 0 | 1/2 - 14 NPT (2) | | | | | |
| 1 | 1/2 - 14 NPT X 3/4 NPT (316 SST) - with adapter (3) | | | | | |
| 2 | 1/2 - 14 NPT X 3/4 BSP (316 SST) - with adapter (10) | | | | | |
| 3 | 1/2 - 14 NPT X 1/2 BSP (316 SST) - with adapter (10) | | | | | |
| 4 | 1/2 - 1/2 NPTF (316 SST) - with adapter | | | | | |
| 5 | 1/2 - 3/4 NPTF (316 SST) - with adapter | | | | | |
| A | M20 X 1.5 (4) | | | | | |
| B | PG 13.5 DIN (4) | | | | | |
| Z | User's specification | | | | | |
| CODE | Probe Material / Diaphragm (Wetted Parts) | | | | | |
| A | 304L SST / 316L SST | | | | | |
| I | 316L SST / 316L SST | | | | | |
| U | 316L SST / Hastelloy C276 | | | | | |
| Z | User's specification | | | | | |
| CODE | Probe Length | | | | | |
| 1 | 500 mm | | | | | |
| 2 | 630 mm | | | | | |
| 3 | 800 mm | | | | | |
| 4 | 1000 mm | | | | | |
| 5 | 1250 mm | | | | | |
| 6 | 1600 mm | | | | | |
| 7 | 2000 mm | | | | | |
| 8 | 2500 mm | | | | | |
| 9 | 3200 mm | | | | | |
| Z | User's specification | | | | | |
| CODE | Probe Fill Fluid | | | | | |
| N | Neobee M20 Propylene Glycol Oil (11) | | | | | |
| Z | User's specification | | | | | |
| CODE | Optional Items | | | | | |

| | | | | | | | | | | | | | | | | | | |
|--------|---|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|--|---|
| LD2901 | - | 2 | | 1 | | 1 | | 2 | | A | | I | | 1 | | N | | * |
| LD2911 | - | 2 | | 1 | | 1 | | 2 | | A | | I | | 1 | | N | | * |
| LD2921 | - | 2 | | 1 | | 1 | | 2 | | A | | I | | 1 | | N | | * |
| LD2931 | - | 2 | | 1 | | 1 | | 2 | | A | | I | | 1 | | N | | * |

← Typical Model Number

*Leave blank for no optional items.

| MODEL | | PRESSURE TRANSMITTER WITH EXTENDED PROBE (CONTINUATION) | |
|-------------|--|---|--|
| CODE | Output Signal (9) | | |
| G0 | 4-20 mA | | |
| G4 | 4-20 mA + Output for Remote Indicator | | |
| CODE | Housing Material (7) (8) | | |
| H0 | Aluminium (IP/TYPE) | H3 | 316 SST for saline atmosphere (IPW/TYPEX) (6) |
| H1 | 316 SST (IP/TYPE) | H4 | Copper Free Aluminium (IPW/TYPEX) (6) |
| H2 | Aluminium for saline atmosphere (IPW/TYPEX) (10) | | |
| CODE | Identification Plate | | |
| IN | CEPEL: Ex-ia | | |
| CODE | Painting | | |
| P0 | Munsell N 6,5 Gray | P6 | Epoxy Yellow |
| P3 | Polyester Black | P8 | Without Painting |
| P4 | Epoxy White | P9 | Blue Safety Base Epoxy - Eletrostatic Painting |
| P5 | Polyester Yellow | PC | Safety Base Polyester - Eletrostatic Painting |
| CODE | Display Unit 1 (9) | | |
| Y0 | Percentage | Y3 | Temperature (Temperature) |
| Y1 | Current (mA) | YU | User's specification (5) |
| Y2 | Pressure (Eng.Unit) | | |
| CODE | Display Unit 2 (9) | | |
| Y0 | Percentage | Y6 | Temperature (Temperature) |
| Y4 | Current (mA) | YU | User's specification (5) |
| Y5 | Pressure (Eng. Unit) | | |
| CODE | Tag Plate | | |
| J0 | With TAG | J2 | User's specification |
| J1 | Without TAG | | |

| | | | | | | | | | | | | | | |
|--------|---|----|--|----|--|----|--|----|--|----|--|----|--|----|
| LD290I | - | G0 | | H0 | | IN | | P0 | | Y0 | | Y5 | | J0 |
| LD291I | - | G0 | | H0 | | IN | | P0 | | Y0 | | Y5 | | J0 |
| LD292I | | | | H0 | | IN | | P0 | | | | | | J0 |
| LD293I | | | | H0 | | IN | | P0 | | | | | | J0 |

← Typical Model Number

Optional Items

| | |
|--------------------------------|---|
| Special Procedures | C1 – Degrease Cleaning (Oxygen or Chlorine Service) C4 – Polishing of the wet parts according to 3A certification (11) |
| Burnout | BD – Down Scale BU – Up Scale |
| Special Characteristics | U0 – With 1 Flush Connection 1/4" NPT (if supplied with lower housing) U1 – With 2 Flush Connections 1/4" NPT per 180° U2 – With 2 Flush Connections 1/4" NPT per 90° U3 – With 2 Flush Connections 1/2" - 14 NPT per 180° (with cover) U4 – Without Flush Connection ZZ – User's specifications |

NOTE

- (1) Silicone Oils not recommendations for Oxygen (O2) or Chlorine service.
- (2) Certificate for use in Hazardous Locations (CEPEL, NEPSI, NEMKO, EXAM, FM, CSA).
- (3) Certificate for use in Hazardous Locations (CEPEL, CSA).
- (4) Certificate for use in Hazardous Locations (CEPEL, NEPSI, NEMKO, EXAM).
- (5) Limited values to 4 1/2 digits; limited unit to 5 characters.
- (6) IPW/TYPEX was tested for 200 hours according to NBR 8094 / ASTM B 117 standard.
- (7) IPX8 tested for 10 meters of water column for 24 hours.
- (8) Ingress Protection:

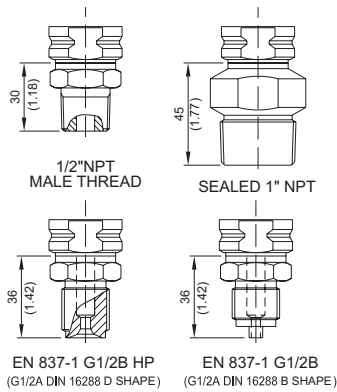
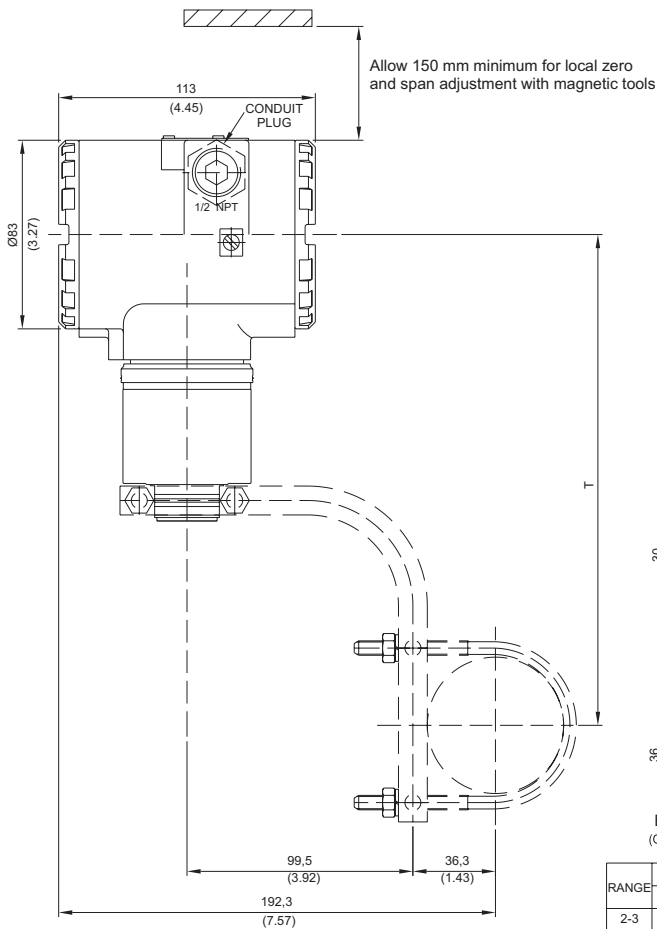
(9) Only available for LD290 and LD291.

(10) Not certified for use in hazardous locations.

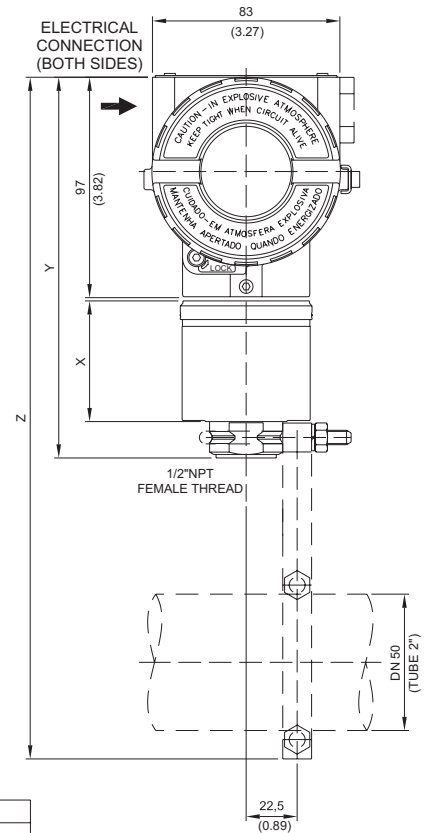
(11) Compliant with 3A-7403 standard for food and other applications where sanitary connections are required:
 - Neobee M20 Fill Fluid;
 - Wet face finishing: 0.8 µm Ra (32 µ" AA);
 - Wet O-Ring: Viton, Teflon and Buna-N.

| Products | CEPEL | NEMKO / EXAM | FM | CSA | NEPSI |
|----------|--------|--------------|--------------|---------|-------|
| LD29X | IP66/W | IP66/68/W | Type 4X/6/6P | Type 4X | IP67 |

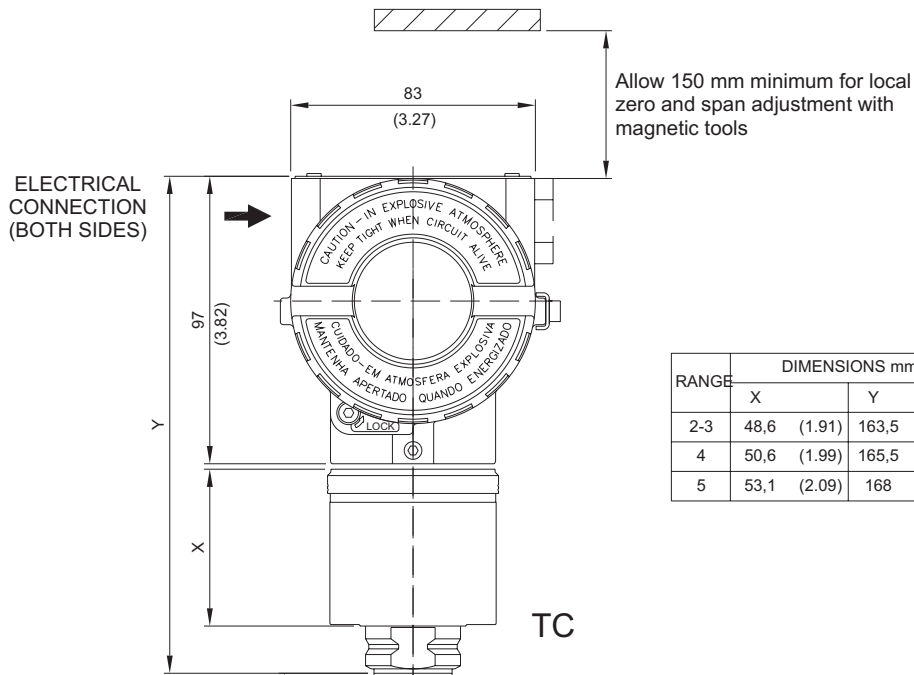
LD290M - Gage Pressure Transmitters



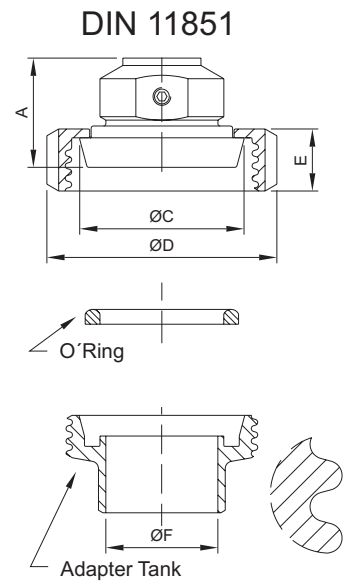
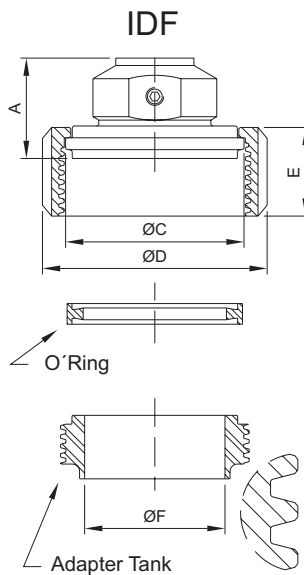
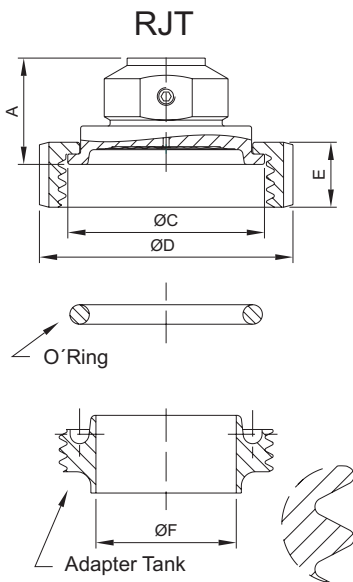
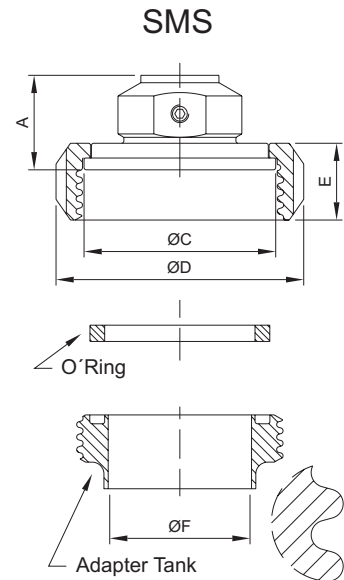
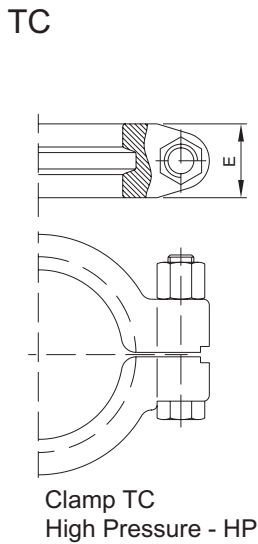
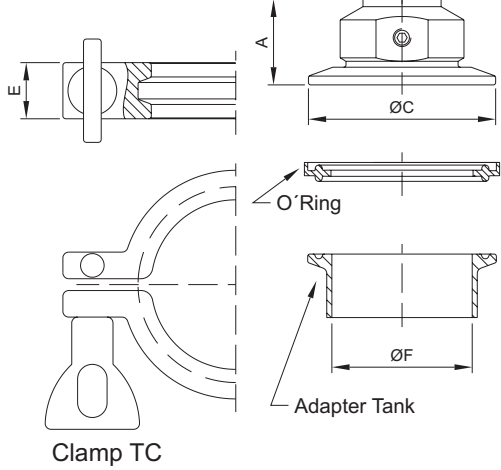
| RANGE | DIMENSIONS mm (*) | | | |
|-------|-------------------|--------------|--------------|---------------|
| | X | Y | T | Z |
| 2-3 | 48,6 (1.91) | 163,5 (6.44) | 211,5 (8.33) | 295,5 (11.63) |
| 4 | 50,6 (1.99) | 165,5 (6.52) | 213,5 (8.41) | 297,5 (11.71) |
| 5 | 53,1 (2.09) | 168 (6.61) | 216 (8.50) | 300 (11.81) |



LD290S - Pressure Sanitary Transmitters



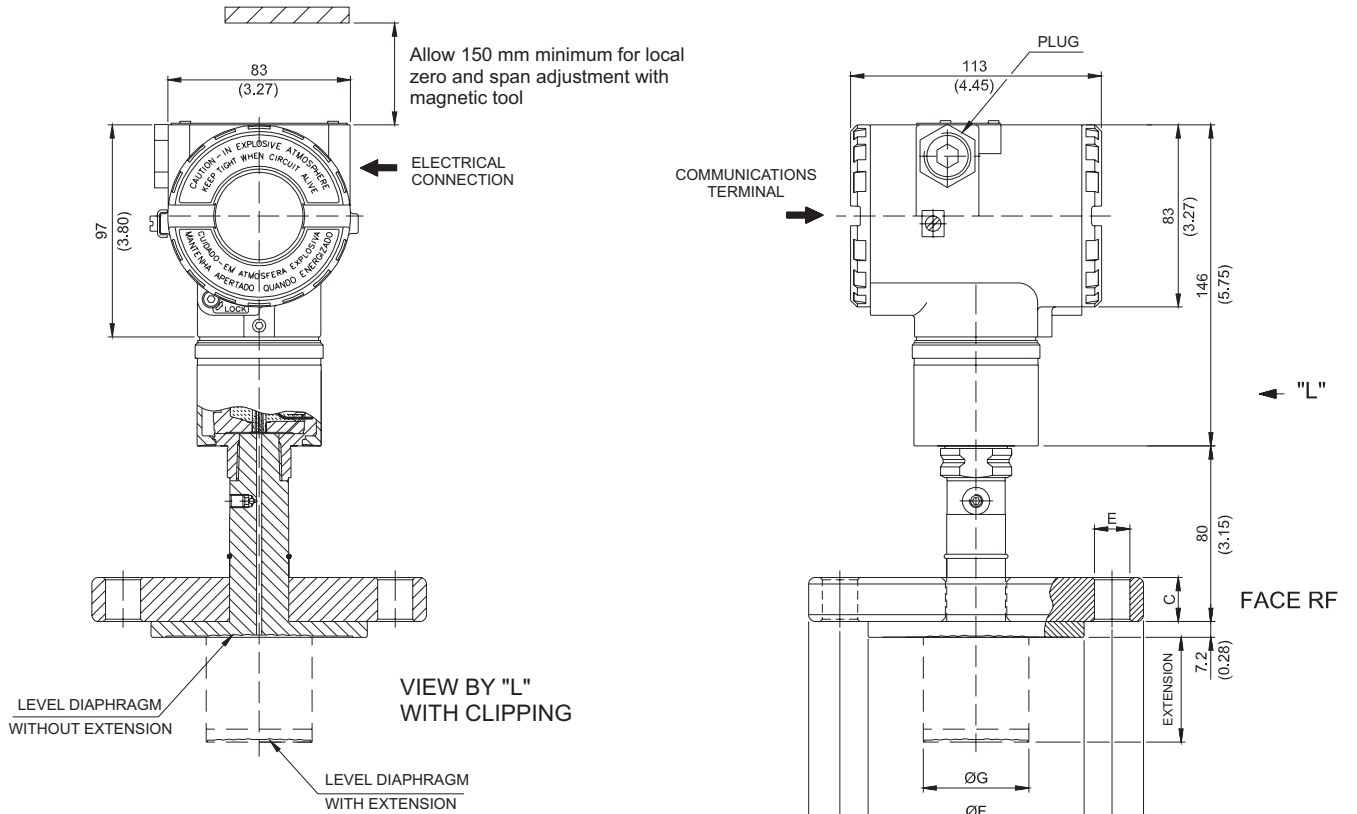
| RANGE | DIMENSIONS mm (") | |
|-------|-------------------|--------------|
| | X | Y |
| 2-3 | 48,6 (1.91) | 163,5 (6.44) |
| 4 | 50,6 (1.99) | 165,5 (6.52) |
| 5 | 53,1 (2.09) | 168 (6.61) |



| CONNECTION WITHOUT EXTENSION | Dimensions in mm (inche) | | | | |
|------------------------------|--------------------------|-------------|-------------|-----------|-------------|
| | A1 | ØC | ØD | E | ØF |
| Tri-Clamp - 1 1/12" | 27 (1.06) | 50 (1.96) | 61 (2.40) | 18 (0.71) | 35 (1.38) |
| Tri-Clamp - 1 1/2" HP | 27 (1.06) | 50 (1.96) | 66 (2.59) | 25 (0.98) | 35 (1.38) |
| Tri-Clamp - 2" | 29 (1.14) | 63.5 (2.50) | 76.5 (3.81) | 18 (0.71) | 47.6 (1.87) |
| Tri-Clamp - 2" HP | 29 (1.14) | 63.5 (2.50) | 81 (3.19) | 25 (0.98) | 47.6 (1.87) |
| Threaded DN40 - DIN 11851 | 37 (1.46) | 56 (2.20) | 78 (3.07) | 21 (0.83) | 38 (1.50) |
| Threaded DN50 - DIN 11851 | 38 (1.50) | 68.5 (2.70) | 92 (3.62) | 22 (0.86) | 50 (1.96) |
| Threaded SMS - 1 1/2" | 31 (1.22) | 55 (2.16) | 74 (2.91) | 25 (0.98) | 35 (1.38) |
| Threaded SMS - 2" | 32 (1.26) | 65 (2.56) | 84 (3.30) | 26 (1.02) | 48.6 (1.91) |
| Threaded RJT - 2" | 35 (1.38) | 66.7 (2.63) | 86 (3.38) | 22 (0.86) | 47.6 (1.87) |
| Threaded IDF - 2" | 34 (1.34) | 60.5 (2.38) | 76 (2.99) | 30 (1.18) | 47.6 (1.87) |

Table 1 - LD290S - Table relative to dimension drawing from page 17

LD290L - Flanged Pressure Transmitter

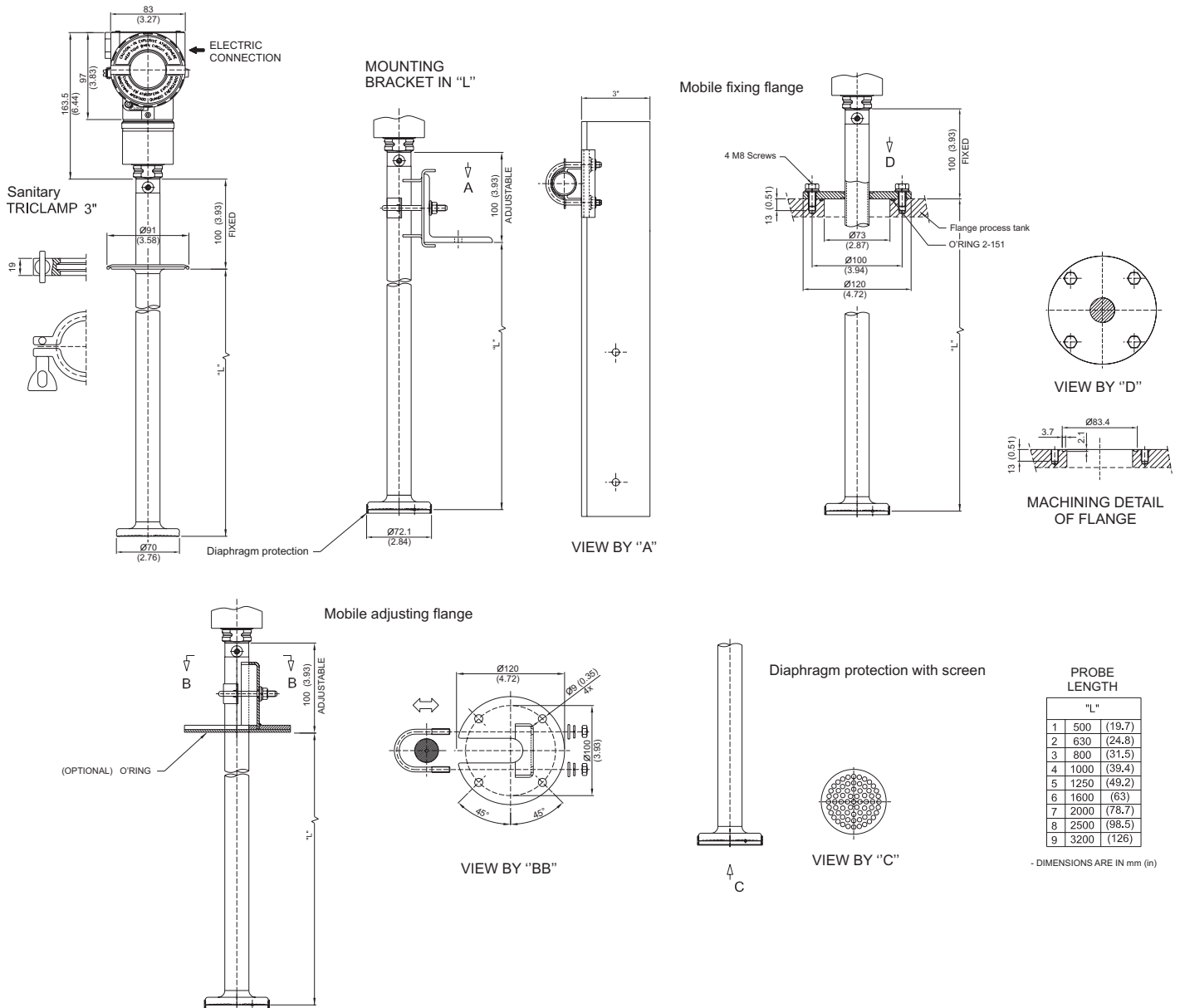


NOTES:
-EXTENSION LENGHT mm (in): 0, 50 (1.96), 100 (3.93), 150 (5.9) OR 200 (7.87)
-DIMENSIONS ARE mm (in)

| ANSI-B 16.5 DIMENSIONS | | | | | | | | |
|------------------------|---------|--------------|--------------|-------------|-----------|-------------|-----------|-------|
| DN | CLASS | A | B | C | E | F (RF) (FF) | G | HOLES |
| 1" | 150 | 108 (4.25) | 79.4 (3.16) | 14.3 (0.56) | 16 (0.63) | 50.8 (2) | - | 4 |
| | 300/600 | 124 (4.88) | 88.9 (3.5) | 17.5 (0.69) | 19 (0.75) | 50.8 (2) | - | 4 |
| 1.1/2" | 150 | 127 (5) | 98.6 (3.88) | 20 (0.78) | 16 (0.63) | 73.2 (2.88) | 40 (1.57) | 4 |
| | 300 | 155.4 (6.12) | 114.3 (4.5) | 21 (0.83) | 22 (0.87) | 73.2 (2.88) | 40 (1.57) | 4 |
| 2" | 150 | 152.4 (6) | 120.7 (4.75) | 17.5 (0.69) | 19 (0.75) | 92 (3.62) | 48 (1.89) | 4 |
| | 300 | 165.1 (6.5) | 127 (5) | 20.7 (0.8) | 19 (0.75) | 92 (3.62) | 48 (1.89) | 8 |
| 3" | 150 | 190.5 (7.5) | 152.4 (6) | 22.3 (0.87) | 19 (0.75) | 127 (5) | 73 (2.87) | 4 |
| | 300 | 209.5 (8.25) | 168.1 (6.62) | 27 (1.06) | 22 (0.87) | 127 (5) | 73 (2.87) | 8 |
| 4" | 150 | 228.6 (9) | 190.5 (7.5) | 22.3 (0.87) | 19 (0.75) | 158 (6.22) | 89 (3.5) | 8 |
| | 300 | 254 (10) | 200 (7.87) | 30.2 (1.18) | 22 (0.87) | 158 (6.22) | 89 (3.5) | 8 |

| EN 1092-1 / DIN2501 DIMENSIONS | | | | | | | | |
|--------------------------------|-------|------------|------------|-----------|-----------|------------|-----------|-------|
| DN | PN | A | B | C | E | F | G | HOLES |
| 25 | 10/40 | 115 (4.53) | 85 (3.35) | 18 (0.71) | 14 (0.55) | 68 (2.68) | - | 4 |
| 40 | 10/40 | 150 (5.9) | 110 (4.33) | 20 (0.78) | 18 (0.71) | 88 (3.46) | 40 (1.57) | 4 |
| 50 | 10/40 | 165 (6.50) | 125 (4.92) | 20 (0.78) | 18 (0.71) | 102 (4.01) | 48 (1.89) | 4 |
| 80 | 10/40 | 200 (7.87) | 160 (6.30) | 24 (0.95) | 18 (0.71) | 138 (5.43) | 73 (2.87) | 8 |
| 100 | 10/16 | 220 (8.67) | 180 (7.08) | 20 (0.78) | 18 (0.71) | 158 (6.22) | 89 (3.5) | 8 |
| | 25/40 | 235 (9.25) | 190 (7.50) | 24 (0.95) | 22 (0.87) | 162 (6.38) | 89 (3.5) | 8 |

LD290I - Pressure Transmitter with Extended Probe



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Up-to-date address information is available on our website.

web: www.smar.com/contactus.asp

