MANUAL

INSTALLATION | OPERATION | MAINTENANCE

GAUGE PRESSURE TRANSMITTER

LD292

FOUNDATION

MAR/24 - VERSION 3

smar

Technology Company

LD292

Gauge Pressure Transmitter

FOUNDATION™

Consult our subsidiary

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INTRODUCTION

The **LD292** is from the first generation of Fieldbus Devices. It is 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. It's microprocessor-based electronics allows total interchangeability with Smar capacitive sensors. It is automatically corrects sensors characteristics changes caused by temperature fluctuations. The digital technology used in the **LD292** enables the choice of several types of transfer functions, an easy interface between the field and the control room and several interesting features that considerably reduce the installation, operation and maintenance costs.

The **LD292** is part of Smar's complete 302 line of Fieldbus devices.

Some of the advantages of bi-directional digital communications are known from existing smart transmitter protocols: Higher accuracy, multi-variable access, remote configuration and diagnostics, and multi-dropping of several devices on a single pair of wires.

Using Fieldbus technology, with its capability to interconnect several devices, very large control schemes can be constructed. In order too be user friendly the function block concept was introduced.

The **LD292**, like the rest of the 302 family, has some Function Blocks built in, like analog Input, PID controller, Input selector and Display Block.

The need for implementation of Fieldbus in small as well as large systems was considered when developing the entire 302 line of Fieldbus devices. They have the common features of being able to act as a master on the network and be configured locally using a magnetic tool, eliminating the need for a configurator or console in many basic applications.

The **LD292** is available as a product on its own, but also replaces the circuit board for the LD291. They use the same sensor board. Refer to the maintenance section of this manual for instructions on upgrading. The **LD292** uses the same hardware and housing for the LD291.The **LD292** is part of SMAR's **Series 302** of Fieldbus devices.

The **LD292**, like its predecessor LD291, has many built-in blocks, eliminating the need for a separate control device. The communication requirement is considerably reduced, and that means less dead-time and tighter control is achieved, not to mention the reduction in cost. They allow flexibility in control strategy implementation.

Get the best results of the **LD292** by carefully reading these instructions.

NOTE
This Manual is compatible with version 3.XX, where 3 denotes software version and XX software release. The indication 3.XX means that this manual is compatible with any release of software version 3.

Waiver of responsibility

The contents of this manual abides by the hardware and software used on the current equipment version. Eventually there may occur divergencies between this manual and the equipment. The information from this document are periodically reviewed and the necessary or identified corrections will be included in the following editions. Suggestions for their improvement are welcome.

Warning

For more objectivity and clarity, this manual does not contain all the detailed information on the product and, in addition, it does not cover every possible mounting, operation or maintenance cases.

Before installing and utilizing the equipment, check if the model of the acquired equipment complies with the technical requirements for the application. This checking is the user's responsibility.

If the user needs more information, or on the event of specific problems not specified or treated in this manual, the information should be sought from Smar. Furthermore, the user recognizes that the contents of this manual by no means modify past or present agreements, confirmation or judicial relationship, in whole or in part.

All of Smar's obligation result from the purchasing agreement signed between the parties, which includes the complete and sole valid warranty term. Contractual clauses related to the warranty are not limited nor extended by virtue of the technical information contained in this manual.

Only qualified personnel are allowed to participate in the activities of mounting, electrical connection, startup and maintenance of the equipment. Qualified personnel are understood to be the persons familiar with the mounting, electrical connection, startup and operation of the equipment or other similar apparatus that are technically fit for their work. Smar provides specific training to instruct and qualify such professionals. However, each country must comply with the local safety procedures, legal provisions and regulations for the mounting and operation of electrical installations, as well as with the laws and regulations on classified areas, such as intrinsic safety, explosion proof, increased safety and instrumented safety systems, among others.

The user is responsible for the incorrect or inadequate handling of equipments run with pneumatic or hydraulic pressure or, still, subject to corrosive, aggressive or combustible products, since their utilization may cause severe bodily harm and/or material damages.

The field equipment referred to in this manual, when acquired for classified or hazardous areas, has its certification void when having its parts replaced or interchanged without functional and approval tests by Smar or any of Smar authorized dealers, which are the competent companies for certifying that the equipment in its entirety meets the applicable standards and regulations. The same is true when converting the equipment of a communication protocol to another. In this case, it is necessary sending the equipment to Smar or any of its authorized dealer. Moreover, the certificates are different and the user is responsible for their correct use.

Always respect the instructions provided in the Manual. Smar is not responsible for any losses and/or damages resulting from the inadequate use of its equipments. It is the user's responsibility to know and apply the safety practices in his country.

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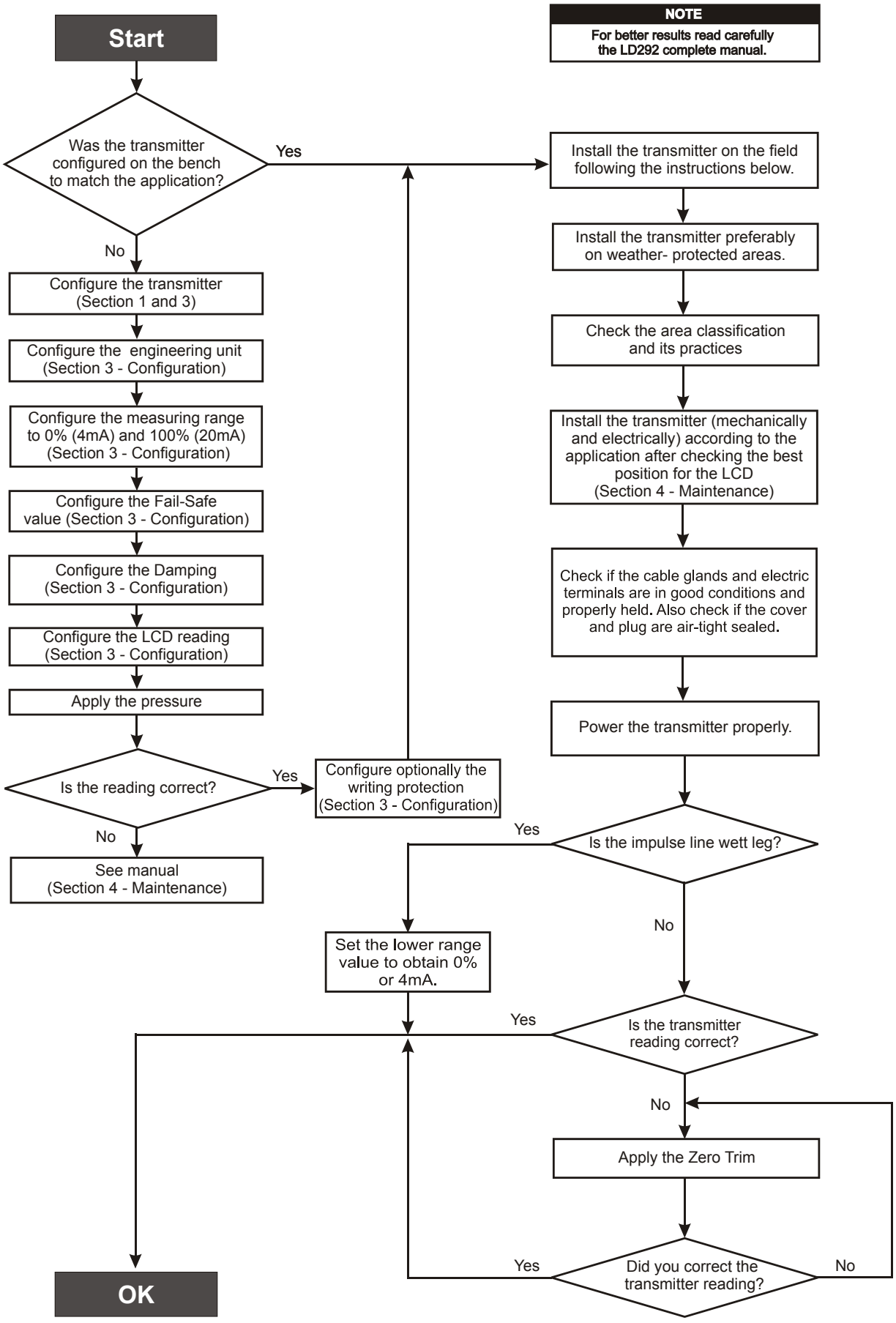

Start
Was the transmitter configured on the bench to match the application?
Yes
No
Configure the transmitter (Section 1 and 3)
Configure the engineering unit (Section 3 - Configuration)
Configure the measuring range to 0% (4mA) and 100% (20mA) (Section 3 - Configuration)
Configure the Fail-Safe value (Section 3 - Configuration)
Configure the Damping (Section 3 - Configuration)
Configure the LCD reading (Section 3 - Configuration)
Apply the pressure
Is the reading correct?
Yes
No
See manual (Section 4 - Maintenance)
Configure optionally the writing protection (Section 3 - Configuration)
NOTE
For better results read carefully the LD292 complete manual.
Install the transmitter on the field following the instructions below.
Install the transmitter preferably on weather- protected areas.
Check the area classification and its practices
Install the transmitter (mechanically and electrically) according to the application after checking the best position for the LCD (Section 4 - Maintenance)
Check if the cable glands and electric terminals are in good conditions and properly held. Also check if the cover and plug are air-tight sealed.
Power the transmitter properly.
Is the impulse line wett leg?
Yes
No
Set the lower range value to obtain 0% or 4mA.
Is the transmitter reading correct?
Yes
No
Apply the Zero Trim
Did you correct the transmitter reading?
Yes
No
OK

Section 1

INSTALLATION

General

NOTE
The installation carried out in hazardous areas should follow the recommendations of the IEC60079-14 standard.

The overall accuracy of level or pressure measurement depends on several variables. Although the transmitter has an outstanding performance, proper installation is essential to maximize its performance.

Among all factors, which may affect transmitter accuracy, environmental conditions are the most difficult to control. There are, however, ways of reducing the effects of temperature, humidity and vibration.

The **LD292** has a built-in temperature sensor to compensate for temperature variations. At the factory, each transmitter is submitted to a temperature cycle process, and the characteristics under different pressures and temperatures are recorded in the transmitter memory. At the field, this feature minimizes the temperature variation effect.

Mounting

Locating the transmitter in areas protected from extreme environmental changes can minimize temperature fluctuation effects.

The transmitter should be installed in such a way as to avoid, as much as possible, direct exposure to the sun or any source of irradiated heat. Installation close to lines and vessels with high temperatures should also be avoided. Use longer sections of impulse piping between tap and transmitter whenever the process fluid is at high temperatures. Use of sunshades or heat shields to protect the transmitter from external heat sources should be considered.

Proper winterization (freeze protection) should be employed to prevent freezing within the measuring chamber, since this will result in an inoperative transmitter and could even damage the cell.

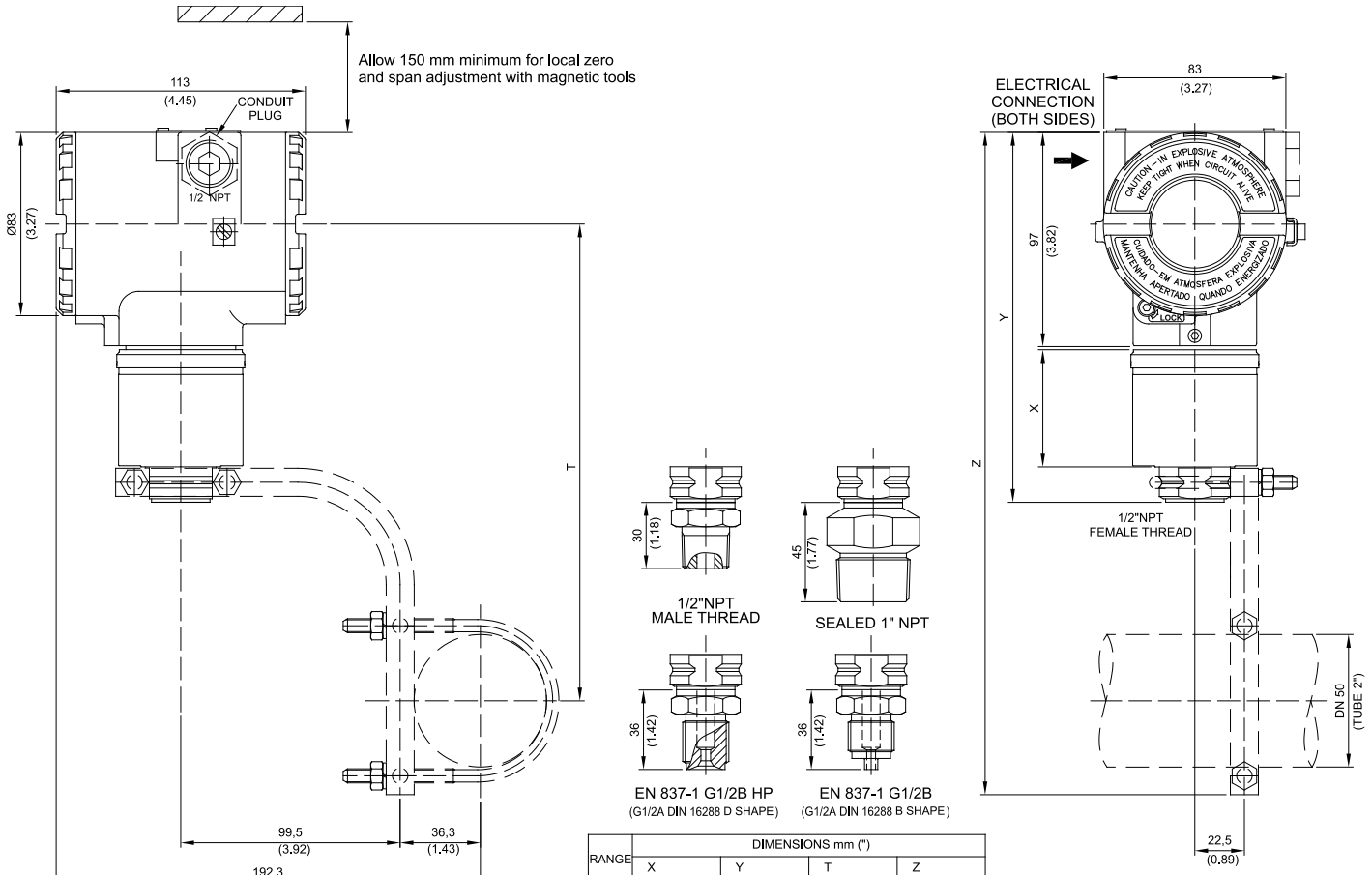
Although the transmitter is virtually insensitive to vibration, installation close to pumps, turbines or other vibrating equipment should be avoided.

The transmitter has been designed to be both rugged and lightweight at the same time. This makes its mounting easier; mounting positions are shown in Figures 1.1 and 1.2.

Should the process fluid contain solids in suspension, install valves or rod-out fittings at regular intervals to clean out the pipes.

The pipes should be internally cleaned by using steam or compressed air, or by draining the line with the process fluid, before such lines are connected to the transmitter (blow-down).

NOTE
When installing or storing the level transmitter, the diaphragm must be protected to avoid scratching-denting or perforation of its surface.



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)

Figure 1.1 (a) - Dimensional Drawing and Mounting Position for LD292

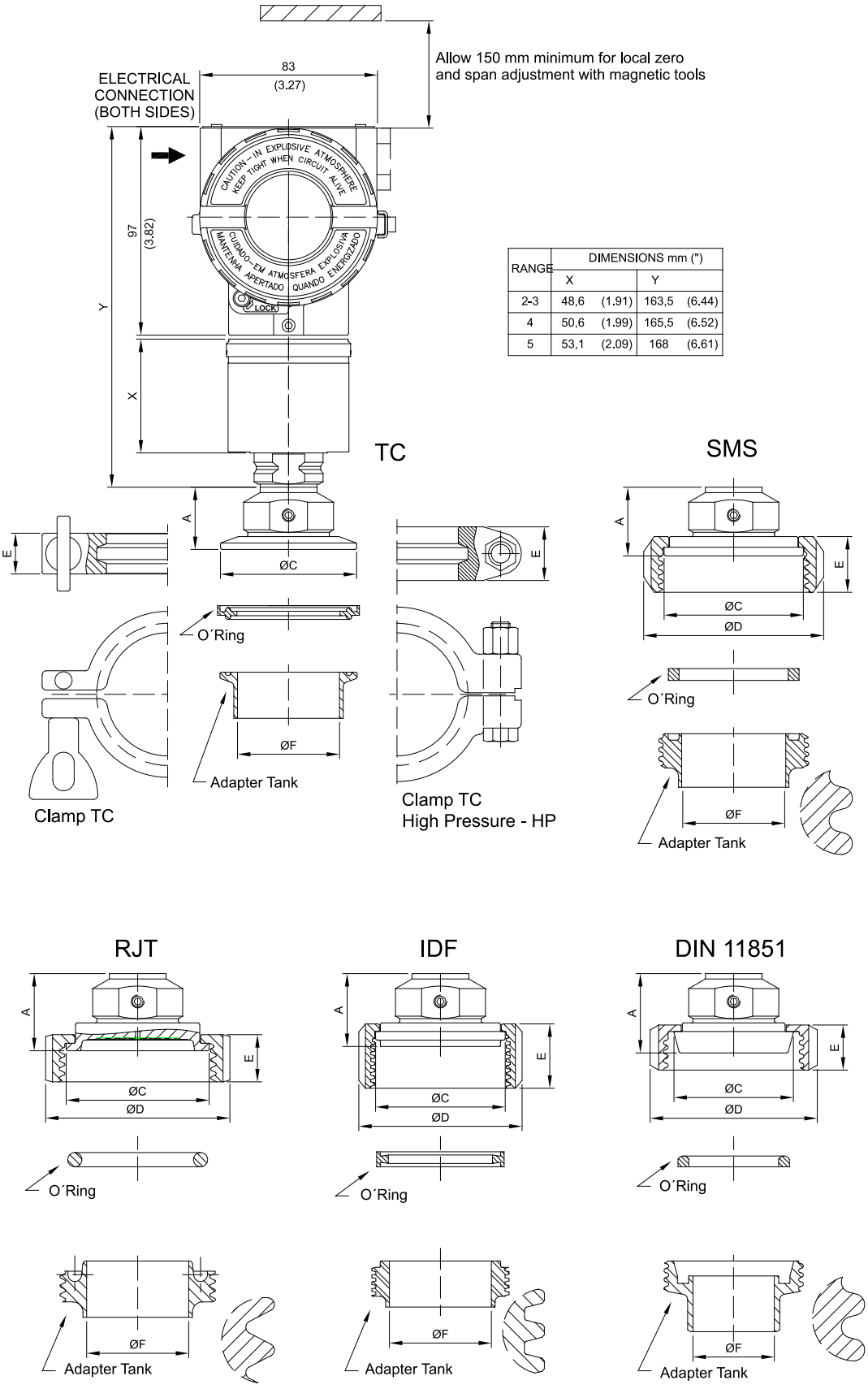
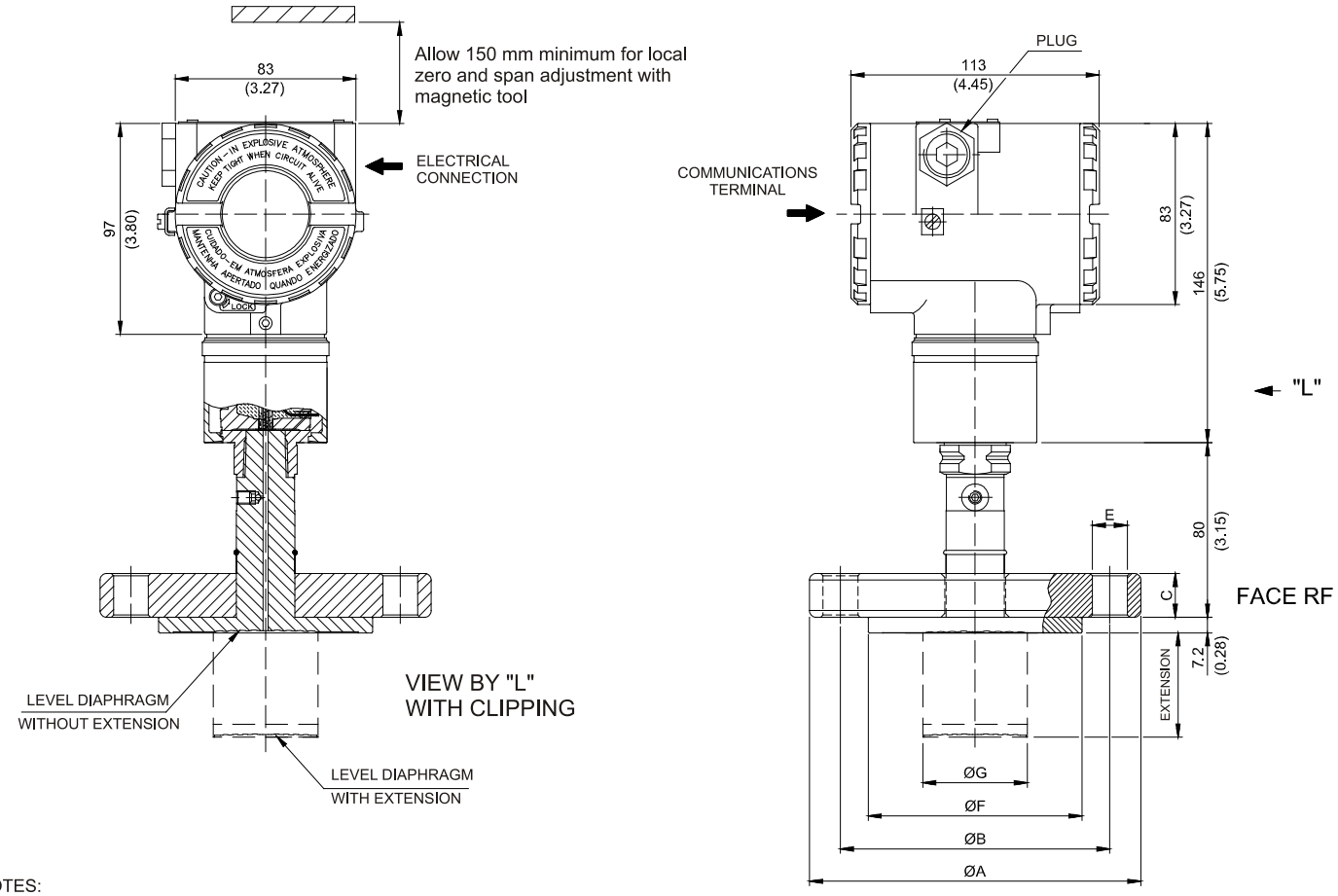


Figure 1.1 (b) - Dimensional Drawing and Mounting Position for LD292 – Sanitary

LD290S - CONNECTIONS					
CONNECTION	Dimensions in mm (inche)				
	A	ØC	ØD	E	ØF
Tri-Clamp - 1 1/2" - wihtout extension	27 (1.06)	50 (1.96)	61 (2.40)	18 (0.71)	35 (1.38)
Tri-Clamp - 1 1/2" HP - without extension	27 (1.06)	50 (1.96)	66 (2.59)	25 (0.98)	35 (1.38)
Tri-Clamp - 2" - without extension	29 (1.14)	63,5 (2.50)	76,5 (3.01)	18 (0.71)	47,6 (1.87)
Tri-Clamp - 2" HP - without extension	29 (1.14)	63,5 (2.50)	81 (3.19)	25 (0.98)	47,6 (1.87)
Threaded DN40 - DIN 11851 - without extension	37 (1.46)	56 (2.20)	78 (3.07)	21 (0.83)	38 (1.50)
Threaded DN50 - DIN 11851 - without extension	38 (1.50)	68,5 (2.70)	92 (3.62)	22 (0.86)	50 (1.96)
Threaded SMS - 1 1/2" - without extension	31 (1.22)	55 (2.16)	74 (2.91)	25 (0.98)	35 (1.38)
Threaded SMS - 2" - without extension	32 (1.26)	65 (2.56)	84 (3.30)	26 (1.02)	48,6 (1.91)
Threaded RJT - 2" - without extension	35 (1.38)	66,7 (2.63)	86 (3.38)	22 (0.86)	47,6 (1.87)
Threaded IDF - 2" - without extension	34 (1.34)	60.5 (2.38)	76 (2.99)	30 (1.18)	47,6 (1.87)

Figure 1.1 (c) - Dimensional Drawing and Mounting Position for LD292 - Sanitary



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
	600	155.4 (6.12)	114,3 (4.5)	29,3 (1.15)	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
	600	165.1 (6.5)	127 (5)	25.4 (1)	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
	600	209.5 (8.25)	168.1 (6.62)	31.8 (1.25)	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
	600	273 (10.75)	215.9 (8.5)	38.1 (1.5)	25 (1)	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

Figure 1.1 (d) - Dimensional Drawing and Mounting Position for LD292 – Level

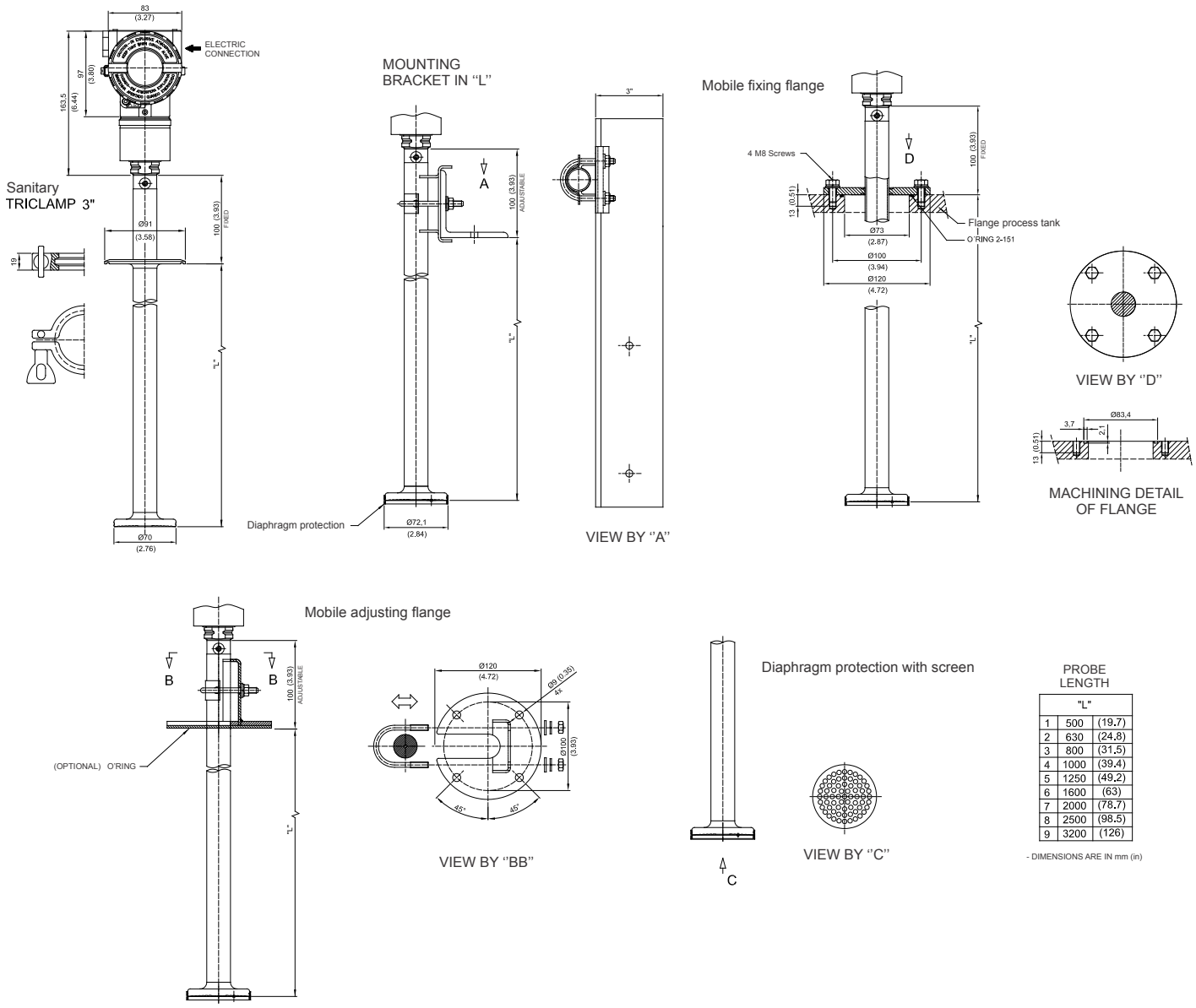


Figure 1.1 (e) - Dimensional Drawing and Mounting Position for LD292 – Level (Insertion)

The figure 1.2 shows how to use the tool to fix the process transmitter tap.

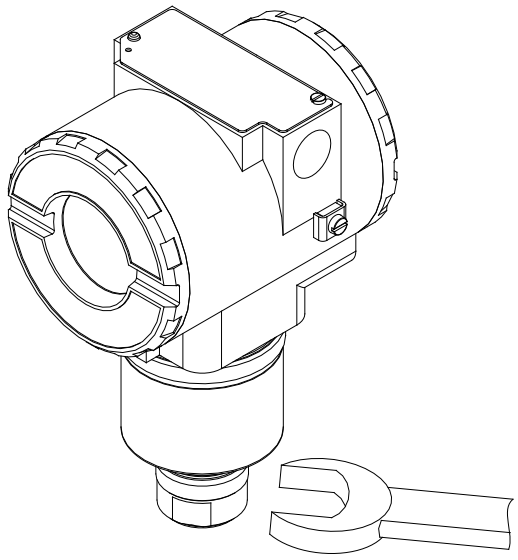


Figure 1.2 – Fixing of the Transmitter in the Tap

Observe operating safety rules during wiring, draining or blow-down.

WARNING
Normal safety precautions must be taken to avoid the possibility of an accident occurring when operating in conditions of high pressure and/or temperature. **Electrical shock can result in death or serious injury.** Avoid contact with the leads and terminals. **Process leaks could result in death or serious injury.** Do not attempt to loosen or remove flange bolts while the transmitter is in service. **Replacement equipment or spare parts not approved by Smar could reduce the pressure retaining capabilities of the transmitter and may render the instrument dangerous.** Use only bolts supplied or sold by Smar as spare parts.

Some examples of installation, illustrating the position of the transmitter in relation to the taps, are shown in Figure 1.3.

The location of pressure taps and the relative position of the transmitter are indicated in Table 1.1.

Process Fluid	Location of Taps	Best Location for the LD292 in Relation to the Taps
Gas	Top or Side	Above the Taps
Liquid	Side	Below the Taps or at the Piping Centrelines
Steam	Side	Below the Taps using Sealing (Condensate) Pots

Table 1.1 - Location of Pressure Taps

NOTE
Except for dry gases, all impulse lines should slope at the ratio 1:10, to avoid trapping bubbles in the case of liquids, or condensation from steam or wet gases.

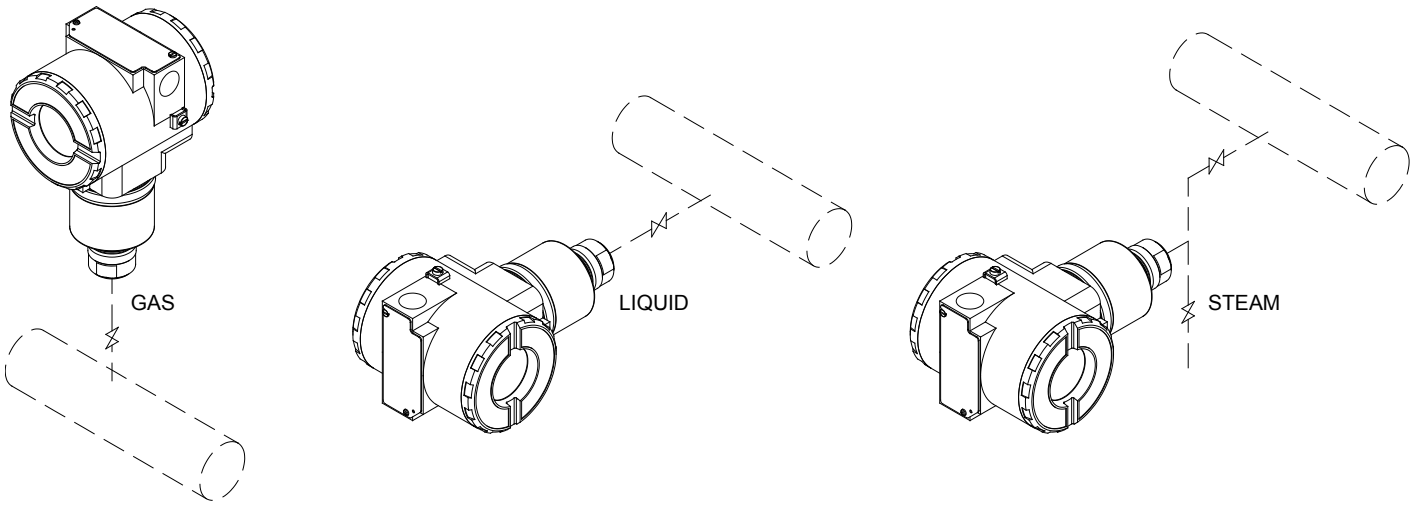
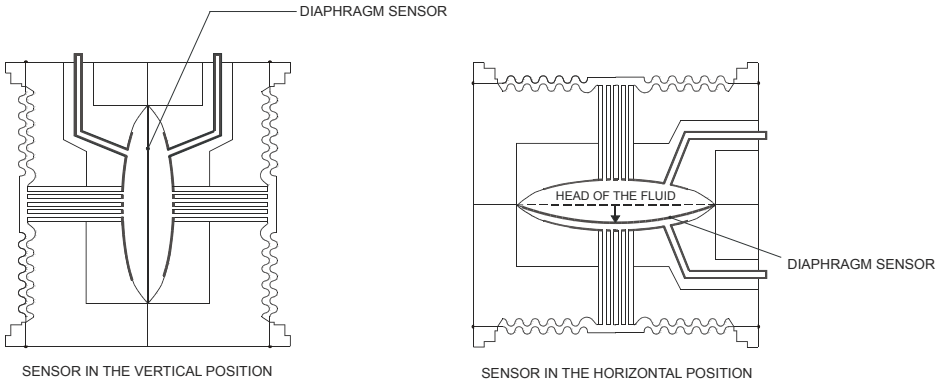


Figure 1.3 - Position of the Transmitter and Taps

NOTE

The transmitters are calibrated in the vertical position and a different mounting position displaces the zero point. Consequently, the indicator will indicate a different value from the applied pressure. In these conditions, it is recommended to do the zero pressure trim. The zero trim is to compensate the final assembly position and its performance, when the transmitter is in its final position. When the zero trim is executed, make sure the equalization valve is open and the wet leg levels are correct.

For the absolute pressure transmitter, the assembly effects correction should be done using the Lower trim, because the absolute zero is the reference for these transmitters, so there is no need for a zero value for the Lower trim.



Electronic Housing

Humidity is fatal for electronic circuits. In areas subjected to high relative humidity, the O-rings for the electronic housing covers must be correctly placed and the covers must be completely closed by tightening them by hand until the O-rings are compressed. Do not use tools to close the covers. Removal of the electronics cover in the field should be reduced to the minimum necessary, as each time it is removed; the circuits are exposed to the humidity.

The electronic circuit is protected by a humidity proof coating, but frequent exposure to humidity may affect the protection provided. It is also important to keep the covers tightened in place. Every time they are removed, the threads are exposed to corrosion, since painting cannot protect these parts. Code-approved sealing methods should be employed on conduit entering the transmitter.

WARNING
The unused cable entries should be plugged and sealed accordingly to avoid humidity entering, which can cause the loss of the product's warranty.

The electronic housing can be rotated to adjust the digital display on a better position. To rotate it, loose the Housing Rotation Set Screw, see Figure 1.4 (a). To prevent humidity entering, the electric housing and the sensor joint must have a minimum of 6 fully engaged threads. The provided joint allows 1 extra turn to adjust the position of the display window by rotating the housing clockwise. If the thread reaches the end before the desired position, then rotate the housing counterclockwise, but not more than one thread turn. Transmitters have a stopper that restricts housing rotation to one turn. See Section 4, Figure 4.1.

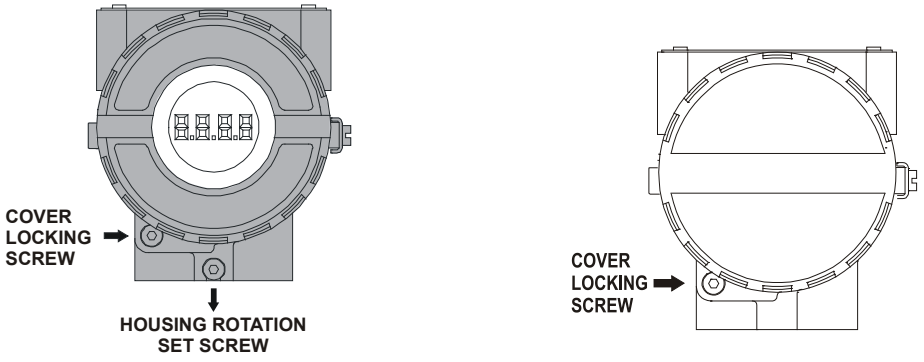


Figure 1.4 - Cover Locking and Housing Rotating Set Screw (a) Electronic Board Side (b) Terminal Connection Side

Wiring

To access the wiring block, loosen the cover locking screw to release the cover. See Figure 1.4 (b).

The **LD292** is protected against reverse polarity, and can withstand ±35 VDC without damage, and will not work if connected in reverse polarity.

For convenience there are three ground terminals: one inside the cover and two externals, located close to the conduit entries, see figure 1.5.

The **LD292** uses the 31.25 kbit/s voltage mode option for the physical signaling. All other devices on the same bus must use the same signaling. All devices are connected in parallel along the same pair of wires.

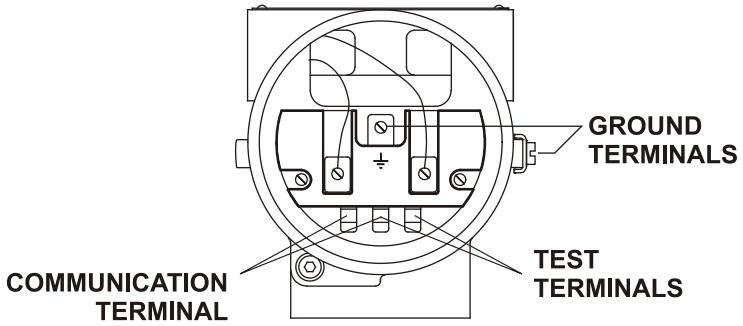


Figure 1.5 - Terminal Block

Various types of Fieldbus devices may be connected on the same bus.

The **LD292** current consumption quiescent is 12 mA.

The **LD292** is powered via the bus. The limit for such devices is 16 for one bus for non-intrinsically safe requirement.

The Figure 1.6 shows the correct installation of the conduit, in order to avoid penetration of water, or other substance, which may cause malfunctioning of the equipment.

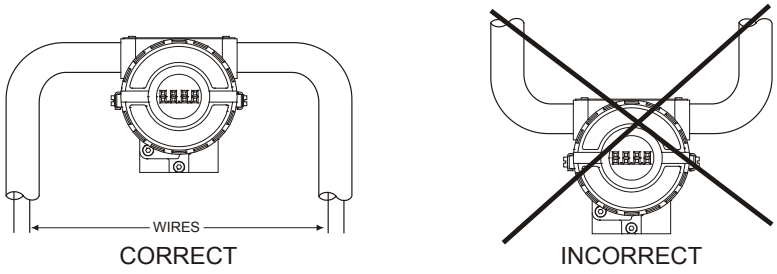


Figure 1.6 - Conduit Installation

NOTE
For more installation details please refer to the Fieldbus Installation Manual

Bus Topology and Network Configuration

Other types of cable may be used, other than for conformance testing. Cables with improved specifications may enable longer trunk length or superior interface immunity. Conversely, cables with inferior specifications may be used subject to length limitations for trunk and spurs plus possible nonconformance to the RFI/EMI susceptibility requirements. For intrinsically safe applications, the inductance/ resistance ratio (L/R) should be less than the limit specified by the local regulatory agency for the particular implementation.

Bus topology (See Figure 1.7) and tree topology (See Figure 1.8) are supported. Both types have a trunk cable with two terminations. The devices are connected to the trunk via spurs. The spurs may be integrated in the device giving zero spur length. A spur may connect more than one device, depending on the length. Active couplers may be used to extend spur length.
Active repeaters may be used to extend the trunk length.

The total cable length, including spurs, between any two devices in the Fieldbus should not exceed 1900 m.

The connection of couplers should be kept less than 15 per 250 m.

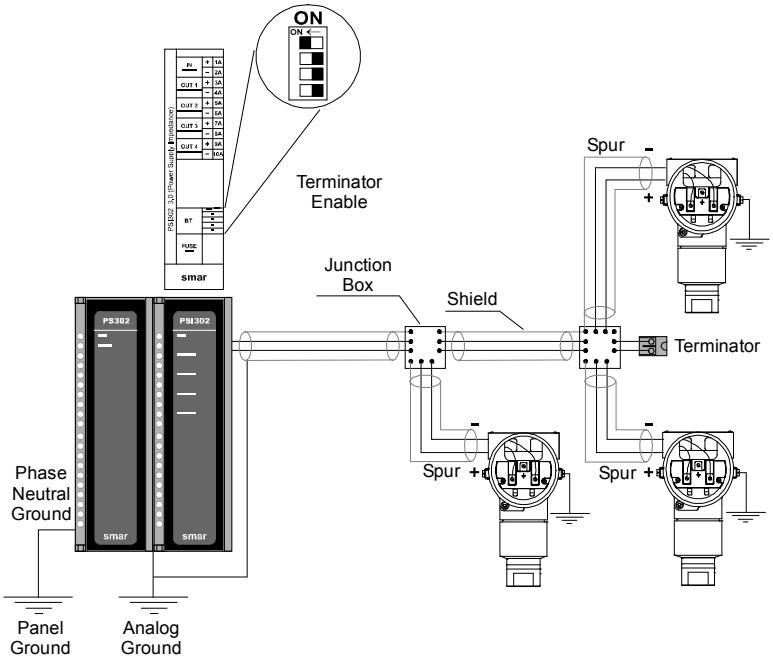


Figure 1.7 - Bus Topology

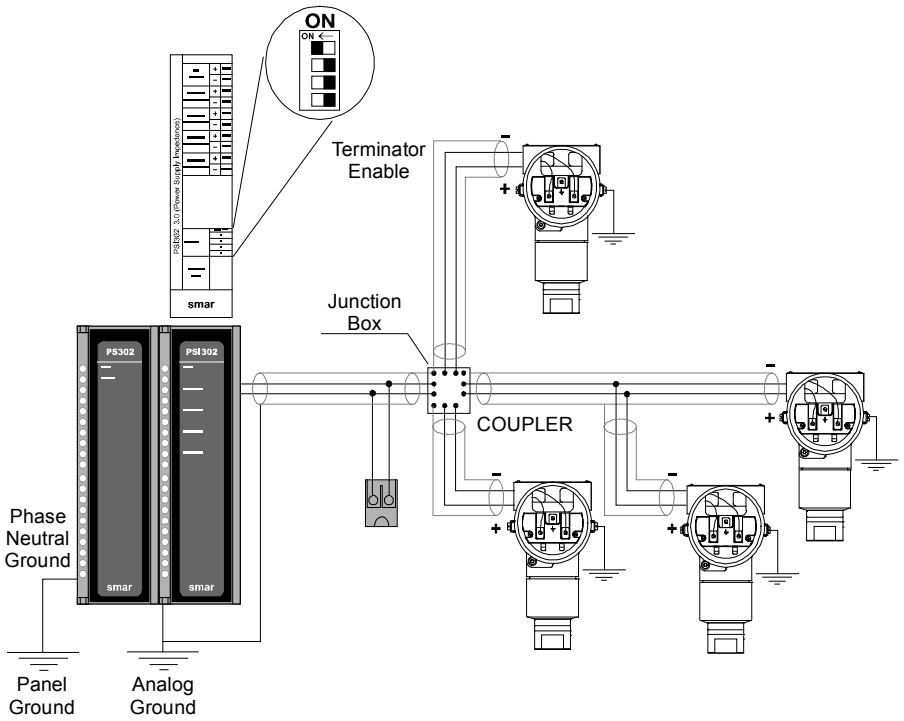


Figure 1.8 - Tree Topology

Intrinsic Safety Barrier

When the Fieldbus is in an area requiring intrinsic safety, a barrier must be inserted on the trunk between the power supply and the transmitters.

Use of **SB312LP** or **DF47** is recommended.

Jumper Configuration

In order to work properly, the jumpers J1 and W1 located in the **LD292** main board must be correctly configured (See Table 1.2).

J1	This jumper enables the simulation mode parameter in the AI block.
W1	This jumper enables the local adjustment programming tree.

Table 1.2 - Description of the Jumpers

Power Supply

The **LD292** receives power from the bus via the signal wiring. The power supply may come from a separate unit or from another device such as a controller or DCS.

The voltage should be between 9 to 32 Vdc for non-intrinsic safe applications.

A special requirement applies to the power supply used in an intrinsically safe bus and depends on the type of barrier used.

Use of **PS302** is recommended as power supply.

Installation in Hazardous Areas

See Appendix A for further information.

OPERATION

The **LD292** Series Pressure Transmitters use capacitive sensors (capacitive cells) as pressure sensing elements, as shown in Figure 2.1. This is exactly the same sensor as the LD291 series uses, the sensor modules are therefore interchangeable.

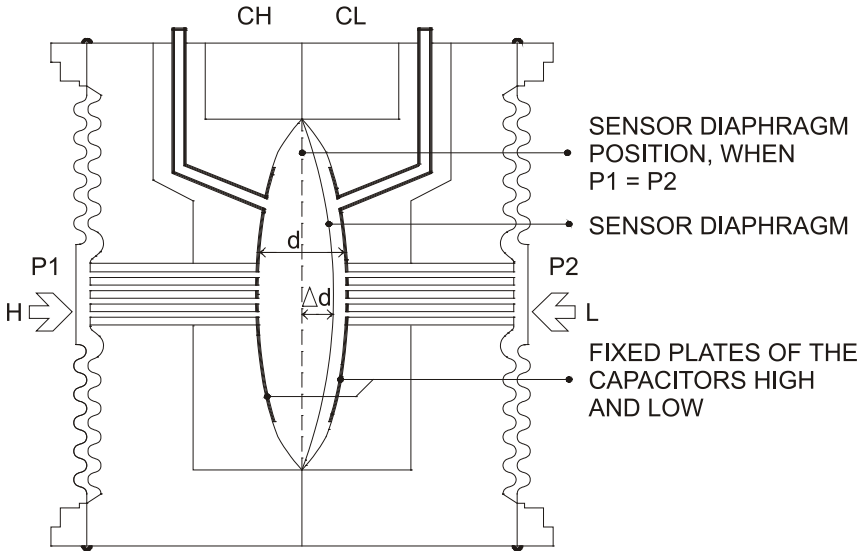


Figure 2.1 - Capacitive Cell

Functional Description - Sensor

Where,
P_1 and P_2 are the pressures and $P_1 \geq P_2$
CH = Capacitance between the fixed plate on P_1 side and the sensing diaphragm.
CL = Capacitance between the fixed plate on the P_2 side and the sensing diaphragm.
d = Distance between CH and CL fixed plates.
Δd = Sensing diaphragm's deflection due to the differential pressure $\Delta P = P_1 - P_2$.

Knowing that the capacitance of a capacitor with flat, parallel plates may be

$$C \approx \frac{\varepsilon \times A}{d}$$

expressed as a function of plate area (A) and distance (d) between the plates:

Where,
ε = Dielectric constant of the medium between the capacitor's plates.

$$CH \approx \frac{\varepsilon \times A}{(d/2) + \Delta d} \text{ and } \frac{\varepsilon \times A}{(d/2) - \Delta d} \approx CL$$

However, should *CH* and *CL* be considered as capacitances of flat and parallel plates with identical areas, then:

However, should the differential pressure (ΔP) applied to the capacitive cell not deflect the sensing diaphragm beyond d/4, it is possible to assume ΔP as proportional to Δd.

By developing the expression (CL - CH)/(CL + CH), it follows that:

$$\frac{CL - CH}{CL + CH} = \frac{2\Delta d}{d}$$

As the distance (d) between the fixed plates CH and CL is constant. It is possible to conclude that the expression (CL - CH)/(CL + CH) is proportional to ∆d and, therefore, to the differential pressure to be measured.

Thus it is possible to conclude that the capacitive cell is a pressure sensor formed by two capacitors whose capacitance vary according to the applied differential pressure.

Functional Description – Electronics

Refer to the block diagram Figure 2.2. The function of each block is described below.

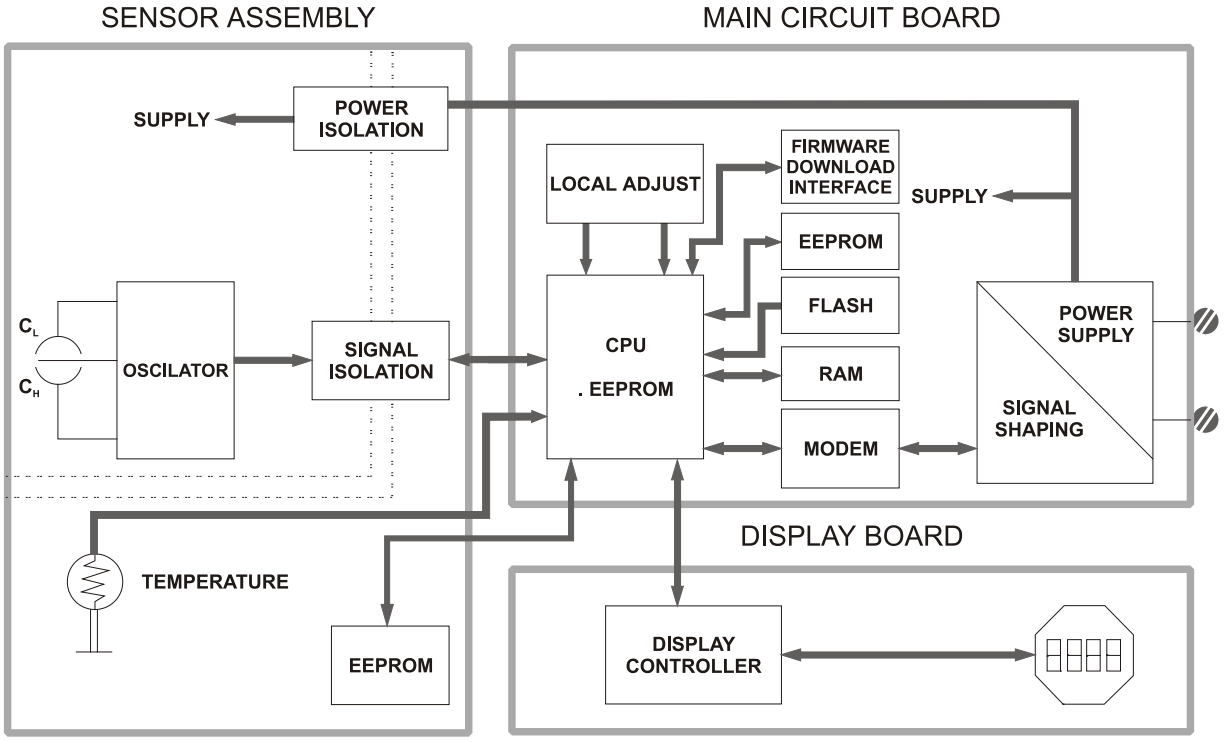


Figure 2.2 - LD292 Block Diagram Hardware

Oscillator
This oscillator generates a frequency as a function of sensor capacitance.

Signal Isolator
The control signals from the CPU and the signal from the oscillator are isolated to avoid ground loops.

Central Processing Unit (CPU), RAM, FLASH and EEPROM
The CPU is the intelligent portion of the transmitter, being responsible for the management and operation of measurement, block execution, self-diagnostics and communication. The program is stored in a FLASH memory for easy upgrade and saving data on power-down event occurrence. For temporary storage of data there is a RAM. The data in the RAM is lost if the power is switched off, however the main board has a nonvolatile EEPROM memory where the static data configured that must be retained is stored. Examples of such data are the following: calibration, links and identification data.

Sensor EEPROM
Another EEPROM is located within the sensor assembly. It contains data pertaining to the sensor's characteristics at different pressures and temperatures. This characterization is done for each sensor at the factory. It also contains the factory settings; they are useful in case of main board replacement, when its does an automatic upload of data from the sensor board to main board.

Fieldbus Modem
Monitors line activity, modulate and demodulate communication signals, inserts and deletes start and end delimiters, and checks integrity of frame received.

Power Supply
Takes power of the loop-line to power the transmitter circuitry.

Power Isolation
Isolates the signals to and from the input section, the power to the input section must be isolated.

Display Controller
Receives data from the CPU identifying which segments on the liquid crystal Display use to turn on. The controller drives the backplane and the segment control signals.

Local Adjustment
There are two switches that are magnetically activated. They can be activated by the magnetic tool without mechanical or electrical contact.

Display

The integral indicator is able to display one or two variables, which are user selectable. When two variables are chosen, the display will alternate between the two with an interval of 3 seconds.

The liquid crystal display includes a field with 4 ½ numeric digits, a field with 5 alphanumeric digits and an information field, as shown on Figure 2.3.

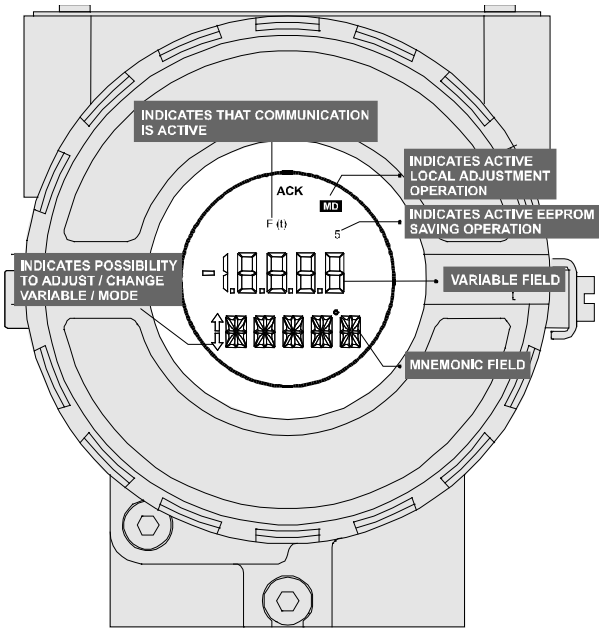


Figure 2.3 - LCD Indicator

Section 3

CONFIGURATION

One of the many advantages of Fieldbus is that device configuration is independent of the configurator. The **LD292** may be configured by a third party terminal or operator console. Any particular configurator is therefore not addressed here.

This section describes the characteristics of the blocks in the **LD292**. They follow the Fieldbus specifications, but in terms of transducer blocks, the input transducer block and display, they have some special features on top of this.

Transducer Block

Transducer block insulates function block from the specific I/O hardware, such as sensors, actuators. Transducer block controls access to I/O through manufacturer specific implementation. This permits the transducer block to execute as frequently as necessary to obtain good data from sensors without burdening the function blocks that use the data. It also insulates the function block from the manufacturer specific characteristics of certain hardware.

By accessing the hardware, the transducer block can get data from I/O or passing control data to it. The connection between Transducer block and Function block is called channel. These blocks can exchange data from its interface.

Normally, transducer blocks perform functions, such as linearization, characterization, temperature compensation, control and exchange data to hardware.

Rel. Index	Param Mnemonic	Description
1.	ST_REV	Indicates the level of static data.
2.	TAG_DESC	Description of Transducer Block.
3.	STRATEGY	This parameter is not checked and processed by Transducer Block.
4.	ALERT_KEY	Number of identification in the plant.
5.	MODE_BLK	Indicates the operation mode of Transducer Block.
6.	BLOCK_ERR	Indicates the status associated with hardware or software in theTransducer.
7.	UPDATE_EVT	It is the alert for any static data.
8.	BLOCK_ALM	It is used for configuration, hardware and others fails.
9.	TRANSDUCER_DIRECTORY	It is used to select several Transducer Blocks.
10.	TRANSDUCER_TYPE	Indicates the type of Transducer according to its class.
11.	XD_ERROR	It is used to indicate calibration status.
12.	COLLECTION_DIRECTORY	Specifies the number of transducer index into Transducer Block.
13.	PRIMARY_VALUE_TYPE	Defines the calculation type for Transducer Block.
14.	PRIMARY_VALUE	It is the value and status used by channel.
15.	PRIMARY_VALUE_RANGE	The High and Low range limit values, the engineering unit code and the number of digits to the right of the decimal point to be used for Primary Value.
16.	CAL_POINT_HI	The highest calibrated value.
17.	CAL_POINT_LO	The lowest calibrated value.
18.	CAL_MIN_SPAN	The minimum calibration span value allowed. This minimum span information is necessary to ensure that when calibration is done, the two calibrated points (high and low) are not too close together.
19.	CAL_UNIT	The Device Description engineering units code index for the calibration values.
20.	SENSOR_TYPE	The type of sensor.
21.	SENSOR_RANGE	The range of sensor.
22.	SENSOR_SN	The serial number of sensor.
23.	SENSOR_CAL_METHOD	The method of last sensor calibration. ISO defines several standard methods of calibration. This parameter is intended to record that method, or if some other method was used.

Rel. Index	Param Mnemonic	Description
24.	SENSOR_CAL_LOC	The location of last sensor calibration. This describes the physical location at which the calibration was performed.
25.	SENSOR_CAL_DATE	The date of the last sensor calibration.
26.	SENSOR_CAL_WHO	The name of person who is in charge of last calibration.
27.	SENSOR_ISOLATION_MTL	Defines the construction material of the isolating diaphragms.
28.	SENSOR_FLUID	Defines the type of fill fluid used in the sensor
29.	SECONDARY_VALUE	The secondary value (temperature value), related to the sensor.
30.	SECONDARY_VALUE_UNIT	The engineering units to be used with SECONDARY_VALUE.
31.	PRESS_LIN_NORMAL	The Linear Normalized Pressure value.
32.	PRESS_NORMAL	The Normalized Pressure value.
33.	PRESS_CUTOFF	The Cutoff Pressure value.
34.	CUTOFF_FLAG	The bypass flag for Pressure value.
35.	DIGITAL_TEMPERATURE	The digital temperature value.
36.	DIFF	The differential pressure value.
37.	YDIFF	The y differential pressure value.
38.	CAPACITANCE_LOW	The low capacitance value.
39.	CAPACITANCE_HIGH	The high capacitance value.
40.	BACKUP_RESTORE	This parameter is used to do backup or to restore configuration data.
41.	SENSOR_RANGE_CODE	Indicates the sensor range code.
42.	COEFF_POL0	The polynomial coefficient 0.
43.	COEFF_POL1	The polynomial coefficient 1.
44.	COEFF_POL2	The polynomial coefficient 2.
45.	COEFF_POL3	The polynomial coefficient 3.
46.	COEFF_POL4	The polynomial coefficient 4.
47.	COEFF_POL5	The polynomial coefficient 5.
48.	COEFF_POL6	The polynomial coefficient 6.
49.	COEFF_POL7	The polynomial coefficient 7.
50.	COEFF_POL8	The polynomial coefficient 8.
51.	COEFF_POL9	The polynomial coefficient 9.
52.	COEFF_POL10	The polynomial coefficient 10.
53.	COEFF_POL11	The polynomial coefficient 11.
54.	POLYNOMIAL_VERSION	Indicates the polynomial version.
55.	CHARACTERIZATION_TYPE	Indicates the type of characterization curve.
56.	CURVE _BYPASS_LD	Enable and disable the characterization curve.
57.	CURVE_LENGTH	Indicates the length of characterization curve.
58.	CURVE_X	Input points of characterization curve.
59.	CURVE_Y	Output points of characterization curve.
60.	CAL_POINT_HI_BACKUP	Indicates the backup for high calibration point.
61.	CAL_POINT_LO_ BACKUP	Indicates the backup for low calibration point.
62.	CAL_POINT_HI_FACTORY	Indicates the factory high calibration point.
63.	CAL_POINT_LO_FACTORY	Indicates the factory low calibration point.
64.	CAL_TEMPERATURE	Defines the temperature calibration point.
65.	DATASHEET	Indicates information about the sensor.
66.	ORDERING_CODE	Indicates information about the sensor and control from factory production.
67.	MAXIMUM_MEASURED_PRESSURE	Indicates the maximum pressure measured
68.	MAXIMUM_MEASURED_TEMPERATURE	Indicates the maximum temperature measured
69.	ACTUAL_OFFSET	Indicates the actual calibrated offset
70.	ACTUAL_SPAN	Indicates the actual span offset

Rel. Index	Param Mnemonic	Description
71.	MAXIMUM_OFFSET_DEVIATION	Defines the maximum offset before an alarm is generate
72.	MAXIMUM_GAIN_DEVIATION	Defines the maximum gain before an alarm is generate
73.	OVERPRESSURE_LIMIT	Defines the maximum overpressure limit before an alarm is generate
74.	MAXIMUM_NUMBER_OF_OVERPRESSURE	Defines the maximum number of overpressure before an alarm is generate

Rel. Index	Param Mnemonic	Obj. Type	Data Type	Store	Size	Valid Range	Initial/ Default Value	Units	Class	View
1.	ST_REV	S	Unsigned16	S	2	Positive	0	none	R/W	1,2,3,4
2.	TAG_DESC	S	VisibleString	S	32		TRD BLOCK	na	R/W	
3.	STRATEGY	S	Unsigned16	S	2		0	none	R/W	4
4.	ALERT_KEY	S	Unsigned8	S	1	1-255	0	na	R/W	4
5.	MODE_BLK	R	DS-69	S	4	OS,AUTO	O/S	none	R/W	1,3
6.	BLOCK_ERR	S	Bit String	D	2			E	R	1,3
7.	UPDATE_EVT	R	DS-73	D	5			na	R	
8.	BLOCK_ALM	R	DS-72	D	13			na	R	
9.	TRANSDUCER_DIRECTORY	S	Array of Unsigned16	N	Variable			none	R	
10.	TRANSDUCER_TYPE	S	Unsigned16	N	2		100	none	R	1,2,3,4
11.	XD_ERROR	S	Unsigned8	D	1		0	none	R	1,3
12.	COLLECTION_DIRECTORY	S	Array of Unsigned 32	S	Variable			None	R	
13.	PRIMARY_VALUE_TYPE	S	Unsigned16	S	2		107	None	R/W	2
14.	PRIMARY_VALUE	R	DS-65	D	5		0	XD_SCALE	R	1,3
15.	PRIMARY_VALUE_RANGE	R	DS-68	S	11	0-100%		XD_SCALE	R	4
16.	CAL_POINT_HI	S	Float	S	4		5080.0	CAL_UNIT	R/W	2
17.	CAL_POINT_LO	S	Float	S	4		0.0	CAL_UNIT	R/W	2
18.	CAL_MIN_SPAN	S	Float	S	4	URL/40 to URL	0.0	CAL_UNIT	R	4
19.	CAL_UNIT	S	Unsigned16	S	2		1149	E	R	4
20.	SENSOR_TYPE	S	Unsigned16	S	1		117	na	R/W	4
21.	SENSOR_RANGE	R	DS-68	S	11		0-100%	XD_SCALE	R	4
22.	SENSOR_SN	S	Unsigned32	S	4	0 to 2^{32}	0	None	R/W	4
23.	SENSOR_CAL_METHOD	S	Unsigned8	S	1		103	none	R/W	4
24.	SENSOR_CAL_LOC	S	VisibleString	S	32		NULL	none	R/W	
25.	SENSOR_CAL_DATE	S	Time of Day	S	7			none	R/W	
26.	SENSOR_CAL_WHO	S	VisibleString	S	32		NULL	none	R/W	
27.	SENSOR_ISOLATION_MTL	S	Unsigned16	S	2		2	none	R/W	4
28.	SENSOR_FLUID	S	Unsigned16	S	2		1	none	R/W	4
29.	SECONDARY_VALUE	R	DS-65	D	5		0	SVU	R	1,3
30.	SECONDARY_VALUE_UNIT	S	Unsigned16	S	2		1001	E	R	2
31.	PRESS_LIN_NORMAL	R	DS-65	D	5	± 1	0	none	R	3
32.	PRESS_NORMAL	R	DS-65	D	5	± 1	0	none	R	3
33.	PRESS_CUTOFF	R	DS-65	D	5	± 1	0	none	R	
34.	CUTOFF_FLAG	S	Unsigned8	S	1	True/False	True	none	R/W	
35.	DIGITAL_TEMPERATURE	R	DS-65	D	5	0-255	0	none	R	3

Rel. Index	Param Mnemonic	Obj. Type	Data Type	Store	Size	Valid Range	Initial/ Default Value	Units	Class	View
36.	DIFF	S	Float	D	4		0	none	R	3
37.	YDIFF	S	Float	D	4		0	none	R	3
38.	CAPACITANCE_LOW	S	Float	D	4		0	none	R	3
39.	CAPACITANCE_HIGH	S	Float	D	4		0	none	R	3
40.	BACKUP_RESTORE	S	Unsigned8	S	1		0	none	R/W	4
41.	SENSOR_RANGE_CODE	S	Unsigned16	S	2		1	none	R/W	4
42.	COEFF_POL0	S	Float	S	4	± INF	-1	none	R/W	4
43.	COEFF_POL1	S	Float	S	4	± INF	0	none	R/W	4
44.	COEFF_POL2	S	Float	S	4	± INF	1	none	R/W	4
45.	COEFF_POL3	S	Float	S	4	± INF	0	none	R/W	4
46.	COEFF_POL4	S	Float	S	4	± INF	2	none	R/W	4
47.	COEFF_POL5	S	Float	S	4	± INF	0	none	R/W	4
48.	COEFF_POL6	S	Float	S	4	± INF	0	none	R/W	4
49.	COEFF_POL7	S	Float	S	4	± INF	0	none	R/W	4
50.	COEFF_POL8	S	Float	S	4	± INF	0	none	R/W	4
51.	COEFF_POL9	S	Float	S	4	± INF	0	none	R/W	4
52.	COEFF_POL10	S	Float	S	4	± INF	0	none	R/W	4
53.	COEFF_POL11	S	Float	S	4	± INF	25	none	R/W	4
54.	POLYNOMIAL_VERSION	S	Unsigned8	S	1	30h to FFh	32	None	R/W	4
55.	CHARACTERIZATION_TYPE	S	Unsigned8	S	1		255	None		2
56.	CURVE _BYPASS_LD	S	Unsigned16	S	2		Enable& Backup	None	R/W	2
57.	CURVE_LENGTH	S	Unsigned8	S	1	2 to 5	5	None	R/W	2
58.	CURVE_X	R	Array of Float	S	20			None	R/W	2
59.	CURVE_Y	R	Array of Float	S	20			None	R/W	2
60.	CAL_POINT_HI_BAKUP	S	Float	S	4		5080	CAL_UNIT	R	2
61.	CAL_POINT_LO_BAKUP	S	Float	S	4		0	CAL_UNIT	R	2
62.	CAL_POINT_HI_FACTORY	S	Float	S	4		5080	CAL_UNIT	R	
63.	CAL_POINT_LO_FACTORY	S	Float	S	4		0	CAL_UNIT	R	
64.	CAL_TEMPERATURE	S	Float	S	4	-40 a 85 °C	17.496	°C	R/W	
65.	DATASHEET	R	Array of Unsigned8	S	10			None	R/W	
66.	ORDERING_CODE	S	VisibleString	S	50		NULL	None	R/W	
67.	MAXIMUM_MEASURED_PRESSURE	S	Float	S	4	± INF	- INF	none	R/w	
68.	MAXIMUM_MEASURED_TEMPERATURE	S	Float	S	4	± INF	- INF	none	R/W	
69.	ACTUAL_OFFSET	S	Float	S	4	± INF		none	R	
70.	ACTUAL_SPAN	S	Float	S	4	± INF		none	R	
71.	MAXIMUM_OFFSET_DEVIATION	S	Float	S	4	± INF	0.5	none	R/W	
72.	MAXIMUM_GAIN_DEVIATION	S	Float	S	4	± INF	2.0	none	R/W	
73.	OVERPRESSURE_LIMIT	S	Float	S	4	± INF	+ INF	none	R/W	
74.	MAXIMUM_NUMBER_OF_OVERPRESSURE	S	Float	S	4	± INF	0	none	R/W	

How to Configure a Transducer Block

Each time when you select a field device on **SYSCON** by instantiating on the Operation menu, automatically you instantiate one transducer block and it appears on screen.

The icon indicates that one transducer block has been created and by clicking twice on the icon, you can access it.

The transducer block has an algorithm, a set of contained parameters and a channel connecting it to a function block.

The algorithm describes the behavior of the transducer as a data transfer function between the I/O hardware and other function block. The set of contained parameters, it means, you are not able to link them to other blocks and publish the link via communication, defines the user interface to the transducer block. They can be divided into Standard and Manufacturer Specific.

The standard parameters will be present for such class of device, as pressure, temperature, actuator, etc., whatever is the manufacturer. Oppositely, the manufacturers specific ones are defined only for its manufacturer. As common manufacturer specific parameters, we have calibration settings, material information, linearization curve, etc.

When you perform a standard routine as a calibration, you are conducted step by step by a method. The method is generally defined as guide line to help the user to make common tasks. The **SYSCON** identifies each method associated to the parameters and enables the interface to it.

The SYSCON configuration software can configure many parameters of the Input Transducer block.

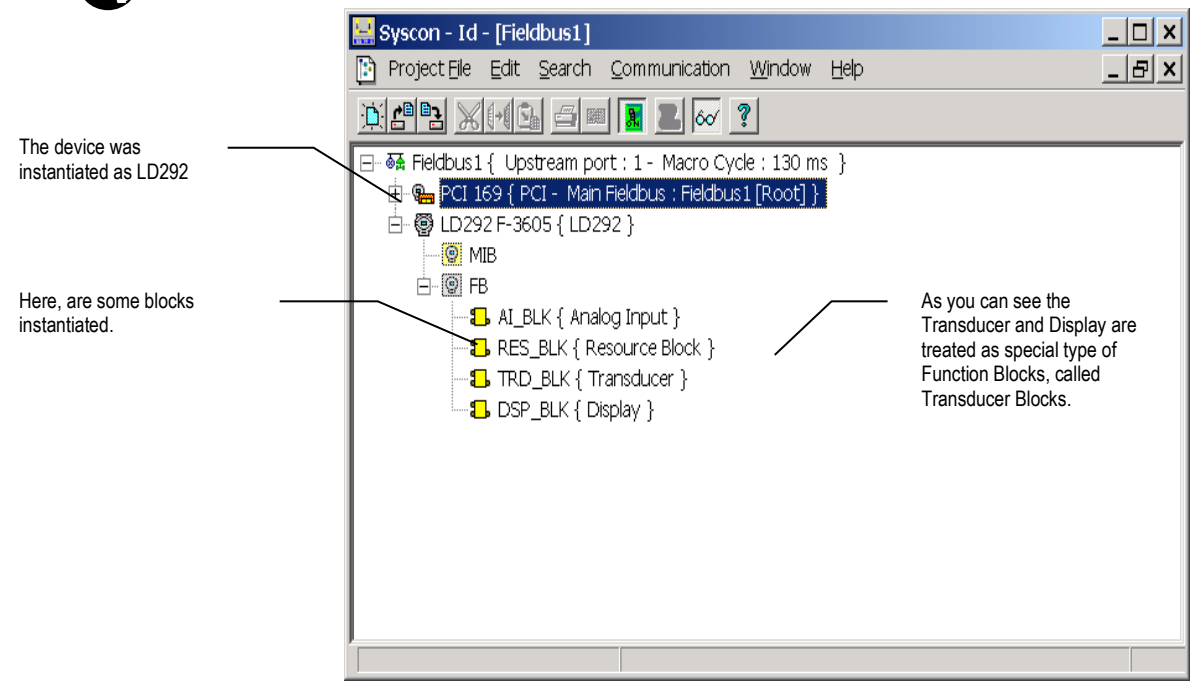


Figure 3.1 - Function and Transducers Blocks

Lower and Upper Trim

Each sensor has a characteristic curve that establishes a relation between the applied pressure and the sensor signal. This curve is determined for each sensor and it is stored in a memory together with the sensor. When the sensor is connected to the transmitter circuit, the content of its memory is made available to the microprocessor.

Sometimes the value on the transmitter display and transducer block reading may not match the applied pressure.
The reasons may be:

- The transmitter mounting position.
- The user's pressure standard differs from the factory standard.
- The transmitter had its original characterization shifted by over pressurization, over heating or by long term drift.

NOTE
Check on section 1, the note on the influence of the mounting position on the indicator. For better accuracy, the trim adjustment should be made in the in the lower and upper values of the operation range values.

The **TRIM** is used to match the reading with the applied pressure.
There are three types of trim available:
Lower Trim: It is used to trim the reading at the lower range. The operator informs the **LD292** the correct reading for the applied pressure. The most common discrepancy is the lower reading.

Upper Trim: It is used to trim the reading at the upper range. The operator informs the correct reading to **LD292** for the applied pressure.

For best accuracy, trim should be done at the operating range. The Figure 3.2 - LD292 SYSCON – Transducer Configuration Screen, Figure 3.3 - LD292 SYSCON - Transducer Configuration Screen and Figure 3.4 - LD292 SYSCON - Transducer Configuration Screen below show the trim adjustment operation into SYSCON.

Pressure Trim - LD292

Via SYSCON
It is possible to calibrate the transmitter by means of parameters CAL_POINT_LO and CAL_POINT_HI.
First of all, a convenient engineering unit should be chosen before starting the calibration. This engineering unit is configured by CAL_UNIT parameter. After its configuration the parameters related to calibration will be converted to this unit.

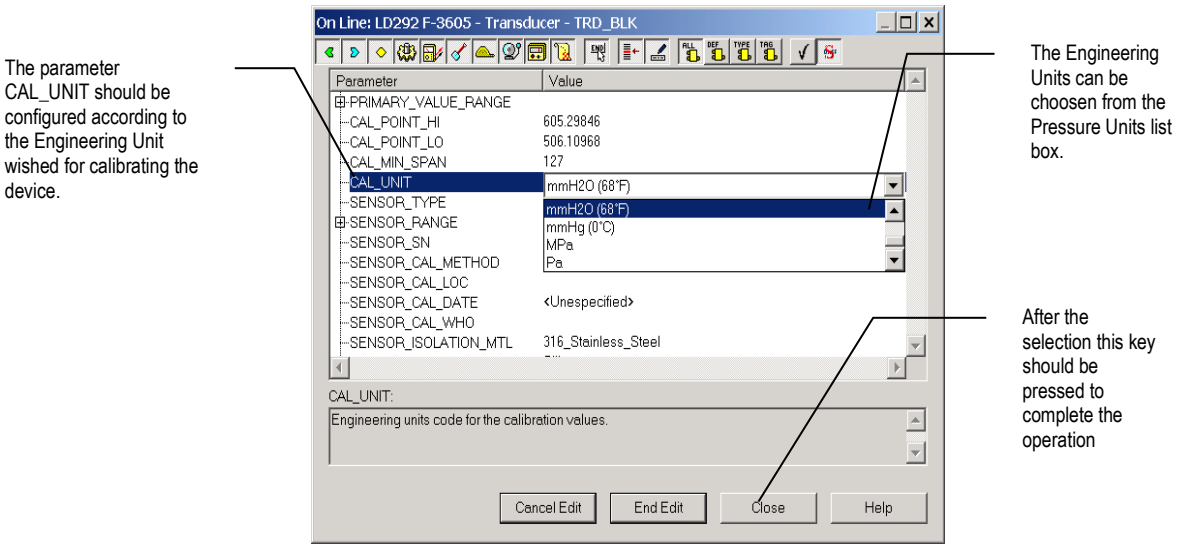


Figure 3.2 - LD292 SYSCON – Transducer Configuration Screen

There are the following engineering units for pressure according to Foundation Fieldbus® standard:

Units	Code
inH_2O a 68 °F	1148
inHg a 0 °C	1156
ftH_2O a 68 °F	1154
mmH_2O a 68 °F	1151
mmHg a 0 °C	1158
psi	1141
bar	1137
mbar	1138
g/cm^2	1144
k/cm^2	1145
Pa	1130
kPa	1133
torr	1139
atm	1140
MPa	1132
inH_2O a 4 °C	1147
mmH_2O a 4 °C	1150

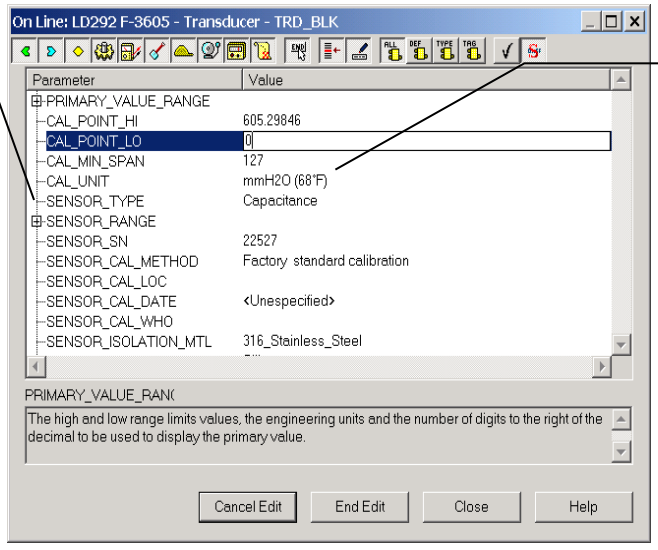
Table 3.3 - Engineering Units for Pressure

CAL_UNIT allows the user to select different units for calibration purposes than the units defined by SENSOR_RANGE. The SENSOR_RANGE parameter defines the maximum and minimum values the sensor is capable of indicating, the engineering units used, and the decimal point.

Let's take the lower value as an example:
Apply to the input zero or the pressure lower value in an engineering unit, this being the same used in parameter CAL_UNIT, and wait until the readout of parameter PRIMARY_VALUE stabilizes.

Write zero or the lower value in parameter CAL_POINT_LO. For each value written a calibration is performed at the desired point.

The Lower Range Value should be entered. This value must be inside of the Sensor range limits allowed for each type of sensor.

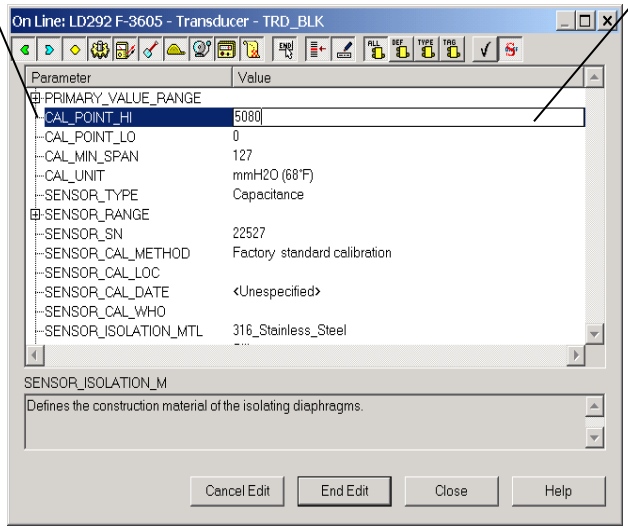


For its case, a sensor range 2 is used: The URL is 605.29846 mmH2O or 24.21193 inH2O.

Figure 3.3 - LD292 SYSCON - Transducer Configuration Screen

Let's take the upper value as an example:
Apply to the input as the upper value a pressure of 5,080mmH_2O and wait until the readout of parameter PRIMARY_VALUE stabilizes. Then, write the upper value as, for example, 5,000mmH_2O in parameter CAL_POINT_HI. For each value written a calibration is performed at the desired point.

The Upper Range Value should be entered. This value must be inside of the Sensor range limits allowed for each type of sensor.



For its case, a sensor range 2 is used: The URL is 5080 mmH2O or 200 inH2O.

Figure 3.4 - LD292 SYSCON - Transducer Configuration Screen

WARNING
It is recommendable that a convenient engineering unit be chosen by means of parameter XD_SCALE of the Analog Input Block, considering that the range limits of the sensor must be respected, these being 100% and 0%. It is also recommendable, for every new calibration, to save existing trim data in parameters CAL_POINT_LO_BACKUP and CAL_POINT_HI_BACKUP, by means of parameter BACKUP_RESTORE, using option LAST_TRIM_BACKUP.

Via Local Adjustment

In order to enter the local adjustment mode, place the magnetic tool in office “Z” until flag “MD” lights up in the display. Remove the magnetic tool from “Z” and place it in orifice “S”. Remove and reinsert the magnetic tool in “S” until the message “LOC ADJ” is displayed. The message will be displayed during approximately 5 seconds after the user removes the magnetic tool from “S”. Let’s take the upper value as an example:

Apply to the input a pressure of 5,000mmH_2O.
Wait until the pressure of readout of parameter P_VAL (PRIMARY_VALUE) stabilizes and then actuates parameter UPPER until it reads 5,000.

NOTE
Trim mode exit via local adjustment occurs automatically should the magnetic tool not be used during approximately 16 seconds. Keep in that even when parameters LOWER or UPPER already present the desired value, they must be actuated so that calibration is performed.

Limit Conditions for Calibration:
For every writing operation in the transducer blocks there is an indication for the operation associate with the waiting method. These codes appear in parameter XD_ERROR. Every time a calibration is performed. Code 0, for example, indicates a successfully performed operation.

Upper:
SENSOR_RANGE_EUO < NEW_UPPER < SENSOR_RANGE_EU100 * 1.25
Otherwise, XD_ERROR = 26.
(NEW_UPPER - PRIMARY_VALUE) < SENSOR_RANGE_EU100 * 0.1
Otherwise, XD_ERROR = 27.
(NEW_UPPER - CAL_POINT_LO) >CAL_MIN_SPAN * 0,75
Otherwise, XD_ERROR = 26.

NOTE
Codes for XD_ERROR: Default Value Set Out of Range. Invalid Calibration Request. Excessive Correction.

Characterization Trim

It is used to correct the sensor reading in several points.

Use an accurate and stable pressure source, preferably a dead-weight tester, to guarantee the accuracy must be at least three times better than the transmitter accuracy. Wait for the pressure to stabilize before performing trim.

The sensor characteristic curve at a certain temperature and for certain ranges may be slightly nonlinear. This eventual non-linearity may be corrected through the Characterization Trim.

The user may characterize the transmitter throughout the operating range, obtaining even better accuracy.

The characterization is determined from two up to five points. Just apply the pressure and tell the transmitter the pressure that is being applied.

WARNING
The characterization trim changes the transmitter characteristics. Read the instructions carefully and certify that a pressure standard with accuracy 0.03% or better is being used, otherwise the transmitter accuracy will be seriously affected.

Characterize a minimum of two points. These points will define the characterization curve. The maximum number of points is five. It is recommended to select the points equally distributed over the desired range or over a part of the range where more accuracy is required.

The Figure 3.5 - The Characterization Curve Configuration shows the window of SYSCON to characterize a new curve. Note that CURVE_X indicates the applied pressure according to standard pressure source and CURVEX_Y indicates measured pressure value to **LD292.**

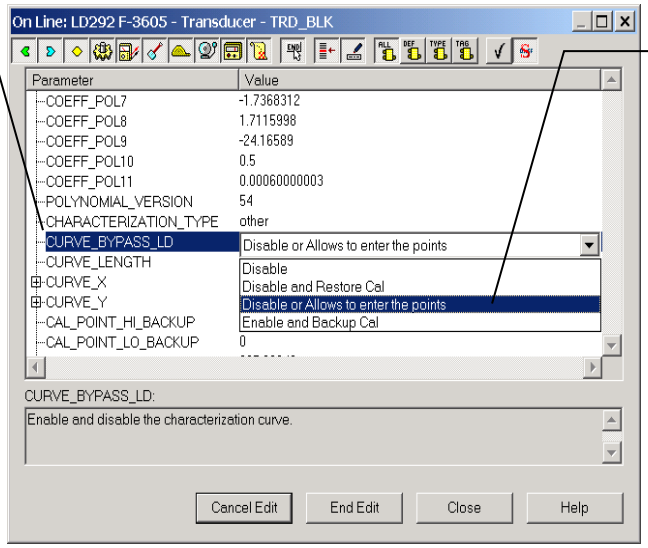
The number of points is configured in parameter CURVE_LENGTH, being in the maximum 5 points. The entry points will be configured in the CURVE_X and of output in the CURVE_Y.

The Parameter CURVE_BYPASS_LD controls the enabling/disabling of the curve and has the following options:

- "Enable and Restore Cal ",
- "Enable and Backup Cal " ,
- "Disable and Restore Cal " ,
- "Disable or Allows to enter the points"

To configure the points of the curve, the option "**Disable or Allows to enter the points** " must be choosen. Apply the desired pressure and wait that the same one stabilizes. When stabilizing to read the pressure normalized through parameter PRESS_NORMAL and then to write in CURVE_X and CURVE_Y, the normalized pressure and the applied pressure, respectively. Finally is necessary to write in the CURVE_LENGTH parameter, the number of configured points, from 2 to 5 points. In case you do not desire to qualify the curve, please, choose the option " Disable and Restore Cal". For enabling and save the calibration settings, please, choose "Enable and Backup Cal".

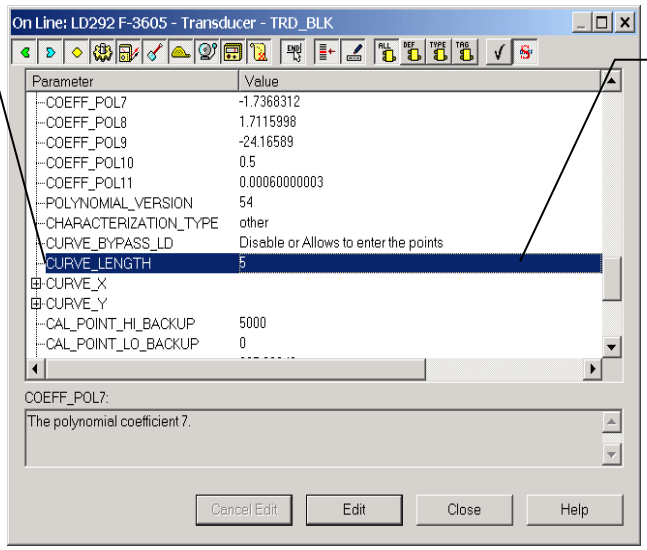
This parameter activates or deactivates the Characterization Curve after the points have been configured.



By the list box the user can enable or disable the Characterization Curve, enter the points, restore or backup the curve entered. This parameter should be used preferable by a method of calibration.

Figure 3.5 - The Characterization Curve Configuration

This parameter identifies the number of valid points.



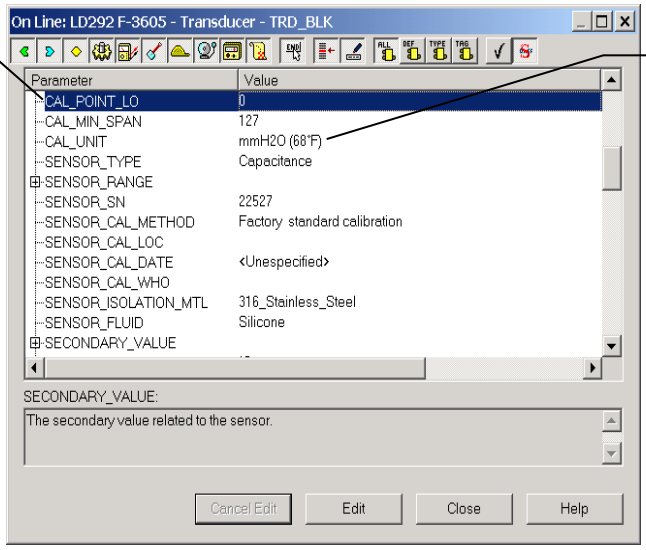
Its Characterization Curve can have a minimum of 2 and up to 5 points. These points should be between the calibrated range for better results.

Figure 3.6 - The Characterization Curve Configuration

Sensor Information

The main information about the transmitter can be accessed selecting the Transducer block icon option as shown on the *Figure 3.10 – Creating Transducers and Function Blocks*. The sensor information will be displayed as shown below.

This parameter assigns the E.U. for all parameters related to calibration methods. Normally, they start their names with CAL_



The appropriate calibration unit can be chosen by selecting the Engineering Units available for each type of Transducer Block

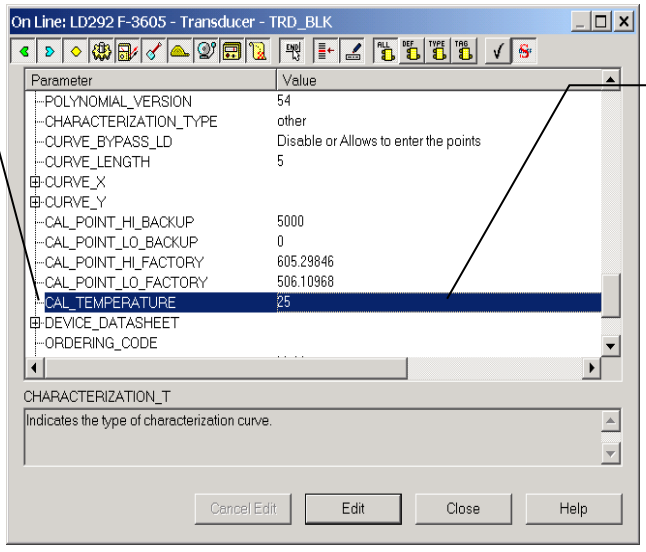
Figure 3.7 - Transducer Block - Sensor Information

Only application dependent options defined by combo boxes can be changed. (E.g. Flange Type, O' Ring Material, etc.) And the others are only factory configured (e.g. Sensor Isolating Diaphragm, Sensor Fluid, etc.).

Temperature Trim

Write in parameter TEMPERATURE_TRIM any value in the range -40°C to +85°C. After that, check the calibration performance using parameter SECONDARY_ VALUE.

By adjusting this parameter to the current temperature, the device's temperature indication is adjusted.



Normally, its operation is done by a method in the factory.

Figure 3.8 - The Temperature Trim Configuration

Sensor Data Reading

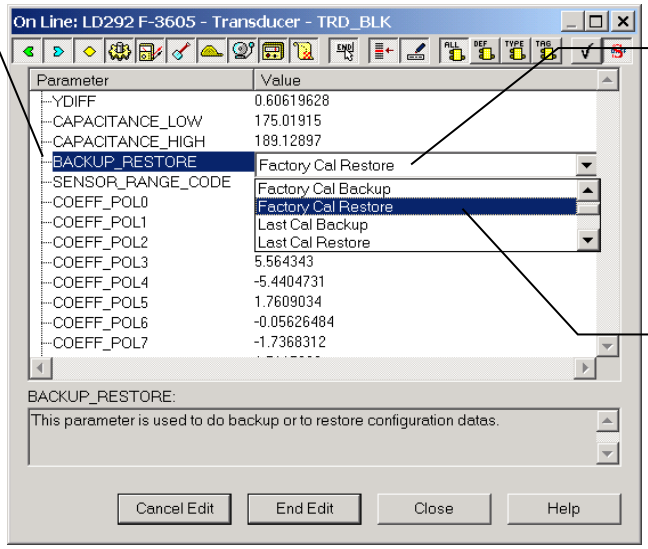
All time that transmitter **LD292** is on, is verified if the serial number of the sensor in the sensor board is the same that the recorded serial number in E2PROM in the main board. When these numbers are different (a swap of sensor set or main board was carried through) the data stored in the E2PROM of sensor board is copied to the E2PROM of the main board.

Through the parameter BACKUP_RESTORE, also this reading can be made, choosing the option "SENSOR_DATA_RESTORE". The operation, in this case, is made independent of the sensor serial number. Through the option "SENSOR_DATA_BACKUP", the sensor data stored in the main board Eeprom memory can be saved in the E2PROM of the sensor board. (This operation is done at factory).

Through this parameter, we can recover default data from factory about sensor and last saved calibration settings, as well as making the rescue of calibrations. We have the following options:

- **Factory Cal Restore:** Recover last calibration settings made at factory;
- **Last Cal Restore:** Recover last calibration settings made by user and saved as backup;
- **Default Data Restore:** Restore all data as default;
- **Sensor Data Restore:** Restore sensor data saved in the sensor board and copy them to main board Eeprom memory.
- **Factory Cal Backup:** Copy the actual calibration settings to the factory ones;
- **Last Cal Backup:** Copy the actual calibration settings to the backup ones;
- **Sensor Data Backup:** Copy the sensor data at main board Eeprom memory to the Eeprom memory located at the sensor board;
- **None:** Default value, no action is done.

This parameter is used to save or restore the default, factory or user configuration stored at the sensor module.



By selecting the options contained in the list box, operations of backup and restore data in the sensor module can be selected.

Using its option, the user can save his last calibration settings.

Figure 3.9 - Transducer Block - Backup/Restore

Transducer Display – Configuration

Using the SYSCON is possible to configure the Display Transducer block. As the name described it is a transducer due the interfacing of its block with the LCD hardware.

The Transducer Display is treated as a normal block by **SYSCON**. It means, this block has some parameters and those ones can be configured according to customer's needs. (See the *Figure 3.10 – Creating Transducers and Function Blocks*).

The customer can choose the parameters to be shown at LCD display, they can be parameters just for monitoring purpose or for acting locally in the field devices by using a magnetic tool.

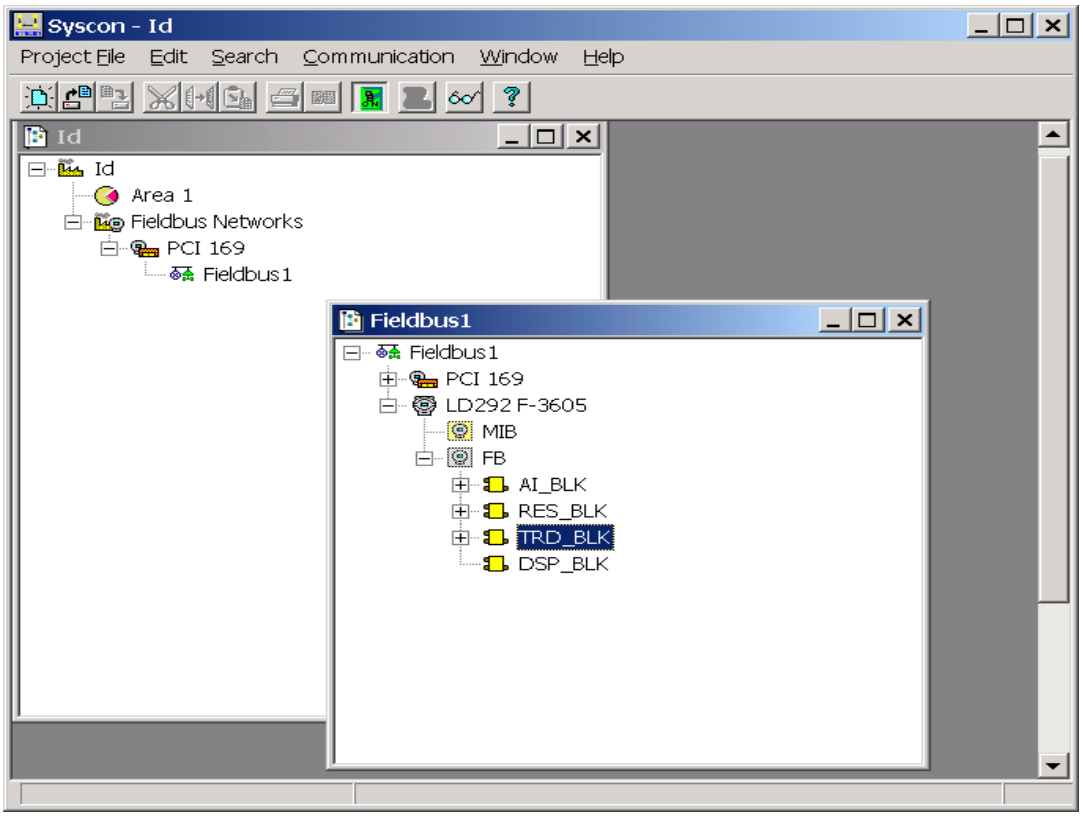


Figure 3.10 – Creating Transducers and Function Blocks

Display Transducer Block

The local adjustment is completely configured by **SYSCON**. It means, the user can select the best options to fit his application. From factory, it is configured with the options to set the Upper and Lower trim, for monitoring the input transducer output and check the Tag. Normally, the transmitter is much better configured by **SYSCON**, but the local functionality of the LCD permits an easy and fast action on certain parameters, since it does not rely on communication and network wiring connections. Among the possibilities by Local Adjustment, the following options can be emphasized: Mode block, Outputs monitoring, Tag visualization and Tuning Parameters setting.

The interface between the user is described very detailed on the "General Installation, Operation and Maintenance Procedures Manual". Please take a detailed look at this manual in the chapter related to "Programming Using Local Adjustment". It is significantly the resources on this transducer display, also all the **Series 302** field devices from SMAR has the same methodology to handle with it. So, since the user has learned once, he is capable to handle all kind of field devices from SMAR.

All function block and transducers defined according Foundation Fieldbus™ have a description of their features written on binary files, by the Device Description Language.

This feature permits that third parties configurator enabled by Device Description Service technology can interpret these features and make them accessible to configure. The Function Blocks and Transducers of Series 302 have been defined rigorously according the Foundation Fieldbus specifications in order to be interoperable to other parties.

In order to able the local adjustment using the magnetic tool, it is necessary to previously prepare the parameters related with this operation via SYSCON (System Configuration). The Figure 3.8 - The Temperature Trim Configuration and the Figure 3.9 - Transducer Block. All values shown on the display are default values.

There are seven groups of parameters, which may be pre-configured by the user in order to able, a possible configuration by means of the local adjustment. As an example, let's suppose that you don't want to show some parameters; in this case, simply write an invalid Tag in the parameter, Block_Tag_Param_X. Doing this, the device will not take the parameters related (indexed) to its Tag as a valid parameters.

Definition of Parameters and Values

Idx	Parameter	DataType (length)	Valid Range/ Options	Default Value	Units	Store	Description
7	BLOCK_TAG_PARAM	VisibleString			None	S	This is a tag of the block to which the parameter belongs to use up to a maximum of 32 characters.
8	INDEX_RELATIVE	Unsigned16	0-65535		None	S	This is the index related to the parameter to be actuated or viewed (1, 2...).
9	SUB_INDEX	Unsigned8	1-255		None	S	To visualize a certain tag, opt for the index relative equal to zero, and for the sub-index equal to one.
10	MNEMONIC	VisibleString			None	S	This is the mnemonic for the parameter identification (maximum of 16 characters). Choose the mnemonic, preferably with no more than 5 characters because, this way, it will not necessary to rotate it on display.
11	INC_DEC	Float			None	S	It is the increment and decrement in decimal units when the parameter is Float or Float Status time, or integer, when the parameter is in whole units.
12	DECIMAL_POINT_NUMBER	Unsigned8	0-4		None	S	This is the number of digits after the decimal point (0 to 3 decimal digits)
13	ACCESS	Unsigned8	Monit/Action		None		The access allows the user to read, in the case of the "Monitoring" option, and to write when "action" option is selected, and then the display will show the increment and decrement arrows.
14	ALPHA_NUM	Unsigned8	Mnem/Value		None	S	These parameters include two options: value and mnemonic. In option value it is possible to display data both in the alphanumeric and in the numeric fields, this way, in the case of a data higher than 10000, it will be shown in the alphanumeric field.
63	DISPLAY_REFRESH	Unsigned8	1		None	D	

In option mnemonic, the display may show the data in the numeric field and the mnemonic in the alphanumeric field.

In case you wish to visualize a certain tag, opt for the index relative equal to zero, and for the sub-index equal to one (refer to paragraph Structure Block in the Function Blocks Manual).

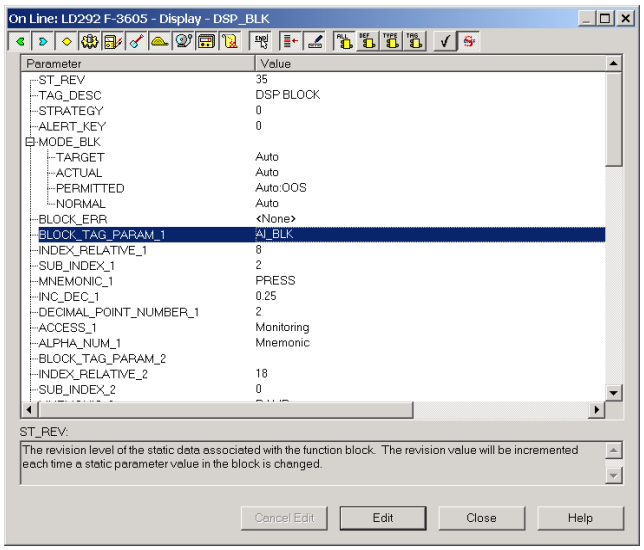


Figure 3.11 - Parameters for Local Adjustment Configuration

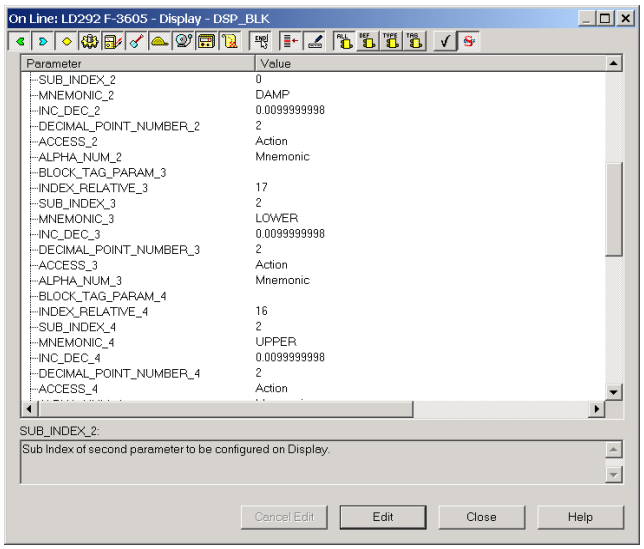


Figure 3.12 - Parameters for Local Adjustment Configuration

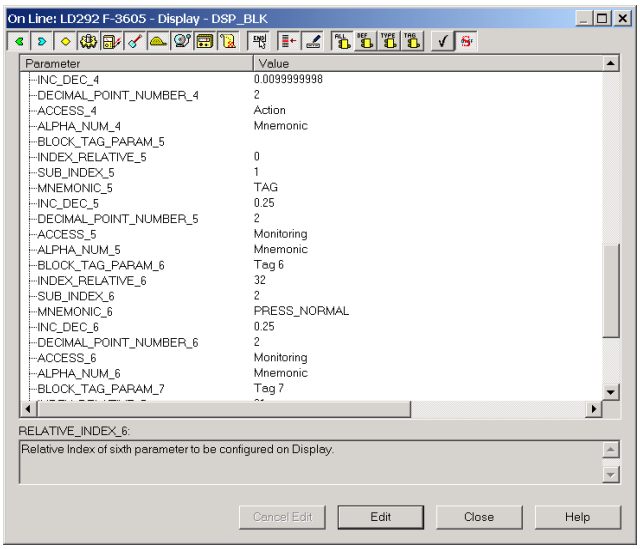
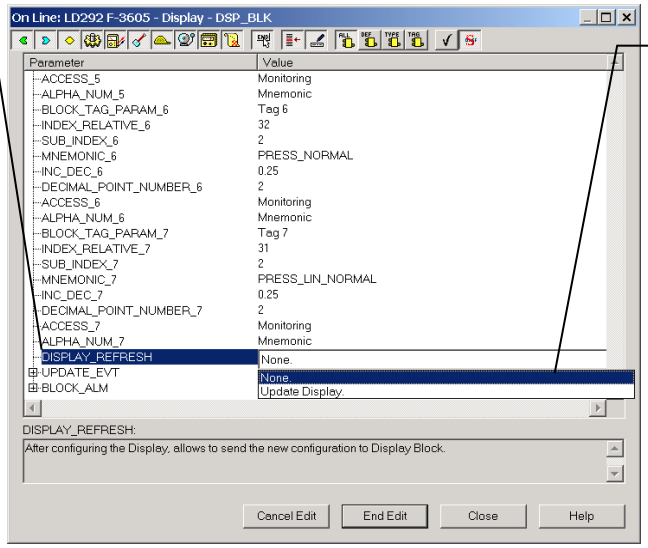


Figure 3.13 - Parameters for Local Adjustment Configuration

This parameter updates the local adjustment programming tree configured on each device.



The option "update" should be selected in order to execute the upgrade of local adjustment programming tree. After its step all the parameters selected will be shown on the LCD display.

Figure 3.14 - Parameters for Local Adjustment Configuration

Programming Using Local Adjustment

The local adjustment is completely configured by **SYSCON**. It means, the user can select the best options to fit his application. From factory, it is configured with the options to set the Upper and Lower trim and for monitoring the input transducer value. Normally, the transmitter is much better configured by **SYSCON**, but the local functionality of the LCD permits an easy and fast action on certain parameters, since it does not rely on communication and network wiring connections. Among the possibilities by Local Adjustment, the following options can be emphasized: Mode block, Outputs, Tag visualization and Tuning Parameters setting.

The interface between the user is also described very detailed on the "General Installation, Operation and Maintenance Procedures Manual" Please take a detailed look at this manual in the chapter related to "Programming Using Local Adjustment". It is significantly the resources on this transducer display, also all the Series 302 field devices from **SMAR** has the same methodology to handle with it. So, since the user has learned once, he is capable to handle all kind of field devices from **SMAR**.

All function block and transducers defined according to Foundation Fieldbus have a description of their features written on binary files, by the Device Description Language. This feature permits that third parties configurator enabled by Device Description Service technology can interpret these features and make them accessible to configure. The Function Blocks and Transducers of Series 302 have been defined rigorously according to the Foundation Fieldbus specifications to be interoperable to other parties.

The jumper W1 on top of the main circuit board must be in place and the main board must be fitted with digital display for access to the local adjustment. Without display, the local adjustment is not possible.

Figure 3.15 - Local Adjustment Holes

Table 3.4 shows the actions on the **Z** and **S** holes on the IF303 when Local Adjustment is enabled.

HOLE	ACTION
Z	Initializes and rotates through the available functions.
S	Selects the function shown in the display.

Table 3.4 - Purpose of the holes on the Housing

J1 Jumper Connections

If J1 (see figure 3.16) is connected to ON, then simulation mode in the AI block is enabled.

W1 Jumper Connections

If W1 is connected to ON, the local adjustment programming tree is enabled and then important block parameters can be adjusted.

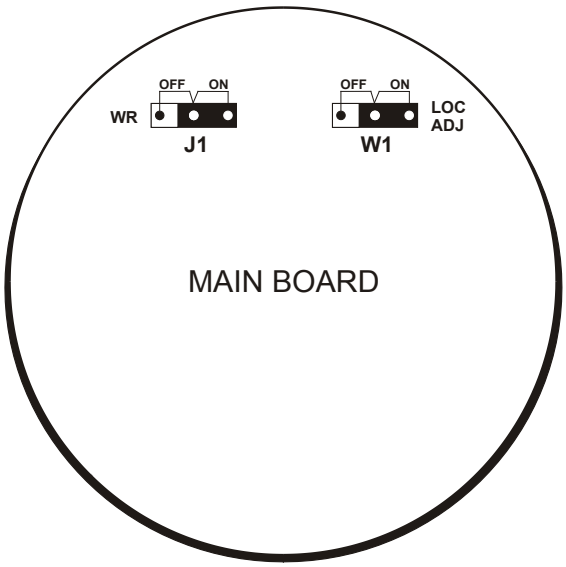
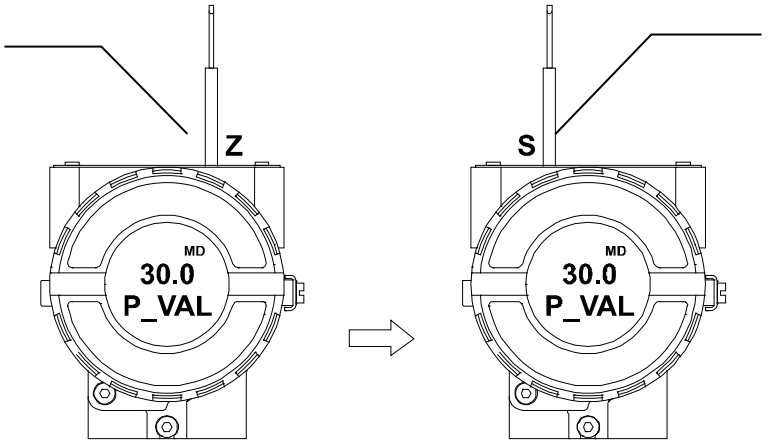


Figure 3.16 - J1 and W1 Jumpers

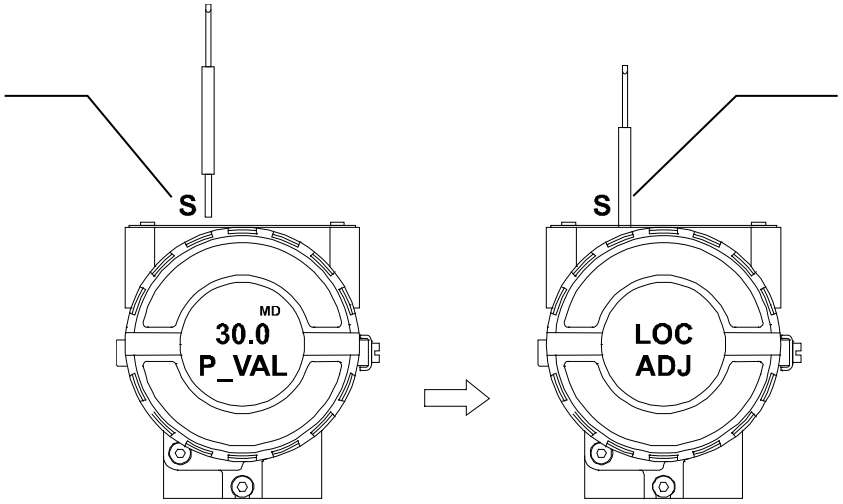
In order to start the local adjustment, place the magnetic tool in orifice **Z** and wait until letters **MD** are displayed.



Place the magnetic tool in orifice **S** and wait during 5 seconds.

Figure 3.17 - Step 1 - LD292

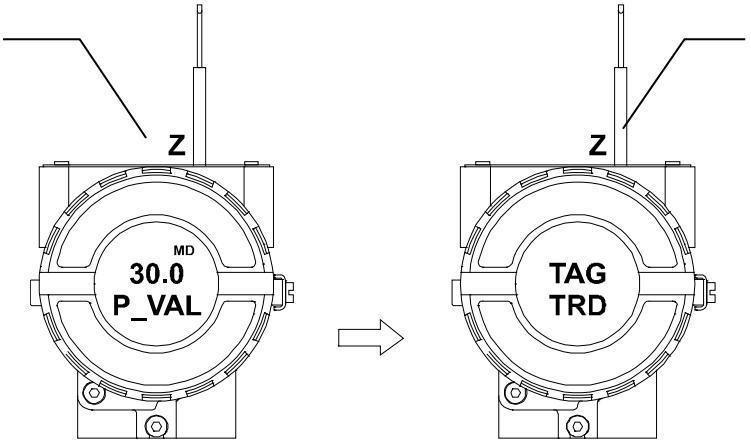
Remove the magnetic tool from orifice **S**.



Insert the magnetic tool in orifice **S** once more and **LOC ADJ** should be displayed.

Figure 3.18 - Step 2 - LD292

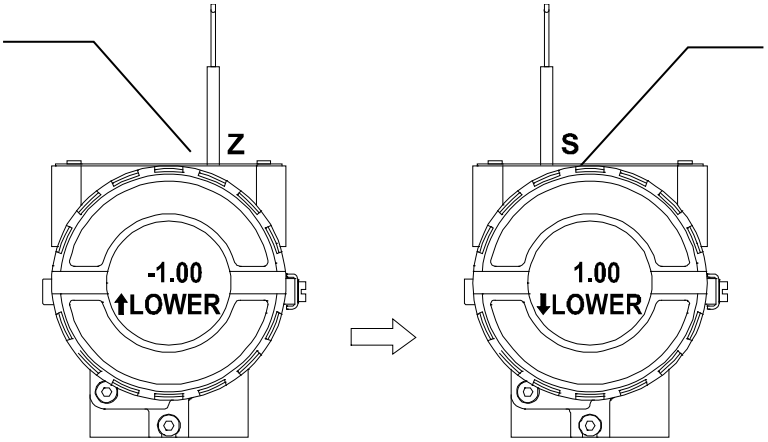
Place the magnetic tool in orifice **Z**. In case this is the first configuration, the option shown on the display is the **TAG** with its corresponding mnemonic configured by the SYSCOM. Otherwise, the option shown on the display will be the one configured in the prior operation. By keeping the tool inserted in this orifice, the local adjustment menu will rotate.



In this option the first variable (**P_VAL**) is showed with its respective value (if you to want that it keeps static, put the tool in **S** orifice and stay there.

Figure 3.19 - Step 3 - LD292

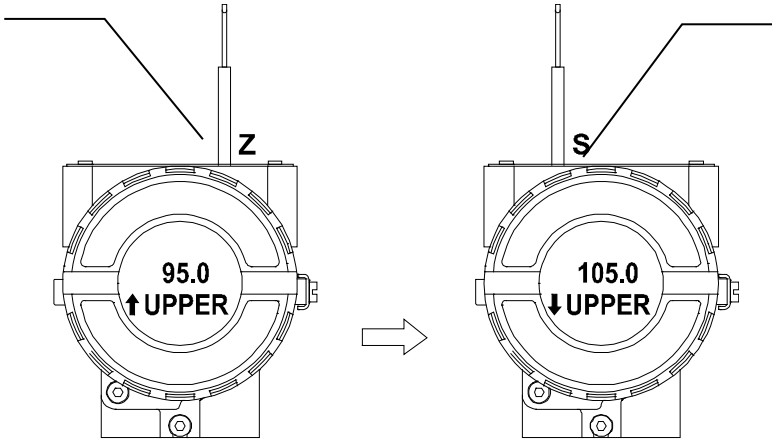
In order to range the lower value(lower), simply insert the magnetic tool in orifice **S** as soon as LOWER is shown on the display. An arrow pointing upward (↑) increments the valve and an arrow pointing downward (↓) decrements the value. In order to increment the value, keep the tool inserted in **S** up to set the value desired.



In order to decrement the lower value, place the magnetic tool in orifice **Z** to shift the arrow to the downward position and then, by inserting and keeping the tool in orifice **S**, it is possible to decrement the lower value.

Figure 3.20 - Step 4 - LD292

In order to range the upper value(upper), simply insert the magnetic tool in orifice **S** as soon as upper is shown on the display. An arrow pointing upward (↑) increments the valve and an arrow pointing downward (↓) decrements the value. In order to increment the value, keep the tool inserted in **S** up to set the value desired.



In order to decrement the upper value, place the magnetic tool in orifice **Z** to shift the arrow to the downward position an then, by insetting and keeping the tool in orifice **S**, it is possible to decrement the upper value.

Figure 3.21 - Step 5 - LD292

NOTE
This Local adjustment configuration is a suggestion only. The user may choose his preferred configuration via SYSCON, simply configuring the display block (See Programming Using Local Adjustment)

Section 4

MAINTENANCE PROCEDURES

General

NOTE
Equipment installed in hazardous atmospheres must be inspected in compliance with the IEC60079-17 standard.

SMAR Series 302 devices are extensively tested and inspected before delivery to the end user. Nevertheless, during their design and development, consideration was given to the possibility of repairs being made by the end user, if necessary.

In general, it is recommended that end users do not try to repair printed circuit boards. Spare circuit boards may be ordered from **SMAR** whenever necessary. Refer to the item "Returning Materials" at the end of this Section.

The table 4.1 shows the messages of errors and potential cause.

SYMPTOM	PROBABLE SOURCE OF PROBLEM
NO COMMUNICATION	*** Transmitter Connections** Check wiring polarity and continuity. Check for shorts or ground loops. Check if the power supply connector is connected to main board. Check if the shield is not used as a conductor. It should be grounded at one end only.
	*** Power Supply** Check power supply output. The voltage must be between 9 - 32 VDC at the **LD292** terminals. Noise and ripple should be within the following limits: a) 16 mV peak to peak from 7.8 to 39 KHz. b) 2 V peak to peak from 47 to 63 Hz for non-intrinsic safety applications and 0.2 V for intrinsic safety applications. c) 1.6 V peak to peak from 3.9 MHz to 125 MHz.
	*** Network Connection** Check that the topology is correct and all devices are connected in parallel. Check that two Terminators are OK and correctly positioned. Check length of trunk and spurs. Check spacing between couplers.
	*** Electronic Circuit Failure** Check the main board for defect by replacing it with a spare one.
INCORRECT READING	*** Transmitter Connections** Check for intermittent short circuits, open circuits, and grounding problems. Check if the sensor is correctly connected to the **LD292** terminal block.
	*** Noise, Oscillation** Adjust damping Check grounding of the transmitters housing. Check that the shielding of the wires between transmitter / panel is grounded only in one end.
	*** Sensor** Check the sensor operation; it shall be within its characteristics. Check sensor type; it shall be the type and standard that the **LD292** has been configured to. Check if process is within the range of the sensor and the **LD292**.

Table 4.1 - Messages of Errors and Potential Cause

If the problem is not presented in the table above follow the Note below:

NOTE
The Factory Init should be tried as a last option to recover the equipment control when the equipment presents some problem related to the function blocks or the communication. **This operation must only be carried out by authorized technical personnel and with the process offline, since the equipment will be configured with standard and factory data.** This procedure resets all the configurations run on the equipment, after which a partial download should be performed. Two magnetic tools should be used to this effect. On the equipment, withdraw the nut that fixes the identification tag on the top of the housing, so that access is gained to the "S" and "Z" holes. The operations to follow are: 1) Switch off the equipment, insert the magnetic tools and keep them in the holes (the magnetic end in the holes); 2) Feed the equipment; 3) As soon as Factory Init is shown on the display, take off the tools and wait for the "5" symbol on the right upper corner of the display to unlit, thus indicating the end of the operation. *This procedure makes effective all the factory configuration and will eliminate eventual problems with the function blocks or with the equipment communication.*

Disassembly Procedure

WARNING
Do not disassemble with power on.

The Figure 4.3 an exploded view of the transmitter and will help to visualize the following:

Sensor

To remove the sensor from the electronic housing, the electrical connections (in the field terminal side) and the main board connector must be disconnected.

Loosen the hex screw (5) and carefully unscrew the electronic housing from the sensor, observing that the flat cable is not excessively twisted.

WARNING
To avoid damage do not rotate the electronic housing more than 270º without disconnecting the electronic circuit from the sensor and from the power supply. See Figure 4.1.

Figure 4.1 – Safety Housing Rotation

Electronic Circuit

To remove the circuit board (**3**), loosen the two screws that anchor the board.

WARNING
The board has CMOS components, which may be damaged by electrostatic discharges. Observe correct procedures for handling CMOS components. It is also recommended to store the circuit boards in electrostatic-proof cases.

Pull the main board out of the housing and disconnect the power supply and the sensor connectors.

Reassemble Procedure

WARNING
Do not assemble the main board with power on.

Sensor

The fitting of the sensor must be done with the main board out of the electronic housing. Mount the sensor to the housing turning clockwise until it stops. Then turn it counterclockwise until it faces the protective cover (**1**). Tighten the hex screw (5) to lock the housing to the sensor.

Electronic Circuit

Plug sensor connector and power supply connector to main board.

Attach the display to the main board. Observe the four possible mounting positions. (Figure 4.2). The **SMAR** mark indicates up position.

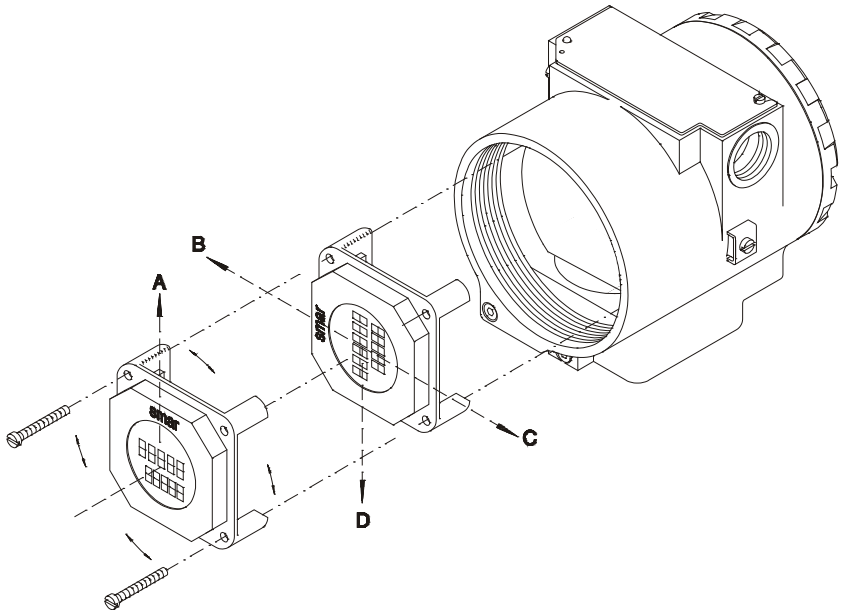


Figure 4.2 - Four Possible Positions of the Display

Anchor the main board and display with their screws (**3**).

After tightening the protective cover (**1**), mounting procedure is complete. The transmitter is ready to be energized and tested. It is recommended to open the transmitter's pressure taps to atmosphere and adjust the TRIM.

Interchangeability

To obtain an accurate and better temperature compensated response. Each sensor is submitted to a characterization process and the specific data is stored in an EEPROM located in the sensor body.

Every time the power is turned on, the main circuit reads the sensor serial number, should it differ from the number stored in the memory. The circuit understands that there is a new sensor and the following information is transferred from the sensor to the main circuit.

- Temperature compensation coefficients.
- Sensor's trim including 5-point characterization curve.
- Sensor characteristics: type, range, diaphragm material and fill fluid.

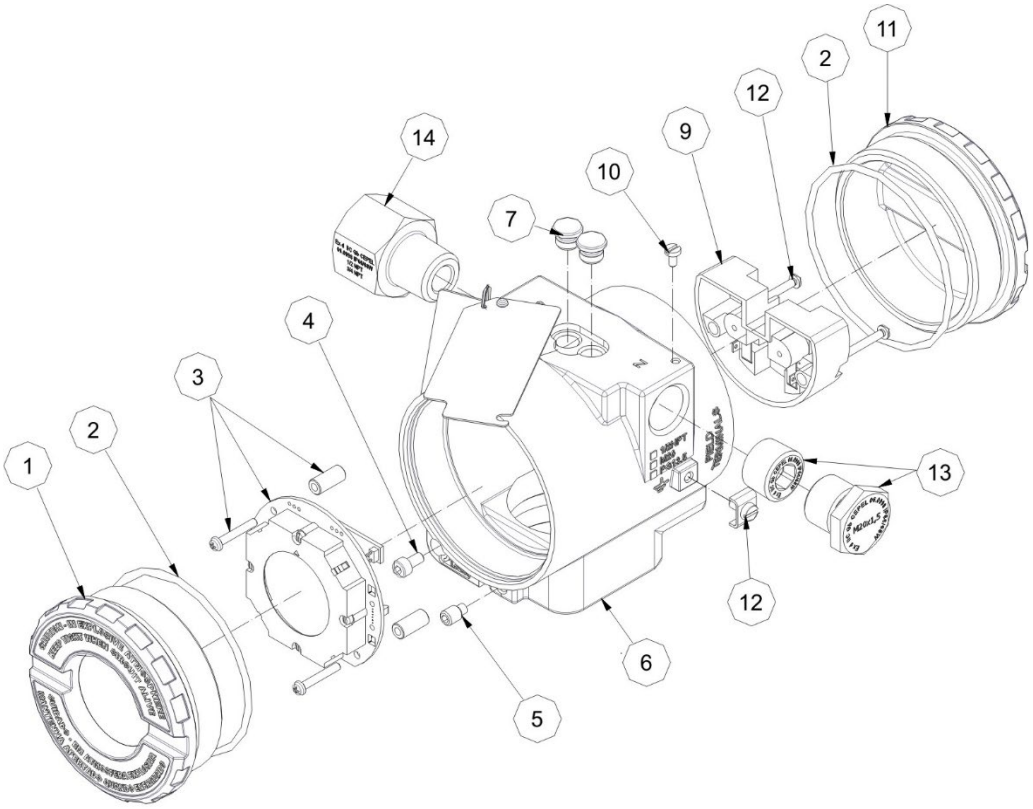
The other transmitter characteristics are stored in the main circuit memory and are not affected by sensor change.

Returning Materials

Should it become necessary to return the transmitter and/or configurator to **SMAR**, simply contact our office, informing the defective instrument serial number, and return it to our factory.

To speed up analysis and solution of the problem, the defective item should be returned with the Service Request Form (SRF – Appendix B) properly filled with a description of the failure observed and with as much details as possible. Other information concerning to the instrument operation, such as service and process conditions, is also helpful.

Instruments returned or to be revised outside the warranty term should be accompanied by a purchase order or a quote request.



14	1	3/4" NPT Adapter in 316 SST BR-EX D	400-0812
13	1	M20 X 1.5 External Hexagon Plug in 316 SST BR Ex d	400-0810
13	1	PG13.5 External Hexagon Plug in 316 SST	400-0811
13	1	1/2"NPT Internal Hexagon Plug in 316 SST BR Ex d	400-1484
12	1	External ground screw	204-0124
11	1	Cover without Window	400-1307-0xx
10	1	Terminal holding screw (316 SST housing)	204-0119
10	1	Terminal holding screw (Aluminum housing)	304-0119
9	1	Terminal Block FB PB	400-0059
8	1	Identification plate fixing screw	204-0116
7	2	Local adjustment protection cap (Z and S)	204-0114
6	1	Electronic Housing	400-1314-2xxxxxx
5	1	Sensor locking screw (Without head)	400-1121
4	2	Cover locking screw	204-0120
3	1	Main electronic circuit board	Note
2	1	Cover O-ring	204-0122
1	1	Cover with window	400-1307-1xx
ITEM	**QTD**	**DESCRIPTION**	**CODE**

Figure 4.3 – Exploded View

ITEM 3 NOTE
Go to https://www.smar.com.br/en/support In general support, check for compatibility note and refer to the document.

ITEM 13 NOTE
The spare part 400-1484, Internal Hexagonal Plug 1/2" NPT SST316 BR-Ex-d, was standardized in SST316 material and will be used in all line of housings (aluminum, copper free aluminum or SST316). With or without CEPEL certificate.

Ordering Code for Housing and Covers

CODE	DESCRIPTION
400-1314 - 2	HOUSING: LD292
Option	**Communication Protocol**
F	FOUNDATION Fieldbus
Option	**Electrical Connection**
0	½ NPT
A	M20 X 1.5
B	PG13.5
Option	**Material**
H0	Aluminum (IP/Type)
H1	316 SST (IP/Type)
H2	Aluminum – for saline atmospheres (IPW/Type X)
H4	Aluminum Copper Free (IPW/Type X)
Option	**Painting**
P0	Gray Munsell N 6,5
P8	Without Painting
P9	Safe Blue Base Epoxy – electrostatic painting

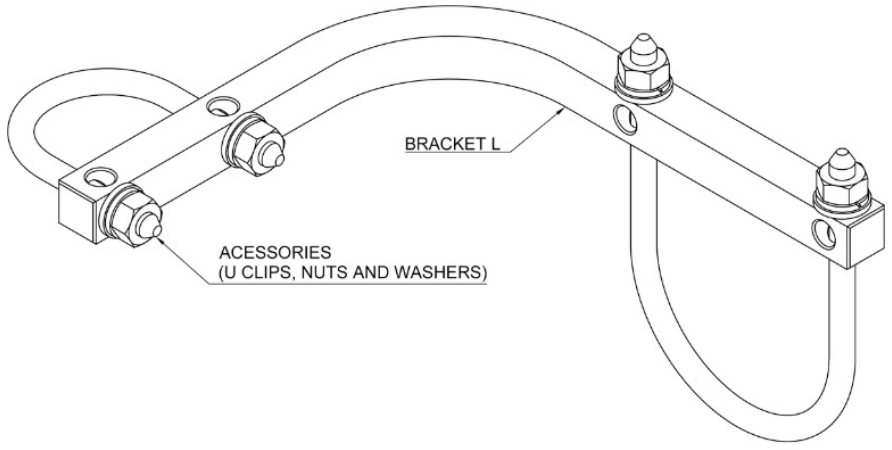
400-1314 - 2	F	0	H0	P0

CODE	DESCRIPTION
400-1307	Cover
Option	**Type**
0	Without window
1	With window
Option	**Material**
H0	Aluminum (IP/Type)
H1	316 SST (IP/Type)
Option	**Painting**
P0	Gray Munsell N 6,5
P8	Without Painting
P9	Safe Blue Base Epoxy – electrostatic painting

400-1307	*	*	*	TYPICAL MODEL

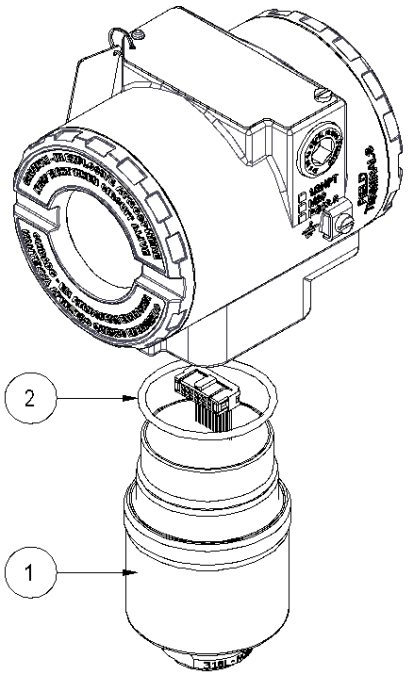
*Select the desired option.

ACCESSORIES	
ORDERING CODE	**DESCRIPTION**
SD1	Magnetic Tool for Local Adjustment



ITEM	QTY	DESCRIPTION	CODE
1	1	Mounting bracket and accessories in carbon steel	209-0801
2	1	Mounting bracket and accessories in 316 SST	209-0802
3	1	Mounting bracket in Carbon Steel with accessories in 316SST	209-0803

Figure 4.4 – Mounting Bracket



ITEM	QTY	DESCRIPTION	CODE
2	**1**	Buna N O'ring for sensor/housing	204-0113
1	**1**	Sensor	209-0241-Mxxxx

The letters x after codes indicate continuation. See complete code in the following tables.

Ordering Code for Sensor

209-0241	SPARE PART NUMBER FOR PRESSURE GAGE SENSOR			
CODE	**Type**	**Range Limits**		
		Min.	**Max.**	**Unit**
M2	Gage	12.5	500	mbar
M3	Gage	-1000	2500	mbar
M4	Gage	-1	25	bar
M5	Gage	-1	250	bar

CODE	Diaphragm Material and 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)**
Z	User's specifications

CODE	Process Connections Material
H	Hastelloy C276 (**1)**
I	316L SST

CODE	Process Connections	CODE	
1	1/2 - 14 NPT - Female	**U**	1/2 BSP – Male
A	M20 X 1,5 Male	**X**	1" NPT Sealed
G	DIN EN 837-1 G1/2B Male **(3)**	**Z**	User's specifications
H	DIN EN 837-1 G1/2B HP Male **(3)**		
M	1/2 - 14 NPT - Male		

209-0241	M2	1	I	1

← Typical Model Number

NOTE

(1) Meets NECE MR - 01 - 75/ISO 15156 recommendations.
(2) Inert Fluid: safe for oxygen service.
(3) The DIN 16288 standard was substituted by the DIN EN 837-1.

209-0241-S	SPARE PART NUMBER FOR SANITARY PRESSURE SENSOR						
CODE	Type	Range Limits Min.	Max.	Unit	Range Limits Min.	Max.	Unit
2	Sanitary	12.5	500	mbar	5.02	201.09	inH_2O
3	Sanitary	62.5	2500	mbar	25.13	1005,45	inH_2O
4	Sanitary	0.625	25	bar	157.1	10054.5	inH_2O
5	Sanitary	6.25	55.15	bar	90.65	799.89	psi

CODE	Diaphragm Material
I	316L SST

CODE	Fill Fluid (Low Side)
S	Silicone DC-200/20 Oil

CODE	Process Connections
4	Thread IDF - 2" – with extension
5	Thread RJT - 2" - with extension
6	Tri-Clamp - 2" - with extension
7	Thread SMS - 2" – with extension
8	DN25 – DIN 11851 – with extension
9	DN40 - DIN 11851 – with extension
A	Tri-Clamp DN50 – with extension
B	Thread IDF - 2"
C	Thread RJT - 2"
D	Tri-Clamp - 2"
E	Thread SMS - 2"
F	Tri-Clamp - 1 1/2"
H	DN40 - DIN 11851
N	Tri-Clamp - 2" HP – with extension
O	Tri-Clamp DN50 HP – with extension
P	Tri-Clamp - 2" HP
Q	Tri-Clamp - 1 1/2" HP
S	Thread SMS - 1 ½"
Z	User's specifications

CODE	O-Ring
0	Without o-ring
B	Buna N
T	Teflon
V	Viton

CODE	Tank Adapter
0	Without adapter
1	316L SST adapter

CODE	Tri-Clamp Connection
0	Without tri-clamp
2	With 304 SST Tri-Clamp

CODE	Diaphragm Material (Sanitary Connection)
H	Hastelloy C276
I	316L SST

CODE	Fill Fluid (Sanitary Connection)
N	Propylene glycol (neobee) Oil max.: 200 ºC
S	Silicone DC-200/20 Oil

209-0241-S	2	I	S	D	B	1	2	I	S

Typical Model Number

*Leave blank for no optional items.

209-0241 SPARE PART NUMBER FOR FLANGED PRESSURE SENSOR

COD.	Type	Range Limits Min.	Range Limits Max.	Min. Span	Unit	Range Limits Min.	Range Limits Max.	Min. Span	Unit	
L2	Level	-50	50	1.25	kPa	-200	200	5	inH_2O	Note: The range can be extended up to 0.75 LRL and 1.2 URL with small degradation of accuracy. The upper range value must be limited to the flange rating.
L3	Level	-250	250	2.08	kPa	-36	36	0.3	psi	
L4	Level	-2500	2500	20.83	kPa	-360	360	3	psi	
L5	Level	-25000	25000	208.30	kPa	-3625	3625	30.2	psi	

COD.	Diaphragm Material (Sensor) and Fill Fluid (Sensor)
1	316L SST - Silicone Oil

COD.	Process Connection	COD.	Process Connection
U	1" 150# (ANSI B16.5)	C	3" 600# (ANSI B16.5)
V	1" 300# (ANSI B16.5)	3	4" 150# (ANSI B16.5)
W	1" 600# (ANSI B16.5)	4	4" 300# (ANSI B16.5)
O	1½" 150# (ANSI B16.5)	D	4" 600# (ANSI B16.5)
P	1½" 300# (ANSI B16.5)	5	DN25 PN 10/40
Q	1½" 600# (ANSI B16.5)	E	DN50 PN10/40
9	2" 150# (ANSI B16.5)	6	DN80 PN25/40
A	2" 300# (ANSI B16.5)	7	DN100 PN10/16
B	2" 600# (ANSI B16.5)	8	DN100 PN25/40
1	3" 150 # (ANSI B16.5)	Z	User´s specifications
2	3" 300# (ANSI B16.5)		

COD.	Type and Material Flange	COD.	Type and Material Flange
2	316L SST (fixed flange)	D	Duplex (UNS 31803/32205)
3	Hastelloy C276 (fixed flange)	S	Super Duplex (UNS 32750/32760)
		Z	User´s specifications

COD.	Extension Lenght	COD.	Extension Lenght
0	0 mm (0")	3	150 mm (6")
1	50 mm (2")	4	200 mm (8")
2	100 mm (4")	Z	User´s specifications

COD.	Diaphragm Material / Extension (Process Connection)	COD.	Diaphragm Material / Extension (Process Connection)
1	316 L SST / 316 SST	5	Titanium / 316 SST **(3)**
2	Hastelloy C276 / 316 SST	L	316L SST with Halar Lining
3	Monel 400 / 316 SST	S	Super Duplex (UNS 32750/32760)
4	Tantalum / 316 SST **(3)**	Z	User´s specifications

COD.	Fill Fluid (Process Connection)	COD.	Fill Fluid (Process Connection)
S	Silicone DC-200/20 Oil	H	Halocarbon 4.2 Oil **(5)**
F	Inert Fluorolube MO-10 Oil **(4)(5)**	N	Propylene Glicol (Neobee) Oil
D	Silicone DC-704 Oil	T	Syltherm 800 Oil
K	Krytox Oil	Z	User´s specifications

COD.	Lower Housing Material	COD.	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 32750/32760)		

COD.	Gasket Material	COD.	Gasket Material
0	Without Gasket	T	Teflon (PTFE)
G	Grafoil (Flaxible Lead)	Z	User´s specifications

209-0241	L2	1	1	6	0	1	S	1	0

TYPICAL MODEL NUMBER

Optional Items

Special Procedure	**C0** - Standard **C1** – Cleaning for use in oxygen/hydrogen peroxide/chlorine.
Flange Face	**Q0** – Raised Face – RF **Q1** – Flat Face - FF **Q2** – For sealing ring - RTJ
Lower Housing Connection	**U0** – With 1 1/4" NPT Flush Connection (if supplied with gasket) **U1** – With 2 Flush 1/4" NPT Connections at 180º **U3** – With 2 1/2" - 14 NPT Flush Connections at 180º (with plug) **U4** – Without Flush Connections

NOTES

(1) Silicone Oils not recommendations for Oxygen (O_2) or Chlorine service.
(2) Not applicable for vacuum service.
(3) Attention, check corrosion rate for the process, tantalum plate 0.1 mm, AISI 316L extension 3 to 6 mm.
(4) Fluorolube fill fluid is not available for Monel diaphragm.
(5) Inert Fluid: Safe for oxygen service.

Isolation Test on Equipment Housings

1. Power off the equipment in the field, remove its back cover and disconnect all field cables from the transmitter terminal block, isolating them safely.

2. It is not necessary to remove the main board and display.

3. Jumper (connect) the power terminals (positive and negative) with the cable coming from the Megohmmeter (megger).

4. Configure the megohmmeter for 500 Vdc scale and check the isolation between the housing and the cable that short-circuits all the terminals.

ATTENTION
 Never test with a voltage greater than 500 Vdc.

5. The value obtained must be greater than or equal to 2GΩ and the voltage application time must be at least 1 second and at most 5 seconds.

6. If the value obtained by the megohmmeter is below 2GΩ, the possibility of moisture entering the electrical connection compartment must be analyzed.

7. It is possible to loosen the two screws that secure the terminal block to the housing and carry out a superficial cleaning and dry the surface well. Afterwards, the isolation can be tested again.

8. If the isolation test still shows that the isolation has been compromised, the housing must be replaced and sent to Nova Smar S.A. for analysis and retrieval.

IMPORTANT
a) For equipment certified Exd and Exi (Explosion Proof and Intrinsically Safe) the standards advise not to carry out repairs in the field of the housing electronic components, only at Nova Smar S.A.
b) In normal use, the housing components must not cause failures that affect its isolation. For this reason, it is important to verify whether there are traces of water entering the housing and, if so, an assessment of the electrical installations and the sealing rings of the covers must be carried out. Nova Smar S.A. has a team ready to support the assessment of facilities, if necessary.

TECHNICAL CHARACTERISTICS

Functional Specifications		
Process Fluid	Liquid, gas, or steam.	
Output Signal	Digital only. Fieldbus, 31.25 kbit/s voltage mode with bus power.	
Power Supply	Bus power 9 - 32 VDC. Current consumption quiescent 12 mA. 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.	
Indicator	Optional 4½-digit numerical and 5-character alphanumerical LCD indicator.	
Hazardous Area Certifications	See Appendix A.	
Temperature Limits	Ambient:	-40 to 85 ºC (-40 to 185 ºF) -15 to 85 ºC (5 to 185 ºF) **LD290I**
	Process:	-40 to 100 ºC (-40 to 212 ºF) Silicone Oil 0 to 85 ºC (32 to 185 ºF) Inert Fluorolube Oil -40 to 150 ºC (-40 to 302 ºF) **LD290L** -15 to 150 ºC (5 to 302 ºF) **LD290I**
	Storage:	40 to 100 ºC (-40 to 212 ºF)
	Display	-20 to 80 ºC (-4 to 176 ºF) Operation -40 to 85 ºC (-40 to 185 ºF) without damage
Turn-on Time	Performs within specifications of less than 10 seconds after power is applied to the transmitter.	
Configuration	Basic configuration may be done using local adjustment magnetic tool if device is fitted with display. Complete configuration is possible using Syscon.	
Volumetric Displacement	Less than 0.15 cm^3 (0.01 in^3).	

Pressure Limits for Flanges

14 MPa (138 bar) for ranges 2, 3, 4.
31 MPa (310 bar) for range 5.

Overpressures above will not damage the transmitter, but a new calibration may be necessary.

WARNING
It is described here only the maximum pressures of the materials referenced in each standard, other materials on request. Temperatures above 150 ° C are not available in standard models.

PRESSURES TABLE FOR SEAL AND LEVEL FLANGES DIN EN 1092-1 2018 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	54.3	48.6	44.1	41.1	38.1	36.3
	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

Pressure Limits for Flanges (continuation)

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	-	-

RT = Reference Temperature (-10 to 50ºC)

PRESSURES TABLE FOR SEAL AND LEVEL FLANGES ASME B16.5 2020 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
	600	103.4	103.4	103	100.3	96.7	92.7	85.7	82.6	80.4
	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

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
	600	103.4	103.4	101.3	91.9	85.3	80.9	77.7	76.3	75.3
	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
	600	82.7	80	69.6	62.8	58.3	54.9	52.1	51	50.1
	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
	600	99.3	96.2	84.4	77	71.3	66.8	63.2	61.8	60.7
	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

Pressure Limits for Sanitary Connections

PRESSURES TABLE FOR TRICLAMP CONNECTIONS BS4825 P3

DN	PN normal		HP (High pressure)	
	20ºC (68ºF)	120ºC (248ºF)	20ºC (68ºF)	120ºC (248ºF)
	Maximum Temperature Allowed (bar)			
1.1/2”	34	20	100	60
2” – DN50	28	17	70	42
3”	22	13	70	42

Pressure Limits for Sanitary Connections (continuation)

PRESSURES TABLE FOR THREADED CONNECTIONS

Sanitary Threads – Temperature Limits				
DN	RJT	IDF	SMS	DIN
	120ºC (248ºF)	120ºC (248ºF)	120ºC (248ºF)	120ºC (248ºF)
	BS4825 P5	BS4825 P4	SMS1145	DIN11851
	Maximum Temperature Allowed (bar)			
DN25	--	--	--	40
1.1/2"-DN40	10	16	40	40
2–DN50	10	16	25	25
3-DN80	10	16	25	25

Humidity Limits	0 to 100% RH.
Damping Adjustment	User configurable from 0 to 128 seconds (via digital communication or local adjustment).

Performance Specifications

Reference conditions	Range starting at zero, temperature 25ºC (77ºF), atmospheric pressure, power supply of 24 Vdc, Silicone oil fill fluid, isolating diaphragms in 316L SST and digital trim equal to lower and upper range values.
Accuracy	For ranges 2, 3, 4 and 5: ±0.075% of span (for span >= 0.1 URL) ±[0.0375 + 0.00375 URL/SPAN] % of span (for span < 0.1 URL) For Level Transmitter: ± 0.08 % of span (for span ≥ 0.1 URL) ± [0.0504 + 0.0047 URL/span] % of span (for span < 0.1 URL) For Insertion Transmitter: ±0.2% of span
Stability	±0.15% of URL for 5 years.
Temperature Effect	± [0.02 URL + 0.06% of span], per 20 ºC (68 ºF) for span >= 0.2 URL ± [0.023 URL+0.045% of span], per 20ºC (68 ºF) for span < 0.2 URL For Level Transmitter: 6 mmH_2O per 20 ºC for 4" and DN100 17 mmH_2O per 20 ºC for 3" and DN80
Power Supply Effect	±0.005% of calibrated span per volt.
Mounting Position Effect	Zero shift of up to 250 Pa (1 inH_2O) which can be calibrated out. No span effect.
Electromagnetic Interference Effect	Designed to comply with, Approved according to IEC61326-1:2006, IEC61326-2-3:2006, IEC61000-6-4:2006, IEC61000-6-2:2005.

Physical Specifications

Electrical Connection	1/2 -14 NPT, PG 13.5, or M20 × 1.5
Process Connection	See Ordering code.
Wetted Parts	**Isolating Diaphragms and Process Connection** 316L SST or Hastelloy C276.
Nonwetted Parts	**Electronic Housing** Aluminum or 316 SST with polyester or epoxy painting or 316 SST without painting housing. Complies with NEMA 4X/6P, IP66 or IP66W*, IP68 or IP68W*. **The IP68 sealing test (immersion) was performed at 10m for 24 hours.* *The W condition or 4X was tested for 200h and refer to saline atmosphere.* **Level Flange (LD292L)** 316L SST, Hastelloy C276, Duplex (UNS 31803/32205), and Super Duplex (UNS 32750/32760) **Fill Fluid** Silicone DC-200/20, Silicone - DC704, Fluorolube MO-10, Krytox, Halocarbon 4.2, Propylene Glycol (Neobee), and Syltherm 800 oils.

Physical Specifications	
Nonwetted Parts (continuation)	**Cover O-Rings** Buna-N. **Mounting Bracket** Optional universal mounting bracket for surface or vertical/horizontal 2" - pipe (DN50) 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 Weight	<2.0Kg (4lb): Aluminum housing without mounting bracket.

Ordering Code

MODEL	GAGE PRESSURE TRANSMITTERS
LD292M	FOUNDATION™ fieldbus

CODE	Type	Range Limits		
		Min.	Max.	Unit
2	Gage	12.5	500	mbar
3	Gage	-1000	2500	mbar
4	Gage	-1	25	bar
5	Gage	-1	250	bar

CODE	Diaphragm Material and 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	CODE	
1	1/2 - 14 NPT - Female	R	Remote Seal
2	1" BSP – Male	U	1/2 BSP – Male
3	1" BSP - Female	V	Valve Manifold integrated to the transmitter
A	M20 X 1,5 Male	X	1" NPT Sealed (SS316 / DC200-20)
B	1/4 - 18 NPT Female	Y	1.1/2 NPT Sealed Male (316L SST Diaphragm Silicone DC200/20 Fluid
C	1/4 - 18 NPT Male	Z	User's specifications
G	DIN EN 837-1 G1/2B Male **(3)**		
H	DIN EN 837-1 G1/2B HP Male **(3)**		
M	1/2 - 14 NPT - Male		

CODE	Electrical Connections	CODE	
0	1/2 - 14 NPT **(4)**	A	M20 X 1.5 **(4)**
1	1/2 - 14 NPT X 3/4 NPT (316 SST) - with adapter **(5)**	B	PG 13.5 DIN **(6)**
2	1/2 - 14 NPT X 3/4 BSP (316 SST) - with adapter **(6)**	Z	User's specifications
3	1/2 - 14 NPT X 1/2 BSP (316 SST) - with adapter **(6)**		

CODE	Mounting Bracket
0	Without Mounting Bracket
1	Carbon Steel Mounting Bracket with Carbon Steel accessories
2	316 SST Mounting Bracket with 316 SST accessories
7	Carbon Steel Mounting Bracket with 316 SST accessories

CODE	Optional Items

LD292M	2	1	I	1	1	A	0	*	TYPICAL MODEL

* Leave blank for no optional items.

MODEL	GAGE PRESSURE TRANSMITTER (CONTINUATION)		
COD.	Housing Material (8) (9)		
H0	Aluminum (IP/TYPE)	H3	316 SST for saline atmosphere (IPW/TYPEX) **(7)**
H1	316 SST (IP/TYPE)	H4	Copper Free Aluminum (IPW/TYPEX) **(7)**
H2	Aluminum for saline atmosphere (IPW/TYPEX) **(7)**		

COD.	Identification Plate				
I4	ATEX (EX-I, EX-D) GAS	I7	ATEX (EX-I) MINING	IJ	ATEX (EX-D) GAS
I5	INMETRO (EX-D, EX-I) GAS	IF	IECEX	IO	INMETRO (EX-T) DUST
I6	Without Certification				

COD.	Painting		
P0	Munsell N 6,5 Gray	P8	Without Painting
P2	Blue Safety Base Epoxy – Atmospheric Zone - Petrobras N1021	P9	Blue Safety Base Epoxy –Eletrostatic Painting
P3	Polyester Black		

COD.	Manufacturing Standard
S0	Smar

COD.	Smar Internal Code

COD.	Tag Plate
J0	With TAG
J1	Without TAG
J2	User's specification

LD292M	H0	I1	P0	S0		J0	TYPICAL MODEL NUMBER

Optional Items

Special Procedures	**C1** –Degrease Cleaning (Oxygen or Chlorine Service)
Special Characteristics	**ZZ** – User Specification

NOTES

(1) Meets NACE material recommendation per MR-01-75.
(2) Inert fluid: safe for oxygen service.
(3) DIN16288 has been replaced by DIN EN 837-1.
(4) Certification EX-d for FM / ATEX / IECEx / INMETRO
(5) Certification EX-d for INMETRO.
(6) Not certified for use in hazardous locations.

MODEL	SANITARY PRESSURE TRANSMITTERS
LD292S	FOUNDATION™ fieldbus

CODE	Type	Range Limits			Range Limits		
		Min.	Max.	Unit	Min.	Max.	Unit
2	Sanitary	12.5	500	mbar	5.02	201.09	inH_2O
3	Sanitary	62.5	2500	mbar	25.13	1005,45	inH_2O
4	Sanitary	0.625	25	bar	157.1	10054.5	inH_2O
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	CODE	Process Connections
4	Thread IDF - 2" – with extension	G	Tri-Clamp – 3"
5	Thread RJT - 2" - with extension	H	DN40 - DIN 11851
6	Tri-Clamp - 2" - with extension	N	Tri-Clamp - 2" HP – with extension
7	Thread SMS - 2" – with extension	O	Tri-Clamp DN50 HP – with extension
8	DN25 – DIN 11851 – with extension	P	Tri-Clamp - 2" HP
9	DN40 - DIN 11851 – with extension	Q	Tri-Clamp - 1 1/2" HP
A	Tri-Clamp DN50 – with extension	R	Tri-Clamp - 3" HP
B	Thread IDF - 2"	S	Thread SMS - 1 ½"
C	Thread RJT - 2"	U	DN50 - DIN 11851
D	Tri-Clamp - 2"	V	DN50 - DIN 11851 – with extension
E	Thread SMS - 2"	Y	According to special option
F	Tri-Clamp - 1 1/2"	Z	User's specifications

CODE	Electrical Connections	CODE	Electrical Connections
0	1/2 - 14 NPT **(1)**	A	M20 X 1.5 **(1)**
1	1/2 - 14 NPT X 3/4 NPT (316 SST) - with adapter **(2)**	B	PG 13.5 DIN **(3)**
2	1/2 - 14 NPT X 3/4 BSP (316 SST) - with adapter **(3)**	Z	User's specifications
3	1/2 - 14 NPT X 1/2 BSP (316 SST) - with adapter **(3)**		

CODE	O'Ring Material	CODE	O'Ring Material
0	Without O'Ring	V	Viton
B	Buna-N	Z	User´s specifications
T	Teflon		

CODE	Adapter
0	Without adapter
1	With adapter in 316 SST

CODE	Tri-Clamp Connection
0	Without Clamp
2	With Tri-Clamp in 304 SST

CODE	Diaphragm Material (Sanitary Connection)
H	Hastelloy C276
I	316L SST

CODE	Fill Fluid (Sanitary Connection)
N	Propylene Glycol (Neobee) Oil **(2)**
S	Silicone DC-200/20 Oil

CODE	Optional Items

LD292S	2	I	N	1	D	0	V	1	2	I	S	*	← Typical Model Number

*Leave blank for no optional items.

MODEL	SANITARY PRESSURE TRANSMITTERS (CONTINUATION)

COD.	Housing Material	COD.	
H0	Aluminum (IP/TYPE)	H3	316 SST for saline atmosphere (IPW/TYPEX)
H1	316 SST (IP/TYPE)	H4	Aluminum Copper Free (IPW/TYPEX)
H2	Aluminum for saline atmosphere (IPW/TYPEX)		

COD.	Identification Plate	COD.	
I4	ATEX (EX-I, EX-D) GAS	IF	IECEX
I5	INMETRO (EX-D, EX-I) GAS	IJ	ATEX (EX-D) GAS
I6	Without Certification	IO	INMETRO (EX-T) DUST
I7	ATEX (EX-I) MINING		

COD.	Painting
P0	Gray Munsell N 6,5
P2	Blue Safety Base Epoxy – Atmospheric Zone - Petrobras N1021
P3	Polyester Black
P7	Beige Epoxy
P8	Without painting (Only 316 SST)

COD.	Manufacturing Standard
S0	Smar

COD.	Smar Internal Code

COD.	Tag Plate		
J0	With tag	J2	User's specification
J1	Without tag		

COD.	Process Connection and Material (High side)
K0	Without special process connection material
K2	Varivent 68

LD292S	H0	I6	P0	S0		J0	K2	← TYPICAL MODEL NUMBER

Optional Items

Special Procedures	**C0** - Standard **C1** –Degrease Cleaning (Oxygen or Chlorine Service)

NOTES
(1) Certification EX-d for FM / ATEX / IECEx / INMETRO
(2) Certification EX-d for INMETRO.
(3) Not certified for use in hazardous locations.

MODEL	LOW COST FLANGED PRESSURE TRANSMITTER
LD292L	FOUNDATION™ fieldbus

COD.	Type	Range Limits Min.	Range Limits Max.	Unit	Range Limits Min.	Range Limits Max.	Unit
2	Level	12.5	500	mbar	5.02	201.09	inH_2O
3	Level	62.5	2500	mbar	25.13	1005.45	inH_2O
4	Level	0.625	25	bar	157.1	10054.5	inH_2O
5	Level	6.25	250	bar	90.65	3625.94	psi

COD.	Diaphragm Material (Sensor) and Fill Fluid (Sensor)
1	316L SST - Silicone Oil

COD.	Local Indicator	COD.	Local Indicator
0	Without Indicator	1	With Digital Indicator

COD.	Process Connection	COD.	Process Connection
U	1" 150# (ASME B16.5)	C	3" 600# (ASME B16.5)
V	1" 300# (ASME B16.5)	3	4" 150# (ASME B16.5)
W	1" 600# (ASME B16.5)	4	4" 300# (ASME B16.5)
O	1½" 150# (ASME B16.5)	D	4" 600# (ASME B16.5)
P	1½" 300# (ASME B16.5)	5	DN25 PN 10/40
Q	1½" 600# (ASME B16.5)	R	DN40 PN 10/10
9	2" 150# (ASME B16.5)	E	DN50 PN10/40
A	2" 300# (ASME B16.5)	6	DN80 PN25/40
B	2" 600# (ASME B16.5)	7	DN100 PN10/16
1	3" 150 # (ASME B16.5)	8	DN100 PN25/40
2	3" 300# (ASME B16.5)	Z	User´s specifications

COD.	Electrical Connection	COD.	Electrical Connection
0	1/2 - 14 NPT **(1)**	A	M20 X 1.5 **(1)**
1	1/2 - 14 NPT X 3/4 NPT (AI 316) - with adapter **(2)**	B	PG 13.5 DIN **(3)**
2	1/2 - 14 NPT X 3/4 BSP (AI 316) - with adapter **(3)**	Z	User´s specifications
3	1/2 - 14 NPT X 1/2 BSP (AI 316) - with adapter **(3)**		

COD.	Type and Material Flange	COD.	Type and Material Flange
2	316L SST (fixed flange)	S	Super Duplex (UNS 32750/32760)
3	Hastelloy C276 (fixed flange)	Z	User´s specifications
D	Duplex (UNS 31803/32205)		

COD.	Extension Length	COD.	Extension Length	COD.	Extension Length
0	0 mm (0")	2	100 mm (4")	4	200 mm (8")
1	50 mm (2")	3	150 mm (6")	Z	User´s specifications

COD.	Diaphragm Material / Extension (Process Connection)	COD.	Diaphragm Material / Extension (Process Connection)
1	316 L SST / 316 SST	6	316L SST with Teflon Lining
2	Hastelloy C276 / 316 SST (4)	B	Tantalum with Teflon Lining
3	Monel 400 / 316 SST	C	Hastelloy C276 with Teflon Lining
4	Tantalum / 316 SST **(7)**	S	Super Duplex (UNS 32750/32760)
5	Titanium / 316 SST **(7)**	Z	User´s specifications

COD.	Fill Fluid (Process Connection)	COD.	Fill Fluid (Process Connection)
S	Silicone DC-200/20 Oil	H	Halocarbon 4.2 Oil **(5)**
F	Inert Fluorolube MO-10 Oil **(5)(6)(8)**	N	Propylene Glycol (Neobee) Oil
D	Silicone DC-704 Oil	T	Syltherm 800 Oil
K	Krytox Oil	Z	User´s specifications

COD.	Lower Housing Material	COD.	Lower Housing Material
0	Without Lower Housing	4	Duplex (UNS 31803)
1	316L SST	Z	User´s specifications
2	Hastelloy C276		
3	Super Duplex (UNS 32750/32760)		

COD.	Gasket Material	COD.	Gasket Material
0	Without Gasket	T	Teflon (PTFE)
G	Grafoil (Flaxible Lead)	Z	User´s specifications

COD.	Optional Items

LD292L	2	1	1	1	0	6	2	1	S	1	T	*

TYPICAL MODEL NUMBER

*Leave it blank when there are not optional items.

MODEL	LOW COST FLANGED PRESSURE TRANSMITTER (CONTINUATION)

COD.	Housing Material		
H0	Aluminum (IP/TYPE)	H3	316 SST for saline atmosphere (IPW/TYPEX)
H1	316 SST (IP/TYPE)	H4	Copper Free Aluminium (IPW/TYPEX)
H2	Aluminum for saline atmosphere (IPW/TYPEX)		

COD.	Identification Plate		
I4	ATEX (EX-I, EX-D) GAS	IF	IECEX
I5	INMETRO (EX-D, EX-I) GAS	IJ	ATEX (EX-D) GAS
I6	Without Certification	IO	INMETRO (EX-T) DUST
I7	ATEX (EX-I) MINING		

COD.	Painting		
P0	Gray Munsell N 6,5	P9	Blue Safety Epoxy - Electrostatic Painting
P2	Blue Safety Epoxy – Atmospheric Zone - Petrobras N1021	PC	Blue Safety Epoxy Polyester - Electrostatic Painting
P3	Polyester Black	PE	Green Munsell 5G 8/4 - Epoxy
P7	Beige Epoxy	PG	Orange Safety Epoxy
P8	Without painting (Only 316 SST)		

COD.	Manufacturing Standard
S0	Smar

COD.	Smar Internal Code

COD.	Tag Plate				
J0	With tag	J1	Without tag	J2	User's specification

COD	Face		
Q0	Raised Face - RF (ASME, DIN)	Q2	For Sealing Ring – RTJ
Q1	Flat - FF (ASME, DIN)		

COD.	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 180º
U3	With 2 Flush Connections 1/2" - 14 NPT per 180º (with plug)
U4	Without Flush Connection
U5	With 1 Flush Connection 1/2" NPT

COD.	Special Characteristics
ZZ	See notes

LD292L	H0	I1	P0	S0		J0	Q0	U0	ZZ

← TYPICAL MODEL

Optional Items

Special Procedures	**C1** –Degrease Cleaning (Oxygen or Chlorine Service)
Burnout	**BD** – Down Scale **BU** – Up Scale

NOTES

(1) Certification EX-d for FM / ATEX / IECEx / INMETRO
(2) Certification EX-d for INMETRO.
(3) Not certified for use in hazardous locations.
(4) Meets recommendations of NACE MR-01-75 standard.
(5) Inert Fluid: Safe for oxygen service.
(6) Not applicable for vacuum service.
(7) Attention, check corrosion rate for the process, tantalum plate 0.1 mm, AISI 316L extension 3 to 6 mm.
(8) Fluorolube fill fluid is not available for Monel diaphragm.
(9) Process Connection 1" / DN25, only available without extension (0mm.)

MODEL	PRESSURE TRANSMITTER WITH EXTENDED PROBE
LD292I	FOUNDATION™ fieldbus

COD.	Type	Range Limits		
		Min.	Max.	Unit
2	Level	12.5	500	mbar

COD.	Diaphragm Material and Fill Fluid
1	316L SST – Silicon Oil **(1)**

COD.	Local Indicator
0	Without Indicator
1	With Indicator

COD.	Bracket		
1	Bracket in L	Z	User's specification
2	Flanged Bracket		
3	Triclamp 3"		

COD.	Electrical Connection		
0	1/2 - 14 NPT **(1)**	A	M20 X 1.5 **(1)**
1	1/2 - 14 NPT X 3/4 NPT (316 SST) – with adapter **(2)**	B	PG 13.5 DIN **(3)**
2	1/2 - 14 NPT X 3/4 BSP (316 SST) - with adapter **(3)**	Z	User's specification
3	1/2 - 14 NPT X 1/2 BSP (316 SST) - with adapter **(3)**		

COD.	Probe Material/Diaphragm (Wetted Parts)
A	304L SST / 316L SST
H	304L SST / Hastelloy C276
I	316L SST / 316L SST
U	316L SST / Hastelloy C276
Z	User's specification

COD.	Probe Length		
1	500 mm	6	1600 mm
2	630 mm	7	2000 mm
3	800 mm	8	2500 mm
4	1000 mm	9	3200 mm
5	1250 mm	Z	User's specification

COD.	Probe Fill Fluid
N	Propylene Glycol Oil (Neobee M20)
Z	User's specification

COD.	Continues next page

LD292I	2	1	1	3	A	I	1	N	*

← TYPICAL MODEL

*Leave blank for no optional items.

MODEL	PRESSURE TRANSMITTER WITH EXTENDED PROBE (CONTINUATION)		
COD.	Housing Material		
H0	Aluminum (IP/TYPE)	H3	316 SST for saline atmosphere (IPW/TYPEX)
H1	316 SST (IP/TYPE)	H4	Aluminum Copper Free (IPW/TYPEX)
H2	Aluminum for saline atmosphere (IPW/TYPEX)		
COD.	Identification Plate		
I4	ATEX (EX-I, EX-D) GAS		
I5	INMETRO (EX-D, EX-I) GAS		
I6	Without certification		
I7	ATEX (EX-I) MINING		
IF	IECEX		
IJ	ATEX (EX-D) GAS		
IO	INMETRO (EX-T) DUST		
COD.	Painting		
P0	Gray Munsell N 6,5	P8	Without painting (Only 316 SST)
P2	Blue Safety Epoxy – Atmospheric Zone - Petrobras N1021	P9	Blue Safety Epoxy - Electrostatic Painting
P3	Polyester Black		
P7	Beige Epoxy		
COD.	Manufacturing Standard		
S0	Smar		
COD.	Display Unit		
Y0	Porcentagem	Y4	Display 2: Current - mA
Y1	Display 1: Current - mA	Y5	Display 2: Pressure (Eng. unit)
Y2	Display 1: Pressure (Eng. Unit)	Y6	Display 2: Temperature (ºC)
Y3	Display 1: Temperature (ºC)	YU	User's specification **(4)**
COD.	Tag Plate		
J0	With TAG	J2	User's specification
J1	Without TAG		

LD292I	H0	I6	P0	S0	Y0	J0

← TYPICAL MODEL

Optional Items

Special Procedures	**C1** –Degrease Cleaning (Oxygen or Chlorine Service)
Burnout	**BD** – Down Scale **BU** – Up Scale
Special Characteristics	**ZZ** – User's specifications

NOTES

(1) Certification EX-d for FM / ATEX / IECEx / INMETRO
(2) Certification EX-d for INMETRO.
(3) Not certified for use in hazardous locations.
(4) Limited values to 4 ½ digits; limited units to 5 characters.

Appendix A

CERTIFICATIONS INFORMATION

European Directive Information

Consult www.Smar.com for the EC declarations of conformity and certificates.

Authorized representative/importer located within the Community:
Smar Europe BV De Oude Wereld 116 2408 TM Alphen aan den Rijn Netherlands

ATEX Directive 2014/34//EU - "Equipment for explosive atmospheres"
The EC-Type Examination Certificate is released by DNV Product Assurance AS (NB 2460) and DEKRA Testing and Certification GmbH (NB 0158).
Designated certification body that monitors manufacturing and released QAN (Quality Assurance Notification) is Nemko AS (NB 0470) and UL International Demko AS (NB 0539).

LVD Directive 2014/35/EU – "Low Voltage"
According the LVD directive Annex II, electrical equipment for use in an explosive atmosphere is outside the scope of this directive.
According to IEC standard: IEC 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements.

PED Directive 2014/68/EU - "Pressure Equipment"
This product is in compliance with Article 4 paragraph 3 of the Pressure Equipment Directive 2014/68/EU and was designed and manufactured in accordance with the sound engineering practice. This equipment cannot bear the CE marking related to PED compliance. However, the product bears the CE marking to indicate compliance with other applicable European Community Directives.

ROHS Directive 2011/65/EU - "Restriction of the use of certain hazardous substances in electrical and electronic equipment"
For the evaluation of the products the following standards were consulted: EN IEC 63000.

EMC Directive 2014/30/EU - "Electromagnetic Compatibility"
For products evaluation, the standard IEC 61326-1 were consulted and to comply with the EMC directive the installation must follow these special conditions:
Use shielded, twisted-pair cable for powering the instrument and signal wiring.
Keep the shield insulated at the instrument side, connecting the other one to the ground.

Hazardous locations general information

Ex Standards:
IEC 60079-0 General Requirements
IEC 60079-1 Flameproof Enclosures "d"
IEC 60079-7 Increased Safe "e"
IEC 60079-11 Intrinsic Safety "i"
IEC 60079-18 Encapsulation "m"
IEC 60079-26 Equipment with Separation Elements or combined Levels of Protection
IEC 60079-31 Equipment dust ignition protection by enclosure "t"
IEC 60529 Classification of degrees of protection provided by enclosures (IP Code)
IEC 60079-10 Classification of Hazardous Areas
IEC 60079-14 Electrical installation design, selection and erection
IEC 60079-17 Electrical Installations, Inspections and Maintenance
IEC 60079-19 Equipment repair, overhaul and reclamation
ISO/IEC 80079-34 Application of quality systems for equipment manufacture

Warning:
Explosions could result in death or serious injury, besides financial damage.
Installation of this instrument in hazardous areas must be in accordance with the local standards and type of protection. Before proceedings with installation make sure that the certificate parameters are in accordance with the classified hazardous area.

Maintenance and Repair
The instrument modification or replaced parts supplied by any other supplier than authorized representative of Smar is prohibited and will void the Certification.

Marking Label
The instrument is marked with type of protection options. The certification is valid only when the type of protection is indicated by the user. Once a particular type of protection is installed, do not reinstall it using any other type of protection.

Intrinsic Safety / Non Incendive application
Only connect the equipment with the "Intrinsic safety" protection type to a circuit intrinsically safe. If the equipment has already been used in circuits not intrinsically safe or if the electrical specifications have not been respected, the safety of the equipment is no longer guaranteed for "Intrinsic Safety" installations.
In hazardous areas with intrinsic safety or or non-incendive requirements, the circuit entity parameters and applicable installation procedures must be observed.
The instrument must be connected to a proper intrinsic safety barrier. Check the intrinsically safe parameters involving the barrier and equipment including the cable and connections. Associated apparatus ground bus shall be insulated from panels and mounting enclosures. Shield is optional, when using shielded cable, be sure to insulate the end not grounded.
Cable capacitance and inductance plus Ci and Li must be smaller than Co and Lo of the Associated Apparatus.
It is recommended do not remove the housing covers when powered on.

Explosionproof / Flameproof application
Only use Explosionproof/Flameproof certified Plugs, Adapters and Cable glands.
The electrical connections entries must be connected using a conduit with sealed unit or closed using metal cable gland or metal blanking plug with at least IP66.
Do not remove the housing covers when powered on.

Enclosure
The electronic housing and sensor threads installed in hazardous areas must have a minimum of 6 fully engaged threads.
The covers must be tightening with at least 8 turns, to avoid the penetration of humidity or corrosive gases, and until it touches the housing. Then, tighten more 1/3 turn (120º) to guarantee the sealing.
Lock the housing and covers using the locking screw.
The enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction.
Care must be taken during installation and use to prevent impact or friction.

Degree of Protection of enclosure (IP)
IPx8: Second numeral meaning continuous immersion in water under special condition defined as 10m for a period of 24 hours (Ref: IEC60529).
IPW/ TypeX: Supplementary letter W or X meaning special condition defined as saline environment tested in saturated solution of NaCl 5% w/w at 35ºC for a period of 200 hours (Ref: NEMA 250/ IEC60529).
For enclosure with IP/IPW/TypeX applications, all NPT threads must apply a proper water-proof sealant (a non-hardening silicone group sealant is recommended).

Hazardous Locations Approvals

FM Approvals
FM 3014713
IS Class I, II, III Division 1, Groups A, B, C and D, E, F, G
XP Class I, Division 1, Groups A, B, C, D
DIP Class II, III Division 1, Groups E, F, G
NI Class I, Division 2, Groups A, B, C, D
T4; Ta = -20 ºC to 60 ºC, Type 4, 4X, 6, 6P

Entity Parameters Fieldbus Power Supply Input (report 3015629):
Vmax = 24 Vdc, Imax = 250 mA, Pi = 1.2 W, Ci = 5 nF, Li = 12 uH
Vmax = 16 Vdc, Imax = 250 mA, Pi = 2 W, Ci = 5 nF, Li = 12 uH
Overpressure Limits: 2000 psi for ranges 2, 3 and 4 and 4500 psi for range 5

Drawing 102A-0078, 102A-1214, 102A-1337, 102A-1634, 102A-1635

ATEX DNV
Explosion Proof (PRESAFE 18 ATEX 12410X)
II 2 G Ex db IIC T6 Gb
Ta -20 ºC to +60 ºC
Options: IP66/68W or IP66/68

Special Conditions for Safe Use
Repairs of the flameproof joints must be made in compliance with the structural specifications provided by the manufacturer. Repairs must not be made on the basis of values specified in tables 1 and 2 of EN/IEC 60079-1.

The Essential Health and Safety Requirements are assured by compliance with:
EN IEC 60079-0:2018 General Requirements
EN 60079-1:2014 Flameproof Enclosures “d”

Drawing 102A-1459, 102A-1515

IECEx DNV
Explosion Proof (IECEx PRE 18.0031X)
Ex db IIC T6 Gb
Ta -20 ºC to +60 ºC
Options: IP66/68W or IP66/68

Special Conditions for Safe Use
Repairs of the flameproof joints must be made in compliance with the structural specifications provided by the manufacturer. Repairs must not be made on the basis of values specified in tables 1 and 2 of EN/IEC 60079-1.

The Essential Health and Safety Requirements are assured by compliance with:
IEC 60079-0:2017 General Requirements
IEC 60079-1:2014-06 Equipment protection by flameproof enclosures “d”

Drawing 102A-2109, 102A-2110

ATEX DEKRA
Intrinsic Safety (DMT 02 ATEX E 084)
Ex I M1 Ex ia I Ma
Ex II 1/2 G Ex ia IIC T4/T5/T6 Ga/Gb

FISCO Field Device
Supply circuit for the connection to an intrinsically safe FISCO fieldbus-circuit:
Ui = 24 Vdc, Ii = 380 mA, Pi = 5.32 W, Ci ≤ 5nF, Li = Neg
Parameters of the supply circuit comply with FISCO model according to Annex G EN 60079-11:2012, replacing EN 60079-27: 2008.

Ambient Temperature:
-40ºC ≤ Ta ≤ +60ºC (T4)
-40ºC ≤ Ta ≤ +50ºC (T5)
-40ºC ≤ Ta ≤ +40ºC (T6)

The Essential Health and Safety Requirements are assured by compliance with:
EN 60079-0:2012 +A11:2013 General Requirements
EN 60079-11:2012 Intrinsic Safety “i”
EN 60079-26:2015 Equipment with equipment protection level (EPL) Ga

Drawing 102A-1459, 102A-1515, 102A-1461, 102A-1517

CEPEL

Segurança Intrínseca (CEPEL 96.0075X)

CEPEL 96.0075X Equipamento de campo FISCO Ex ia IIC T* Ga IP66W Ui = 30 V Ii = 380 mA Pi = 5,32 W Ci = 5,0 nF Li = desp T_{amb}: -20 °C a +50 °C para T5 T_{amb}: -20 °C a +65 °C para T4	CEPEL 96.0075X Equipamento de campo FISCO Ex ia IIIC T* Da IP66W T_{amb}: -20 °C a +50 °C para T100 ºC T_{amb}: -20 °C a +65 °C para T135 ºC

Prova de Explosão (CEPEL 98.0054)

CEPEL 98.0054
Ex db IIC T6 Ga/Gb
Ex tb IIIC T85 ºC Da/Db
IP66W
T_{amb}: -20 °C a +40 °C

Observações:
1) A validade deste Certificado de Conformidade está atrelada à realização das avaliações de manutenção e tratamento de possíveis não conformidades, de acordo com as orientações do Cepel, previstas no Regulamento de Avaliação da Conformidade. Para verificação da condição atualizada de regularidade deste Certificado de Conformidade deve ser consultado o banco de dados de produtos e serviços certificados do Inmetro.
2) O número do certificado é finalizado pela letra "X":
   - Indicar que para a versão do Transmissor de pressão, intrinsecamente seguro, modelos: LD292, LD293, LD302 e LD303 equipado com invólucro fabricado em liga de alumínio, somente pode ser instalado em localização que exigem o “EPL Ga”, se durante a instalação for excluído o risco de ocorrer impacto ou fricção entre o invólucro e peças de ferro/aço.
3) A tampa do invólucro possui uma plaqueta de advertência com a seguinte inscrição: "ATENÇÃO - NÃO ABRA ENQUANTO ENERGIZADO", ou similar tecnicamente equivalente.
4) O produto adicionalmente marcado com a letra suplementar "W" indica que o equipamento foi ensaiado em uma solução saturada a 5% de NaCl p/p, à 35 °C, pelo tempo de 200 h e foi aprovado para uso em atmosferas salinas, condicionado à utilização de acessórios de instalação no mesmo material do equipamento e de bujões de aço inoxidável ASTM-A240, para fechamento das entradas roscadas não utilizadas. Os materiais de fabricação dos equipamentos aprovados para letra "W" são: aço inoxidável AISI 316 e alumínio Copper Free SAE 336 pintados (Procedimento P-CQ-FAB764-11) com tinta Resina Poliéster ou Resina Epóxi com espessura da camada de tinta de 70 a 150 µm e 120 a 200 µm, respectivamente, ou

pintados com o plano de pintura P1 e P2 (Procedimento P-CQ-FAB-765-07) com tinta Resina Epóxi ou Poliuretano Acrílico Alifático com espessura de camada de tinta de 290 µm a 405 µm e 90 µm a 200 µm, respectivamente.

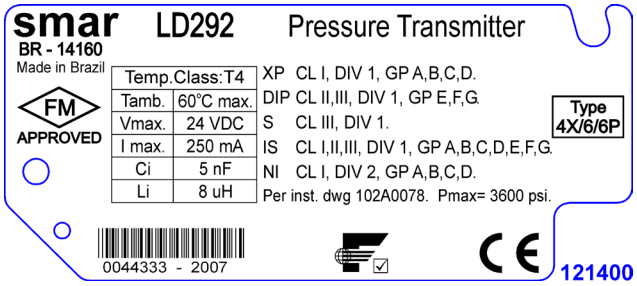
5) Os planos de pintura P1 são permitidos apenas para equipamento fornecido com plaqueta de identificação com marcação para grupo de gás IIB.
6) O grau de proteção IP68 só é garantido se nas entradas roscadas de ½" NPT for utilizado vedante não endurecível à base de silicone conforme Procedimento P-DM-FAB277-08.
7) O segundo numeral oito indica que o equipamento foi ensaiado para uma condição de submersão de dez metros por vinte e quatro horas. O acessório deve ser instalado em equipamentos com grau de proteção equivalente.
8) É responsabilidade do fabricante assegurar que todos os transformadores da placa analógica tenham sido submetidos com sucesso aos ensaios de rotina de 1500 V durante um minuto.
9) Este certificado é válido apenas para os produtos dos modelos avaliados. Qualquer modificação nos projetos, bem como a utilização de componentes ou materiais diferentes daqueles definidos pela documentação descritiva dos produtos, sem a prévia autorização do Cepel, invalidará este certificado.
10) É responsabilidade do fabricante assegurar que os produtos fornecidos ao mercado nacional estejam de acordo com as especificações e documentação descritiva avaliada, relacionadas neste certificado.
11) As atividades de instalação, inspeção, manutenção, reparo, revisão e recuperação dos equipamentos são de responsabilidade dos usuários e devem ser executadas de acordo com os requisitos das normas técnicas vigentes e com as recomendações do fabricante.
12) A marcação é executada conforme a Norma ABNT NBR IEC 60079-0:2020 e o Requisito de Avaliação da Conformidade de Equipamentos Elétricos para Atmosferas Explosivas nas Condições de Gases e Vapores Inflamáveis (RAC), e é fixada na superfície externa do equipamento, em local visível. Esta marcação é legível e durável, levando-se em conta possível corrosão química.

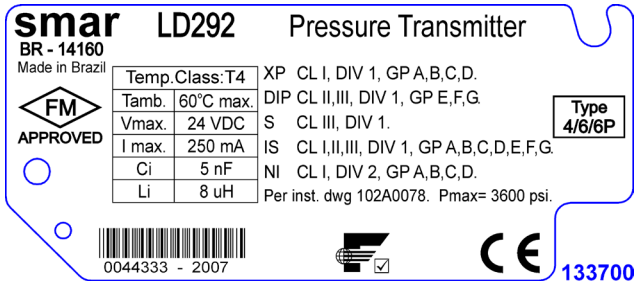
Normas Aplicáveis:
ABNT NBR IEC 60079-0:2020 Atmosferas explosivas - Parte 0: Equipamentos – Requisitos gerais
ABNT NBR IEC 60079-1:2016 Atmosferas explosivas - Parte 1: Proteção de equipamento por invólucro à prova de explosão "d"
ABNT NBR IEC 60079-11:2013 Atmosferas explosivas - Parte 11: Proteção de equipamento por segurança intrínseca "i"
ABNT NBR IEC 60079-26:2022 Atmosferas explosivas - Parte 26: Equipamentos com elementos de separação ou níveis de proteção combinados
ABNT NBR IEC 60079-31:2022 Atmosferas explosivas - Parte 31: Proteção de equipamentos contra ignição de poeira por invólucros "t"
ABNT NBR IEC 60529:2017 Graus de proteção providos por invólucros (Código IP)

Desenhos 102A1372, 102A1252, 102A2028, 102A2027, 102A2086

Identification Plate

FM Approvals





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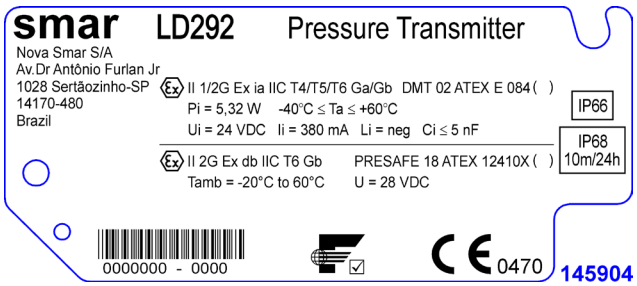

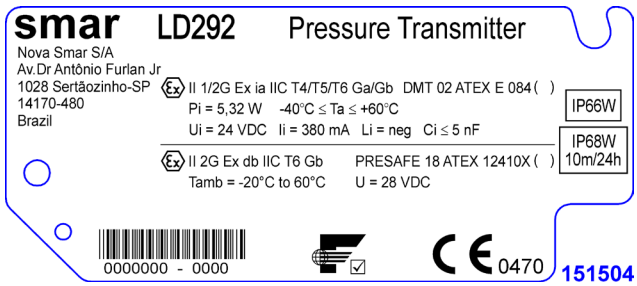

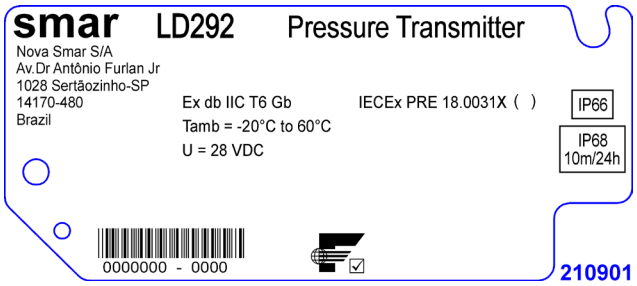

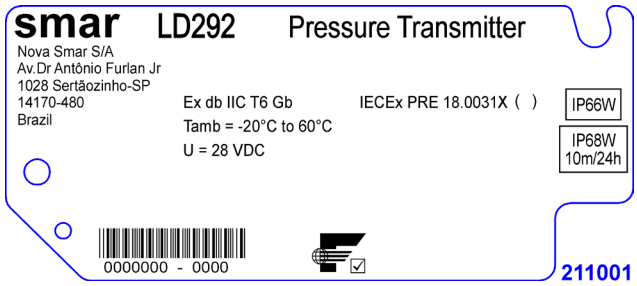

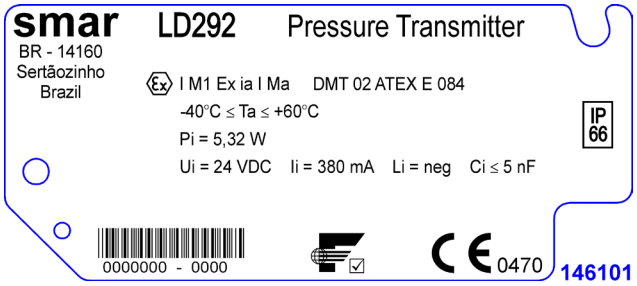

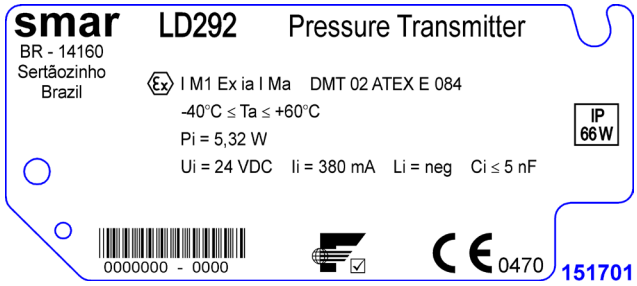

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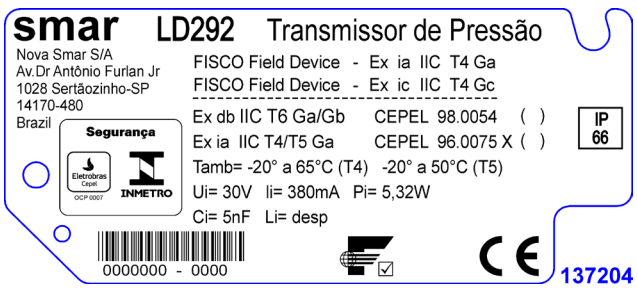
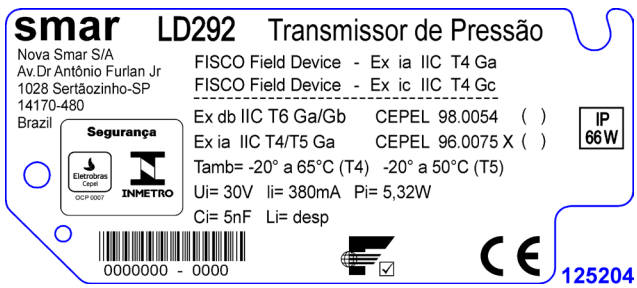
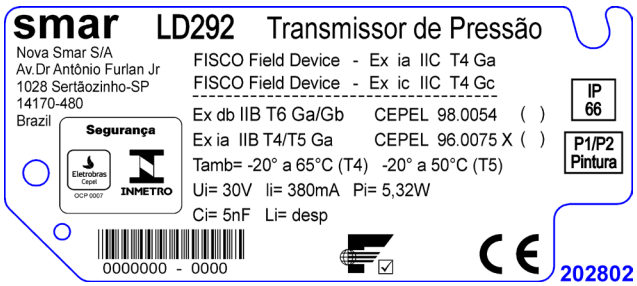
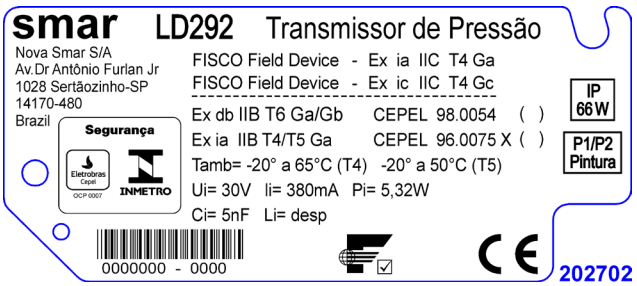





smar LD292 Transmissor de Pressão
Nova Smar S/A
Av.Dr Antônio Furlan Jr
1028 Sertãozinho-SP
14170-480
Brazil
Segurança
Eletrobras Cepel OCP 0007
INMETRO
FISCO Field Device - Ex ia IIC T4 Ga
FISCO Field Device - Ex ic IIC T4 Gc
Ex db IIB T6 Ga/Gb CEPEL 98.0054 ( )
Ex ia IIB T4/T5 Ga CEPEL 96.0075 X ( )
Tamb= -20° a 65°C (T4) -20° a 50°C (T5)
Ui= 30V Ii= 380mA Pi= 5,32W
Ci= 5nF Li= desp
IP 66
P1/P2 Pintura
0000000 - 0000
202802


smar LD292 Transmissor de Pressão
Nova Smar S/A
Av.Dr Antônio Furlan Jr
1028 Sertãozinho-SP
14170-480
Brazil
Segurança
Eletrobras Cepel OCP 0007
INMETRO
FISCO Field Device - Ex ia IIC T4 Ga
FISCO Field Device - Ex ic IIC T4 Gc
Ex db IIB T6 Ga/Gb CEPEL 98.0054 ( )
Ex ia IIB T4/T5 Ga CEPEL 96.0075 X ( )
Tamb= -20° a 65°C (T4) -20° a 50°C (T5)
Ui= 30V Ii= 380mA Pi= 5,32W
Ci= 5nF Li= desp
IP 66 W
P1/P2 Pintura
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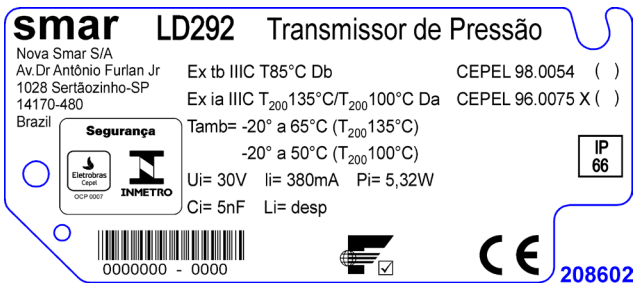
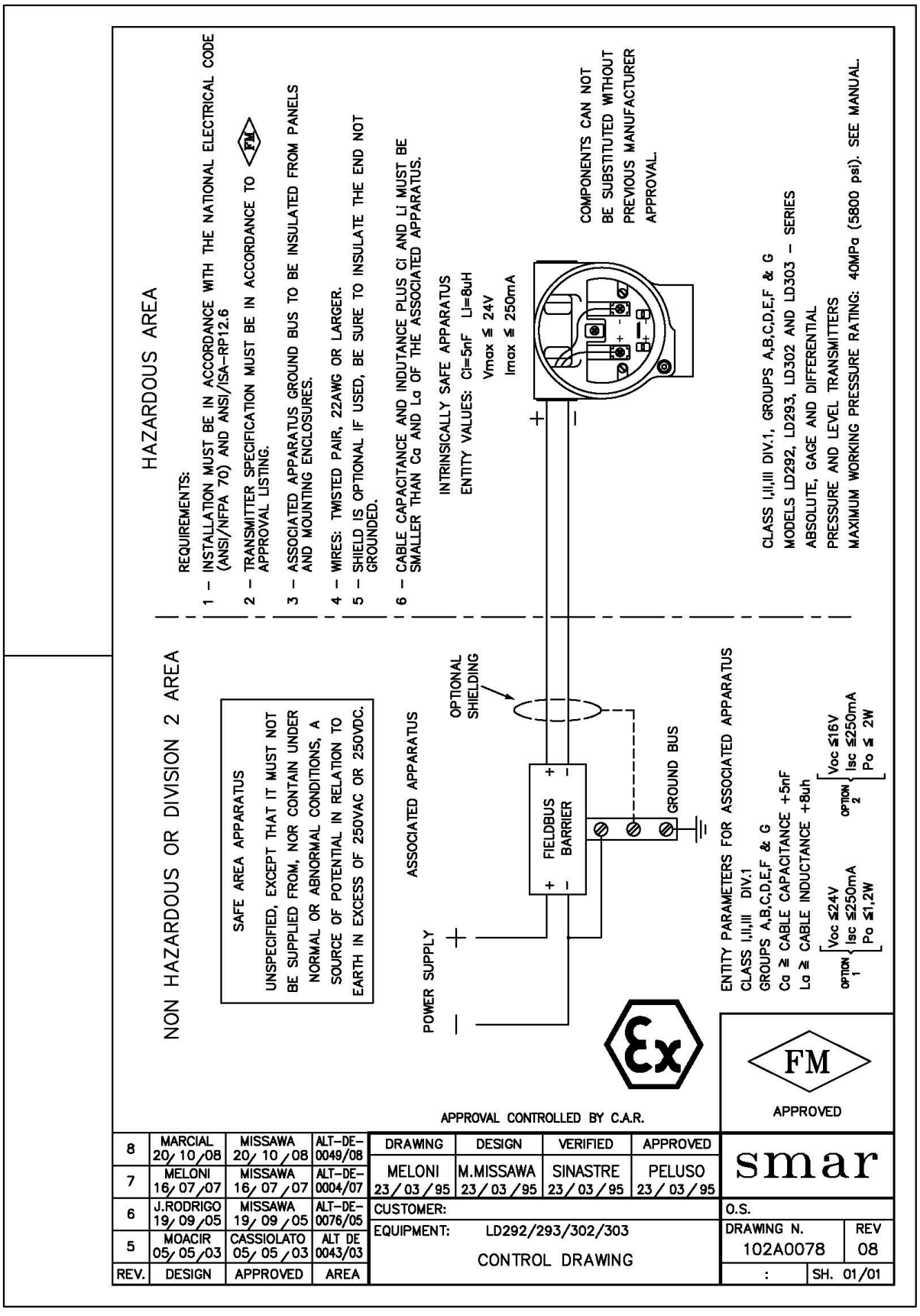

smar LD292 Transmissor de Pressão
Nova Smar S/A
Av.Dr Antônio Furlan Jr
1028 Sertãozinho-SP
14170-480
Brazil
Segurança
Eletrobras Cepel OCP 0007
INMETRO
Ex tb IIIC T85°C Db CEPEL 98.0054 ( )
Ex ia IIIC T200135°C/T200100°C Da CEPEL 96.0075 X ( )
Tamb= -20° a 65°C (T200135°C)
-20° a 50°C (T200100°C)
Ui= 30V Ii= 380mA Pi= 5,32W
Ci= 5nF Li= desp
IP 66
0000000 - 0000
208602

FM Approvals



Appendix B

smar	SRF – Service Request Form Pressure Transmitters	Proposal No.:

Company:	Unit:	Invoice:

COMMERCIAL CONTACT		TECHNICAL CONTACT	
Full Name:		Full Name:	
Function:		Function:	
Phone:	Extension:	Phone:	Extension:
Fax:		Fax:	
Email:		Email:	

EQUIPMENT DATA

Model:	Serial Number:	Sensor Number:
Technology: ( ) 4-20 mA ( ) HART® ( ) FOUNDATION fieldbus ( ) PROFIBUS PA		Version Firmware:

PROCESS DATA

Process Fluid:

Calibration Range		Ambient Temperature (ºF)		Process Temperature (ºF)		Process Pressure	
Min.:	Max.:	Min.:	Max.:	Min.:	Max.:	Min.:	Max.:
Static Pressure		Vacuum					
Min.:	Max.:	Min.:	Max.:				
Normal Operation Time:		Failure Date:					

FAILURE DESCRIPTION

Please, describe the failure. Can the error be reproduced? Is it repetitive?

OBSERVATIONS

USER INFORMATION

Company:

Contact: Title: Section:

Phone: Extension: E-mail:

Date: Signature:

For warranty or non-warranty repair, please contact your representative.
Further information about address and contacts can be found on www.smar.com.br/en/contact-us