

# LD291

SMART PRESSURE TRANSMITTERS

4 to 20 mA + HART® Digital Communication



36.9

The series **LD29X** is the economical alternative in routine gage pressure measurement. This lightweight design eliminates the need for mounting brackets and transmitter supports in many applications.

The model LD291 offers digital HART® based communication simplifying calibration and providing remote diagnostics.

Its microprocessor-based electronics allow for total interchangeability with SMAR capacitive sensors. It automatically corrects sensor characteristic changes caused by temperature fluctuations.

All members of the LD29X series use SMAR's field proven capacitive sensors. Its special design allows a direct process connection and an optional LCD indicator can be added to provide additional operations and local indication.

Basiles the LD291 was developed according to the international safety standards to attend the functional safety requirements in plants that need safety and reability to protect people, ambient and assents, etc.

The LD291 has FMEDA analyses allowing it to work in safety areas according to SIL requirements and making easier to the user the calculation fo Safety Integrity Level (SIL).

MTBF is a basic measure of product and it is calculated adding the MTTR and MTTF. MTTR is the mean time to execute maintenance on all of the removable items in a product. It is the most common measure of maintainability. MTTF is the mean time expected until the first failure of a piece of equipment. It is the inverse of the failure note.



- ✓ **NEW** 0 ~ 1.25 kPa to 0 ~ 25 MPa (0 ~ 5 inH<sub>2</sub>O to 0 ~ 3600 psi)
- ✓ ±0.1% accuracy of the calibrated range
- ✓ Updating time of output current in 100ms
- ✓ Output current resolution of 0.75µA/bit
- ✓ With high performance mathematical co-processor
- ✓ One single electronic board for all models
- ✓ Accepts calibration from URL to URL/40
- ✓ Wetted parts in 316 SST or Hastelloy
- ✓ Digital display (optional)
- ✓ Zero, span and damping adjustment through HART® local switches (only if fitted with display)
- ✓ Digital electronics, sensor and communication
- ✓ Self diagnostics
- ✓ 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
- ✓ Easy upgrade for Foundation Fieldbus and Profibus PA technologies
- ✓ Designed and manufactured according to ISO 9001 standards

## Functional Specifications

### Service

Liquid, gas or vapor application

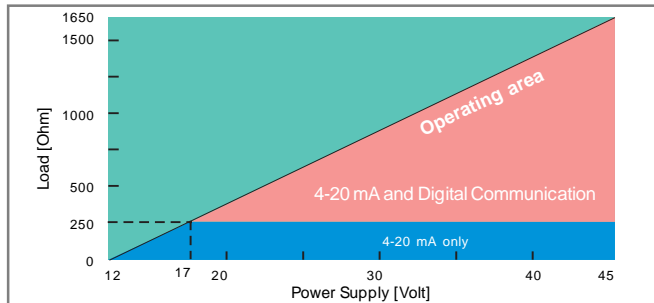
### Output

Two wire, 4-20 mA with HART® superimposed digital communication signal. Output current according to NAMUR-NE 43 standard.

### Power Supply

12 - 45 Vdc

### Load Limitation



### Indicator

Optional 4½-digit numerical and 5-character alphanumeric LCD indicator.

### Hazardous Area Certifications

Explosion proof, weather proof and intrinsically safe (CENELEC, CSA and FM standards).

### Zero and Span Adjustment

By Configurator or Local Adjustment from 0 to 0.975 URL, URL = Upper Range Limit.

### Temperature Limits

Ambient: -40 to 85 °C (-40 to 185 °F).  
 Process: -40 to 100 °C (-40 to 212 °F) (Silicone Oil).  
 0 to 85 °C (-32 to 185 °F) (Fluorolube Oil).  
 Storage: -40 to 100 °C (-40 to 212 °F).  
 Display: -10 to 60 °C (14 to 140 °F) operation.  
 -40 to 85 °C (-40 to 185 °F) without damage.

### Failure Alarm

In case of sensor or circuit failure, the self diagnostics drives the output to 3.6 or 21.0 mA and according to user's choice.

### Turn-on Time

Performs within specifications in less than 10 seconds after power is applied to the transmitter.

### Overpressure Limits

14 MPa (2000 psi) for ranges 2, 3 and 4  
 31 MPa (4500 psi) for range 5

These overpressures will not damage the transmitter, but a new calibration may be necessary.

### Humidity Limits

0 to 100% RH.

### Damping Adjustment

User configurable, from any value higher than 0 seconds plus intrinsic sensor response time (0.2s).

### Configuration

By digital communication (HART® protocol) using the Configuration Interface CONF301 or the Hart Pocket Configurator HPC301. Can be done partially, through local adjustment.

## Performance Specifications

NEW

### Accuracy

± 0.1% of span (for span ≥ 0.1 URL).  
 ± 0.05 (1 +(0.1 URL/span))% of span (for span < 0.1 URL).

For Ranges 5:

± 0.2% of span (for span ≥ 0.1 URL).  
 ± 0.1 (1 +(0.1 URL/span))% of span (for span < 0.1 URL).

### Stability

±0.2% of URL for 1 year.

### Temperature Effect

±(0.18% URL + 0.18% span) per 20 °C (36 °F).

### Power Supply Effect

0.005% of calibrated span per volt.

### Mounting Position Effect

Zero shift of up to 250 Pa (1 inH<sub>2</sub>O) which can be calibrated out. No span effect.

### Electro-Magnetic Effect

Designed to comply with IEC IEC61000-6-2:1999, IEC61000-6-4:1997 and IEC61326:2002 standards.

## Physical Specifications

### Electrical Connection

½ -14 NPT, Pg 13,5 or M20 x 1,5

### Process Connection

See ordering code.

### Wetted Parts

- Isolating Diaphragms and Process Connection  
316L SST, Hastelloy C276.

### Nonwetted Parts

- Electronic Housing  
Injected aluminum with polyester painting or 316 SST (NEMA 4X, IP67).
- Fill Fluid  
Silicone or Fluorolube Oil.
- Cover O-Rings  
Buna N.
- Mounting Bracket  
Optional universal mounting bracket for surface or vertical/horizontal 2"-pipe (DN 50) carbon steel with polyester painting or 316 SST. Accessories (bolts, nuts, washers and U-clamp) in carbon steel or 316 SST.
- Identification Plate  
316 SST.

### Approximate Weights

< 2.0 kg (4lb): aluminum housing without mounting bracket.

Smar Pressure Transmitters are protect by USA patent number 6,433,791

MODEL LD291	SMART PRESSURE TRANSMITTERS - 4 to 20 mA + HART Digital Communication					
<b>CODE</b>	<b>Range</b>					
<b>M2</b>	Gage	1.25	to	50 kPa	5	to 200 inH <sub>2</sub> O
<b>M3</b>	Gage	6.25	to	250 kPa	25	to 1000 inH <sub>2</sub> O
<b>M4</b>	Gage	62.50	to	2500 kPa	9	to 360 psi
<b>M5</b>	Gage	0.625	to	25 MPa	90	to 3600 psi
<b>Note:</b> The range can be extend up to 1.2 URL with small degradation of accuracy.						
<b>CODE</b>	<b>Diaphragm Material</b>		<b>Fill Fluid (Low Side)</b>		<b>Process Connection Material</b>	
<b>1I</b>	316L SST		Silicone Oil		316L SST	
<b>2I</b>	316L SST		Fluorolube Oil		316L SST	
<b>3H</b>	Hastelloy C276		Silicone Oil*		Hastelloy C276*	
<b>4H</b>	Hastelloy C276		Fluorolube Oil*		Hastelloy C276*	
<b>Z</b>	Others - Specify					
<b>CODE</b>	<b>Local Indicator</b>					
<b>0</b>	Without Indicator					
<b>1</b>	With Digital Indicator					
<b>CODE</b>	<b>Process Connections</b>					
<b>1</b>	½ - 14 NPT - Female					
<b>G</b>	G ½ A DIN 16288 Form B - Male					
<b>H</b>	G ½ A DIN 16288 Form D - Male					
<b>M</b>	½ - 14 NPT - Male					
<b>V</b>	Valve Manifold integrated to the transmitter					
<b>Z</b>	Others - Specify					
<b>CODE</b>	<b>Electrical Connections</b>					
<b>0</b>	½ - 14 NPT					
<b>A</b>	M20 x 1,5					
<b>B</b>	Pg 13,5 DIN					
<b>CODE</b>	<b>Mounting Bracket</b>					
<b>0</b>	Without Mounting Bracket					
<b>1</b>	Carbon Steel Mounting Bracket with Carbon Steel accessories					
<b>2</b>	316 SST Mounting Bracket with 316 SST accessories					
<b>7</b>	Carbon Steel Mounting Bracket with 316 SST accessories					
<b>Z</b>	Others - Specify					
<b>CODE</b>	<b>Optional Items **</b>					
<b>H1</b>	316 SST Housing					
<b>ZZ</b>	Special Options - Specify					

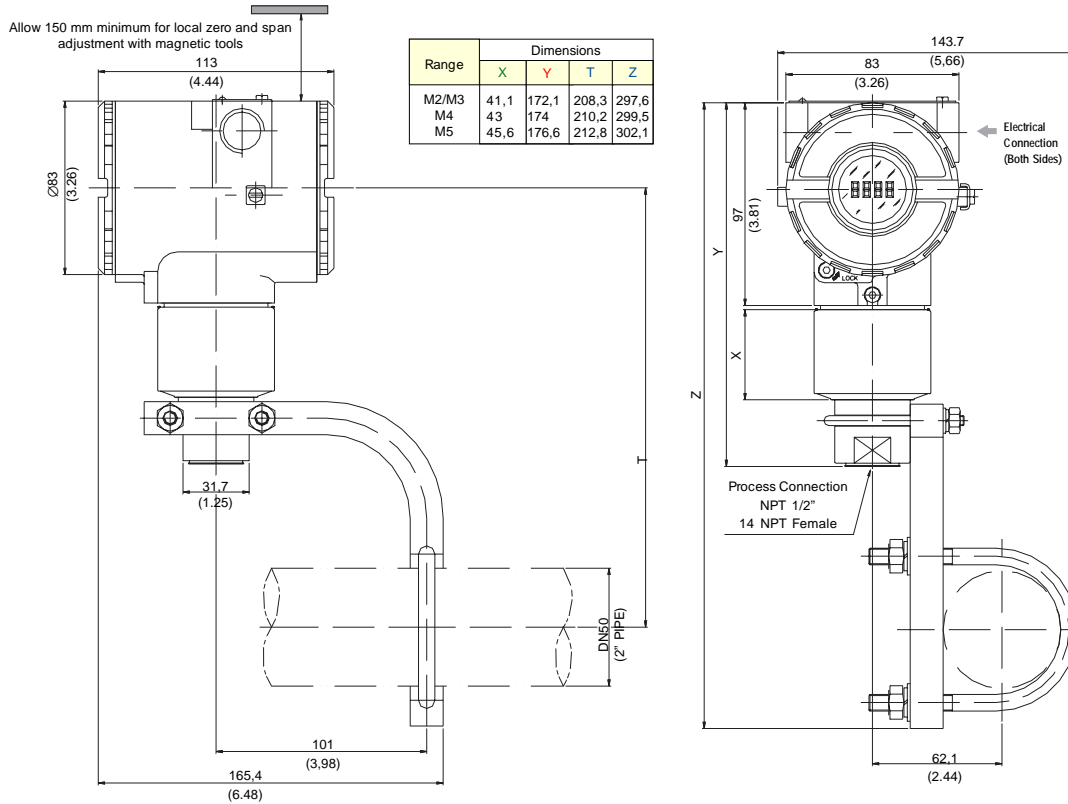
**LD291** - **M2** | **1I** | **0** - **1** | **A** - **0** / **\*\*** ← TYPICAL MODEL NUMBER

\* Meets NACE material recommendations per MR-01-75.  
 \*\* Leave it blank for no optional items.

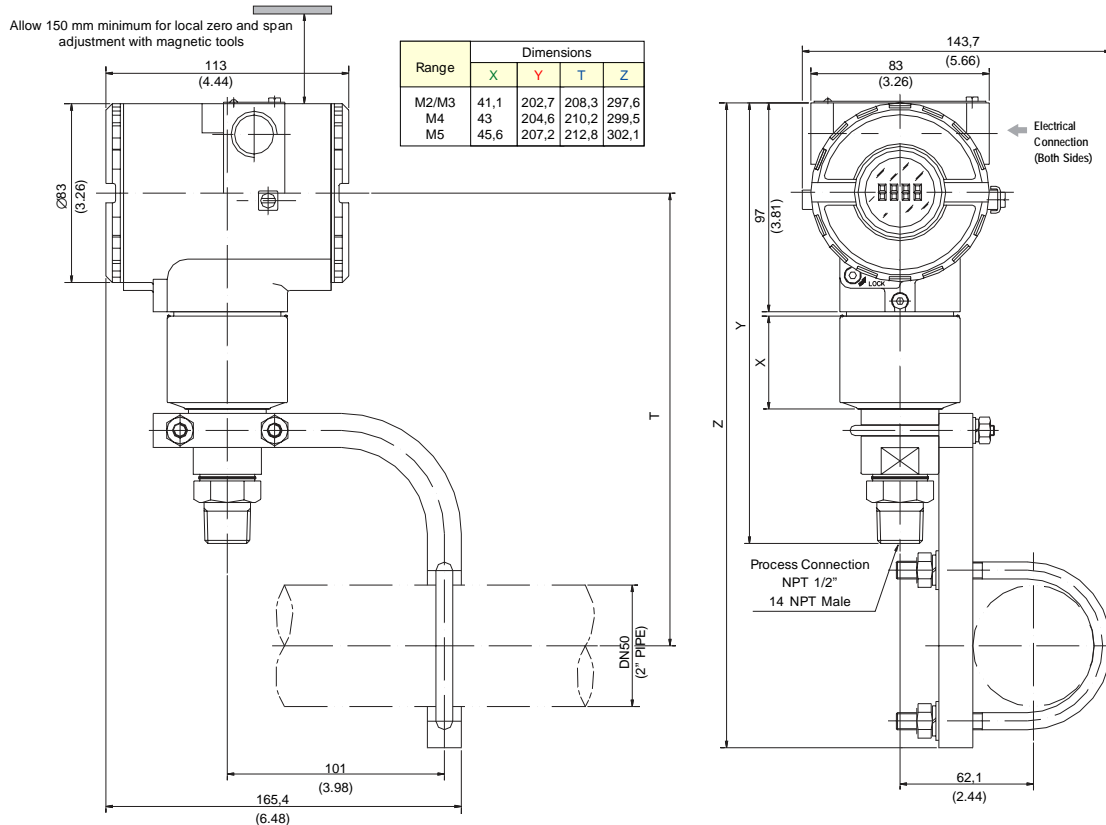
Hastelloy is a trademark of the Cabot Corp.  
 Fluorolube is a trademark of Hooker Chemical Corp.  
 HART is a trademark of Hart Communication Foundation.

Dimensions are mm (in)

## PROCESS CONNECTION 1/2" 14 NPT FEMALE



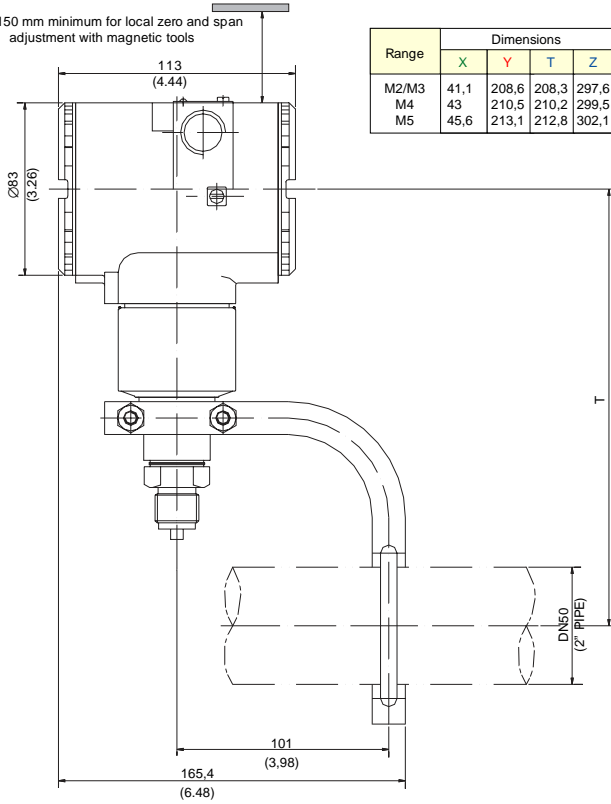
## PROCESS CONNECTION 1/2" 14 NPT MALE



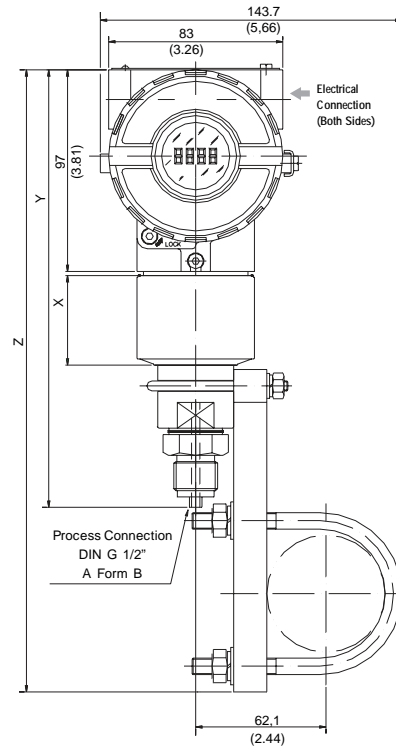
Dimensions are mm (in)

### PROCESS CONNECTION DIN G 1/2" A FORM B

Allow 150 mm minimum for local zero and span adjustment with magnetic tools

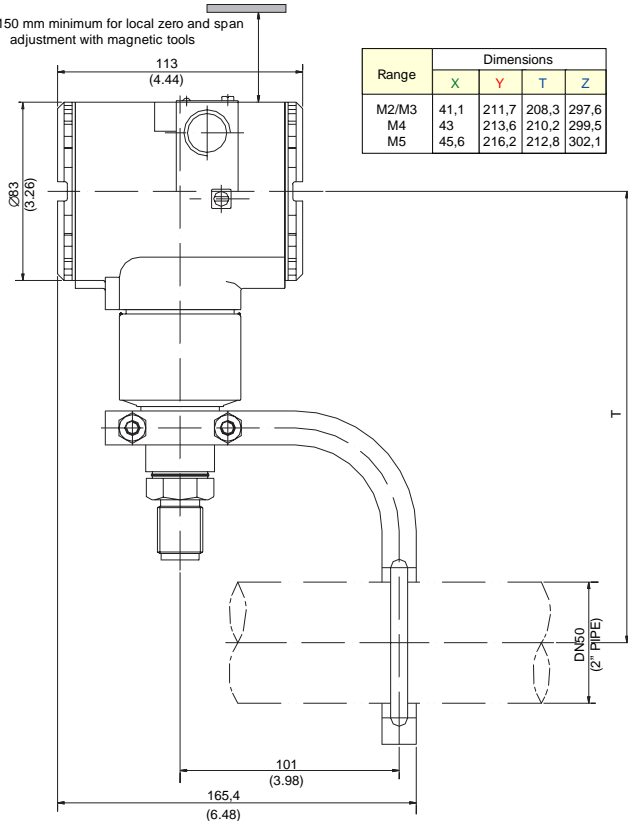


Range	Dimensions			
	X	Y	T	Z
M2/M3	41,1	208,6	208,3	297,6
M4	43	210,5	210,2	299,5
M5	45,6	213,1	212,8	302,1

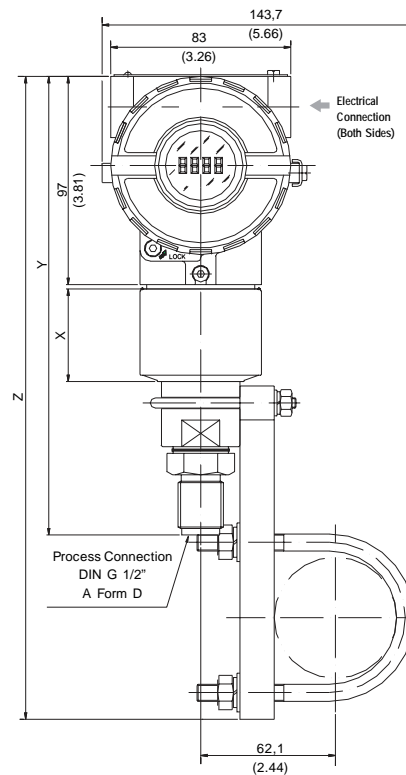


### PROCESS CONNECTION DIN G 1/2" A FORM D

Allow 150 mm minimum for local zero and span adjustment with magnetic tools



Range	Dimensions			
	X	Y	T	Z
M2/M3	41,1	211,7	208,3	297,6
M4	43	213,6	210,2	299,5
M5	45,6	216,2	212,8	302,1



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