MANUAL

INSTRUCTIONS | OPERATION | MAINTENANCE

PROFIBUS PA
PRESSURE TRANSMITTER
LD303

APR/25 - VERSION 4

smar
Technology Company

LD303

Profibus PA Pressure Transmitter

PROFIBUS®

Consult our subsidiary

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INTRODUCTION

The **LD303** is from the first generation of Profibus-PA devices. It is a transmitter for differential, absolute and gauge pressure, level and flow measurements. It is based on a field-proven capacitive sensor that provides reliable operation and high performance. The digital technology used in the **LD303** 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 **LD303** is part of Smar's complete 303 line of Profibus-PA 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.

The system controls variable sampling, algorithm execution and communication so as to optimize the usage of the network, not loosing time. Thus, high closed loop performance is achieved.

Using Profibus technology, with its capability to interconnect several devices, very large control schemes can be constructed. In order to be user friendly the function block concept was introduced. The **LD303**, like the rest of the 303 family, has some Function Blocks built in, like Analog Input and Totalizer Block.

The need for implementation of Fieldbus in small as well as large systems was considered when developing the entire 303 line of Profibus-PA devices. They have common features and can configured locally using a magnetic tool, eliminating the need for a configurator or console in many basic applications.

The **LD303** is available as a product on its own, but also replaces the circuit board for the LD301. They use the same sensor board. Refer to the maintenance section of this manual for instructions on upgrading. The **LD303** uses the same hardware and housing for the LD303.The **LD303** is part of SMAR's **Series 303** of Profibus-PA devices.

The **LD303**, like its predecessor LD301, has some 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 LD303 by carefully reading these instructions.

WARNING
In case of using Simatic PDM as the configuration and parameterization tool, Smar recommends that the user does not apply the option "Download to Device". This function can improperly configure the field device. Smar recommends that user make the use of the option "Download to PG / PC" and then selecting the Device Menu, use the menus of the transducer, function and display blocks acting specifically, according to each menu and method for reading and writing.

NOTE
This Manual is compatible with version 4.XX, where 4 denotes software version and XX software release. The indication 4.XX means that this manual is compatible with any release of software version 4.

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.

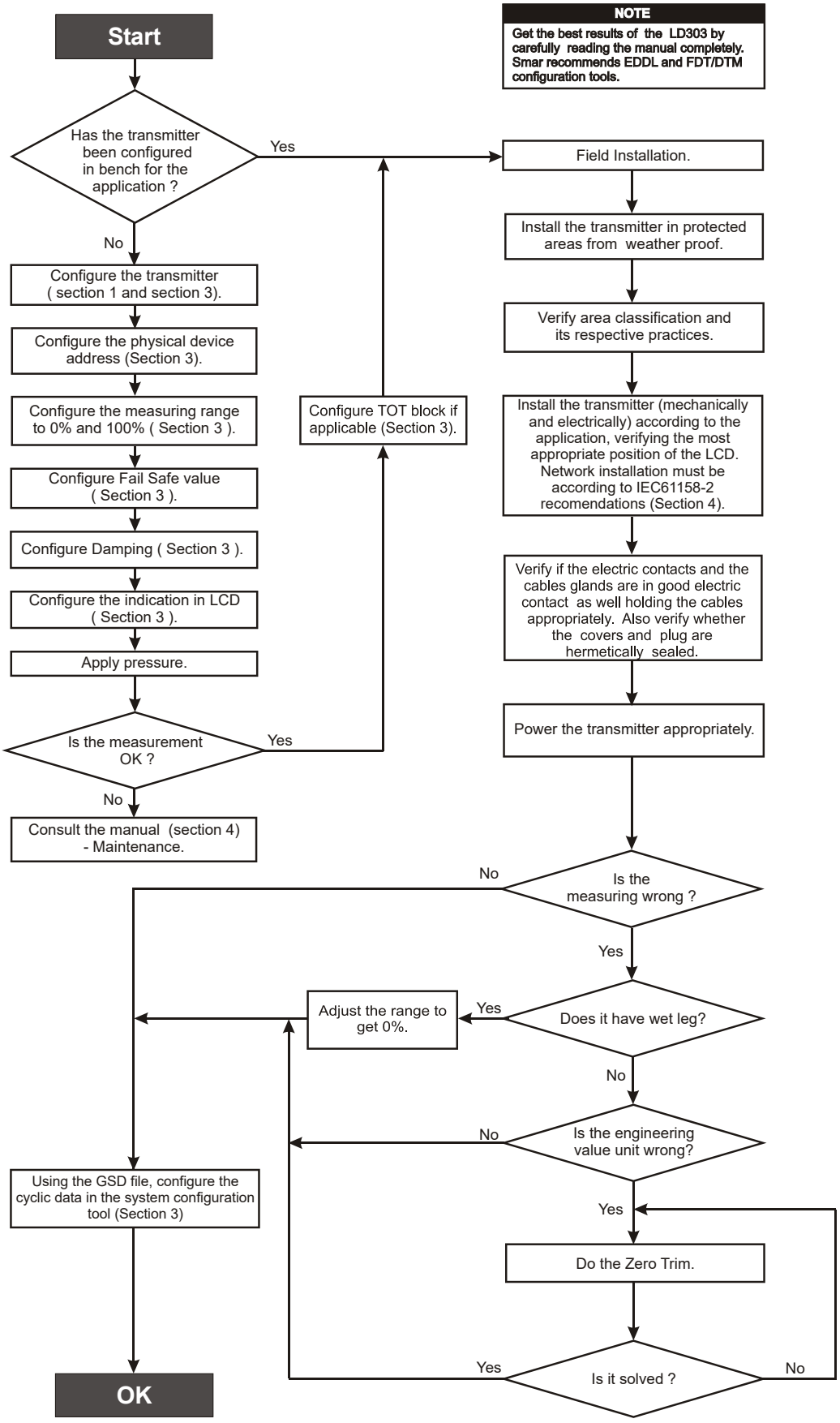
The user is responsible for the incorrect or inadequate handling of equipments run with pneumatic or hydraulic pressure or, still, subject to corrosive, aggressive or combustible products, since their utilization may cause severe bodily harm and/or material damages.

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.

TABLE OF CONTENTS

Basic Installation Flowchart



Section 1

INSTALLATION

General

NOTE
Installations in hazardous areas must follow the recommendations of applicable standards. Refer to Appendix A for this information.

The overall accuracy of a flow, 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 **LD303** 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.

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. When necessary, use thermal insulation to protect the transmitter from external heat sources.

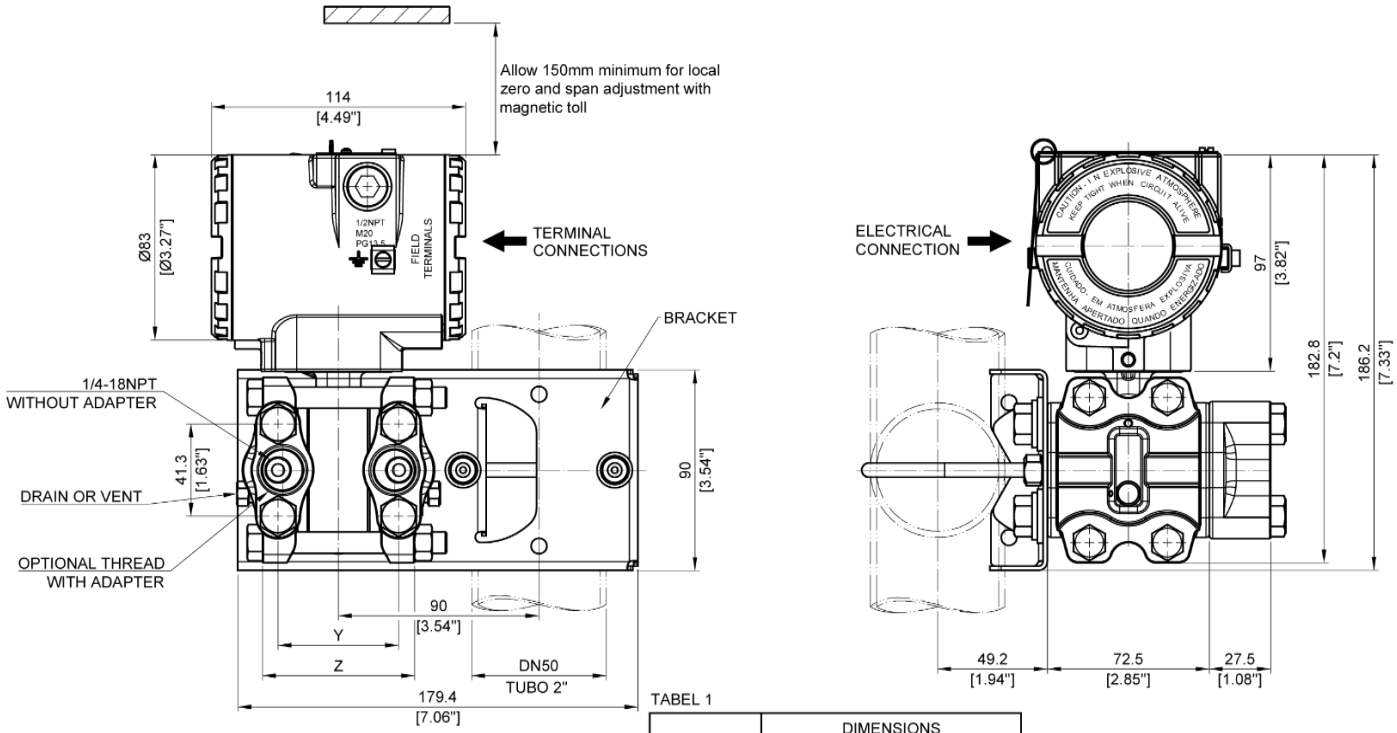
Humidity is fatal for electronic circuits. In areas subjected to high relative humidity, the O-rings for the electronic housing covers must be correctly placed and the covers must be completely closed by tightening them by hand until the O-rings are compressed.

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. The unused outlet connection should be plugged accordingly.

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

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

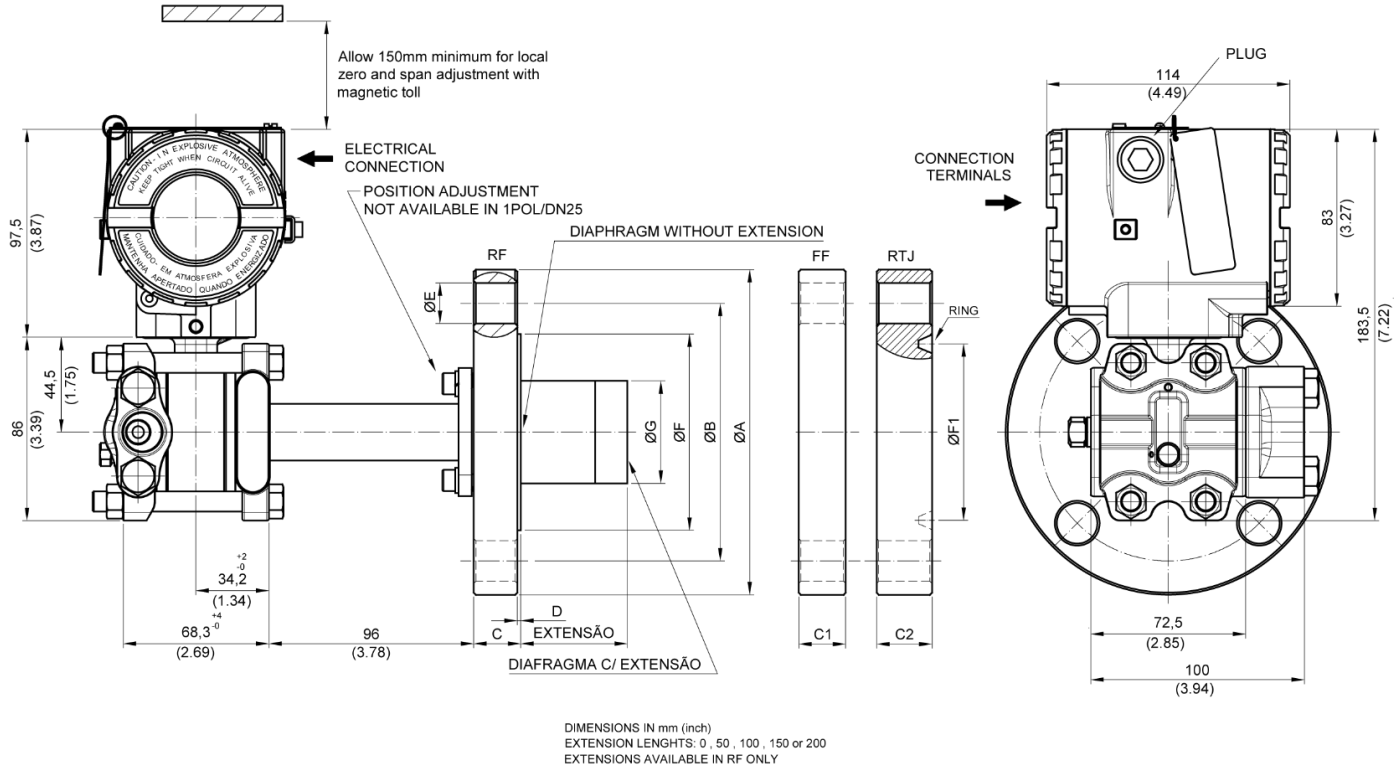
The transmitter has been designed to be both rugged and lightweight at the same time. This makes its mounting easier; mounting positions are shown in Figure 1.1.



TABEL 1

RANGE	DIMENSIONS	
	Y	Z
0-1-2-3	54,0 (2.13)	69,6 (2.74)
4	56,0 (2.20)	71,6 (2.82)
5	58,3 (2.30)	73,9 (2.91)
6	58,7 (2.31)	74,3 (2.93)

Figure 1.1 (a) – Dimensional Drawing and Mounting Position - Differential, Flow, Gage, Absolute and High Static Pressure Transmitters with Mounting Bracket



DIMENSIONS IN mm (inch)
EXTENSION LENGHTS: 0 , 50 , 100 , 150 or 200
EXTENSIONS AVAILABLE IN RF ONLY

ASME-B 16.5 - 2017 DIMENSIONS

DN	CLASS	A	B	C	C1 (FF)	C2 (RTJ)	D	E	F	F1 (RTJ)	RING	G	HOLES
1"	150	110 (4.33)	79,2 (3.12)	17 (0.67)	17 (0.67)	21 (0.83)	2 (0.06)	16 (0.63)	50,8 (2)	47,6 (1.87)	R15		4
	300	125 (4.92)	88,9 (3.50)	19 (0.75)	19 (0.75)	25 (0.98)	2 (0.06)	19 (0.75)	50,8 (2)	50,8 (2)	R16		4
	600	125 (4.92)	88,9 (3.50)	25 (0.96)		25 (0.98)	7 (0.25)	19 (0.75)	50,8 (2)	50,8 (2)	R16		4
1.1/2"	150	125 (4.92)	98,6 (3.88)	20 (0.78)	20 (0.79)	24,4 (0.96)	2 (0.06)	16 (0.63)	73,2 (2.88)	65,1 (2.56)	R19	40 (1.57)	4
	300	155 (6.10)	114,3 (4.5)	21 (0.83)	20 (0.79)	28,7 (1.13)	2 (0.06)	22 (0.87)	73,2 (2.88)	68,3 (2.68)	R20	40 (1.57)	4
	600	155 (6.10)	114,3 (4.5)	29,3 (1.15)		28,7 (1.13)	7 (0.25)	22 (0.87)	73,2 (2.88)	68,3 (2.68)	R20	40 (1.57)	4
2"	150	150 (5.90)	120,7 (4.75)	20 (0.79)	20 (0.79)	23,9 (0.94)	2 (0.06)	19 (0.75)	92 (3.62)	82,6 (3.25)	R22	48 (1.89)	4
	300	165 (6.50)	127 (5)	22,7 (0.89)	20,7 (0.81)	28,6 (1.13)	2 (0.06)	19 (0.75)	92 (3.62)	82,6 (3.25)	R23	48 (1.89)	8
	600	165 (6.50)	127 (5)	32,3 (1.27)		33,3 (1.31)	7 (0.25)	19 (0.75)	92 (3.62)	82,6 (3.25)	R23	48 (1.89)	8
3"	150	190 (7.48)	152,4 (6)	24,3 (0.96)	22,3 (0.88)	28,7 (1.13)	2 (0.06)	19 (0.75)	127 (5)	114,3 (4.5)	R29	73 (2.87)	4
	300	210 (8.27)	168,1 (6.62)	29 (1.14)	27 (1.06)	34,9 (1.37)	2 (0.06)	22 (0.87)	127 (5)	123,8 (4.87)	R31	73 (2.87)	8
	600	210 (8.27)	168,1 (6.62)	38,8 (1.53)		39,7 (1.56)	7 (0.25)	22 (0.87)	127 (5)	123,8 (4.87)	R31	73 (2.87)	8
4"	150	228,6 (9)	190,5 (7.5)	24,3 (0.96)	22,3 (0.88)	28,7 (1.13)	2 (0.06)	19 (0.75)	157 (6.19)	149,2 (5.87)	R36	89 (3.50)	8
	300	255 (10)	200 (7.87)	32,2 (1.27)	30,2 (1.19)	38,1 (1.50)	2 (0.06)	22 (0.87)	157 (6.19)	149,2 (5.87)	R37	89 (3.50)	8
	600	275 (10.83)	215,9 (8.5)	45,1 (1.77)		46 (1.81)	7 (0.25)	25 (1)	157 (6.19)	149,2 (5.87)	R37	89 (3.50)	8

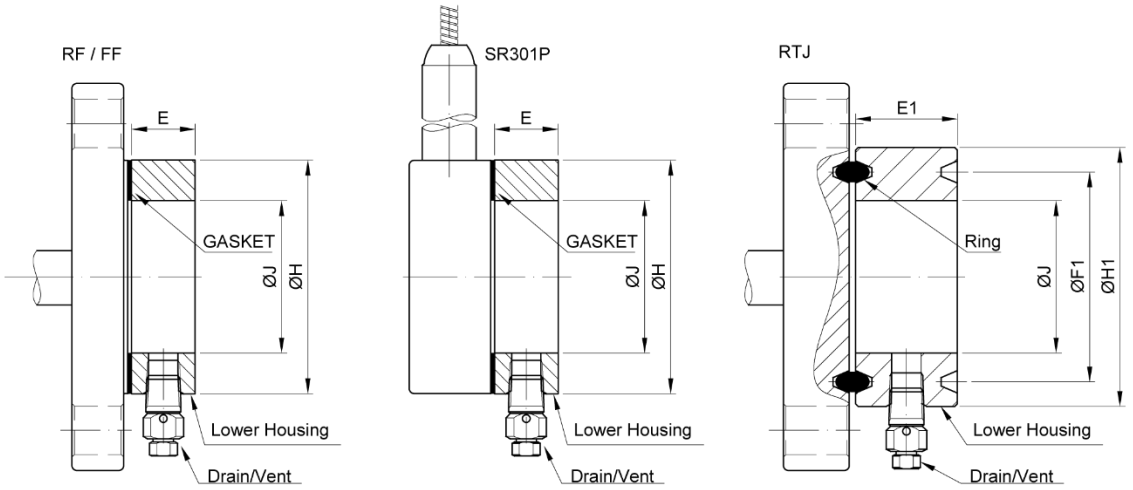
EN 1092-1-2008 DIMENSIONS

DN	PN	A	B	C	C1 (FF)		D	E	F		G	HOLES
25	10/40	115 (4.53)	85 (3.35)	19 (0.75)	19 (0.75)		2 (0.08)	14 (0.55)	68 (2.67)			4
40	10/40	150 (5.91)	110 (4.33)	20 (0.78)	20 (0.78)		3 (0.12)	18 (0.71)	88 (3.46)		40 (1.57)	4
50	10/40	165 (6.50)	125 (4.92)	20 (0.78)	20 (0.78)		3 (0.12)	18 (0.71)	102 (4.01)		48 (1.89)	4
80	10/40	200 (7.87)	160 (6.3)	24 (0.95)	24 (0.95)		3 (0.12)	18 (0.71)	138 (5.43)		73 (2.87)	8
100	10/16	220 (8.67)	180 (7.08)	20 (0.78)			3 (0.12)	18 (0.71)	158 (6.22)		89 (3.50)	8
	25/40	235 (9.25)	190 (7.5)	24 (0.95)			3 (0.12)	22 (0.87)	162 (6.38)		89 (3.50)	8

JIS B 2220 DIMENSIONS

	CLASS	A	B	C		D	E	F		G	HOLES
40A	20K	140 (5.5)	105 (4.13)	20 (0.78)		2 (0.08)	19 (0.75)	81 (3.2)		40 (1.57)	4
50A	10K	155 (6.1)	120 (4.72)	20 (0.78)		2 (0.08)	15 (0.59)	96 (3.78)		48 (1.89)	4
	20K	155 (6.1)	120 (4.72)	20 (0.78)		2 (0.08)	19 (0.75)	96 (3.78)		48 (1.89)	8
	40K	165 (6.5)	130 (5.12)	26 (1.02)		2 (0.08)	19 (0.75)	105 (4.13)		48 (1.89)	8
80A	10K	185 (7.28)	150 (5.9)	22 (0.87)		2 (0.08)	19 (0.75)	126 (4.96)		73 (2.87)	8
	20K	200 (7.87)	160 (6.3)	22 (0.87)		2 (0.08)	19 (0.75)	132 (5.2)		73 (2.87)	8
100A	10K	210 (8.27)	175 (6.89)	20 (0.78)		2 (0.08)	19 (0.75)	151 (5.95)		89 (3.50)	8

Figure 1.1 (b) – Dimensional Drawing and Mounting Position - Flanged Pressure Transmitter with Integral Flange

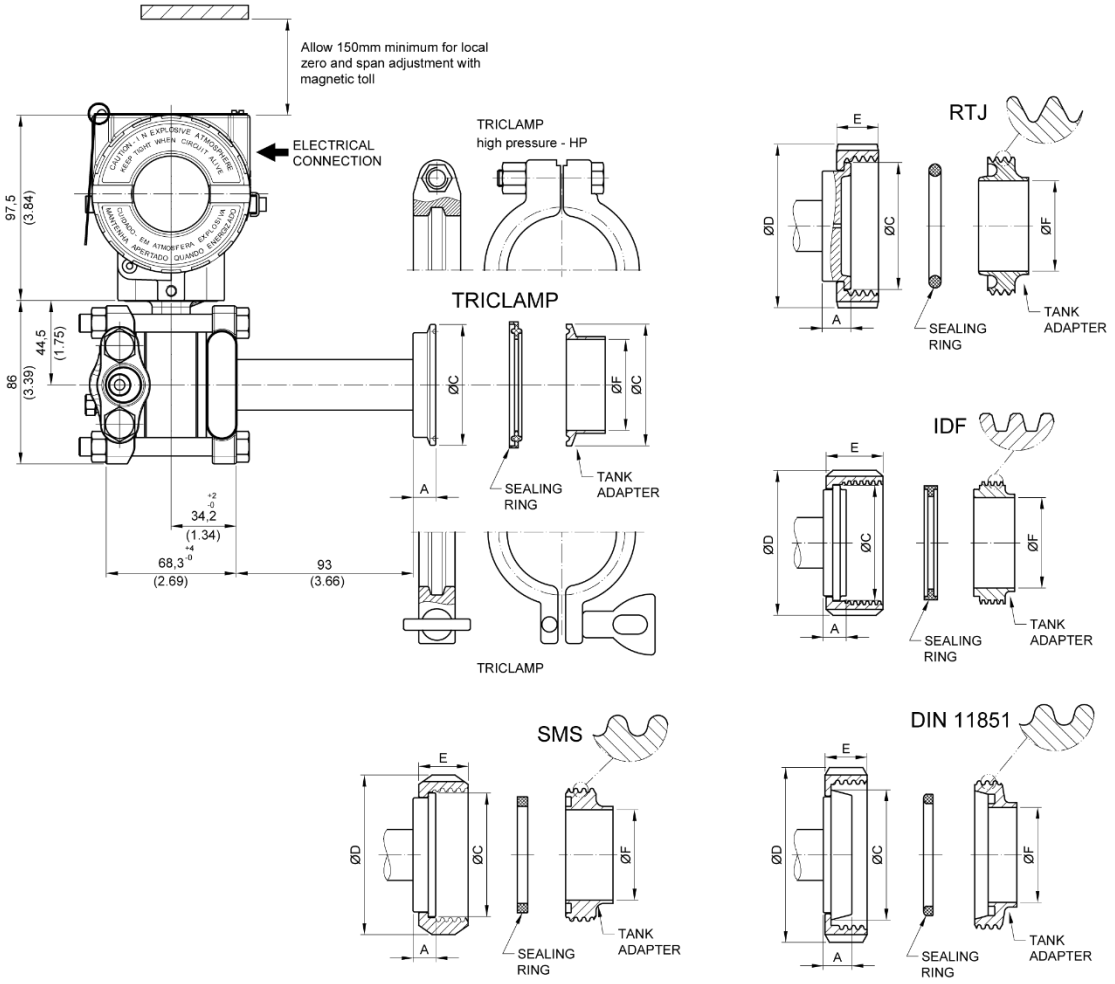


DIMENSIONS - RF / FF - mm (inch)						
STANDARD	DN	CLASS	H	J	E	
					1/4"NPT	1/2"NPT
ASME B16.5	1"	ALL	50,8 (2,00)	35 (1,38)	25	
	1.1/2"		73,2 (2,88)	48 (1,89)	25	35
	2"		91,9 (3,62)	60 (2,36)	25	35
	3"		127 (5,00)	89 (3,50)	25	35
	4"		158 (6,22)	115 (4,53)	25	35
DIN EN 1092-1	25	ALL	68 (2,68)	35 (1,38)	25	35
	40		88 (3,46)	48 (1,89)	25	35
	50		102 (4,02)	60 (2,36)	25	35
	80		138 (5,43)	89 (3,50)	25	35
	100		158 (6,22)	115 (4,53)	25	35
JIS B 2220	40A	20K	81 (3,19)	48 (1,89)	25	35
	50A	10K	96 (3,78)	60 (1,36)	25	35
		40K	105 (4,13)	60 (1,36)	25	35
	80A	10K	126 (4,96)	89 (3,50)	25	35
		20K	132 (5,20)	89 (3,50)	25	35
	100A	10K	151 (5,94)	115 (4,53)	25	35

DIMENSIONS - RTJ - mm (inch) - ASME B16.5							
DN	CLASS	F1	RING	H1	J	E1	
						1/4"NPT	1/2"NPT
1"	150	47,6 (1,87)	R15	63,5 (2,50)	35 (1,38)	40	45
	300	50,8 (2,00)	R16	70 (2,75)	35 (1,38)	40	45
	600	50,8 (2,00)	R16	70 (2,75)	35 (1,38)	40	45
	1500	50,8 (2,00)	R16	71,5 (2,81)	35 (1,38)	40	45
	2500	60,3 (2,37)	R18	73 (2,88)	35 (1,38)	40	45
1.1/2"	150	65,1 (2,56)	R19	82,5 (3,25)	48 (1,89)	40	45
	300	68,3 (2,69)	R20	90,5 (3,56)	48 (1,89)	40	45
	600	68,3 (2,69)	R20	90,5 (3,56)	48 (1,89)	40	45
	1500	68,3 (2,69)	R20	92 (3,62)	48 (1,89)	40	45
	2500	82,6 (3,25)	R23	114 (4,50)	48 (1,89)	40	45
2"	150	82,6 (3,25)	R22	102 (4,00)	60 (2,36)	40	45
	300	82,6 (3,25)	R23	108 (4,25)	60 (2,36)	40	45
	600	82,6 (3,25)	R23	108 (4,25)	60 (2,36)	40	45
	1500	95,3 (3,75)	R24	124 (4,88)	60 (2,36)	40	45
	2500	101,6 (4,00)	R26	133 (5,25)	60 (2,36)	40	45
3"	150	114,3 (4,50)	R29	133 (5,25)	89 (3,50)	40	45
	300	123,8 (4,87)	R31	146 (5,75)	89 (3,50)	40	45
	600	123,8 (4,87)	R31	146 (5,75)	89 (3,50)	40	45
4"	150	149,2 (5,87)	R36	171 (6,75)	115 (4,53)	40	45
	300	149,2 (5,87)	R37	175 (6,88)	115 (4,53)	40	45
	600	149,2 (5,87)	R37	175 (6,88)	115 (4,53)	40	45

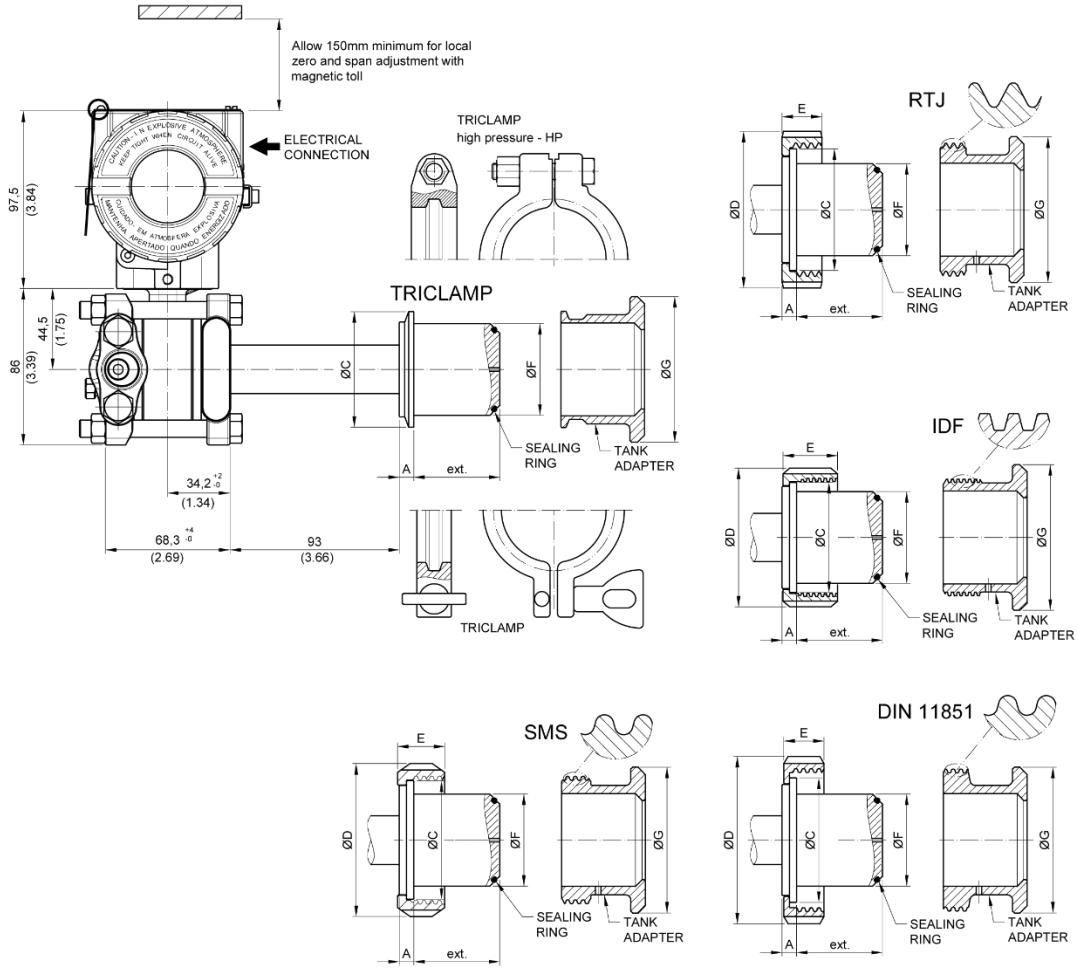
LOWER HOUSING 1/2NPT SUPPLIED WITH PLASTIC PROTECTION
NOT LOWER HOUSING 1/2 NPT FOR 1 INCH

Figure 1.1 (c) – Dimensional Drawing and Mounting Position - Lower Housing



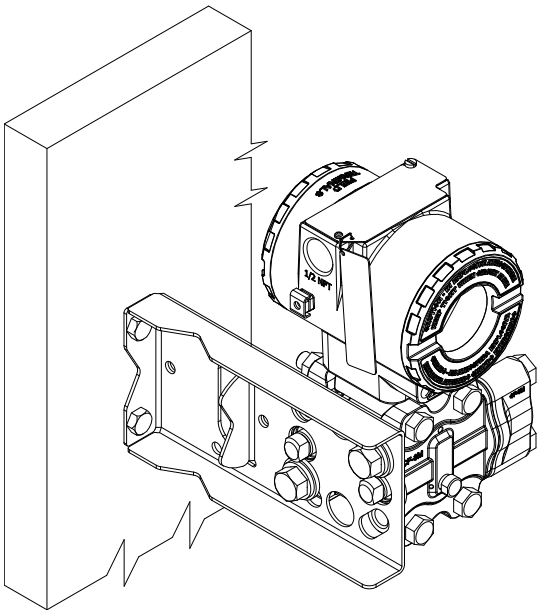
SR301S / LD30xS / LD400S							
CONNECTIONS WITHOUT EXTENSION	Dimensions in mm (inch)						
	A	ØC	ØD	E	ØF	ØG	EXT.
Tri-Clamp - 1 1/2" - without extension	12 (0.47)	50 (1.96)	---	---	35 (1.38)	---	---
Tri-Clamp - 1 1/2" HP - without extension	12 (0.47)	50 (1.96)	---	---	35 (1.38)	---	---
Tri-Clamp - 2" - without extension	12 (0.47)	63,5 (2.5)	---	---	47,6 (1.87)	---	---
Tri-Clamp - 2" HP - without extension	12 (0.47)	63,5 (2.5)	---	---	47,6 (1.87)	---	---
Tri-Clamp - 3" - without extension	12 (0.47)	91 (3.58)	---	---	72 (2.83)	---	---
Tri-Clamp - 3" HP - without extension	12 (0.47)	91 (3.58)	---	---	72 (2.83)	---	---
Thread DN40 - DIN 11851 - without extension	13 (0.51)	56 (2.2)	78 (3.07)	21 (0.83)	38 (1.5)	---	---
Thread DN50 - DIN 11851 - without extension	15 (0.59)	68,5 (2.7)	92 (3.62)	22 (0.86)	50 (1.96)	---	---
Thread DN80 - DIN 11851 - without extension	16 (0.63)	100 (3.94)	127 (5)	29 (1.14)	81 (3.19)	---	---
Thread SMS - 1 1/2" - without extension	12 (0.47)	55 (2.16)	74 (2.91)	25 (0.98)	35 (1.38)	---	---
Thread SMS - 2" - without extension	12 (0.47)	65 (2.56)	84 (3.3)	26 (1.02)	48,6 (1.91)	---	---
Thread SMS - 3" - without extension	12 (0.47)	93 (3.66)	113 (4.45)	32 (1.26)	73 (2.87)	---	---
Thread RJT - 2" - without extension	15 (0.59)	66,7 (2.63)	86 (3.38)	22 (0.86)	47,6 (1.87)	---	---
Thread RJT - 3" - without extension	15 (0.59)	92 (3.62)	112 (4.41)	22,2 (0.87)	73 (2.87)	---	---
Thread IDF - 2" - without extension	12 (0.47)	60.5 (2.38)	76 (2.99)	30 (1.18)	47,6 (1.87)	---	---
Thread IDF - 3" - without extension	12 (0.47)	87,5 (3.44)	101,6 (4)	30 (1.18)	73 (2.87)	---	---

Figure 1.1 (d) – Dimensional Drawing and Mounting Position - Sanitary Transmitter without Extension



SR301S / LD30XS / LD400S							
CONNECTIONS WITH EXTENSION	Dimensions in mm (inch)						
	A	ØC	ØD	E	ØF	ØG	EXT.
Tri-Clamp DN50 - with extension	8 (0.315)	64 (2.52)	---	---	50,5 (1.99)	80 (3.15)	48 (1.89)
Tri-Clamp DN50 HP - with extension	8 (0.315)	64 (2.52)	---	---	50,5 (1.99)	80 (3.15)	48 (1.89)
Tri-Clamp - 2" - with extension	8 (0.315)	64 (2.52)	---	---	50,5 (1.99)	80 (3.15)	48 (1.89)
Tri-Clamp - 2" HP -with extension	8 (0.315)	64 (2.52)	---	---	50,5 (1.99)	80 (3.15)	48 (1.89)
Tri-Clamp - 3" - with extension	8 (0.315)	91 (3.58)	---	---	72,5 (2.85)	100 (3.94)	50 (1.96)
Tri-Clamp - 3" HP - with extension	8 (0.315)	91 (3.58)	---	---	72,5 (2.85)	100 (3.94)	50 (1.96)
Thread DN25 - DIN 11851 - with extension	6 (0.24)	47,5 (1.87)	63 (2.48)	21 (0.83)	43,2 (1.7)	80 (3.15)	26,3 (1.03)
Thread DN40 - DIN 11851 - with extension	8 (0.315)	56 (2.2)	78 (3.07)	21 (0.83)	50,5 (1.99)	80 (3.15)	48 (1.89)
Thread DN50 - DIN 11851 - with extension	8 (0.315)	68,5 (2.7)	92 (3.62)	22 (0.86)	50,5 (1.99)	80 (3.15)	48 (1.89)
Thread DN80 - DIN 11851 - with extension	8 (0.315)	100 (3.94)	127 (5)	29 (1.14)	72,5 (2.85)	100 (3.94)	50 (1.96)
Thread SMS - 2" - with extension	8 (0.315)	65 (2.56)	84 (3.3)	26 (1.02)	50,5 (1.99)	80 (3.15)	48 (1.89)
Thread SMS - 3" - with extension	8 (0.315)	93 (3.66)	113 (4.45)	32 (1.26)	72,5 (2.85)	100 (3.94)	50 (1.96)
Thread RJT - 2" - with extension	8 (0.315)	66,7 (2.63)	86 (3.38)	22 (0.86)	50,5 (1.99)	80 (3.15)	48 (1.89)
Thread RJT - 3" - with extension	8 (0.315)	92 (3.62)	112 (4.41)	22,2 (0.87)	72,5 (2.85)	100 (3.94)	50 (1.96)
Thread IDF - 2" - with extension	8 (0.315)	60.5 (2.38)	76,2 (3)	30 (1.18)	50,5 (1.99)	80 (3.15)	48 (1.89)
Thread IDF - 3" - with extension	8 (0.315)	87,5 (3.44)	101,6 (4)	30 (1.18)	72,5 (2.85)	100 (3.94)	50 (1.96)

Figure 1.1 (e) – Dimensional Drawing and Mounting Position - Sanitary Transmitter with Extension



WALL OR PANEL MOUNTING
(See Section 5 – spare parts list
for mounting brackets available)

Figure 1.2 – Drawing of LD303 Mounted on the Panel or Wall

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 transmitter position in relation to the taps, are shown in Figure 1.3. The pressure taps location, and the relative positions of the transmitter are indicated in Table 1.1.

Process Fluid	Location of	Location of LD301 in Relation to the Taps
Gas	Top or Side	Above the Taps
Liquid	Side	Below the Taps or at the same level
Steam	Side	Below the Taps using Sealing (Condensate) Pots

Table 1.1 - Location of Pressure Taps

NOTE
For liquids, condensates, wet vapors and gases the impulse lines must be tilted on the ratio of 1:10 to prevent bubbles from accumulating;
The transmitter and its impulse lines must be tightly fixed;
If necessary, install the condensate and mud pots;
Use manifold valves to facilitate maintenance and adjustments.

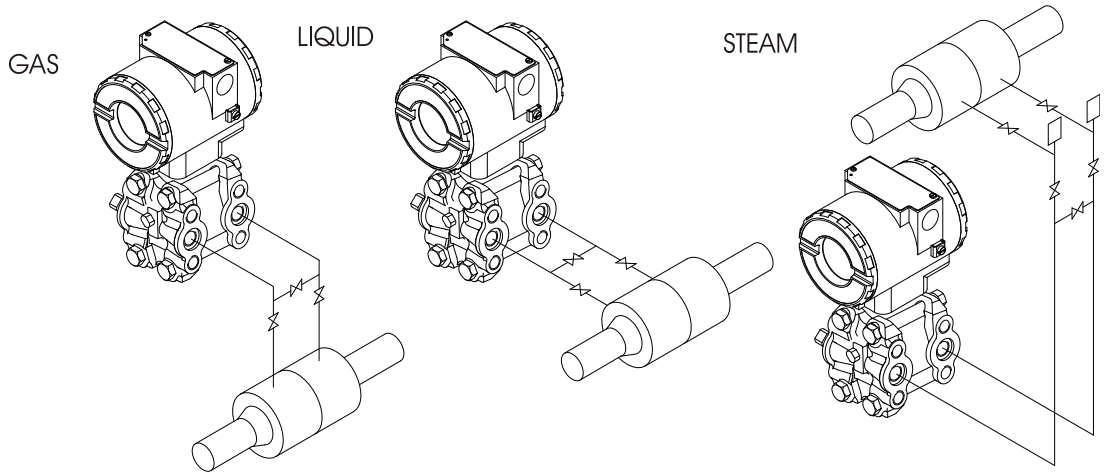


Figure 1.3 - Position of the Transmitter and Taps

Housing Rotation

The housing can be rotated in order to get the digital display in better position. To rotate it, releases the Housing Rotation Set Screw. See Figure 1.4.

The digital display itself can also be rotated. In Section 4, See Figure 4.3.

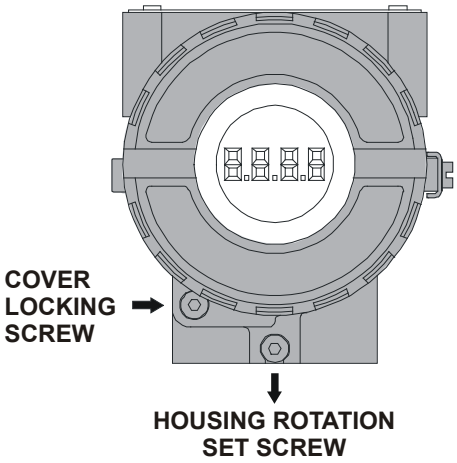


Figure 1.4 - Housing Rotation Set Screw

Reach the wiring block by removing the Electrical Connection Cover. This cover can be locked closed by the cover locking screw (Figure 1.5). To release the cover, rotate the locking screw clockwise.

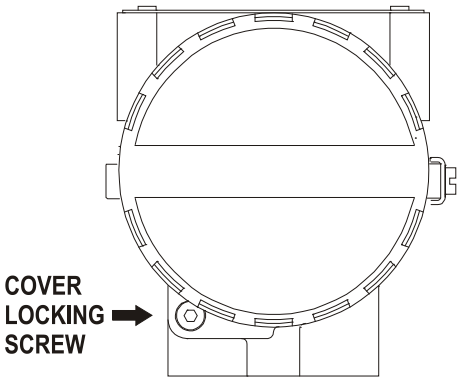


Figure 1.5 - Housing Rotation Set Screw

For convenience there are three ground terminals: one inside the cover and two externals, located close to the conduit entries. See figure 1.6.

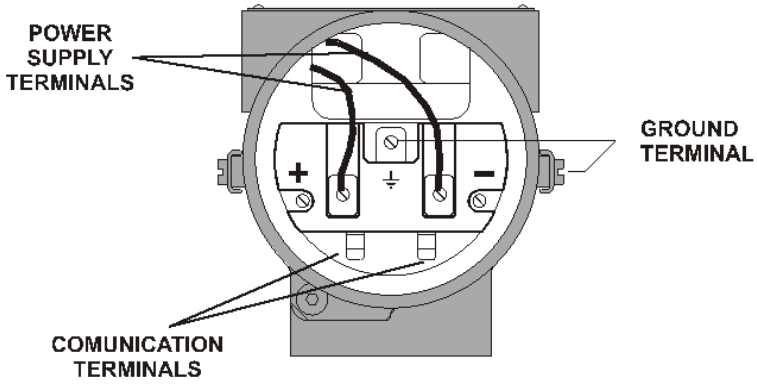


Figure 1.6 - Terminal Block

The **LD303** 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.

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

The **LD303** is powered via bus. The limit for such devices is according to the DP/PA coupler limitation for one bus for non-intrinsically safe requirement.

In hazardous area, the number of devices may be limited by intrinsically safe restrictions, according to the DP/PA coupler and barriers limitation.

The **LD303** is protected against reverse polarity, and can withstand ±35 VDC without damage, but it will not operate when in reverse polarity.

The Figure 1.7 shows the correct installation of the conduit, in order to avoid penetration of water, or other substance, which may cause malfunctioning of the equipment.

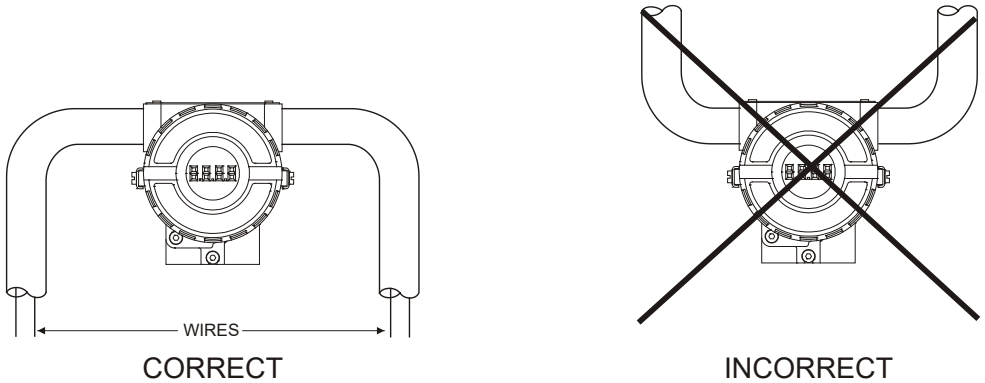


Figure 1.7 - Conduit Installation Diagram

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, due to the fact that the absolute zero, is the reference for these transmitters, so there is no need for a zero value for the Lower trim.

When the sensor is in the horizontal position, the weight of the fluid pushes the diaphragm down, making it necessary a Lower Pressure Trim see Figure 1.8.

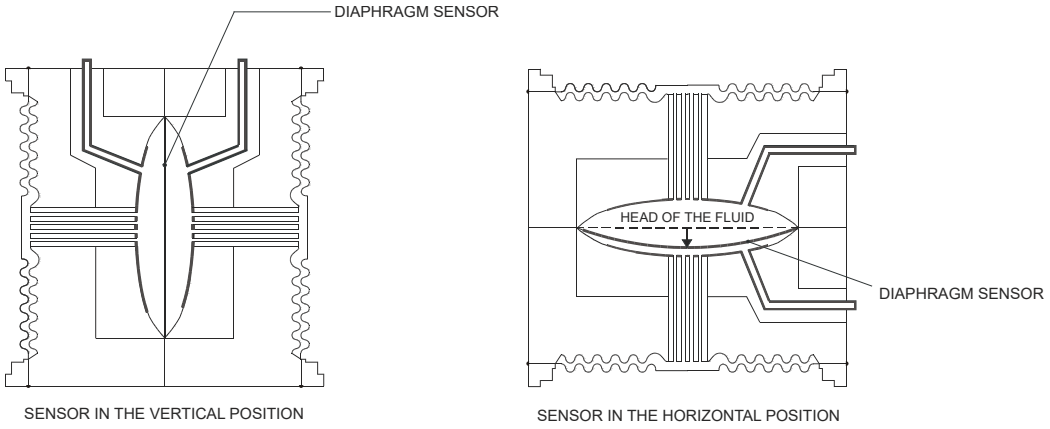


Figure 1.8 - Sensor Positions

NOTE
Please refer to the General Installation, Operation and Maintenance Procedures Manual for more details.

Bus Topology and Network Configuration

Wiring

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 1.9) and tree topology (See Figure 1.10) 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 Profibus should not exceed 1900 m.

The connection of couplers should be kept less than 15 per 250 m. In following figures the DP/PA link depends on the application needs.

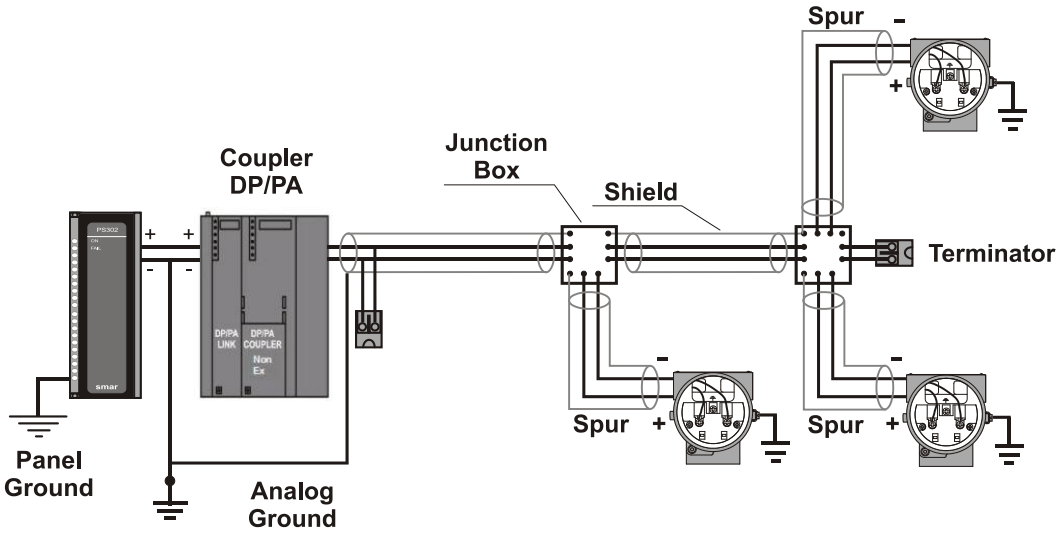


Figure 1.9 - Bus Topology

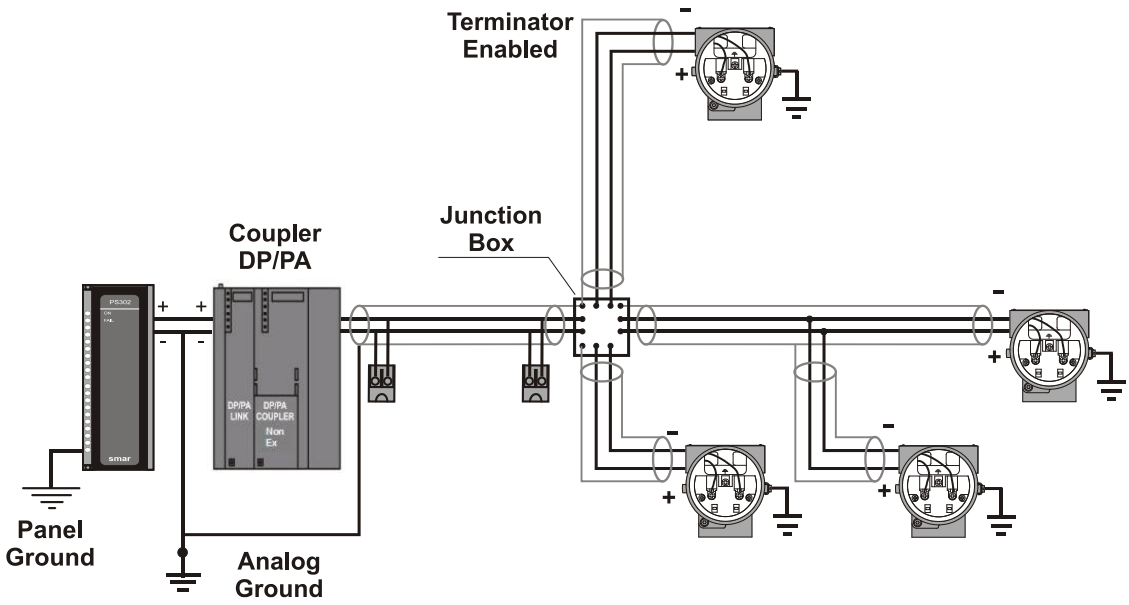


Figure 1.10 - Tree Topology

Intrinsic Safety Barrier

When the Profibus is in an area requiring intrinsic safety, a barrier must be inserted on the trunk between the power supply and the DP/PA coupler, when it is Non-Ex type.

Jumper Configuration

In order to work properly, the jumpers J1 and W1 located in the **LD303** 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 **LD303** 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

Consult the Appendix A for Hazardous Location Approvals.

OPERATION

The **LD303** 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 LD301 series uses, the sensor modules are therefore interchangeable.

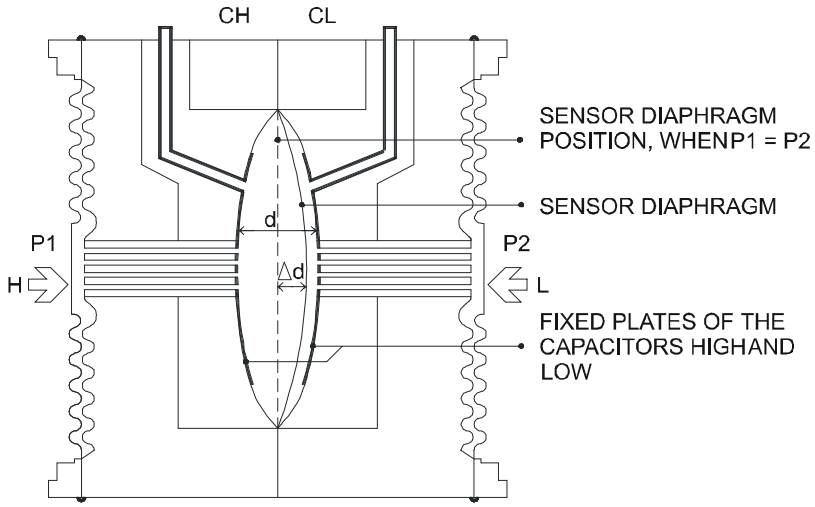


Figure 2.1 - Capacitive Cell

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

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

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

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

$$\Delta P \propto \Delta \mathrm{d}$$

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 Δd 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 capacitances 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.

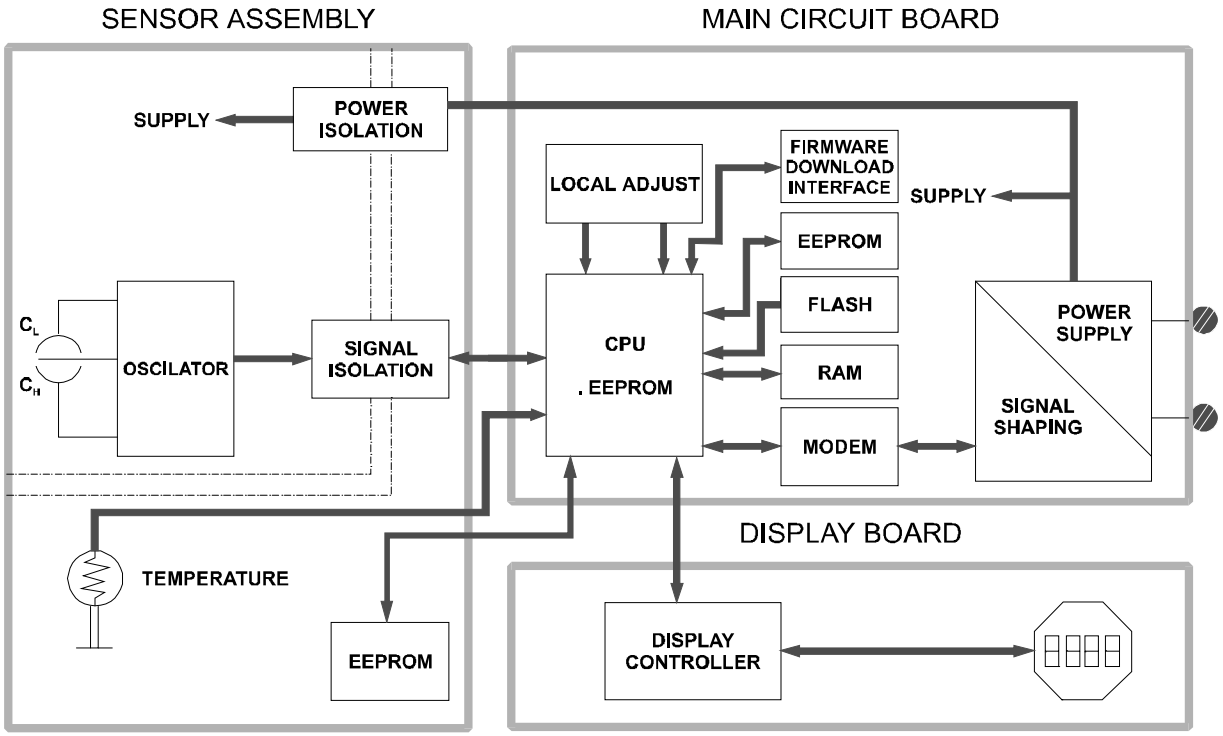


Figure 2.2 - LD303 Block Diagram Hardware

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.

Profibus 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. The magnetic tool without mechanical or electrical contact can activate them.

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.

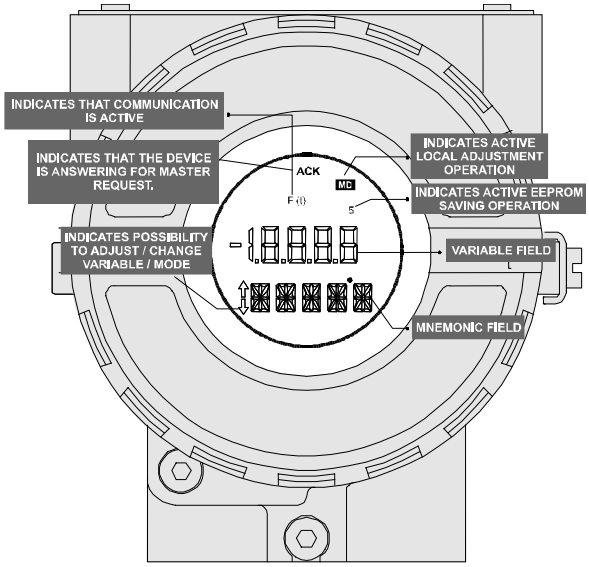


Figure 2.3 - LCD Indicator

CONFIGURATION

This section describes the characteristics of the blocks in the **LD303**. They follow the Profibus PA specifications, but in terms of transducer blocks, the input transducer block and display, they have some special features on top of this.

The 303 Smar family is integrated in ProfibusView from Smar and Simatic PDM from Siemens. It is possible to integrate any 303 Smar devices into any configuration tool for Profibus PA devices. It is necessary to provide a Device Description or Drive according to the configuration tool. In this manual is taken several examples using ProfibusView or Simatic PDM.

In order to assure correct values in the offline configuration, first run “Download to PG/PC” option to assure valid values. After, run the Menu Device option to configure the required parameters using the related menus.

NOTE
In offline configuration, it is not advisable to use the “Download to Device” option. This function can misconfigure the equipment.

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 allows 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.

Transducer Block Diagram

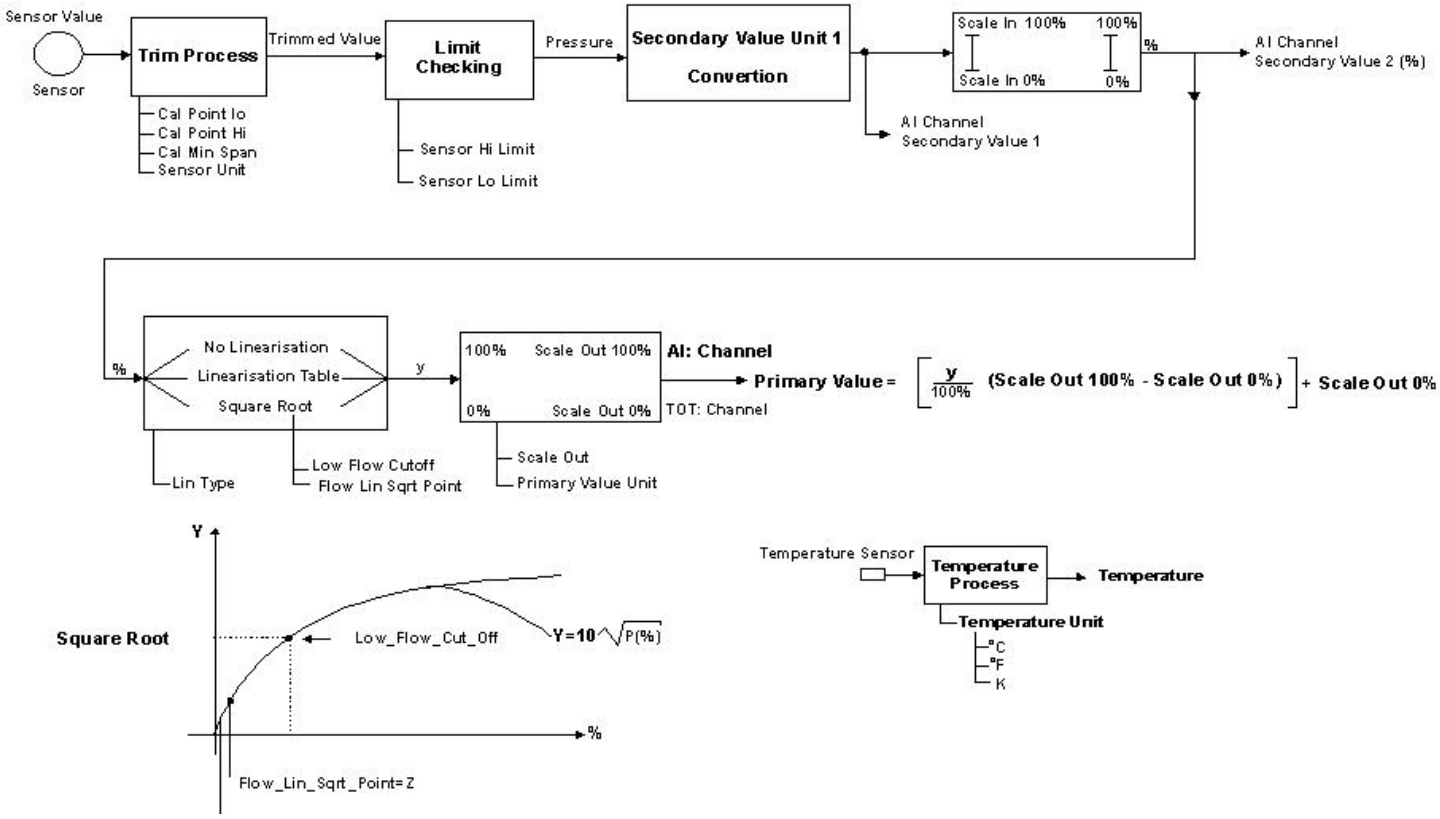


Figure 3.1 – Transducer Block Diagram

Pressure Transducer Block Parameter Description

Parameter	Description
BACKUP_RESTORE	This parameter allows to save and to restore data according to factory and user calibration procedures. It has the following options: 1, "Factory Cal Restore", 2, "Last Cal Restore", 3, "Default Data Restore", 4, "Shut-Down Data Restore", 5, "Sensor Data Restore", 11, "Factory Cal Backup", 12, "Last Cal Backup", 14, "Shut-Down Data Backup", 15, "Sensor Data Backup", 0, "None".
CAL_MIN_SPAN	This parameter contains 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. Unit derives from SENSOR_UNIT.
CAL_POINT_HI	This parameter contains the highest calibrated value. For calibration of the high limit point you give the high measurement value (pressure) to the sensor and transfer this point as HIGH to the transmitter. Unit derives from SENSOR_UNIT.
CAL_POINT_LO	This parameter contains the lowest calibrated value. For calibration of the low limit point you give the low measurement value (pressure) to the sensor and transfer this point as LOW to the transmitter. Unit derives from SENSOR_UNIT.
CAL_TEMPERATURE	This parameter contains the calibrated temperature value. Unit derives from TEMPERATURE_UNIT.
COEFF_POL	This parameter contains the polynomial coefficients.

Parameter	Description
DEAD BAND_BYPASS	This parameter is used to enable the zero cutoff. { 1, "True" } { 0, "False" }
EEPROM_FLAG	This parameter is used to indicate EEPROM saving process. { 0, "False" } { 1, "True" }
FACTORY_CURVE_BYPASS	This parameter is used to enable factory characterization curve. { 85, "Disable" } { 170, "Enable and Backup Cal" } { 4010, "Disable and Restore Cal" } { 61440, "Disable or Allows to enter the points" }
FACTORY_CURVE_X	This parameter contains input points of factory characterization curve.
FACTORY_CURVE_Y	This parameter contains input points of factory characterization curve.
FACTORY_CURVE_LENGTH	This parameter contains the number of points of factory characterization curve
FLOW_LIN_SQRT_POINT	This is the point of the flow function where the curve changes from linear to square root function. The input has to be done in percent of flow.
LIN_TYPE	Linearization – Type: 0 – No Linearization 1 – User Defined Table 10 – Square Root
LOW_FLOW_CUT_OFF	This is the point in percent of flow till that the output of the flow function is set to zero. It is used for suppressing low flow values.
MAIN_BOARD_SN	This is the main board serial number.
MAX_SENSOR_VALUE	Holds the maximum process SENSOR_VALUE. A write access to this parameter resets to the momentous value. The unit is defined in SENSOR_UNIT.
MIN_SENSOR_VALUE	Holds the minimum process SENSOR_VALUE. A write access to this parameter resets to the momentous value. The unit is defined in SENSOR_UNIT.
MAX_TEMPERATURE	Holds the maximum temperature. A write access to this parameter resets to the momentous value.
MIN_TEMPERATURE	Holds the minimum temperature. A write access to this parameter resets to the momentous value.
ORDERING_CODE	Indicates information about the sensor and control from production factory.
POLYNOMIAL_VERSION	Indicates the polynomial version.
PRESS_LIN_NORMAL	Indicates the Linear Normalized Pressure.
PRESS_NORMAL	Indicates Normalized Pressure.
PRIMARY_VALUE	This parameter contains the measured value and status available to the Function Block. The unit of PRIMARY_VALUE is the PRIMARY_VALUE_UNIT.
PRIMARY_VALUE_TYPE	This parameter contains the application of the pressure device. 0: Pressure 1: Flow 2: Level 3: Volume 4-127: reserved > 128: manufacture specific
PRIMARY_VALUE_UNIT	This parameter contains the engineering units index code for the primary value. See explanation about Primary_Value_Unit.
PROCESS_CONNECTION_MATERIAL	Not used.
PROCESS_CONNECTION_TYPE	Not used.
SCALE_IN	This is the input conversion of the Pressure into SECONDARY_VALUE_2 using the high and low scale. The related unit is the SECONDARY_VALUE_1_UNIT.
SCALE_OUT	This is the output conversion of the linearized value using the high and low scale. The related unit is the PRIMARY_VALUE_UNIT.
SECONDARY_VALUE_1	This parameter contains the Pressure value and status available to the Function Block.
SECONDARY_VALUE_1_UNIT	This parameter contains the pressure units of the SECONDARY_VALUE_1.
SECONDARY_VALUE_2	This parameter contains the measured value after input scaling and status available to the Function Block. The related unit is the SECONDARY_VALUE_UNIT_2.

Parameter	Description
SECONDARY_VALUE_2_UNIT	This parameter contains the units of the SECONDARY_VALUE_2 defined by the manufacturer
SENSOR_DIAPHRAGM_MATERIAL	This parameter contains the index code for the material of the diaphragm, which comes in contact with the process media.
SENSOR_FILL_FLUID	This parameter contains the index code for the fill fluid inside the sensor. The index code is manufacture specific.
SENSOR_MAX_STATIC_PRESSURE	Not used.
SENSOR_O_RING_MATERIAL	Not used.
SENSOR_HI_LIM	This parameter contains the sensor upper limit value. Unit derives from SENSOR_UNIT.
SENSOR_LO_LIM	This parameter contains the sensor lower limit value. Unit derives from SENSOR_UNIT.
SENSOR_RANGE_CODE	Indicates the sensor range code. { 0, "Range 1 (20 inH2O)" }, { 1, "Range 2 (200 inH2O)" }, { 2, "Range 3 (1000 inH2O)" }, { 3, "Range 4 (360 psi)" }, { 4, "Range 5 (3600 psi)" }, { 5, "Range 6 (5800 psi)" }, { 253, "Special" }
SENSOR_SERIAL_NUMBER	This parameter contains the sensor serial number.
SENSOR_TYPE	This parameter contains the index code for the sensor type described in the manufacturer's specific table. {117, "Capacitance"}
SENSOR_UNIT	This parameter contains the engineering units index code for the calibration values. See Table 3.4.
SENSOR_VALUE	This parameter contains the raw sensor value. The uncalibrated measurement value from the sensor. Unit derives from SENSOR_UNIT.
TAB_ACTUAL_NUMBER	Contains the actual numbers of entries in the table. It shall be calculated after the transmission of the table is finished.
TAB_INDEX	The index parameter identifies which element of the table is in the X_VALUE and Y_VALUE parameter currently
TAB_MAX_NUMBER	TAB_MAX_NUMBER is the maximum size (number of X_VALUE and Y_VALUE values) of the table in the device.
TAB_OP_CODE	The modification of a table in a device influences the measurement or actuation algorithms of the device. Therefore an indication of a starting and an end point is necessary. The TAP_OP_CODE controls the transaction of the table. 0: not initialized 1: new operation characteristic, first value (TAB_ENTRY=1), old curve cleared 2: reserved 3: last value, end of transmission, check table, swaps the old curve with the new curve, actualize ACTUAL_NUMBER. 4: delete point of table with actual index (optional), sort records with increasing Charact-Input-Value, assign new indexes, and decrement CHARACT_NUMBER. 5: insert point (Charact-Input-Value relevant) (optional), sort records with increasing Charact-Input-Value, assign new indexes. Increment CHARACT_NUMBER. 6: replace point of table with actual index (optional).
TAB_STATUS	It is common to provide a plausibility check in the device. The result of this check is indicated in the TAB_STATUS parameter. 0: not initialized 1: good (new table is valid) 2: not monotonous increasing (old table is valid) 3: not monotonous decreasing (old table is valid) 4: not enough values transmitted (old table is valid) 5: too many values transmitted (old table is valid) 6: gradient of edge too high (old table is valid) 7: Values not excepted (old values are valid) 8 - 127 reserved > 128 manufacturer specific
TAB_X_Y_VALUE	The X_Y_VALUE parameter contains one value couple of the table.

Parameter	Description
TEMPERATURE	This parameter contains the temperature (e.g. sensor temperature used for measurement compensation) with the associated status used within the transducer. The unit of TEMPERATURE is the TEMPERATURE_UNIT.
TEMPERATURE_UNIT	This parameter contains the units of the temperature. The unit codes are: K (1000), °C (1001), and °F (1002).
TRD_TRANSDUCER_TYPE	Indicates the type of pressure transmitter: 107, differential; 108, gauge; 109, absolute; 65535, others/special.
TRIMMED_VALUE	This parameter contains the sensor value after the trim processing. Unit derives from SENSOR_UNIT.
XD_ERROR	Indicates the condition of calibration process according to: {16, "Default value set"}, {22, "Applied process out of range"}, {26, "Invalid configuration for request"}, {27, "Excess correction"}, {28, "Calibration failed"}

Table 3.1 - Pressure Transducer Block Parameter Description

Pressure Transducer Block Parameter Attributes

Rel. Index	Parameter	Object Type	Data Type	Storage	Size	Access	Parameter usage/ Type of transport	Default – value	Down-load Order	Mandatory / Optional (Class)	View
... Standard Parameter											
Additional Parameter for Transducer Block											
8	SENSOR_VALUE	Simple	Float	D	4	r	C/a	0	-	M (B)	
9	SENSOR_HI_LIM	Simple	Float	N	4	r	C/a	0	-	M (B)	
10	SENSOR_LO_LIM	Simple	Float	N	4	r	C/a	0	-	M (B)	
11	CAL_POINT_HI	Simple	Float	N	4	r,w	C/a	5080.0	-	M (B)	
12	CAL_POINT_LO	Simple	Float	N	4	r,w	C/a	0.0	-	M (B)	
13	CAL_MIN_SPAN	Simple	Float	N	4	r	C/a	0	-	M (B)	
14	SENSOR_UNIT	Simple	Unsigned 16	N	2	r,w	C/a	1151	2	M (B)	
15	TRIMMED_VALUE	Record	DS-33	D	5	r	C/a	0.0	-	M (B)	
16	SENSOR_TYPE	Simple	Unsigned 16	N	2	r	C/a	117	-	M (B)	
17	SENSOR_SERIAL_NUMBER	Simple	Unsigned 32	N	4	r,w	C/a	0	-	M (B)	
18	PRIMARY_VALUE	Record	DS-33	D	5	r	C/a	0.0	-	M (B)	1
19	PRIMARY_VALUE_UNIT	Simple	Unsigned 16	N	2	r,w	C/a	1151	3	M (B)	
20	PRIMARY_VALUE_TYPE	Simple	Unsigned 16	N	2	r,w	C/a	100	-	M (B)	
21	SENSOR_DIAPHRAGM_ MATERIAL	Simple	Unsigned 16	S	2	r,w	C/a	2	-	O (B)	
22	SENSOR_FILL_FLUID	Simple	Unsigned 16	S	2	r,w	C/a	2	-	O (B)	
23	SENSOR_MAX_STATIC_PRESSURE	Not used.									
24	SENSOR_O_RING_MATERIAL	Not used.									
25	PROCESS_CONNECTION_TYPE	Not used.									
26	PROCESS_CONNECTION_MATERIAL	Not used.									
27	TEMPERATURE	Record	DS-33	D	5	r	C/a	0.0	-	O (B)	
28	TEMPERATURE_UNIT	Simple	Unsigned 16	N	2	r,w	C/a	1001	4	O (B)	
29	SECONDARY_VALUE_1	Record	DS-33	D	5	r	C/a	0.0	-	O (B)	
30	SECONDARY_VALUE_1_UNIT	Simple	Unsigned 16	N	2	r,w	C/a	1151	5	O (B)	
31	SECONDARY_VALUE_2	Record	DS-33	D	5	r	C/a	0	-	O (B)	
32	SECONDARY_VALUE_2_UNIT	Simple	Unsigned 16	N	2	r,w	C/a	1151	6	O (B)	
33	LIN_TYPE	See explanation about table handling							1	M (B)	
34	SCALE_IN	Array	Float	S	8	r,w	C/a	5080.0	7	O(B)	
35	SCALE_OUT	Array	Float	S	8	r,w	C/a	0.0	8	O (B)	
36	LOW_FLOW_CUT_OFF	Simple	Float	S	4	r,w	C/a	0.0	-	O (B)	
37	FLOW_LIN_SQRT_POINT	Simple	Float	S	4	r,w	C/a	0.0	-	O (B)	
38	TAB_ACTUAL_NUMBER	See explanation about table handling									
39	TAB_INDEX	See explanation about table handling									
40	TAB_MAX_NUMBER	See explanation about table handling									

Rel. Index	Parameter	Object Type	Data Type	Storage	Size	Access	Parameter usage/ Type of transport	Default – value	Down-load Order	Mandatory / Optional (Class)	View
41	TAB_MIN_NUMBER	See explanation about table handling									
42	TAB_OP_CODE	See explanation about table handling									
43	TAB_STATUS	See explanation about table handling									
44	TAB_X_Y_VALUE	See explanation about table handling									
45	MAX_SENSOR_VALUE	Simple	Float	N	4	r,w	C/a	0.0	-	O (B)	
46	MIN_SENSOR_VALUE	Simple	Float	N	4	r,w	C/a	0.0	-	O (B)	
47	MAX_TEMPERATURE	Simple	Float	N	4	r,w	C/a	0.0	-	O (B)	
48	MIN_TEMPERATURE	Simple	Float	N	4	r,w	C/a	0.0	-	O (B)	
49	RESERVED BY PNO										
50	RESERVED BY PNO										
51	RESERVED BY PNO										
52	RESERVED BY PNO										
53	RESERVED BY PNO										
54	RESERVED BY PNO										
55	RESERVED BY PNO										
56	RESERVED BY PNO										
57	RESERVED BY PNO										
58	RESERVED BY PNO										
59	RESERVED BY PNO										
60	CAL_TEMPERATURE	Simple	Float	N	4	r,w	C/a	25.0	-	O (B)	
61	BACKUP_RESTORE	Simple	Unsigned 8	S	1	r,w	C/a	0	-	O (B)	
62	FACTORY_CURVE_BYPASS	Simple	Unsigned 16	S	2	r,w	C/a	0x0F	-	O (B)	
63	FACTORY_CURVE_X	Array	Float	S	20	r,w	C/a	-	-	O (B)	
64	FACTORY_CURVE_Y	Array	Float	S	20	r,w	C/a	-	-	O (B)	
65	FACTORY_CURVE_LENGTH	Simple	Unsigned 8	S	1	r,w	C/a	5	-	O (B)	
66	PRESS_LIN_NORMAL	Record	DS-33	D	5	r	C/a	0.0	-	O (B)	
67	PRESS_NORMAL	Record	DS-33	D	5	r	C/a	0.0	-	O (B)	
68	DEAD BAND_BYPASS	Simple	Unsigned 8	S	1	r,w	C/a	TRUE	-	O (B)	
69	COEFF_POL	Array	Float	S	48	r,w	C/a	-	-	O (B)	
70	POLYNOMIAL_VERSION	Simple	Unsigned 8	S	1	r,w	C/a	0x32	-	O (B)	
71	SENSOR_RANGE_CODE	Simple	Unsigned 8	S	1	r,w	C/a	1	-	O (B)	
72	TRD_TRANSDUCER_TYPE	Simple	Unsigned 16	S	2	r,w	C/a	107	-	O (B)	
73	XD_ERROR	Simple	Unsigned 8	D	1	r	C/a	0x10	-	O (B)	
74	MAIN_BOARD_SN	Simple	Unsigned 32	S	4	r,w	C/a	0	-	O (B)	
75	EEPROM_FLAG	Simple	Unsigned 8	D	1	r	C/a	FALSE	-	O (B)	
76	ORDERING_CODE	Array	Unsigned 8	S	50	r,w	C/a	-	-	O (B)	

Table 3.2 Pressure Transducer Blocks Parameter Attributes

LD303 - Cyclic Configuration

The PROFIBUS-DP and PROFIBUS-PA protocols have mechanisms against communication failures between the slave device and the network master. For example, during initialization, these mechanisms are used to check these possible errors. After powering up the field device (slave), it can cyclically exchange information with the class 1 master, if the parameterization for the slave is correct. This information is obtained using the GSD files (supplied by the device manufacturer, it contains their descriptions). Through the commands below, the master executes all initialization process with the PROFIBUS-PA device:

- Get_Cfg: uploads the slave configuration on the master and checks network configuration;
- Set_Prm: writes to the slave parameters and executes the parameterization network;
- Set_Cfg: configures the slaves according to its outputs and inputs;
- Get_Cfg: another command, where the master checks the slave configuration.

All these services are based on the information obtained from slave GSD files. The GSD file from **LD303** shows details such as, hardware and software revision, device bus timing and information about cyclic data exchange.

LD303 has two function blocks: one AI (Analog Input) and one TOT (Totalizer). It also has the empty module for applications where not all function blocks are necessary. The following cyclic order of the blocks should be respected: AI and TOT. Suppose, only the AI block is necessary, then configure this way: AI, EMPTY_MODULE.

Most PROFIBUS configuration tools use two directories where the different manufacturers' GSDs and BITMAPS files are stored. The GSDs and BITMAPS for Smar devices can be obtained through the Nova Smar website: https://www.smar.com.br/en/device-library.

The following example shows the necessary steps to integrate the **LD303** on a Profibus system.

These steps are valid for the entire 303 line of Smar devices:

- Copy the **LD303** gsd file to the research directory of the PROFIBUS configuration tool, usually called GSD;
- Copy the **LD303** bitmap file to the research directory of the PROFIBUS configuration tool usually called BMP;
- After choosing the master, define the baud rate for the network. Do not forget that couplers may work with the following baud rate: 45.45 kbits/s (Siemens model), 93.75 kbits/s (P+F model) and 12 Mbits/s (P+F, SK2 model). The IM157 device link (Siemens model) may work up to 12 Mbits/s;
- Add the **LD303** and specify its physical bus address;
- Choose the cyclic configuration via parameterization using the gsd file that depends on the application, as detailed previously. For every AI (Analog Input) block, the **LD303** provides the process variable to the master in 5 bytes value, being the first four according to float point data type and the fifth byte is the status that brings the measure quality of this information.

In the TOT (Totalizer) block, the user can choose the totalization value (Total) and the integration is made considering the operation mode (Mode_Tot). It allows defining of how the totalization will be, with the following options: only positive value of the flow, only negative values of the flow, or both. In this block, the user can reset the totalization and configure the preset value through the Set_Tot parameter. The reset option is very used in batch processes;

It allows activating the condition of watchdog, which the device goes to a fail safe condition, when a loss of communication is detected with the master.

How to Configure the Transducer Block

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 configuration tool identifies each method associated to the parameters and enables the interface to it.

The ProfibusView from Smar and Simatic PDM (Process Device Manager), from configuration software, for example, can configure many parameters of the Input Transducer block. See figure 3.2 and 3.3.

Figure 3.2 - Function and Transducers Blocks – ProfibusView

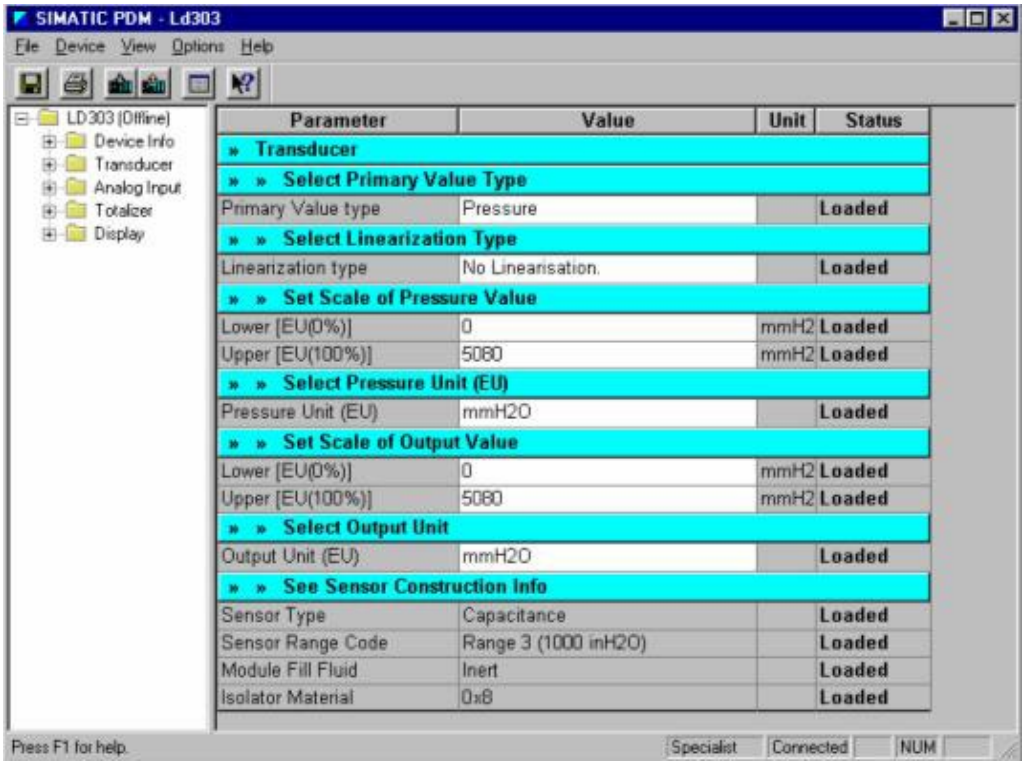


Figure 3.3 - Function and Transducers Blocks – Simatic PDM

Use the main menu for the following functions:

- To change the device address;
- To make the up/download of parameters;
- To configure the Transducer Blocks, Analog Blocks and Display Block;
- To calibrate the transmitter;
- To make the reset by software, to protect the device against writing and to simulate the value from transducer block to analog block;
- To save and restore data calibration.

Depending on the application, select "Pressure"or "Flow".

The user can select the linearization according to his application.

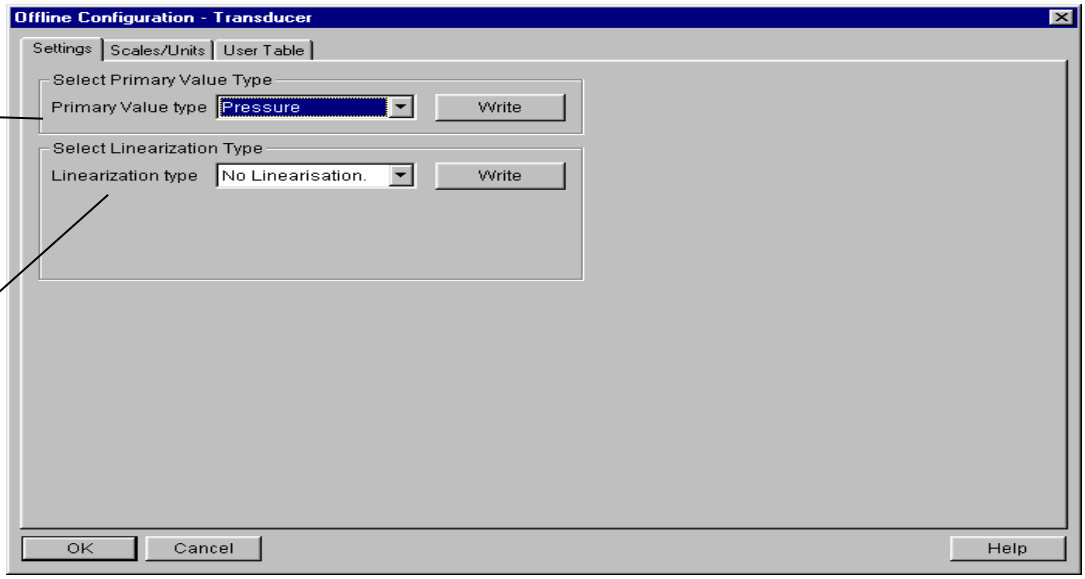


Figure 3.4 – Office Configuration – Transducer

The main menu also gives access to the transducer block configuration screen.

Using this window, the user can set the Primary Value Type according to his application, selecting "Pressure" or “Flow".

Also, the user can select the Linearization Type, choosing "No Linearization", "Square Root" or "User Defined (Table)”.

When the user desires to make the square root of pressure is necessary to set Primary Value Type to "Flow".

Using the next window the user can configure the units according to the Transducer Block Diagram:

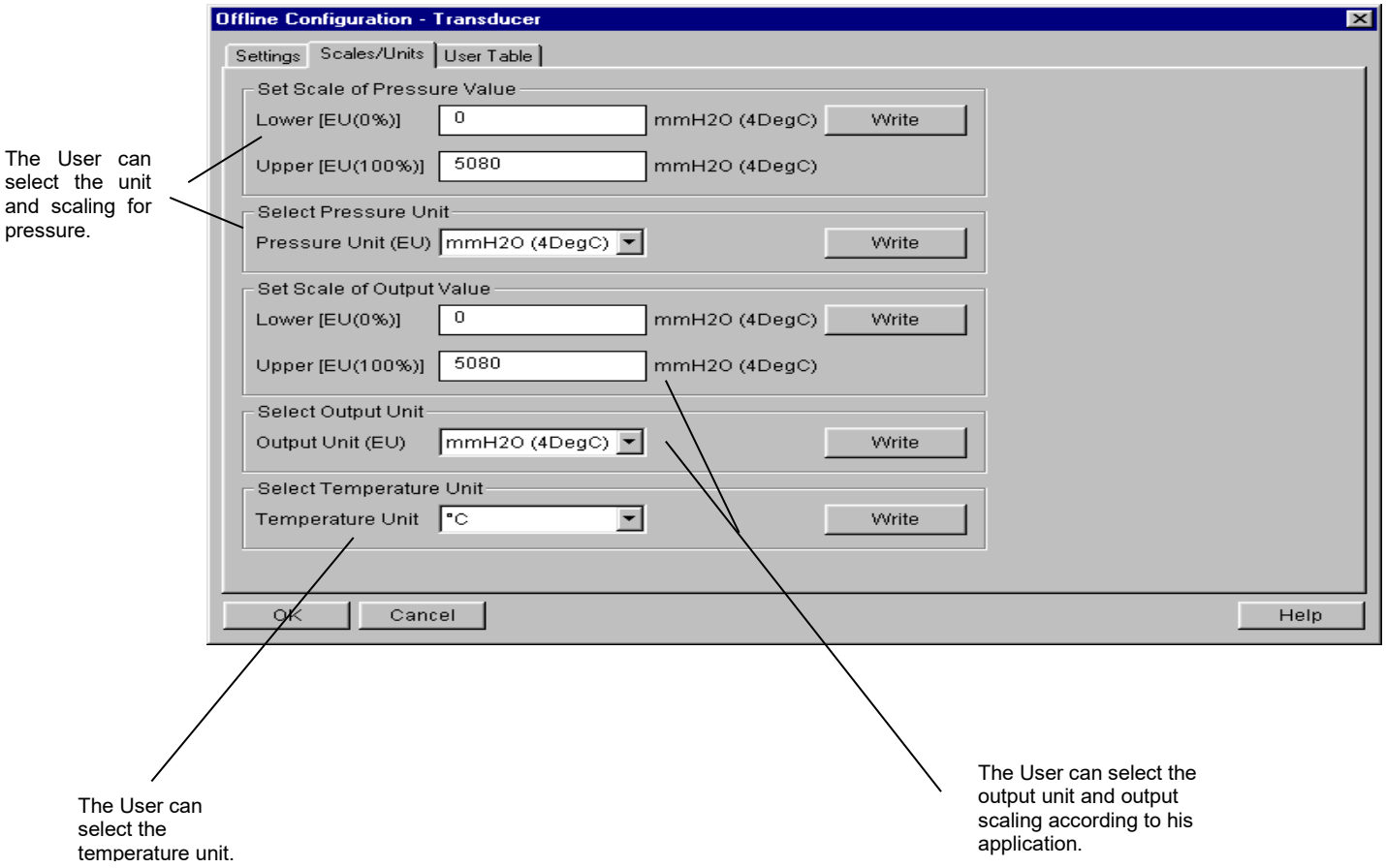


Figure 3.5 – Scale Units for Transducer Block

Table handling

There is the possibility to load and re-load tables in the devices. This table is used for linearization mostly. For this procedure the following parameters are necessary:

TAB_INDEX
TAB_X_Y_VALUE
TAB_MIN_NUMBER
TAB_MAX_NUMBER
TAB_OP_CODE
TAB_STATUS

The TAB_X_Y_VALUE parameter contains the value couple of the each table entries.

The TAB_INDEX parameter identifies which element of the table is in the TAB_X_Y_VALUE parameter currently (see the following figure).

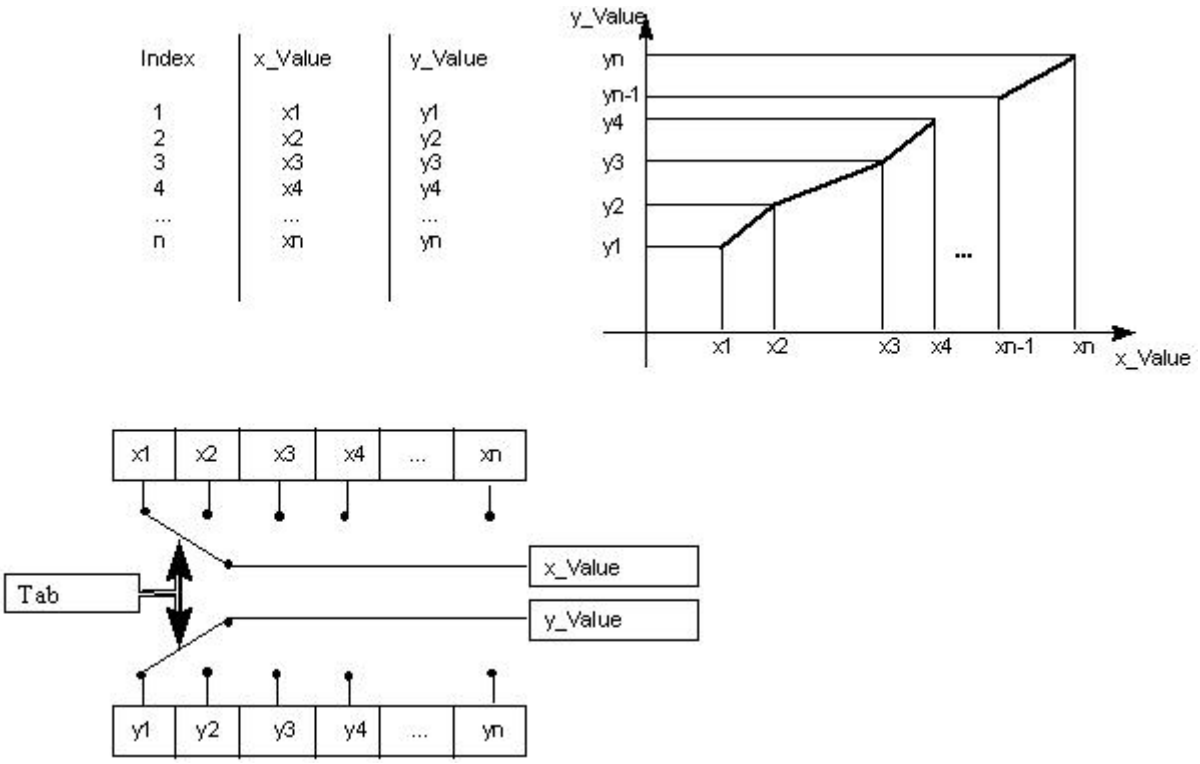


Figure 3.6 – Parameters of a Table

TAB_MAX_NUMBER is the maximum size of the table in the device. TAB_MIN_NUMBER is the minimum size of the table in the device.
The modification of a table in the device influences the measurement algorithms of the device. Therefore an indication of a starting and an endpoint is necessary. The TAB_OP_CODE controls the transaction of the table. The device provides a plausibility check. The result of this check is indicated in the TAB_STATUS parameter.

The User Table is used to make the pressure characterization in several points.

The user can configure up to 21 points in percentage unit.

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 User Table.

The user just needs to configure the input values and the correspondent output values in %.

Configure a minimum of two points. These points will define the characterization curve. The maximum number of points is 21. 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.

Go to "Device Off Line Configuration Transducer" window and select "user defined (table)".

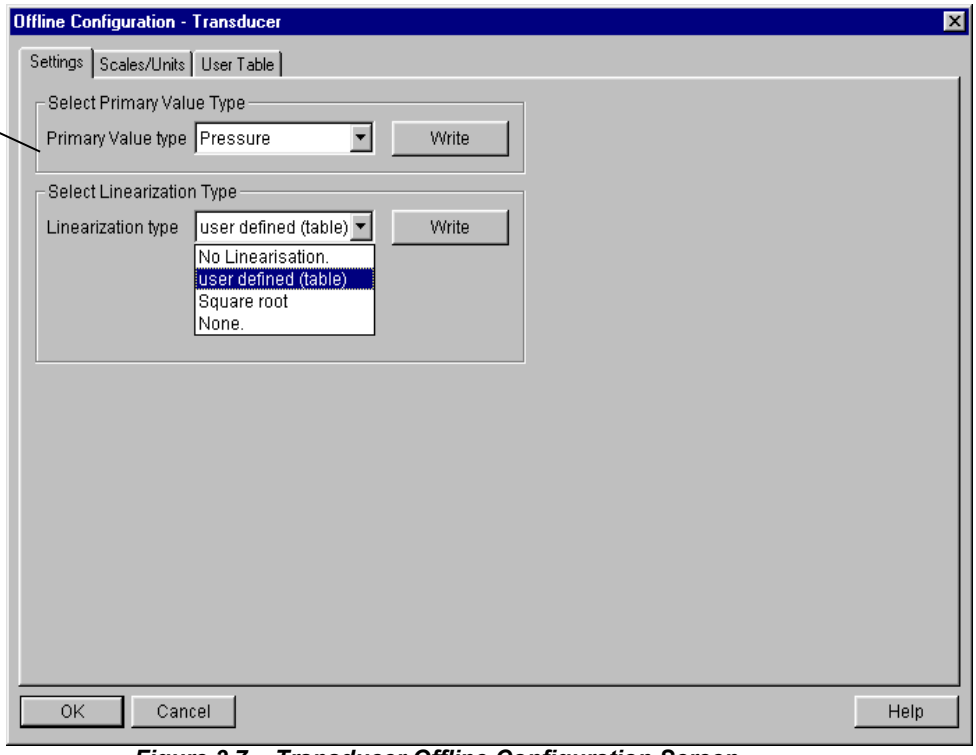
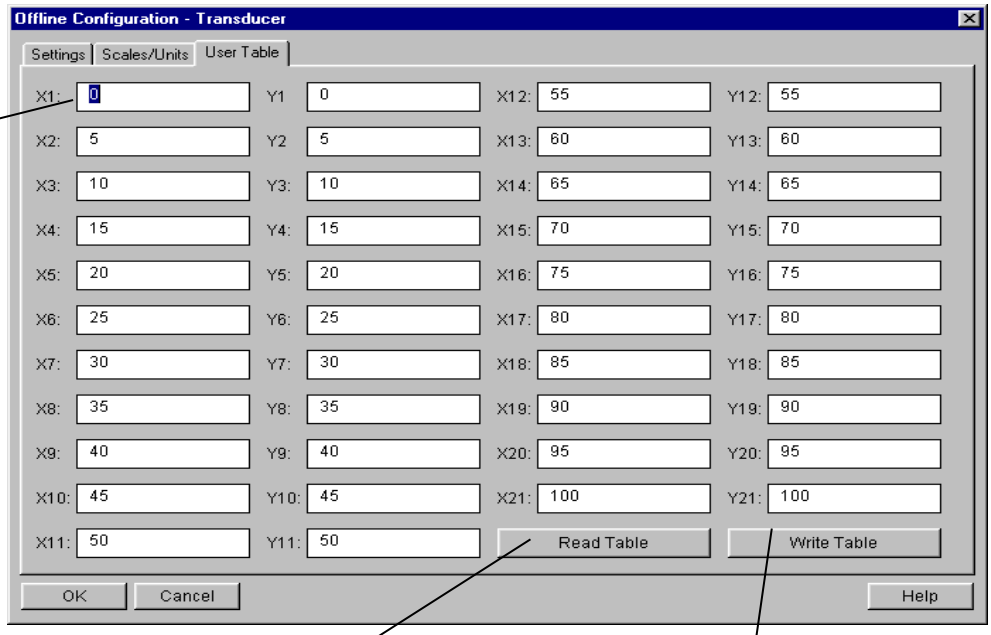


Figure 3.7 – Transducer Offline Configuration Screen

Using the menu Table, the user can configure the points.

The user also can read the configurable table and write a new one. In this case, the table must be monotonous increasing; otherwise, the points will not be configurable. Please see the following figure:

Enter the input and output values.



Allows the reading of configurable table.

After configuring the points, this key must be press to verify if the table is monotonous increasing.

Figure 3.8 –Transducer Off Line Configuration – User Table Screen

See the Transducer Block configuration screens below using ProfibusView.

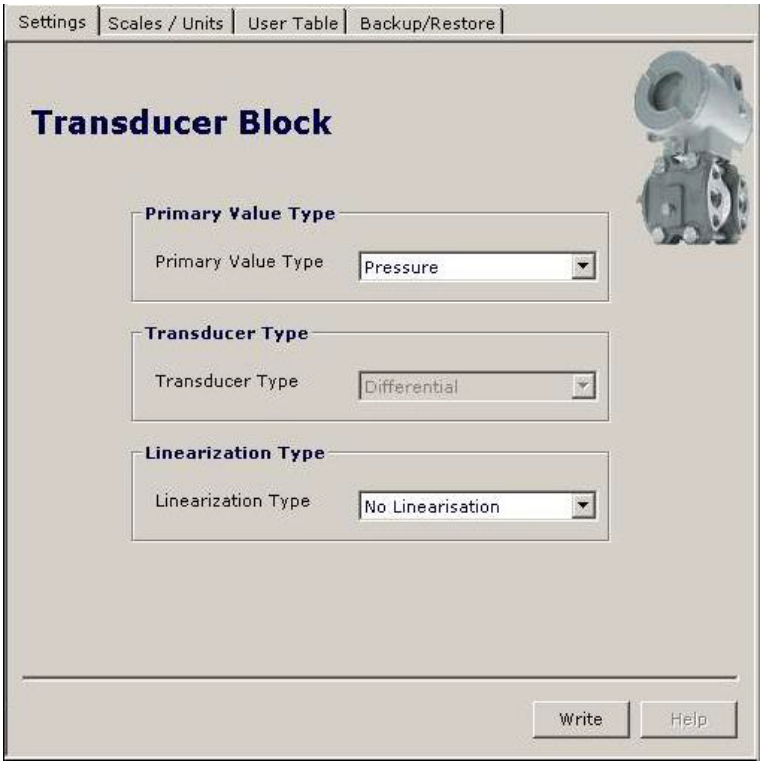


Figure 3.9 - Scale Units for Transducer Block

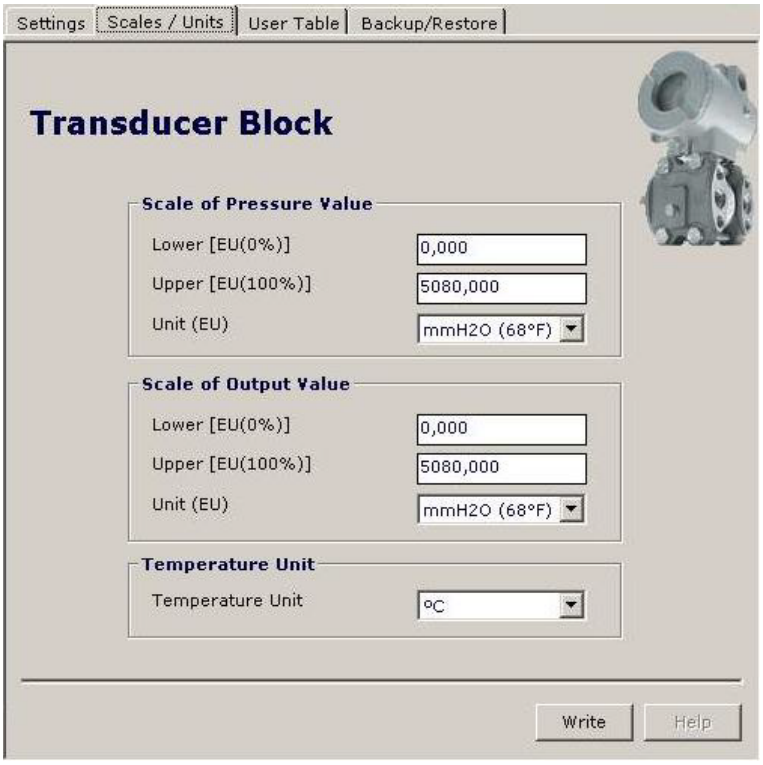


Figure 3.10 - Transducer Configuration Screen

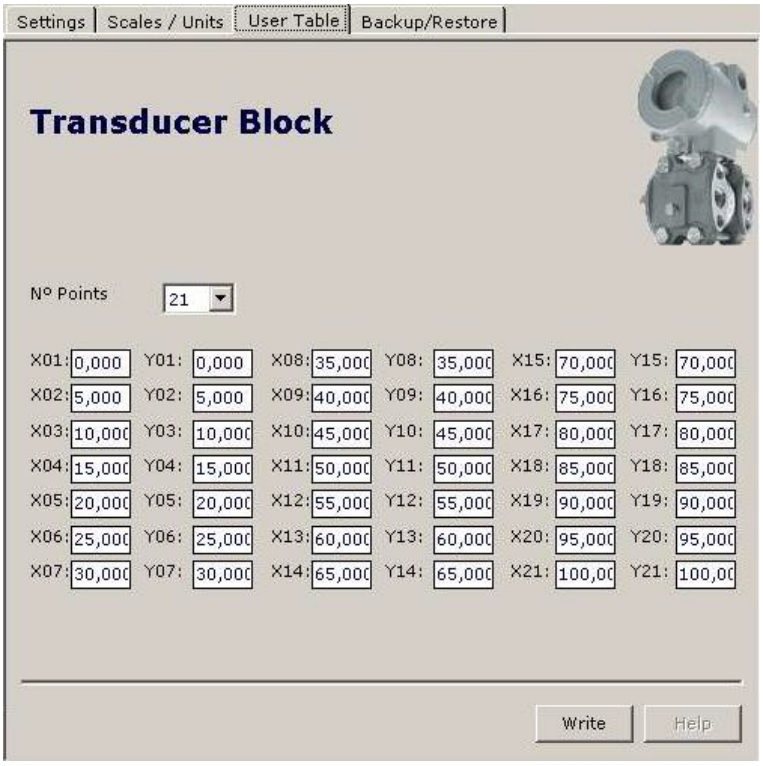


Figure 3.11 - Transducer Configuration – User Table Screen

How to Configure the Analog Input Block

The Analog Input block takes the input data from the Transducer block, selected by channel number, and makes it available to other function blocks at its output. The transducer block provides the input unit of the Analog Input, and when the unit is changed in the transducer, the PV_SCALE unit is changed too. Optionally, a filter may be applied in the process value signal, whose time constant is PV_FTIME. Considering a step change to the input, this is the time in seconds to the PV reaches 63.2 % of the final value. If the PV_FTIME value is zero, the filter is disabled. For more details, please, see the Function Blocks Specifications.

To configure the Analog Input Block in offline mode, please, go to the main menu and select "Device Offline Configuration - Analog Input Block. Using this window, the user can configure the block mode operation, selects the channel, scales and unit for input and output value and the damping.

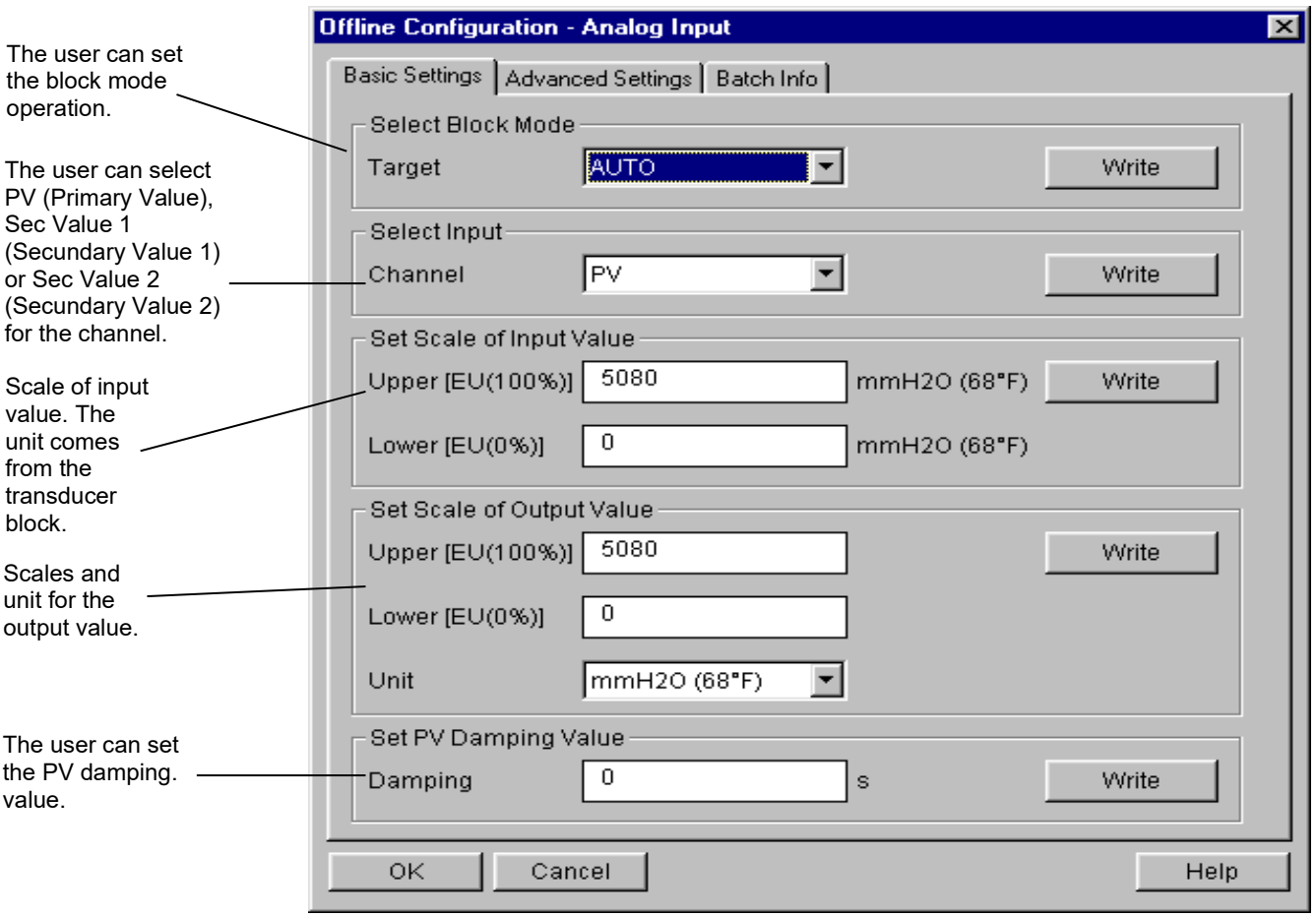


Figure 3.12 – Basic Settings for Analog Input Block

Selecting the window "Advanced Settings", the user can configure the conditions for alarms and warnings, as well the fail safe condition. Please, see the window:

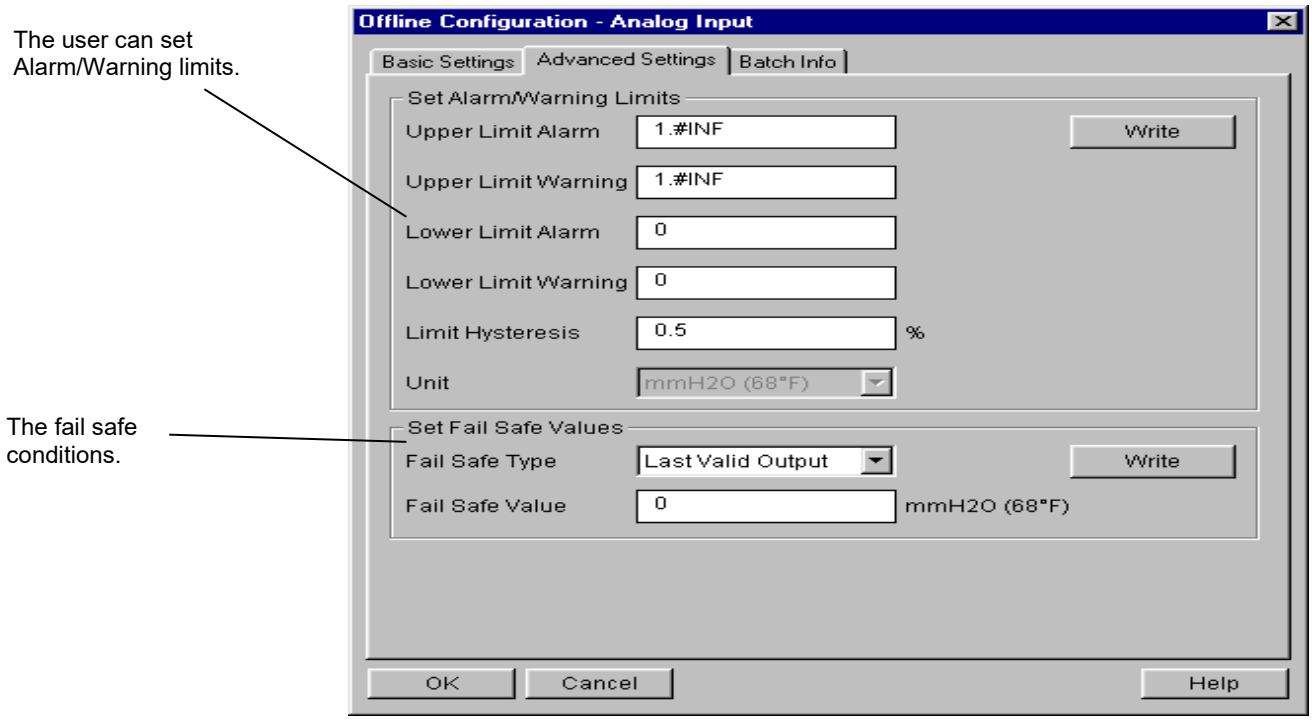


Figure 3.13 – Advanced Settings for Analog Input Block

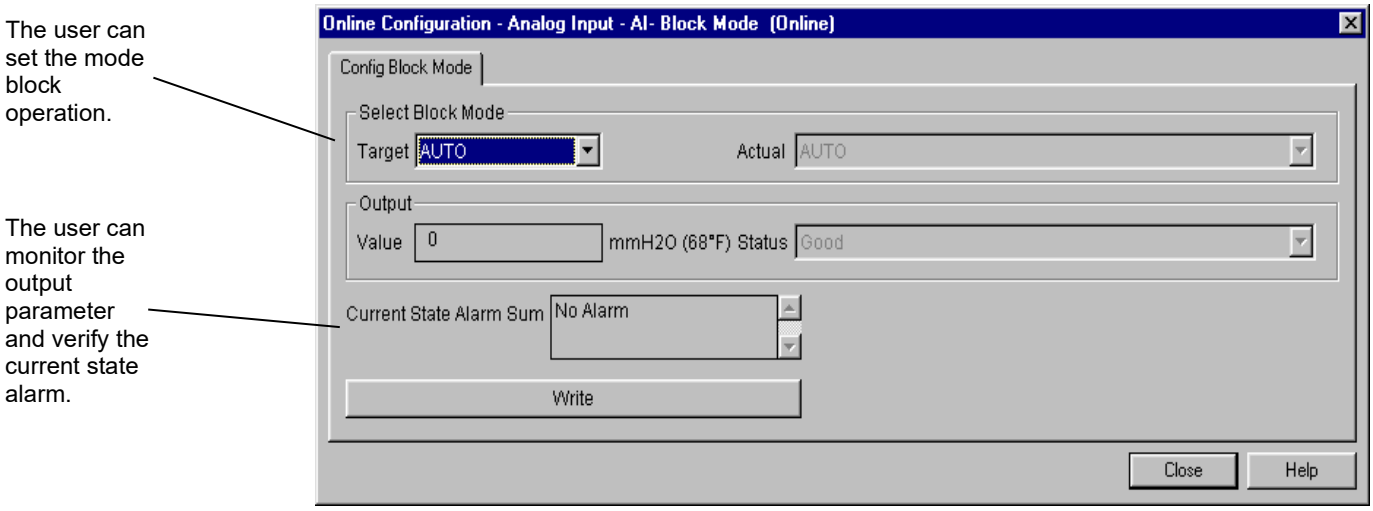


Figure 3.14 – Configuration for Analog Input Block

See the Analog Input Block configuration screens below using ProfibusView.

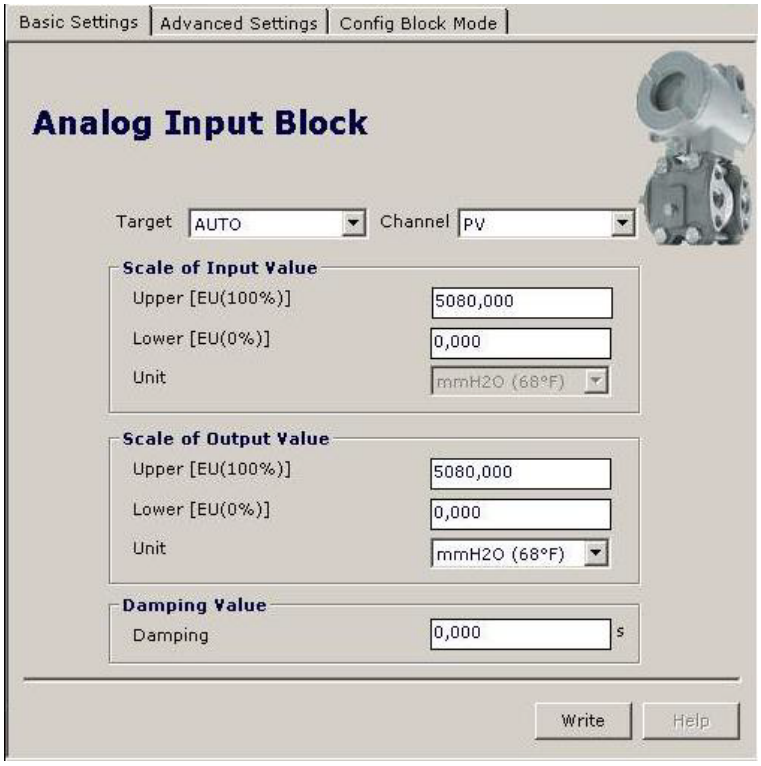


Figure 3.15 - Basic Settings for Analog Input Block

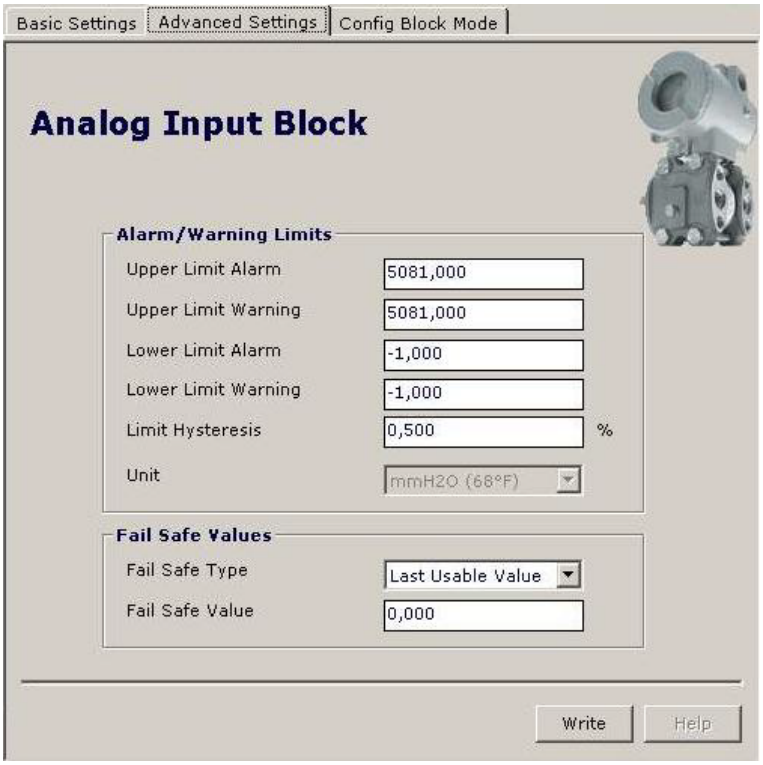


Figure 3.16 - Advanced Settings for Analog Input Block

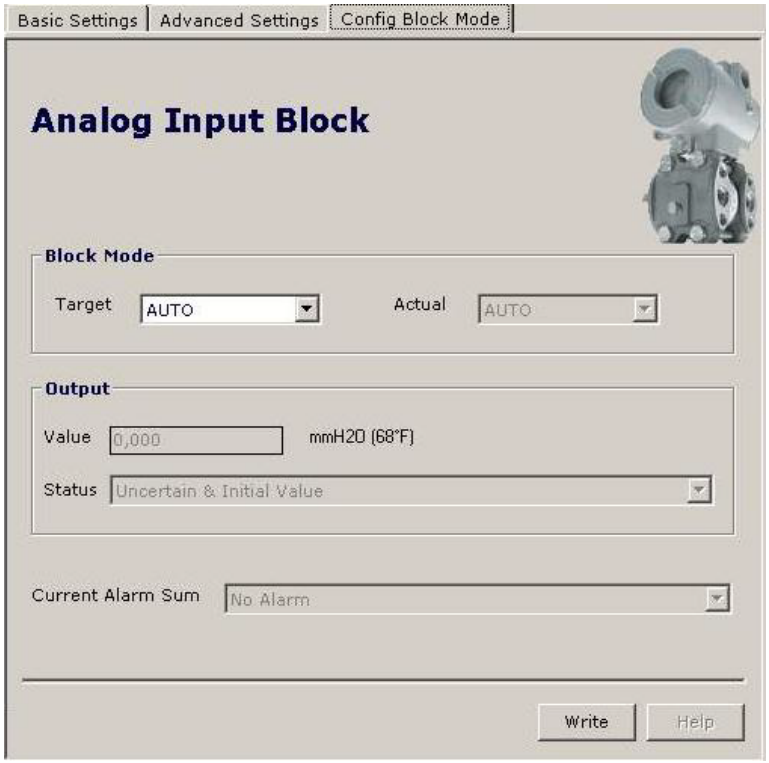


Figure 3.17 - Configuration for Analog Input Block

How to configure the Totalizer Block

The Totalizer function block takes the input data from the Transducer block, selected by channel number, and integrates over the time. This block is normally used to totalize flow, giving total mass or volume over a certain time, or totalize power, giving the total energy.

The Totalizer Function Block integrates a variable (e.g. flow rate or power) in function of the time to the corresponding quantity (e.g., volume, mass or distance). The rate unit of the Totalizer is providing by the transducer block. Internally, the time units are converted in rate units per second. Each rate, multiplied by the block execution time, gives the mass, volume or energy increment per block execution.

The TOTAL is the totalized quantity. The engineering unit used in the output is the UNIT_TOT. The unit of the output must be compatible with the unit of the input provided by the transducer by the channel. Then, if the input the rate is mass flow (like Kg/s, g/min, ton/h) the unit of the output must be mass (like kg, g, ton, lb, etc.).

For more details, please, see the Function Blocks Specifications.

To configure the Totalizer Block, please, go to the main menu and select Configuration - Totalizer Block. In this block, the user can configure the block mode operation, selects the channel, Totalizer mode and unit for the total:

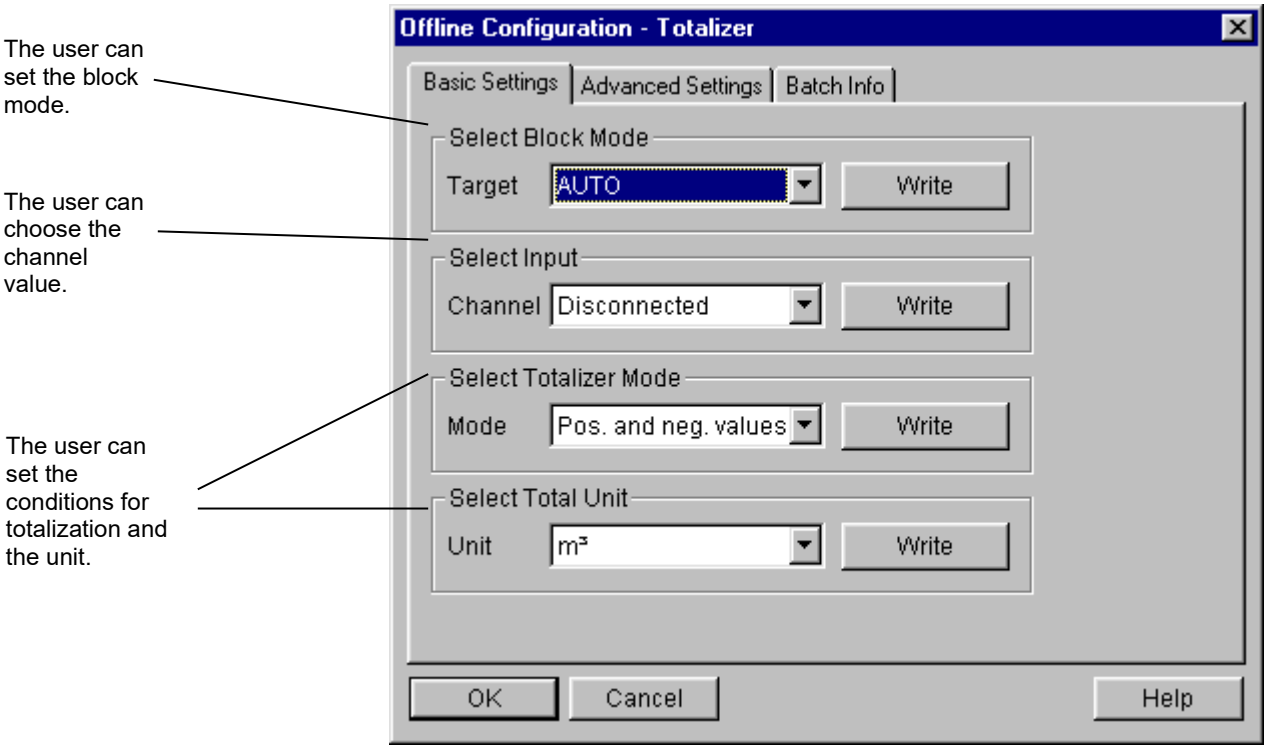


Figure 3.18 – Basic Settings for Totalizer Block

Choosing the "Advanced Settings" window, the user can set alarm and warning limits, as well the fail-safe condition:

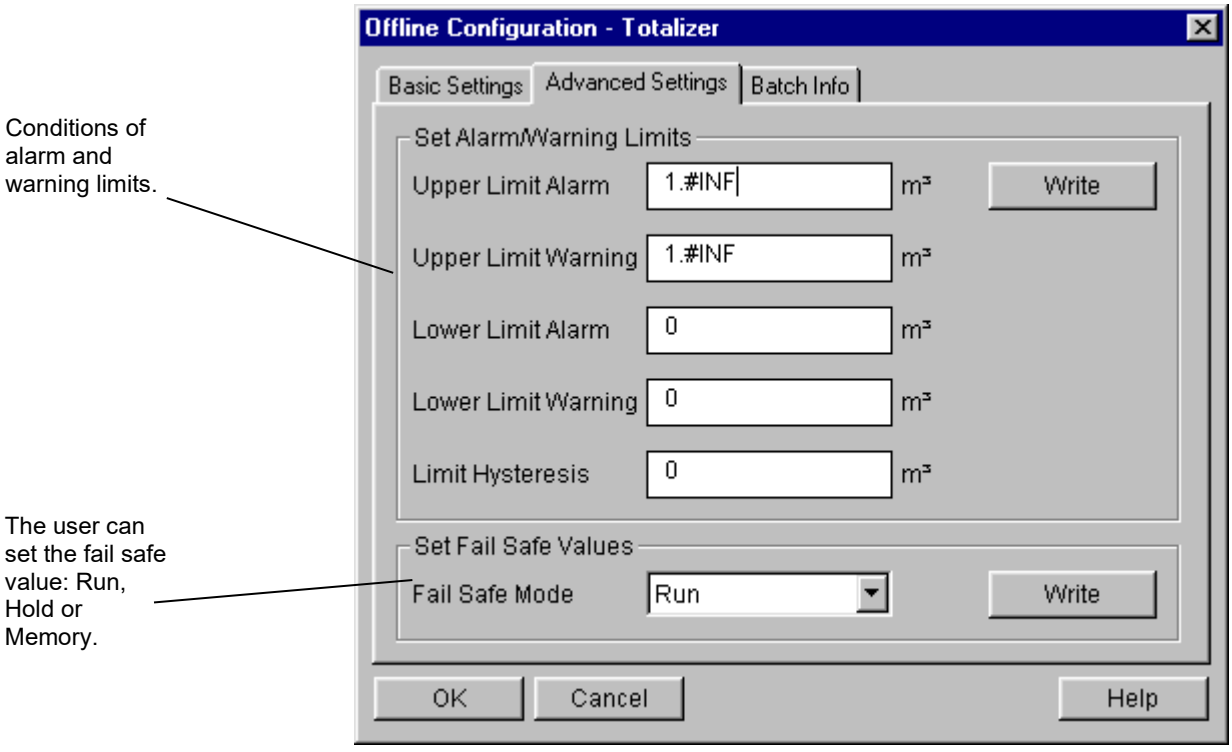


Figure 3.19 – Advanced Settings for Totalizer Block

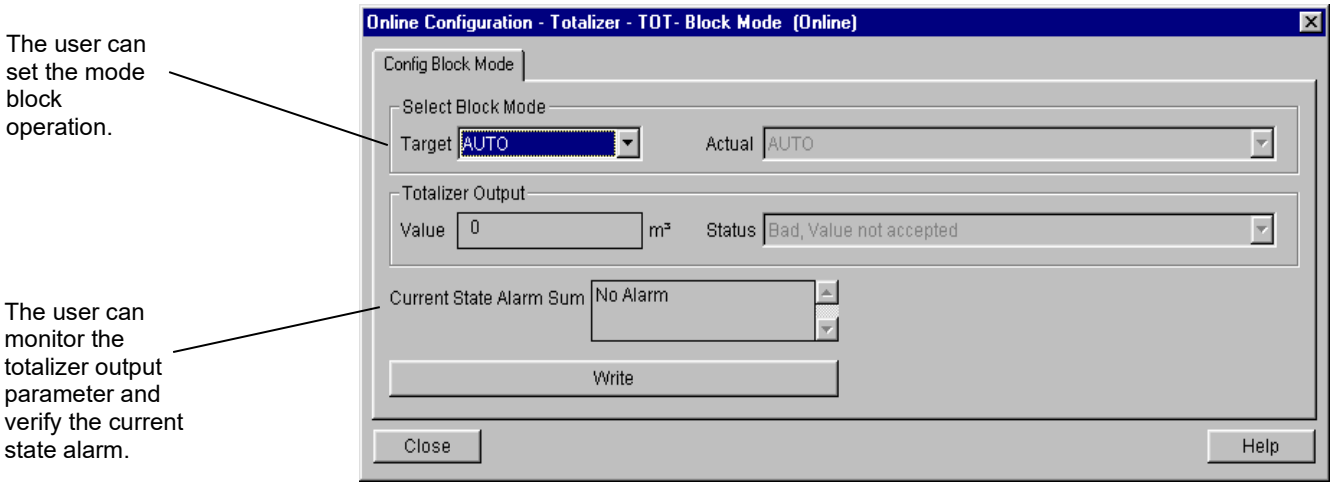


Figure 3.20 - Block Mode for Totalizer Block

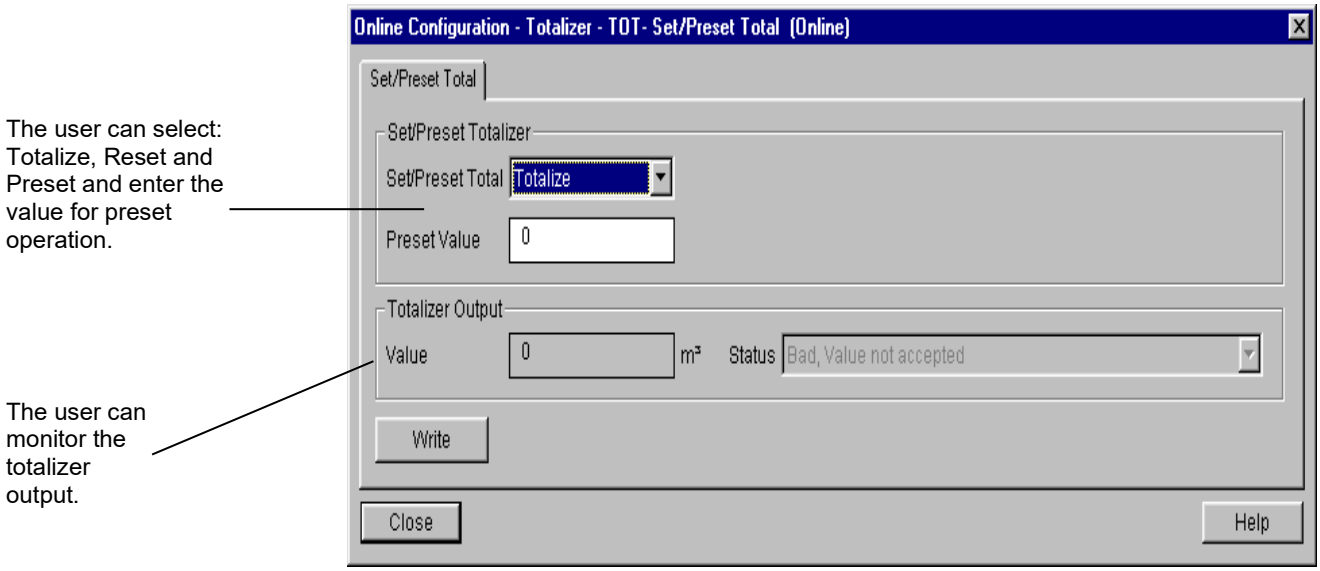


Figure 3.21 – Set / Reset for Totalizer Block

See the Totalizer Block configuration screens below using ProfibusView.

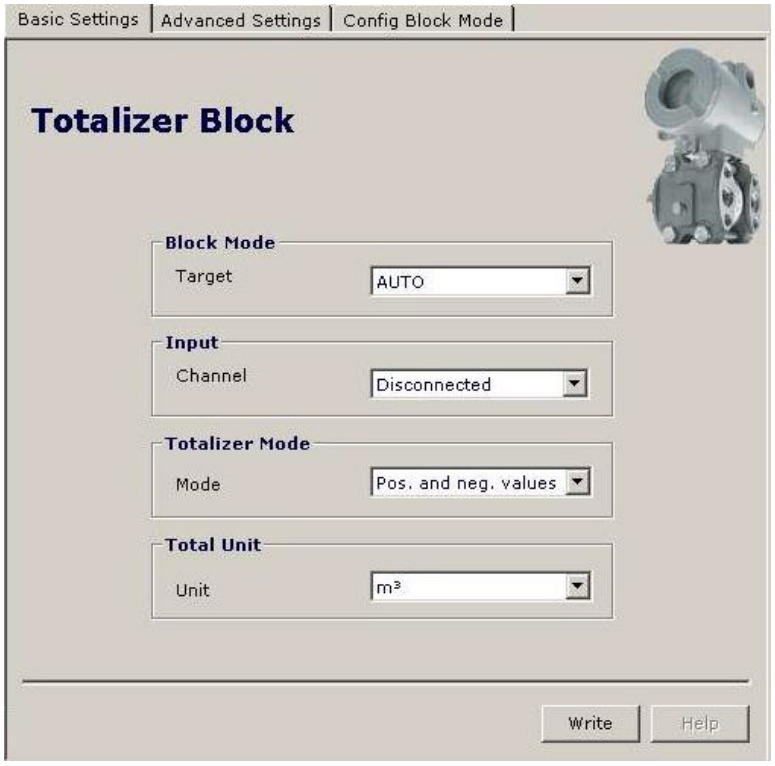


Figure 3.22 - Basic Settings for Totalizer Block

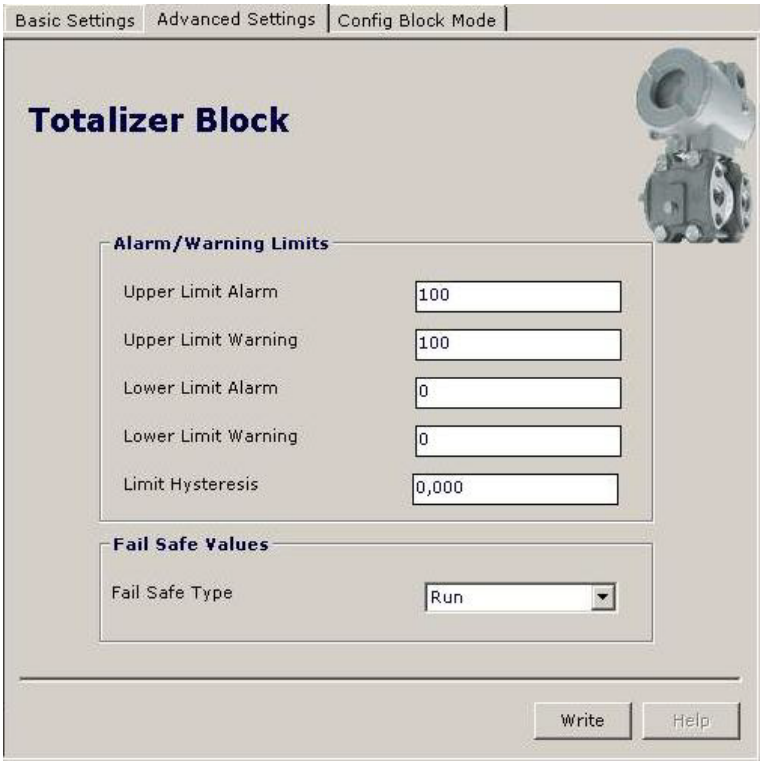


Figure 3.23 - Advanced Settings for Totalizer Block

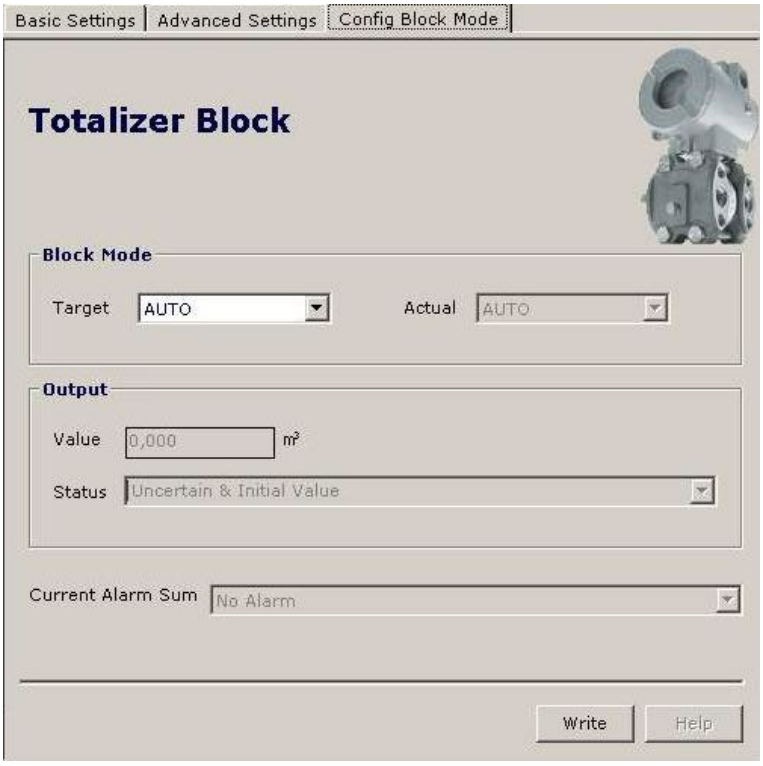


Figure 3.24 - Block Mode for Totalizer Block

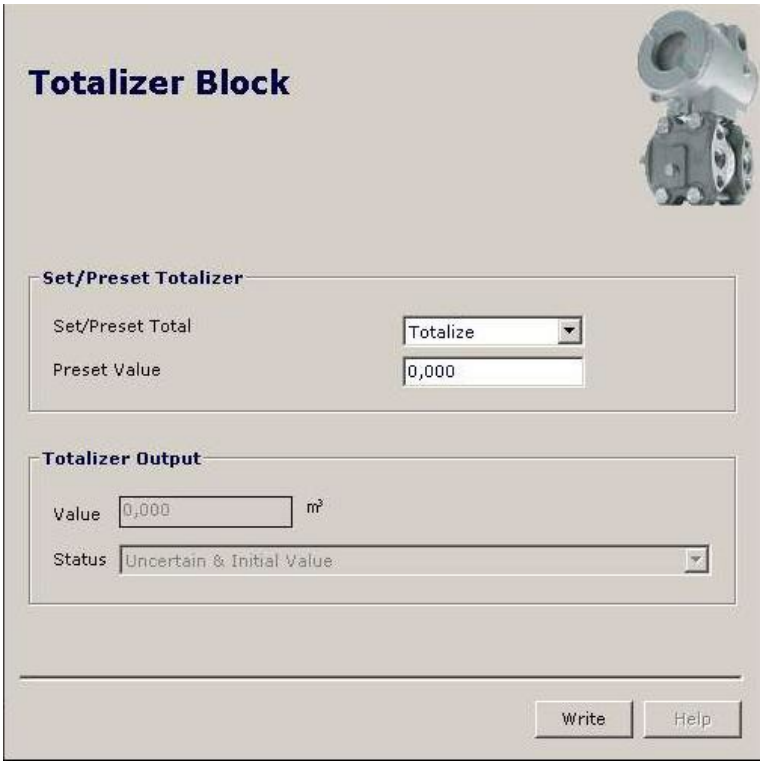


Figure 3.25 – Set / Reset for Totalizer Block

Lower and Upper Trim

NOTE
The calibration screens of lower and upper value of the ProfibusView are like Simatic PDM screens.

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.

The **TRIM** is used to match the reading with the applied pressure.
There are two types of trim available:

Lower Trim: It is used to trim the reading at the lower range. The operator informs the **LD303** the correct reading for the applied pressure. The most common discrepancy is the lower reading.

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

Upper Trim: It is used to trim the reading at the upper range. The operator informs the correct reading to **LD303** for the applied pressure.

For best accuracy, trim should be done at the operating range. The figures 3.26 to 3.29 show the trim adjustment operation.

Pressure Trim - LD303

NOTE
The calibration screens Pressure Trim of the ProfibusView are like Simatic PDM screens.

Via Configuration Tool

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 SENSOR_UNIT parameter. After its configuration the parameters related to calibration will be converted to this unit. Then, select Zero/Lower or Upper calibration menu.

The parameter SENSOR_UNIT should be configured according to the Engineering Unit wished for calibrating the device.

After the selection, this key should be pressed to complete the operation

The Engineering Units can be chosen from the Sensor Units list box.

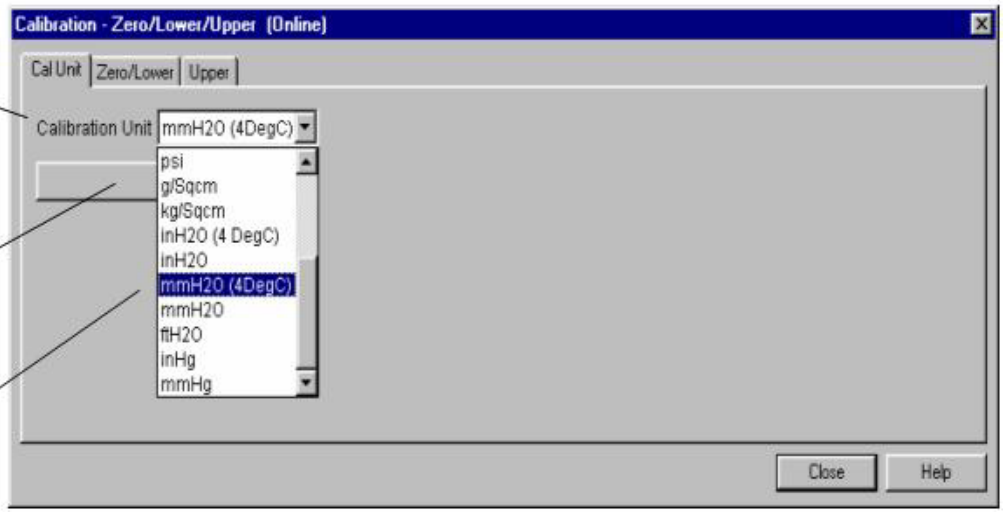


Figure 3.26 – Transducer Configuration Screen

The following engineering unit's codes are defined for pressure according to Profibus PA standard:

UNIT	CODES
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 Unit's Code

SENSOR_UNIT allows the user to select different units for calibration purposes than the units defined by SENSOR_RANGE. The SENSOR_HI_LIM and SENSOR_LO_LIM parameters define 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 SENSOR_UNIT, and wait until the readout of pressure stabilizes.

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

For this case, a sensor range 3 is used: The LRL is -25400 mmH2O or -1000 inH2O.

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

After the calibration, the user can see the result for this process.

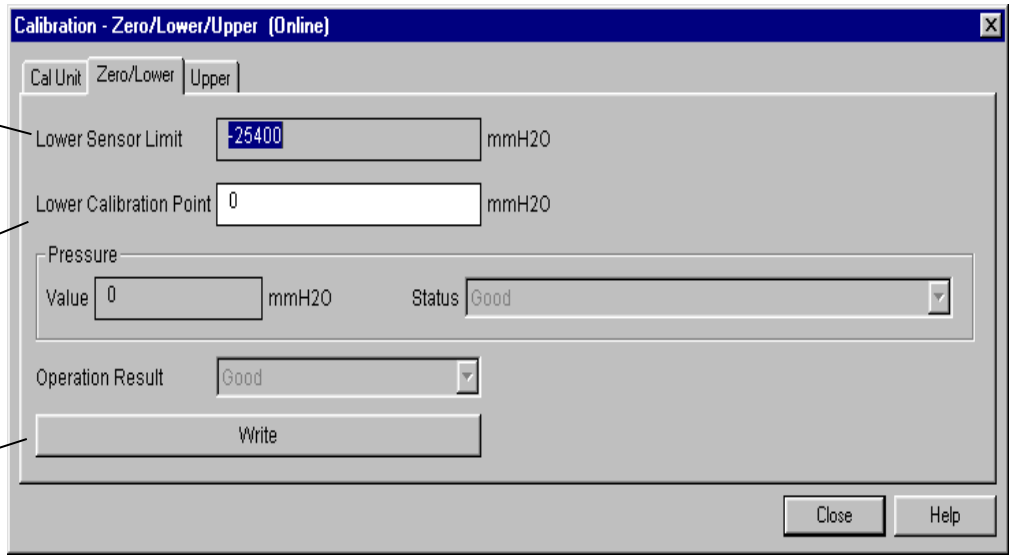


Figure 3.27 –Transducer Configuration Screen

Let's take the upper value as an example:

Apply to the input as the upper value a pressure of 25.400 mmH_2O and wait until the readout of pressure stabilizes. Then, write the upper value as, for example, 25.400 mmH_2O in parameter CAL_POINT_HI. For each value written a calibration is performed at the desired point.

For this case, a sensor range 3 is used: The URL is 25400 mmH2O or 1000 inH2O.

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

After the calibration, the user can see the result for this process.

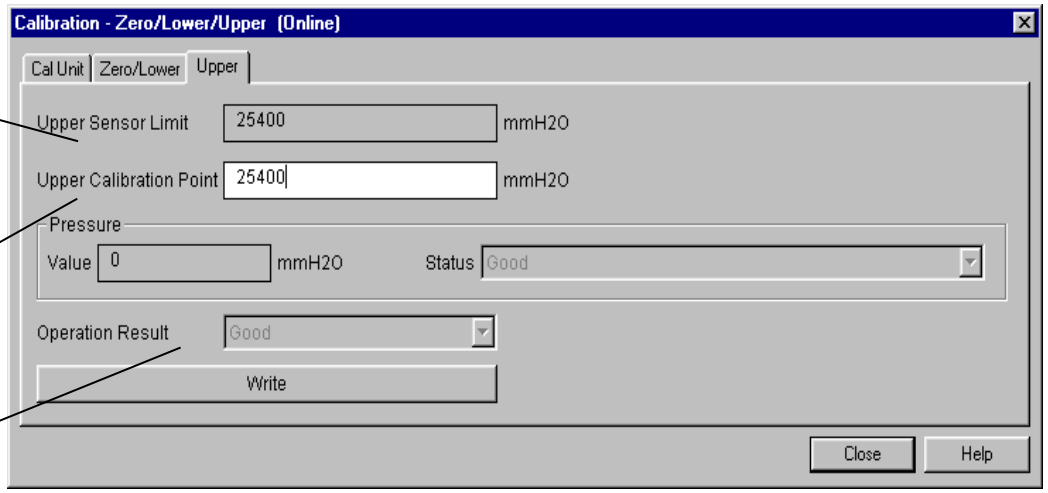


Figure 3.28 – Transducer Configuration Screen

WARNING
It is recommendable, for every new calibration, to save existing trim data, by means of parameter BACKUP_RESTORE, using option "Last Cal 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 25.400 mmH_2O.

Wait until the pressure value stabilizes and then actuates parameter UPPER until it reads 25.400.

For the lower value the procedure is the same, but we need to actuate in the parameter LOWER.

NOTE
Trim mode exit via local adjustment occurs automatically should the magnetic tool not be used during some 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 16, 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: 16: Default Value Set; 22: Out of Range; 26: Invalid Calibration Request; 27: Excessive Correction.

Characterization Trim

NOTE
The calibration screens Characterization Trim of the ProfibusView are like Simatic PDM screens.

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 3.29 shows the window of Simatic PDM to characterize a new curve. Note that FACTORY_CURVE_X indicates the applied pressure according to standard pressure source and FACTORY_CURVEX_Y indicates measured pressure value to **LD303.**

The number of points is configured in parameter FACTORY_CURVE_LENGTH, being in the

maximum 5 points. The entry points will be configured in the FACTORY_CURVE_X and of output in the FACTORY_CURVE_Y.

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

- "Disable ",
- "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 chosen. Then press the "Characterization Cal". The following message appears: "This Function alters XMTR characteristics. Proceed? Y/N". To proceed, select "Yes". A new message appears: "Is XMTR connected to accurate pressure standard ?". To proceed, select "Yes". Apply the desired pressure and wait that the same one stabilizes. If the pressure is not stable, select "No-read again". If it is stable, enter "Yes" and then, type the applied pressure P1. Repeat this procedure for the next point P2. After that, if the user wants to configure more points, just repeat this procedure up to 5 points. If not, just select "No" for the question "Do you want to configure more points? ".

After configuring the points, the user needs to qualify the curve. The option "Enable and backup cal", enables the curve and save the calibration settings. The option "Disable and restore the cal", disables the curve and restores the calibration settings. The option "Disable", just disables the curve and does not take care about the calibration settings.

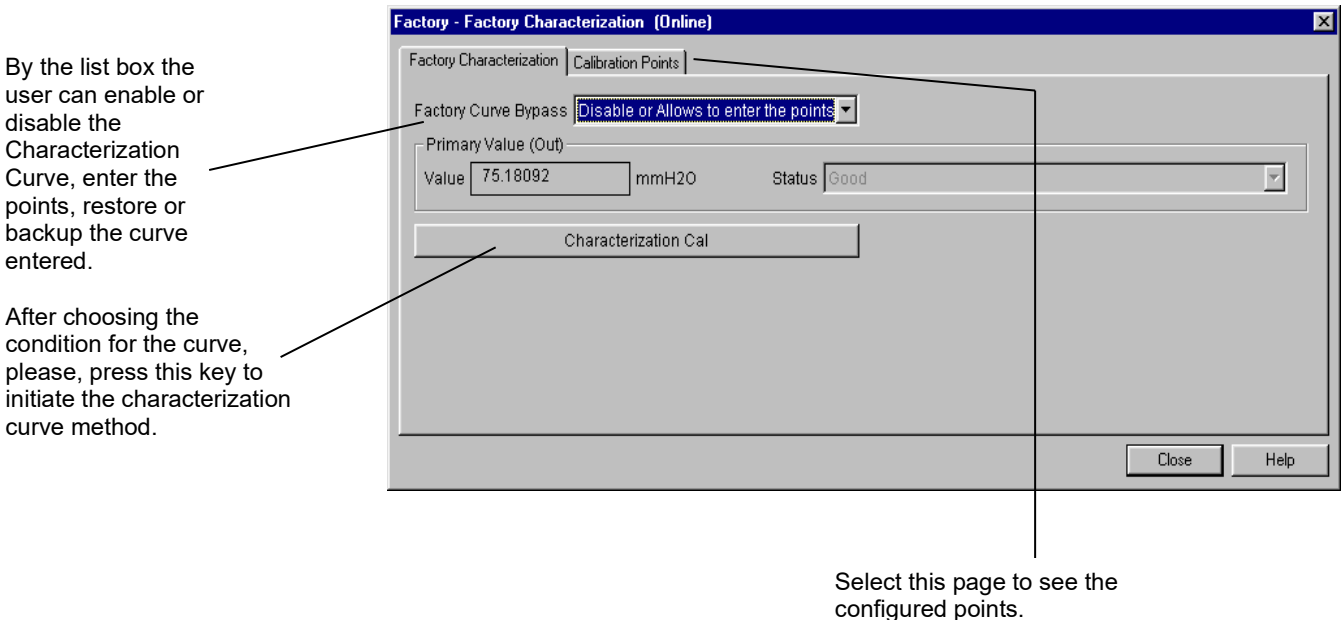


Figure 3.29 – The Characterization Curve Configuration

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

Sensor Information

The main information about the transmitter can be accessed selecting the Transducer block folder option as shown on the next figure. The sensor information will be displayed as shown below:

Sensor Construction Information.

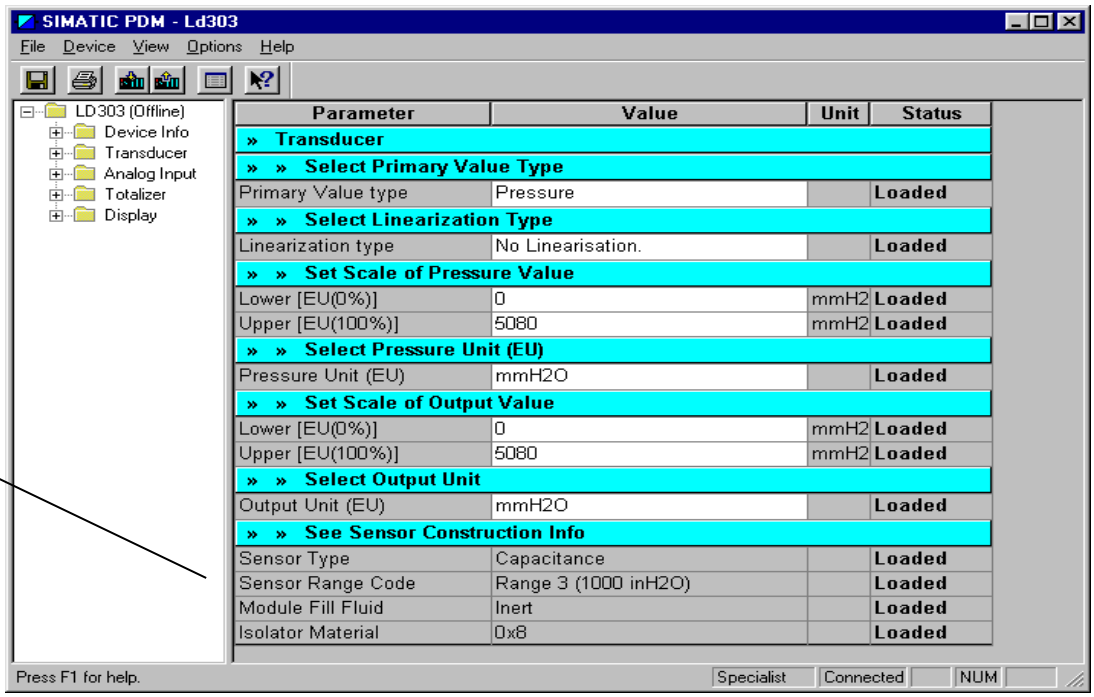


Figure 3.30 – Transducer Block – Sensor Information

Some parameters are only factory configured (e.g. Sensor Type, Module Fill Fluid, etc.).

Temperature Trim

NOTE
The calibration screens Temperature Trim the ProfibusView are like Simatic PDM screens.

Write in parameter CAL_TEMPERATURE any value in the range -40 °C to +85 °C. After that, check the calibration performance using parameter TEMPERATURE. The user can select the unit using the parameter TEMPERATURE_UNIT. Normally, its operation is done by a method in the factory.

The user can select the temperature unit.

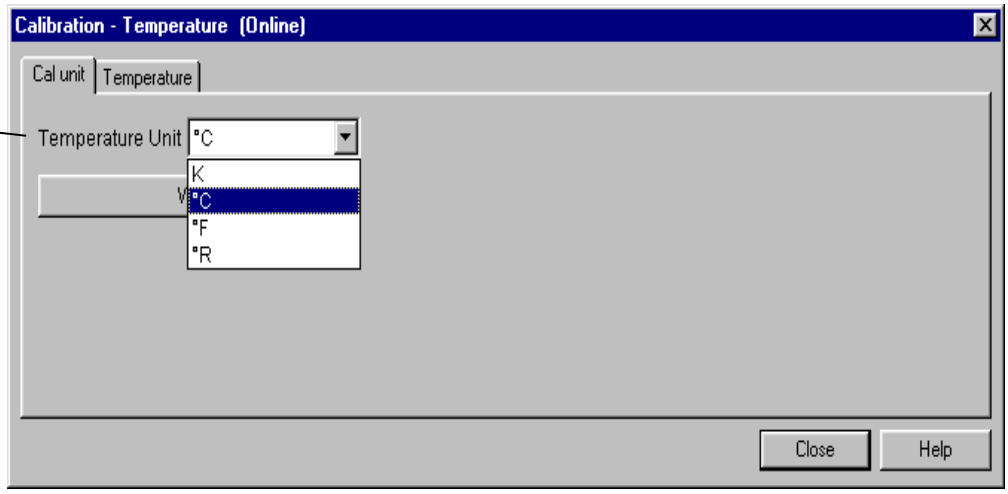


Figure 3.31 – The Temperature Screen

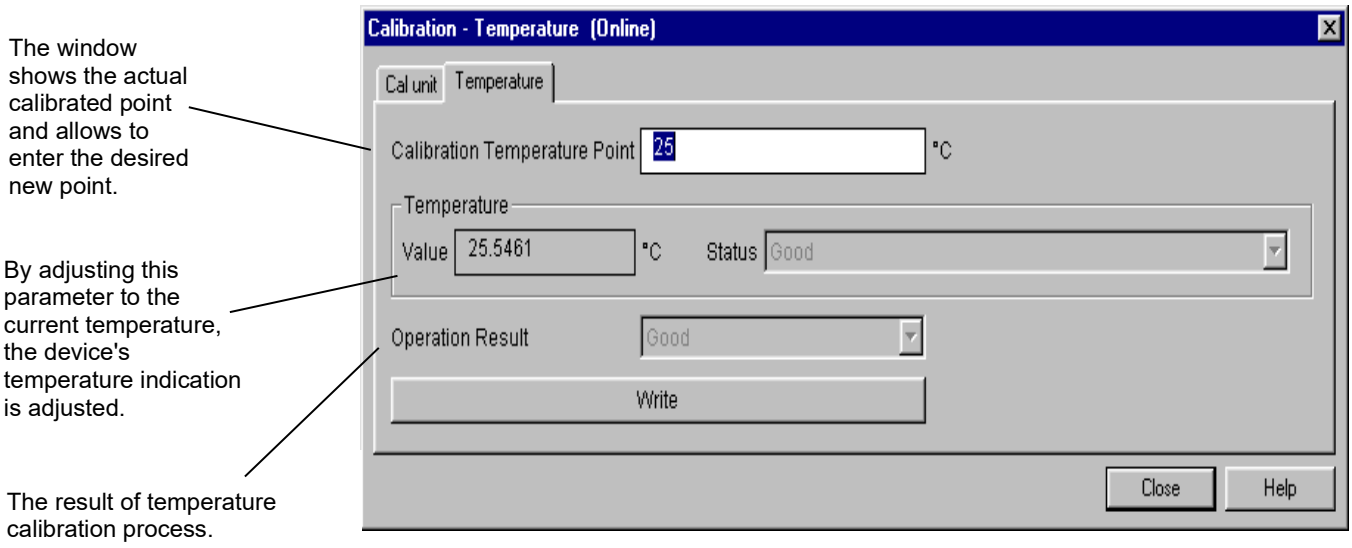


Figure 3.32 – The Temperature Trim Configuration Screen

Sensor Data Reading

All time that transmitter **LD303** is on, is verified if the serial number of the sensor in the sensor board is the same as the recorded serial number in EEPROM 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 EEPROM of sensor board is copied to the EEPROM 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 EEPROM of the sensor board. (This operation is done at factory).

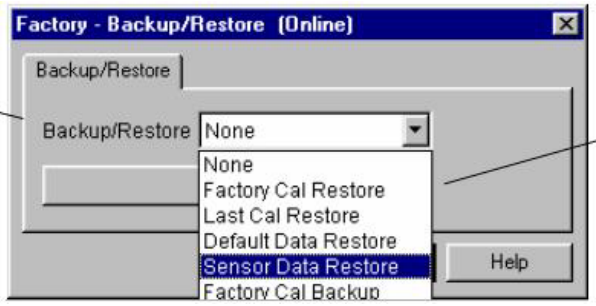
Through this parameter, we can recover default data from factory about sensor and last saved calibration settings, as well as making the rescue of calibrations. We have the following options:

- **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.

On the main menu, selecting "Device Factory - Backup/Restore", the user can select backup and restore operations:

NOTE
The backup setting screen of the ProfibusView is like Simatic PDM screen.

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.

Figure 3.33 – Transducer Block – Backup/Restore

Transducer Display – Configuration

NOTE
The Transducer Display Configuration screen of the ProfibusView is like Simatic PDM screen.

Using ProfibusView or Simatic PDM 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 any configuration tool. It means, this block has some parameters and those ones can be configured according to customer's needs.

The customer can choose up to six 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. The seventh parameter is used to access the physical device address. The user can change this address according to his application. To access and configure the Display Block, please, go to the main menu select "Device OnLine Configuration - Display Block":

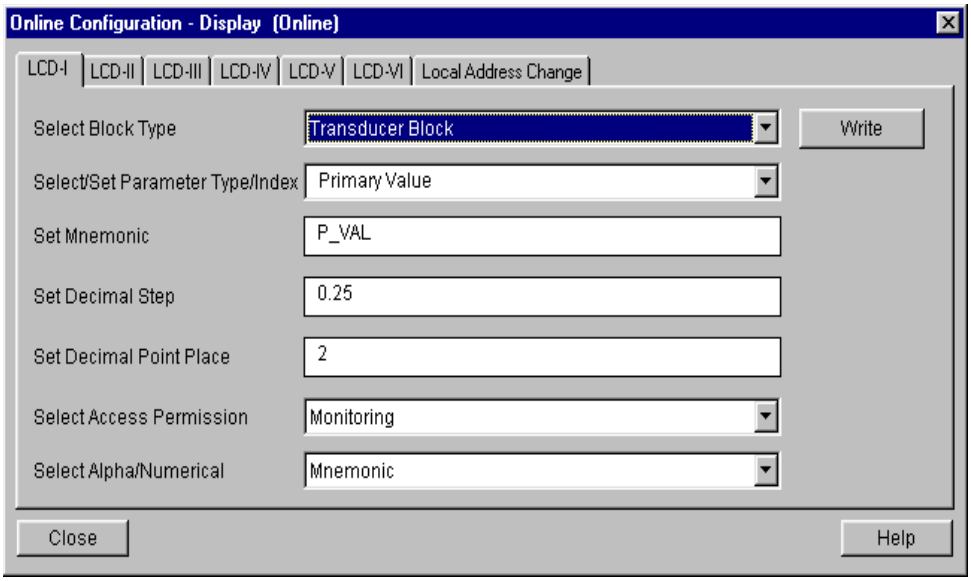


Figure 3.34 – Display Block

Display Transducer Block

The local adjustment is completely configured by ProfibusView or Simatic PDM. It means, the user can select the best options to fit the 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 ProfibusView or Simatic PDM, 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 303 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 Profibus PA have a description of their features written, by the Device Description Language.

This feature permits those third parties configuration tools enabled by Device Description Service technology can interpret these features and make them accessible to configure. The Function Blocks and Transducers of Series 303 have been defined rigorously according the Profibus PA 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 System Configuration.

There are six 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 select "None" in the parameter, "Select Block Type". Doing this, the device will not take the parameters related (indexed) to its Block as a valid parameter.

Definition of Parameters and Values

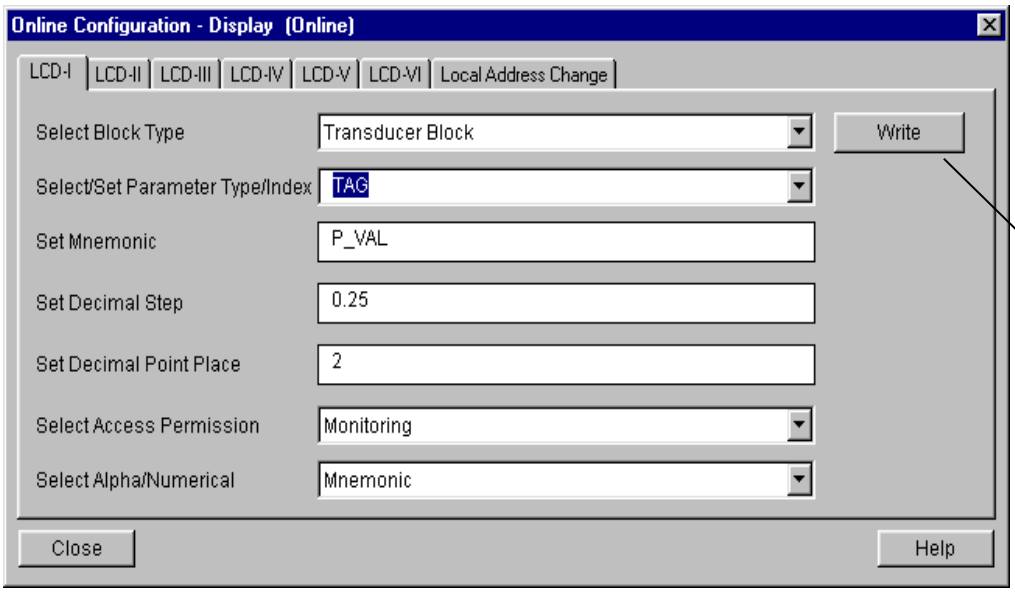
Idx	Parameter	Data Type (length)	Valid Range/ Options	Default Value	Units	Store	Description
7	BLOCK_TAG_PARAM	Visible String			None	S	This is a tag of the block to which the parameter belongs to use up to a maximum of 32 characters.
8	INDEX_RELATIVE	Unsigned16	0-65535		None	S	This is the index related 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	Visible String			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_REFLESH	Unsigned8	1		None	D	

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

For devices where the software version is higher or equal to 1.10, please see the configuration of

local adjustment using the local adjustment, in the Installation, operation and maintenance procedures manual.

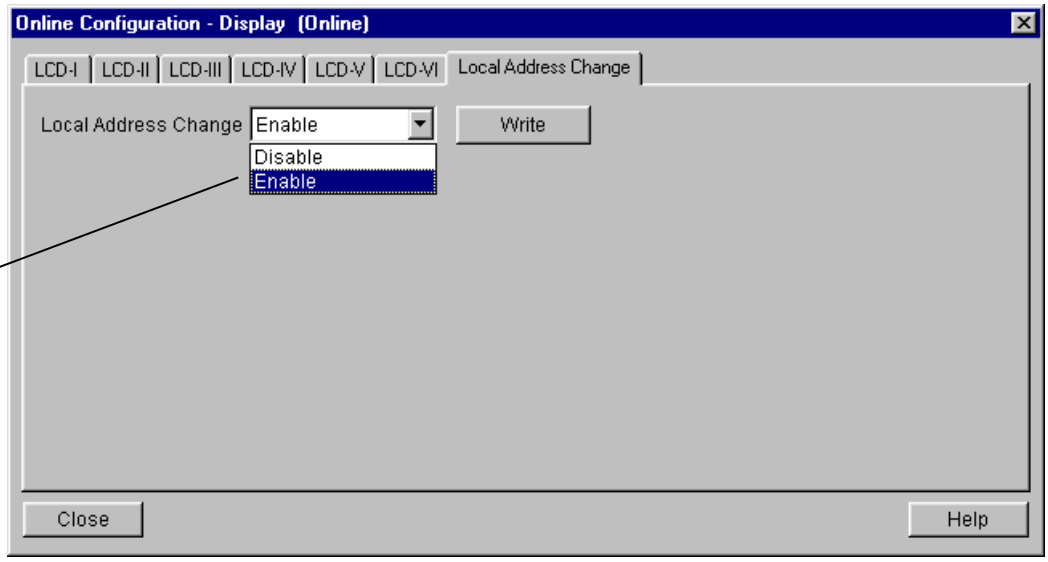
In case you wish to visualize a certain tag, opt for the index relative equal to "tag". To configure other parameters just select "LCD-II" up to "LCD-VI" windows:



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

Figure 3.35 – Parameters for Local Adjustment Configuration

The window "Local Address Change" allows the user "enable/disable" the access to changing the physical device address.



When the option "enable" is selected, the user can change the physical device address.

Figure 3.36 – Parameters for Local Adjustment Configuration

When the user enter into the local adjustment and rotate the parameters using the magnetic tool, after escaping to normal operation, e.g, the monitoring, if the parameter when the magnetic tool is removed has "Access Permission equal to "monitoring", then this last parameter will be shown at the LCD.

Always on the LCD interface will be shown two parameters at the same time, switching between the configured parameter at the LCD-II and the last monitoring parameter. If the user do not want to show two parameters at the same time, it is only necessary to opt for "none" when configure the LCD-II:

Selecting "None", only the last chosen monitoring parameter will be shown at LCD.

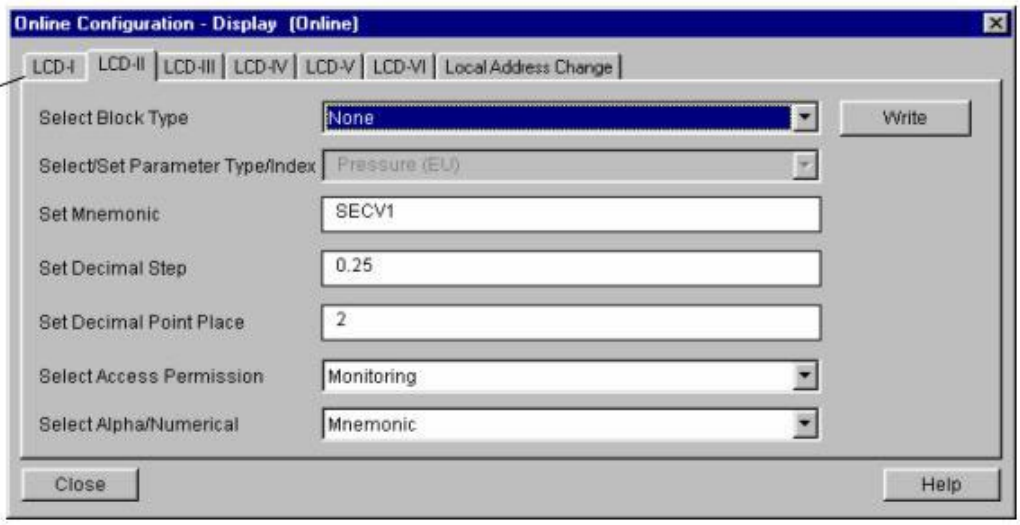
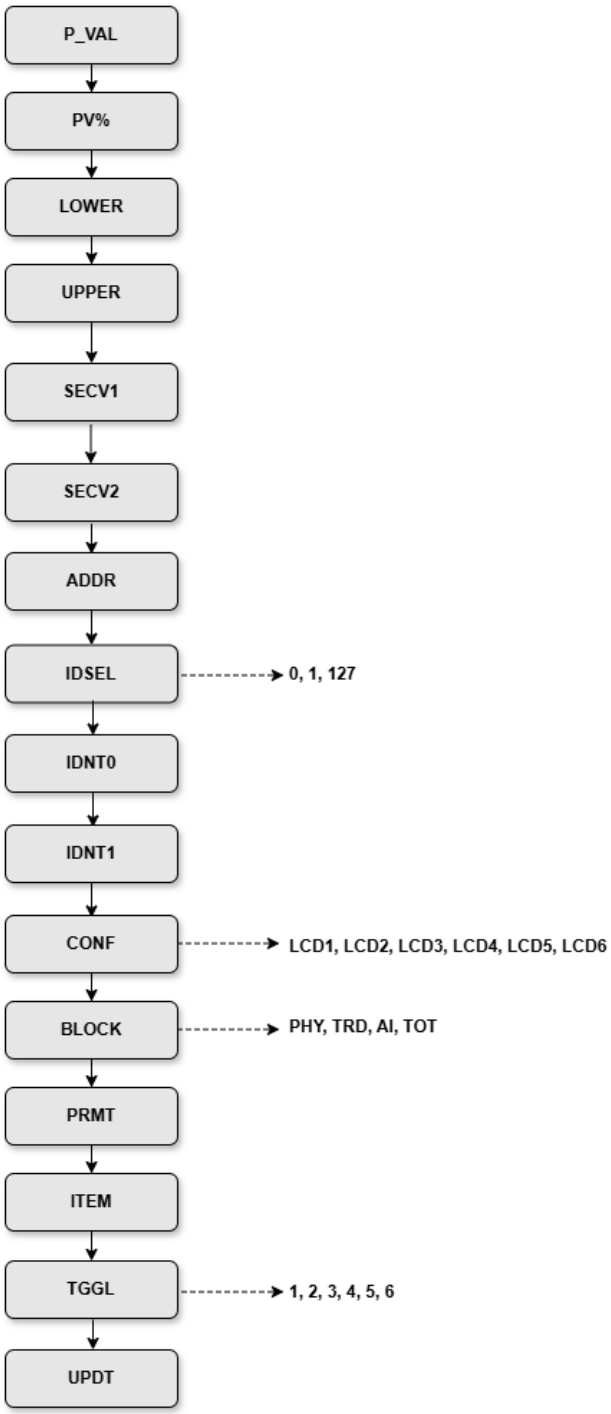


Figure 3.37 - Parameters for Local Adjustment Configuration

Local Adjustment Tree



How to access the local adjustment tree

- Place the magnetic tool in hole Z, wait for the MD icon to appear on the display;
- Place the magnetic tool in hole S, wait 2 seconds, remove it from S, wait 2 seconds, place it in S again and wait for LOC ADJ to appear on the display.

How to search and select menu options

- Hold the magnetic tool in Z to move through the local adjustment tree.
- Enter in S to select the desired option.

How to configure a block parameter in one of the local adjustment tree options

- Navigate to the CONF option and select the desired LCD;
- Return the switch to hole Z, navigate to the next option, BLOCK, and select the block to be configured, placing the magnetic tool in hole S;
- Return the switch to hole Z, navigate to the next option, PRMT, and select the parameter to be configured, placing the magnetic tool in hole S;
- Then, in the ITEM option, configure the subindex, if applicable;
- Navigate to the UPDT option and insert the magnetic tool in S;
- Enter local adjustment again and look for the configured parameter in the chosen LCD. After all these steps the parameter can be changed;
- Repeat the above steps for all parameters that will be configured. Use views 2 to 6 (LCD-II to LCD_VI) to avoid corrupting the main view of normal equipment operation (LCD-I).

The user can select the "Mode Block" parameter at the LCD. In this case is necessary to select the index equal to "Mode Block":

With this option, the Mode Block parameter is shown at the LCD.

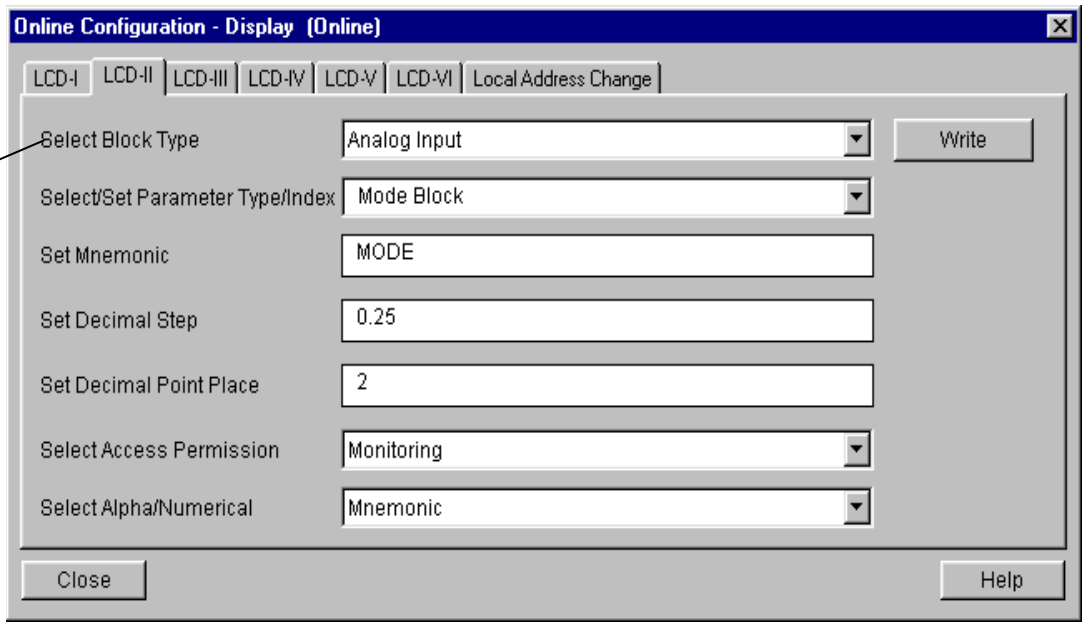


Figure 3.38 – Parameters for Local Adjustment Configuration

Programming Using Local Adjustment

The local adjustment is completely configured by ProfibusView or Simatic PDM. It means, the user can select the best options to fit the 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 configuration tool, but the local functionality of the LCD allows 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 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 303 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. This Local adjustment configuration is a suggestion only. The user may choose his preferred configuration via configuration toll, simply configuring the display block.

The transmitter has two holes marked S and Z, right underneath the identification plate. They access

two reed switches that can be activated by inserting the handle of the magnetic tool. This procedure enables the adjustment of the most important parameters of blocks. It also enables pre-configuration of the communication. See figure 3.39.

The table 3.5 describes what the actions in the S and Z holes cause in the **LD303** when the local adjustment is enable.

Without display the local adjustment is not possible.

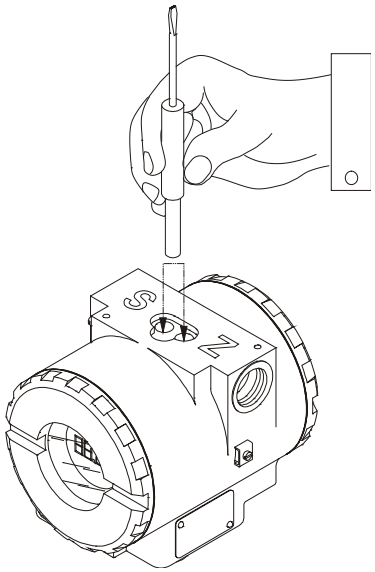


Figure 3.39 – Local Adjustment Holes

Action in	Cause
S	Starts and moves among the available functions.
Z	Selects the function showed in the indicator.

Table 3.5 – Purpose of the holes on the Housing

J1 Jumper Connection

If J1 jumper (see figure 3.40) is connected to the bolts under the word ON parameters could be simulated, through SIMULATE parameter, of the function blocks.

W1 Jumper Connection

If W1 jumper (see figure 3.40) is connected to the bolts under the word ON, the local adjustment programming tree is enabled and then important block parameters can be adjusted and communication can be pre-configured via local adjustment.

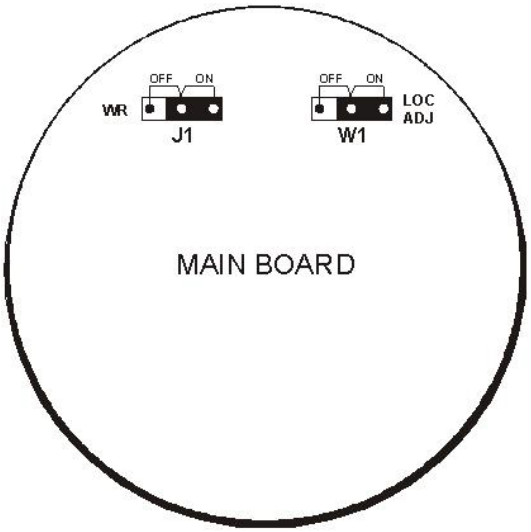
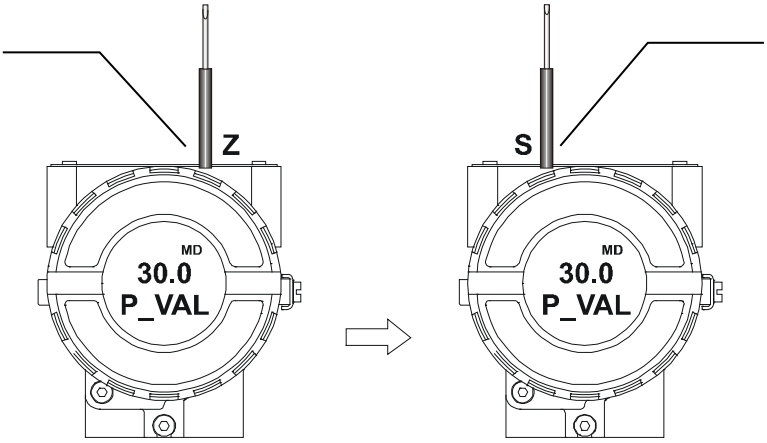


Figure 3.40 - J1 and W1 Jumpers

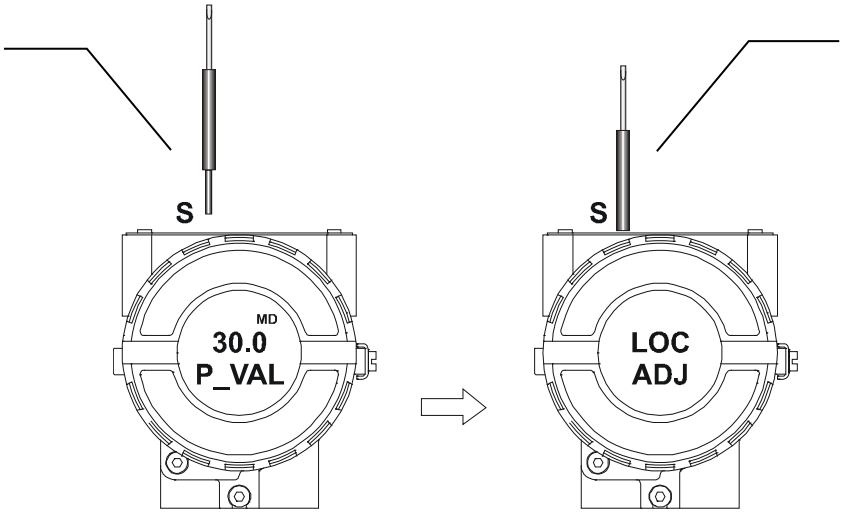
In order to start the local adjustment, place the magnetic tool in **Z** hole and wait until letters **MD** are displayed.



Place the magnetic tool in **S** hole and wait for 5 seconds.

Figure 3.41 - Step 1 - LD303

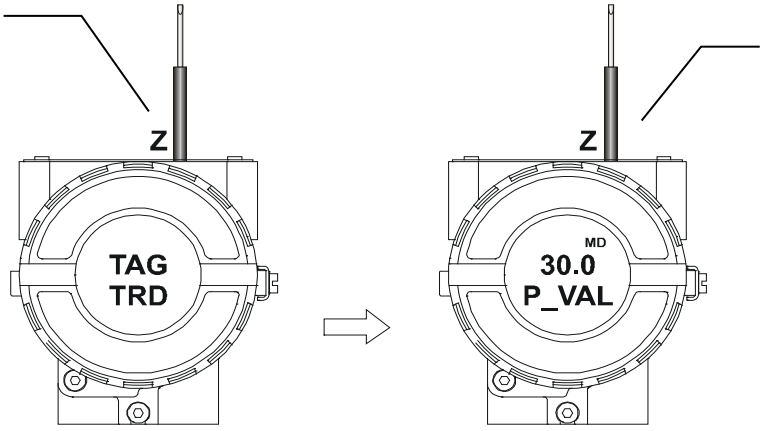
Remove the magnetic tool from **S** hole.



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

Figure 3.42 - Step 2 - LD303

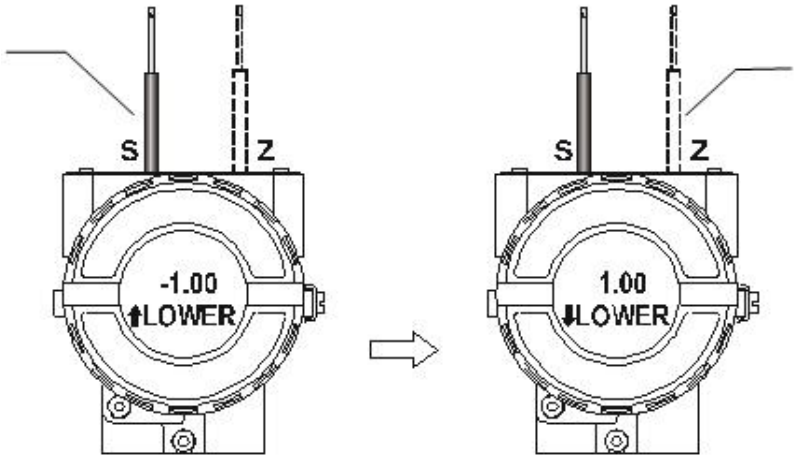
Place the magnetic tool in **Z** hole. If this is the first configuration, the option shown on the display is the **TAG** with its corresponding mnemonic configured by the configurator. Otherwise, the option shown on the display will be the one configured in the prior operation. By keeping the tool inserted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



Suppose to be the first configuration. In this case, the option (**P_VAL**) is showed with its respective value. To change this value, insert the magnetic tool in **S** hole, and keep it there until getting the desired value.

Figure 3.43 – Step 3 – LD303

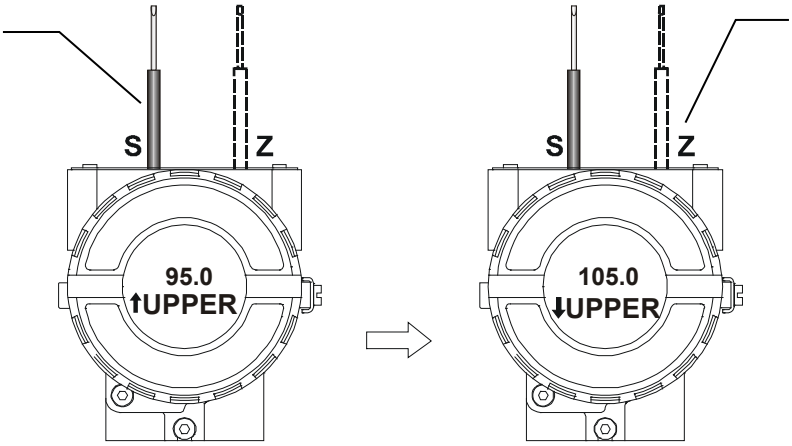
In order to select the next function, the lower value (**LOWER**), move the magnetic tool from **S** to **Z** hole. An arrow pointing upward (↑) increments the value and an arrow pointing downward (↓) decrements the value. In order to increment the value, insert and keep the tool in **S** orifice until getting the desired value.



In order to decrement the lower value, place the magnetic tool in **Z** hole to shift the arrow to the downward position. After that, insert and keep the tool in **S** until getting the desired value.

Figure 3.44 - Step 4 - LD303

To select the next function, the upper value (**UPPER**), move the magnetic tool from **S** to **Z** hole. An arrow pointing upward (↑) increments the value and an arrow pointing downward (↓) decrements the value. In order to increment the value, insert and keep the tool in **S** hole until getting the desired value.



In order to decrement the upper value, place the magnetic tool in **Z** hole to shift the arrow to the downward position. After that, insert and keep the tool in **S** hole until getting the desired value.

Figure 3.45 - Step 5 - LD303

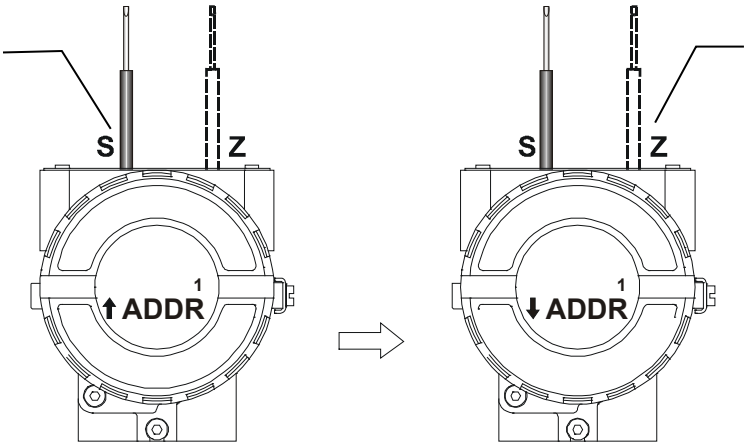
The **SECV1** and **SECV2** options will then appear, which are outputs from the transducer block and are read-only. See details in the topic “Description of Pressure Transducer Block Parameters”.

To obtain the next function, the address (ADDR), move the magnetic key from S hole to Z hole. The arrow pointing upwards increases the address value. Keep the key inserted in S to increase it to the desired address.

To decrease the address value, place the magnetic key in Z hole to move the arrow indication downwards. After that, insert it in S hole to decrease it.

This option configures the address of the LD303 in the PROFIBUS PA network. Acceptable values range from 3 to 126.

To select the next function, the address value (**ADDR**), move the magnetic tool from **S** to **Z** hole. An arrow pointing upward (↑) increments the value and an arrow pointing downward (↓) decrements the value. In order to increment the value, insert and keep the tool in **S** hole until getting the desired value.



To decrement the address value, place the magnetic tool in **Z** hole to shift the arrow to the downward position. After that, insert and keep the tool in **S** hole until getting the desired value.

Figure 3.46 - Step 6 - LD303

The local adjustment tree has other configuration options. See below:

IDSEL
There are three possible values for this parameter, resulting in three operating modes:
(0) PROFILE SPECIFIC – Equipment complies with a generic GSD, and this must be used when there is a perspective of exchanging equipment between manufacturers.
(1) MANUFACTURER SPECIFIC – (DEFAULT) Equipment complies with the manufacturer's GSD with its characteristics.
(127) AUTOMATIC_IDENT_NUMBER – Equipment will respond with the IDENT_NUMBER configured in the IDNT0 and IDNT1 parameters. For more details see note.

IDENT0
After changing the IDSEL parameter to 127, the equipment's IDENT_NUMBER value must be converted from hexadecimal to decimal, found inside the GSD file used to include it in the configuration, and the first part of the converted number must be written in IDNT0.

IDENT1
In IDENT1 write the second part of the equipment's IDENT_NUMBER value in decimal.

Examples:
0X06CA => IDNT0 = 6 and IDNT1 = 202
0X8079 => IDNT0 =128 and IDNT1 = 121

CONF
This option allows selecting the LCD to configure it, that is, which item will be shown on the LD303 display and the local adjustment tree. Six options are available – from LCD1 to LCD6.

BLOCK
In this option, the user can select the function block to be configured.

PRMT
It is the number corresponding to the relative index of the parameter to be configured within the function block chosen in the BLOCK option.

ITEM
This option must be configured if the parameter selected in PRMT has sub-items. For example, the OUT_SCALE parameter is composed of EU at 100%, EU at 0%, Unit Index and Decimal Point.

TGGL
This option allows choosing how many configured parameters will be alternately shown on the display during normal operation. For example, if TGGL equals two, the display will alternate between LCD1 and LCD2.

UPDT
The configuration is finished by activating UPDT after choosing the options for the local adjustment.

NOTE

AUTOMATIC_IDENT_NUMBER is a feature available from LD303 firmware version 4.11 onwards. This procedure can be used to replace a device from another manufacturer with a SMAR device without changing the configuration of the PROFIBUS master in operation.

This action is recommended when there is an urgent need to replace the equipment or there is no possibility of maintaining the configuration.

In this case, the IDENT_NUMBER of the SMAR equipment must be changed to reflect the same code as the equipment it will replace. This can only be done by comparing the GSD files of both and ensuring module compatibility.

For example, if there is a PROFIBUS PA device from another manufacturer in your network and that, according to its GSD file, has IDENT_NUMBER = 0x0639 and it is necessary to replace it with a Smar device, without downloading the configuration in the PROFIBUS master, the user must proceed as follows:

1) Change the address of the SMAR device to the same address as the device to be replaced.

2) Check in the configuration in operation on the client, which is the model and IDENT_NUMBER of the equipment via GSD file. Take a note of this number, for example 0x0639 is the IDENT_NUMBER used by one of the equipment models from another manufacturer.

3) On the Smar equipment, using the magnetic tool, go to the IDENT parameter and set the value to 127. This value means that the equipment will work in AUTOMATIC_IDENT_NUMBER.

4) After changing the IDENT parameter to 127, convert the GSD value to decimal and write the values in items IDNT0 and IDNT1:

   0x0639 => IDNT0 = 6 | IDNT1 = 57

5) Restart the equipment.

This Smar equipment can be added in place of another manufacturer's equipment without changing the configuration. Parameterizations (SETUP, Kp, Tr, scales) must be performed locally or with ProfibusView and PBI.

In case of FACT_INIT on the instrument, it will return to the default mode (1) MANUFACTURER SPECIFIC with the original IDENT_NUMBER Smar.

Cyclical Diagnosis

Via cyclic communication is possible to verify diagnostics from the **LD303** using the Profibus Master Class 1 or even via acyclic communication via Master Class 2. The Profibus-PA devices provide up to 4 standard diagnoses bytes via Physcial Block (see figure 3.47 and 3.48) and when the most significant bit of the fourth Byte is "1", the diagnose will extend the information in more 6 bytes. These Diagnosis bytes can also be monitored via cyclic tools.

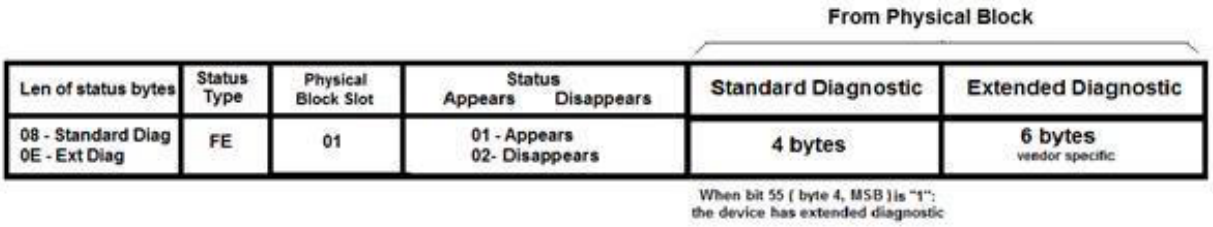


Figure 3.47 – Cyclical Diagnosis

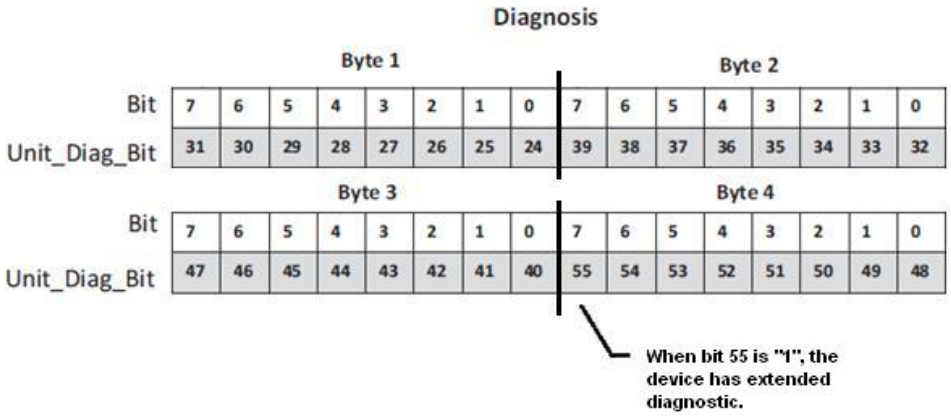


Figure 3.48 – Cyclic Diagnosis mapping for 4 bytes of Physical Block.

Unit_Diag_bit is described in the GSD file Profibus-PA device.

See below a description part of a GSD file for the 4 bytes and more detail:

```
;---------- Description of device related diagnosis: ----------------------
;

Unit_Diag_Bit(16)   = "Error appears"
Unit_Diag_Bit(17)   = "Error disappears"
;
;Byte 01
Unit_Diag_Bit(24)   = "Hardware failure electronics"
Unit_Diag_Bit(25)   = "Hardware failure mechanics"
Unit_Diag_Bit(26)   = "Not used 26"
Unit_Diag_Bit(27)   = "Electronic temperature alarm"
Unit_Diag_Bit(28)   = "Memory error"
Unit_Diag_Bit(29)   = "Measurement failure"
Unit_Diag_Bit(30)   = "Device not initialized"
Unit_Diag_Bit(31)   = "Device initialization failed"

;Byte 02
Unit_Diag_Bit(32)   = "Not used 32"
Unit_Diag_Bit(33)   = "Not used 33"
Unit_Diag_Bit(34)   = "Configuration invalid"
Unit_Diag_Bit(35)   = "Restart"
Unit_Diag_Bit(36)   = "Coldstart"
```

```
Unit_Diag_Bit(37)   = "Maintenance required"
Unit_Diag_Bit(38)   = "Characteristics invalid"
Unit_Diag_Bit(39)   = "Ident_Number violation"


;Byte 03
Unit_Diag_Bit(40)   = "Not used 40"
Unit_Diag_Bit(41)   = "Not used 41"
Unit_Diag_Bit(42)   = "Not used 42"
Unit_Diag_Bit(43)   = "Not used 43"
Unit_Diag_Bit(44)   = "Not used 44"
Unit_Diag_Bit(45)   = "Not used 45"
Unit_Diag_Bit(46)   = "Not used 46"
Unit_Diag_Bit(47)   = "Not used 47"


;byte 04
Unit_Diag_Bit(48)   = "Not used 48"
Unit_Diag_Bit(49)   = "Not used 49"
Unit_Diag_Bit(50)   = "Not used 50"
Unit_Diag_Bit(51)   = "Not used 51"
Unit_Diag_Bit(52)   = "Not used 52"
Unit_Diag_Bit(53)   = "Not used 53"
Unit_Diag_Bit(54)   = "Not used 54"
Unit_Diag_Bit(55)   = "Extension Available"

;Byte 05 TRD Block & PHY Block
Unit_Diag_Bit(56)   = "Sensor failure"
Unit_Diag_Bit(57)   = "Temperature Out of work range"
Unit_Diag_Bit(58)   = "Pressure Sensor Out of High limit"
Unit_Diag_Bit(59)   = "Pressure Sensor Out of Low limit"
Unit_Diag_Bit(60)   = "Calibration Error - Check XD_ERROR parameter"
Unit_Diag_Bit(61)   = "Primary Value Unit not valid"
Unit_Diag_Bit(62)   = "No valid polynomial version"
Unit_Diag_Bit(63)   = "Device is writing lock"

;byte 06 AI Block
Unit_Diag_Bit(64)   = "Simulation Active in AI Block"
Unit_Diag_Bit(65)   = "Fail Safe Active in AI Block"
Unit_Diag_Bit(66)   = "AI Block in Out of Service"
Unit_Diag_Bit(67)   = "AI Block Output out of High limit"
Unit_Diag_Bit(68)   = "AI Block Output out of Low limit"
Unit_Diag_Bit(69)   = "No assigned channel to AI Block"
Unit_Diag_Bit(70)   = "Not used 70"
Unit_Diag_Bit(71)   = "Not used 71"

;byte 07 TOT Block
Unit_Diag_Bit(72)   = "TOT Block in Out of Service"
Unit_Diag_Bit(73)   = "Totalization Out of High limit"
Unit_Diag_Bit(74)   = "Totalization Out of Low limit"
Unit_Diag_Bit(75)   = "No assigned channel to TOT Block"
Unit_Diag_Bit(76)   = "Not used 76"
Unit_Diag_Bit(77)   = "Not used 77"
Unit_Diag_Bit(78)   = "Not used 78"
Unit_Diag_Bit(79)   = "Not used 79"

;byte 08
Unit_Diag_Bit(80)   = "Not used 80"
Unit_Diag_Bit(81)   = "Not used 81"
Unit_Diag_Bit(82)   = "Not used 82"
Unit_Diag_Bit(83)   = "Not used 83"
Unit_Diag_Bit(84)   = "Not used 84"
Unit_Diag_Bit(85)   = "Not used 85"
Unit_Diag_Bit(86)   = "Not used 86"
Unit_Diag_Bit(87)   = "Not used 87"
```

```
;byte 09
Unit_Diag_Bit(88)   = "Not used 88"
Unit_Diag_Bit(89)   = "Not used 89"
Unit_Diag_Bit(90)   = "Not used 90"
Unit_Diag_Bit(91)   = "Not used 91"
Unit_Diag_Bit(92)   = "Not used 92"
Unit_Diag_Bit(93)   = "Not used 93"
Unit_Diag_Bit(94)   = "Not used 94"
Unit_Diag_Bit(95)   = "Not used 95"

;byte 10
Unit_Diag_Bit(96)   = "Not used 96"
Unit_Diag_Bit(97)   = "Not used 97"
Unit_Diag_Bit(98)   = "Not used 98"
Unit_Diag_Bit(99)   = "Not used 99"
Unit_Diag_Bit(100)  = "Not used 100"
Unit_Diag_Bit(101)  = "Not used 101"
Unit_Diag_Bit(102)  = "Not used 102"
Unit_Diag_Bit(103)  = "Not used 103"
```

NOTE

If the FIX flag is active on LCD, the **LD303** is configured to "Profile Specific" mode. When in "Manufacturer Specific" mode, the Identifier Number is 0x0895. Once the Identifier_Number_Selector is changed from "Profile Specific" to "Manufacturer Specific" or vice-versa, one must wait 5 seconds while is saved. Then, turn the **LD303** off and turn it on again. So, the Identifier Number is updated to the communication level. If the equipment is in "Profile Specific" and using the GSD file Identifier Number equals 0x0895, the acyclic communication will work with the tools based on EDDL, FDT/DTM, but no cyclic communication with the Profibus-DP master.

Section 4

MAINTENANCE PROCEDURES

General

NOTE
Installations in classified areas must follow the recommendations of applicable standards. Refer to Appendix A for this information.

SMAR Series 303 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 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.

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 **LD303** 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 that the coupler connections are OK and correctly positioned. Check that the Terminators are according to the specifications. Check length of trunk and spurs. Check spacing between couplers.
	▪ **Network Configuration** Make sure that device address is configured correctly.
	▪ **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 **LD303** 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 **LD303** has been configured to. Check if process is within the range of the sensor and the **LD303**.

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. With exception to the equipment physical address and the GSD identifier number selector parameter. After doing this, all configurations must be remade according to their applications.

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.

Note that this procedure must be performed by authorized personal only and with the process switched off, since the equipment will be configured with standard and factory data.

Disassembly Procedure

WARNING

Do not disassemble with power on.

The following figures represent exploded views of the transmitter and help to understand the following. The numbers between parameters correspond to the highlighted parts in the drawing.

Sensor Cleaning

To have access to the sensor for cleaning purposes, the transmitter should be removed from its process connections. The transmitter should be isolated from the process by means of manifolds or valves; then, the drain must be opened to vent any remaining pressure.

Figure 4.1 - Sensor Safety Rotation

After this, the transmitter may be removed from the standpipe. After removing bolts and flanges, the isolating diaphragms will be easily accessible for cleaning.

Cleaning should be done carefully to avoid damaging the delicate isolating diaphragms. Use of a

soft cloth and a non-acid solution is recommended. The oscillating circuit is a part of the sensor and the replacement of one implies replacing the other.

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 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.

Electronic Circuit

To remove the circuit board, 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 Mounting

When mounting the sensor, make use of a new set of o-rings compatible with the process fluid. The bolts, nuts, flanges and other parts should be inspected for corrosion or other eventual damage. Damaged parts should be replaced.

The O-rings should be lightly lubricated with silicon oil before they are fitted into place. Use halogen grease on applications having inert filling fluid. The flanges must be positioned on a flat surface. Insert the o-rings in the sensor. Set the four bolts and nuts initially with manual tightening, keeping the flanges in parallel through the whole mounting and finalize with an adequate tool, remembering to tighten them crosswise.

O'RINGS AND BACKUP RINGS FOR HIGH PRESSURE
Except for special cases, the new standard flanges do not use parbak. For specials that still use it, proceed as follows: Do not bend the parback ring and check that it has no biting. Mount it carefully. The flat side must press the o-ring in the mounting.

- Tighten one nut till the flange seats.
- Tighten the nut diagonally across with a torque of 2.75 ±0.25 kgf.m.
- Tighten the first nut with the same torque.
- Verify the flange alignment.
- Check torque on the four bolts.

If adapters have been removed, it is recommended to replace o´rings and to connect the adapters to the process flanges before coupling them to the sensor. Optimum torque is 2.75 ±0.25 Kgf.m.

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 parallel to the process flange. Tighten the hex screw to lock the housing to the sensor.

Electronic Circuit

Plug sensor connector and power supply connector to main board. If there is a display, attach it to the main board by means of 4 screws (3). The display can be installed in any of the 4 possible positions (See next Figure).

The "▲" mark indicates up position.

Pass the screws through the main board holes and the spacers as shown on Figure 4.2 and tighten them to the housing.

After tightening the protective cover (1), mounting procedure is complete. The transmitter is ready to be energized and tested. It is recommended that adjustments be done on the ZERO TRIM and on the UPPER PRESSURE TRIM.

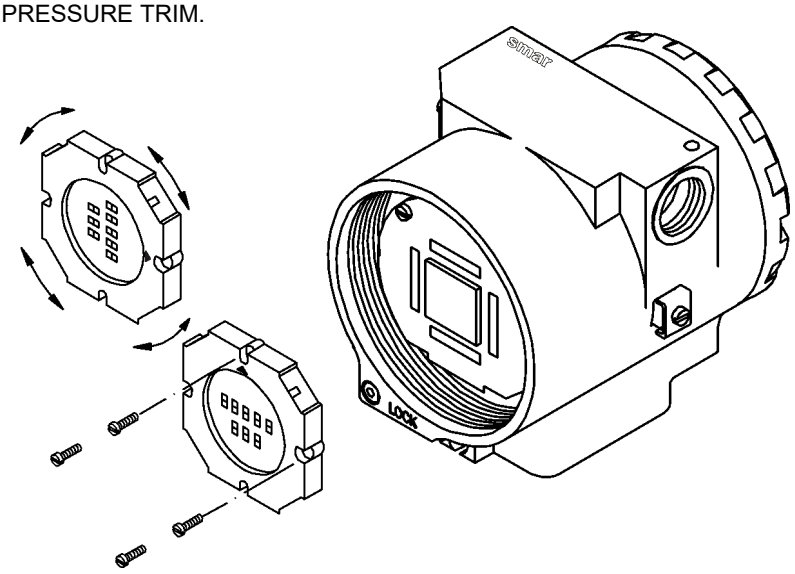


Figure 4.2 - Four Possible Positions of the Display

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

If it becomes necessary to return the transmitter and/or configurator to Smar, simply contact our office, informing the defective instrument's 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.

Application with Halar

Technical Specification

Halar® is chemically one of the most resistant fluoropolymer. It is a thermoplastic of the melting process manufactured by Solvay Solexis, Inc. For its chemical structure, a 1:1 alternating ethylene copolymer and chlorinetrifluoroethylene, Halar® (ECTFE) offers an only combination of useful properties.

The diaphragms in 316L Stainless Steel covered with Halar®, are ideal for applications in contact with aggressive liquids. They offer excellent resistance to the chemic and abrasion with a wide temperature range. Halar® does not contaminate liquids of high purity and it is not affected by most of corrosive chemists, usually found in the industries, including strong minerals, oxidant acids, alkalis, liquid oxygen and some organic solvents.

Halar® is trademark of *Solvay Solexis, Inc*.

TPE – Total Probable Error (Software)

Software to calculate the assembly error of the Pressure Transmitters with possible connections to the process.

TPE was developed to a fast and effective aid of the products related the pressure measurement. The users are the Applications Engineer and Commercial Areas. The customer can request a report of performance estimate to Smar.

This product allows simulations of possible assemblies, verifying important data as the error estimates of the response time, capillary length analysis and diaphragms mechanical resistance with temperature variation. See an example in the next Figure.

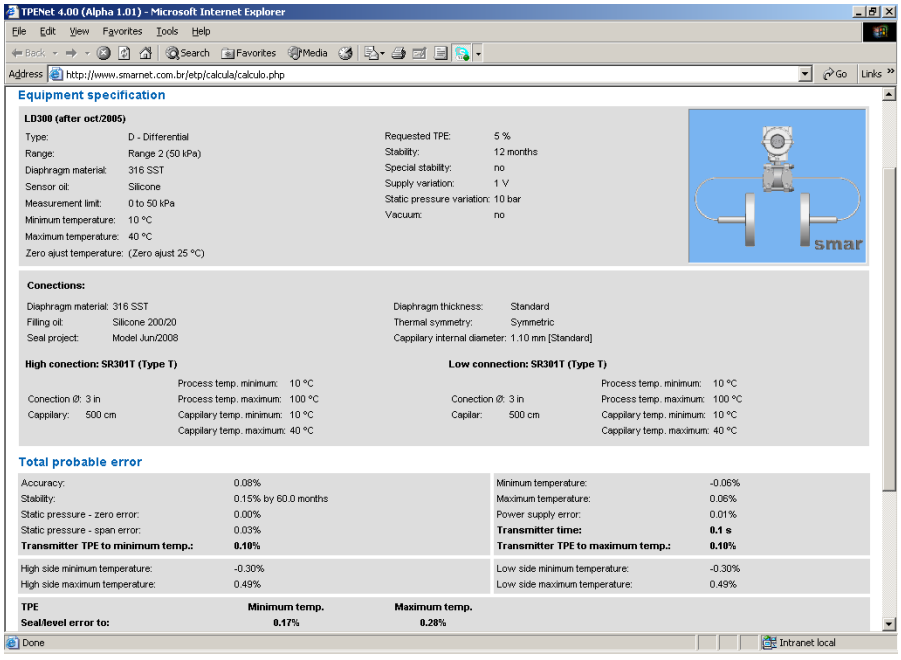


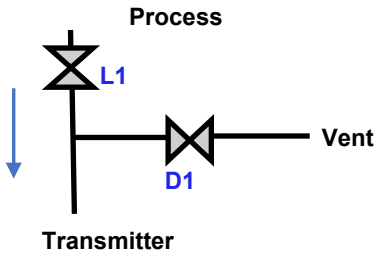
Figure 4.3 – TPE Software Screen

Use of Manifolds – Transmitter Operational Safety

Importance of using manifolds

- Use of manifolds increases safety in maintenance maneuvers on transmitters;
- Following the indicated procedures, it avoids maneuvers that can cause overpressure in differential transmitters;
- When necessary, complementary operational actions must be implemented.

2-Way Manifold



Operation

- Usually used to measure gauge or absolute pressure in which the fluid is drained through the manifold drain screw;
- During normal operation, the line valve must be opened and the drain valve closed;
- In case of dangerous, toxic, and corrosive fluids, high temperature, high pressure, etc., it is recommended to connect the drain outlet pipe, when it exists, directing the fluid to a safe place.

Maintenance

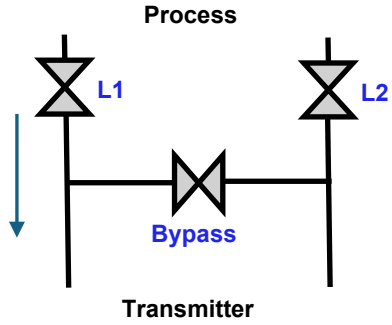
Start of operation - mounting the transmitter to the manifold

- Initial positions: L1 valve closed and D1 valve opened;
- Mount the transmitter on the manifold;
- Close D1 valve;
- Open L1 valve.

Removing the transmitter or zero adjustment

• Close the L1 valve;
• Open valve D1, making sure that all liquid fluid has drained;
• Set the zero or remove the transmitter;
• Return the instrument to operation following the steps for starting the operation.

3-Way Manifold



Operation

- Usually used for differential pressure measurement;
- During normal operation, both L1 and L2 valves must be opened and the Bypass valve closed;
- It has a disadvantage that there are no drain valves, so it is recommended the use of transmitters with drain screws. The risk of handling hazardous fluids must be considered.

Maintenance

Start of operation - mounting the transmitter to the manifold

- Initial positions: L1 and L2 valves closed and Bypass valve opened;
- Mount the transmitter on the manifold;
- Make sure that the drain screws of the transmitter are closed;
- Open L2 valve;
- Close Bypass valve;
- Open L1 valve.

Removing the transmitter or zero adjustment (without static pressure)

NOTE
This procedure is recommended for non-high static pressures.

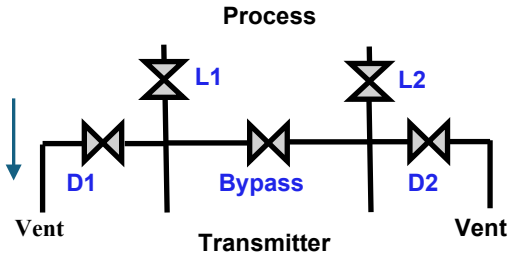
- Close L1 valve;
- Open Bypass valve;
- Close L2 valve;
- If the transmitter has drains, open them to atmosphere;
- Set the zero or remove the transmitter;
- Return the instrument to operation following the steps for starting the operation.

Removing the transmitter or zero adjustment (with static pressure)

NOTE
This procedure is recommended when you want to compensate the deviation caused by static pressure.

- Close L1 valve;
- Open Bypass valve;
- Set the zero or remove the transmitter;
- Return the instrument to operation following the steps for starting the operation.

5-Way Manifold



Operation

- Usually used to measure differential pressure in which the fluid is drained through the manifold drain screws;
- During normal operation, both line valves must be opened, the Bypass valve and both drain valves must be closed;
- In case of dangerous, toxic, and corrosive fluids, high temperature, high pressure, etc., it is recommended to connect the drain outlet pipe, when it exists, directing the fluid to a safe

place.

Maintenance

Start of operation - mounting the transmitter to the manifold

- Initial positions: L1 and L2 valves closed, Bypass valve opened, and D1 and D2 opened;
- Mount the transmitter on the manifold;
- Close the D1 and D2 drain valves;
- Open L2 valve;
- Close Bypass valve;
- Open L1 valve.

Removing the transmitter or zero adjustment (without static pressure)

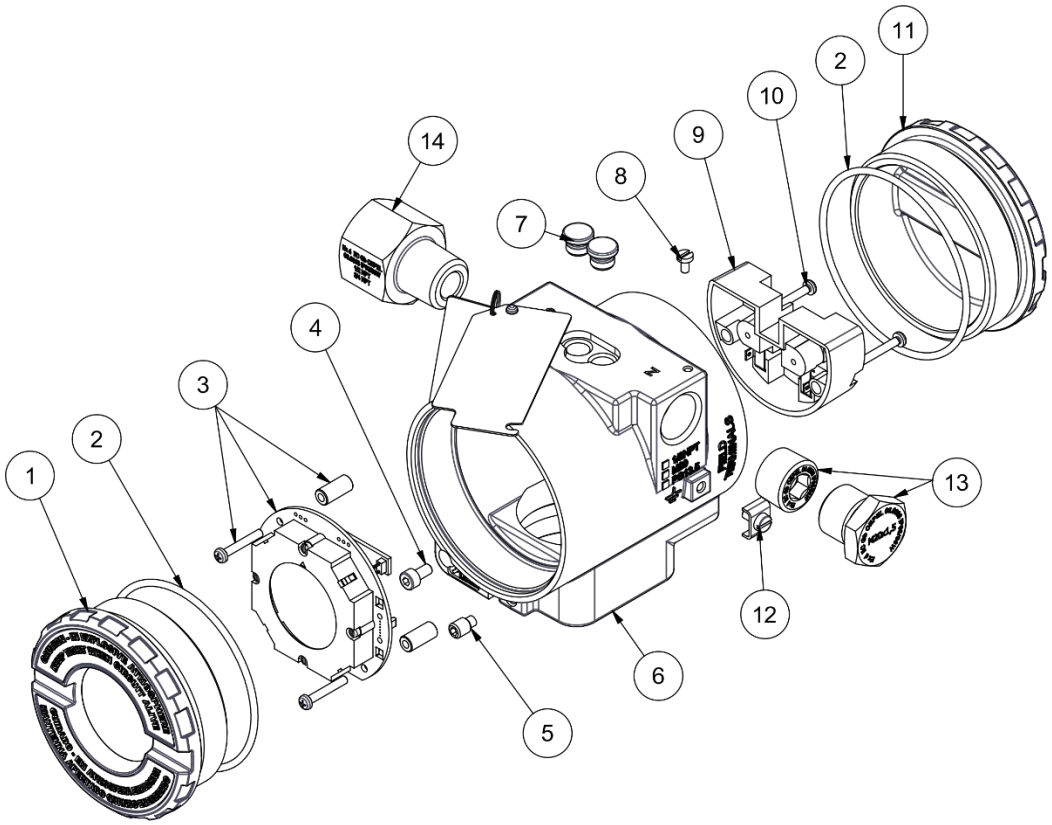
NOTE
This procedure is recommended for non-high static pressures.

- This procedure **does not take into account** static pressure compensation;
- Close L1 valve;
- Open Bypass valve;
- Close L2 valve;
- Open D1 and D2 valves, making sure that all liquid fluid has drained;
- Set the zero or remove the transmitter;
- Return the instrument to operation following the steps for starting the operation.

Removing the transmitter or zero adjustment (with static pressure)

- Adjust zero;
- Close L1 valve;
- Open Bypass valve;
- Close L2 valve;
- Keep both vent valves closed;
- Set the zero of the transmitter;
- Return the instrument to operation following the steps for starting the operation.

Spare Parts

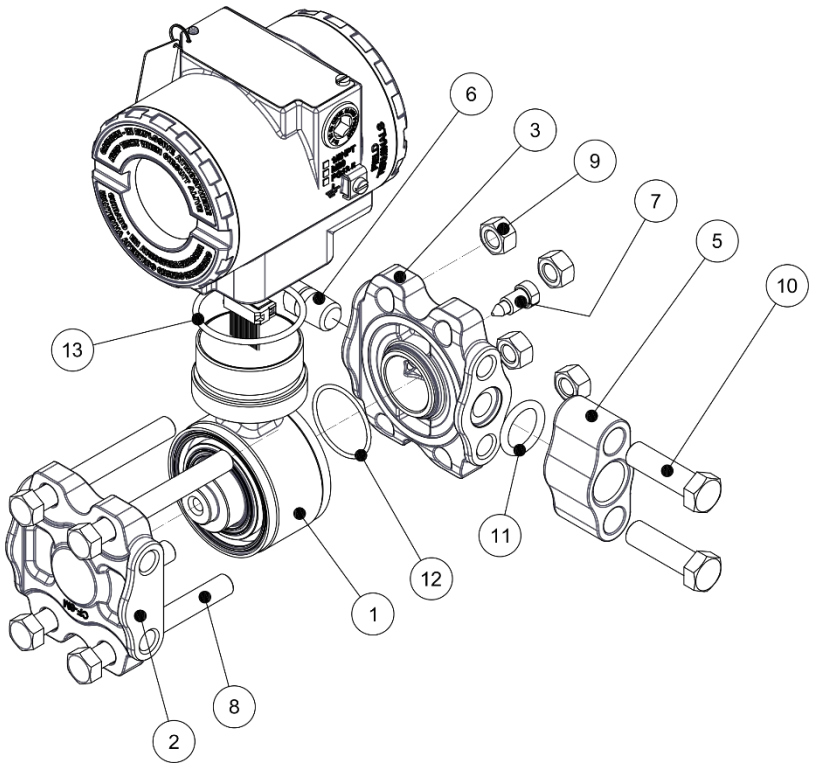


ITEM	QTY	DESCRIPTION	CODE
14	01	¾ NPT AISI 316 ADAPTER BR EXD	400-0812
13	01	PG13,5 PLUG AISI 316	400-0811
13	01	M20X1.5 PLUG AISI 316 BR EXD	400-0810
13	01	½ NPT PLUG AISI 316 BR EXD	400-1484
12	01	EXTERNAL GROUND SCREW	204-0124
11	01	COVER WITHOUT WINDOW	400-1307-0XX
10	01	TERMINAL BLOCK FIXING SCREW	204-0119
09	01	TERMINAL BLOCK	400-0059
08	01	IDENTIFICATION PLATE FIXING SCREW	204-0116
07	02	LOCAL ADJUSTMENT PROTECTION CAP (Z AND S)	204-0114
06	01	ELECTRONIC HOUSING	400-1314-1XXXX
05	01	SENSOR LOCKING SCREW	400-1121
04	02	COVER LOCKING SCREW	204-0120
03	01	ELECTRONIC BOARD	NOTE
02	02	COVER O-RING	204-0122
01	01	COVER WITH WINDOW	400-1307-1XX

Figure 4.4 - Exploded View

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

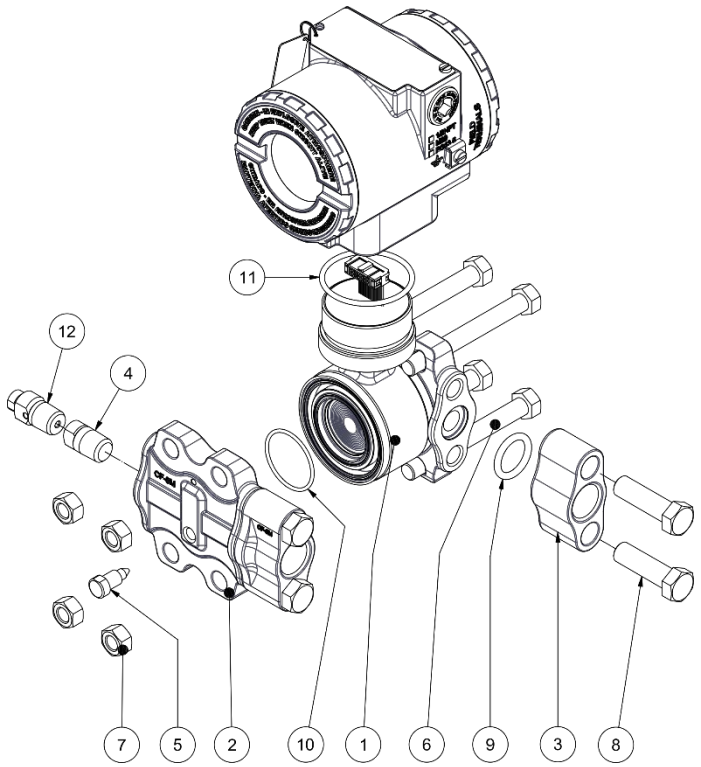
ITEM 13 NOTE
The spare part 400-1484, Internal Hexagonal Plug 1/2" NPT SST316 BR-Ex-d, was standardized in SST316 material and will be used in all line of housings (aluminum, copper free aluminum or SST316). With or without INMETRO certificate.



the campanula ID 4 only used in absolute model, welded on the sensor.
the letter "x" in codes, see complete code in manual.
The part numbers of electronic housing are in other figure

13	1	oring sensor / housing buna N	204-0113
12	1	oring sensor etileno	203-0404
12	1	oring sensor teflon	203-0403
12	1	oring sensor viton	203-0402
12	1	oring sensor buna N	203-0401
11	1	oring adapter etileno	203-0704
11	1	oring adapter teflon	203-0703
11	1	oring adapter viton	203-0702
11	1	oring adapter buna N	203-0701
10	2	Adapter's screw SS316	203-0351
10	2	Adapter's screw carbon steel bicromatized	203-0350
9	4	Flange's Nut SS316	203-0312
9	4	Flange's Nut carb bicromatized	203-0302
8	4	Flange's screw SS316	203-0310
8	4	Flange's screw carbon steel bicromatized	203-0300
7	1	Drain Screw Monel	203-1403
7	1	Drain Screw Hastelloy	203-1402
7	1	Drain Screw SS 316	203-1401
6	1	Plug 1-4NPT monel	203-0554
6	1	Plug 1-4NPT hastelloy	203-0553
6	1	Plug 1-4NPT SS 316	203-0552
5	1	Adapter 1/2NPT monel 400 bar	203-0604
5	1	Adapter 1/2NPT HS CW-12MW (hast)	203-0603
5	1	Adapter 1/2NPT SS CF-8M (316)	203-0602
5	1	Adapter 1/2NPT carbon steel	203-0601
3	1	Differential Flange	400-1330-xxx
2	1	Absolute/Gage Flange SS	204-1102
1	1	Gage Sensor (without campanula)	204-0301-M-xxx
1	1	Absolute Sensor	204-0301-A-xxx
ITEM	QTY	DESCRIPTION	CODE

Figure 4.5 –Manometric/Absolute Mounting LD303M



The letters x after codes see complete code in manual
the parbak rings 203-0710 are use only flanges with sealing 45°,
This new version use radial sealing, not use parbak rings.
A drain valve can be used with flanges without drain, in place of 1/4NPT plug.

ITEM	QTY	DESCRIPTION	PART NUMBER
12	1	drain valve monel	400-0794
12	1	drain valve hastelloy	400-0793
12	2	drain valve SS 316	400-0792
11	1	oring sensor / housing buna N	204-0113
10	2	oring sensor etileno	203-0404
10	2	oring sensor teflon	203-0403
10	2	oring sensor viton	203-0402
10	2	oring sensor buna N	203-0401
9	1	oring adapter etileno	203-0704
9	2	oring adapter teflon	203-0703
9	2	oring adapter viton	203-0702
9	2	oring adapter buna N	203-0701
8	4	Adapter's screw SS316	203-0351
8	4	Adapter's screw carbon steel bicromatized	203-0350
7	4	Flange's Nut SS316	203-0312
7	4	Flange's Nut carb bicromatized	203-0302
6	4	Flange's screw SS316	203-0310
6	4	Flange's screw carbon steel bicromatized	203-0300
5	2	Drain Screw Monel	203-1403
5	2	Drain Screw Hastelloy	203-1402
5	4	Drain Screw SS 316	203-1401
4	2	Plug 1-4NPT monel	203-0554
4	2	Plug 1-4NPT hastelloy	203-0553
4	2	Plug 1-4NPT SS 316	203-0552
3	2	Adapter 1/2NPT monel 400 bar	203-0604
3	2	Adapter 1/2NPT HS CW-12MW (hast)	203-0603
3	2	Adapter 1/2NPT SS CF-8M (316)	203-0602
3	2	Adapter 1/2NPT carbon steel	203-0601
2	2	differential Flange Standard	400-1330-xxx
1	1	Sensor	204-0301-Dxxxxx

Figure 4.6 – Differential Mounting LD303D

ACCESSORIES	
ORDERING CODE	**DESCRIPTION**
SD1	Magnetic Tool for Local Adjustment
PS302	Power Supply
BT302	Terminator
SYSCON	System configurator

Detailed Code for Ordering Spare Parts

CODE	DESCRIPTION
400-1314-1	HOUSING; LD303
Option	**Communication Protocol**
P	PROFIBUS PA
Option	**Electrical Connection**
0	½ NPT
A	M20 X 1,5
B	PG13,5
Option	**Material**
H0	Aluminum (IP/Type)
H1	SST (IP/Type)
H2	Aluminum for saline atmosphere (IPW/Type X)
H4	Aluminum Copper Free (IPW/Type X)
Option	**Painting**
P0	Gray Munsell N 6.5 Polyester
P1	Safety Blue Epoxy – Immersion Condition-Petrobras N1021
P2	Safety Blue Epoxy – Atmospheric Zone - Petrobras N1021
P3	Black Polyester
P8	Without Painting
P9	Blue Safety Epoxy
PG	Orange Safety Epoxy

400-1314-1	*	*	*	*	**TYPICAL MODEL**

*Select the desired option

CODE	DESCRIPTION
400-1307	Covers
Option	**Type**
0	Without window
1	With window
Option	**Material**
H0	Aluminum (IP/TYPE)
H1	SST (IP/TYPE)
Option	**Painting**
P0	Gray Munsell N6.5 Polyester
P2	Safety Blue Epoxy – Atmospheric Zone - Petrobras N1021
P8	Without painting
P9	Safe Blue Base Epoxy

400-1307	*	*	*	**TYPICAL MODEL**

*Select the desired option

CODE	DESCRIPTION
400-1330	DIFFERENTIAL FLANGE STANDARD 1/4 NPT CONNECTION

Option	Drain valve
0	Without drain valve
1	With drain valve

Option	Thread for fixing
0	7/16 - 20 UNF
1	M10 X 1.5
2	M12 X 1.75

Option	Flange Material
A	SST 304L / CF-3
H	HASTELLOY C276 / CW-12MW
I	SST 316 / CF-8M

400-1330	1	0	I

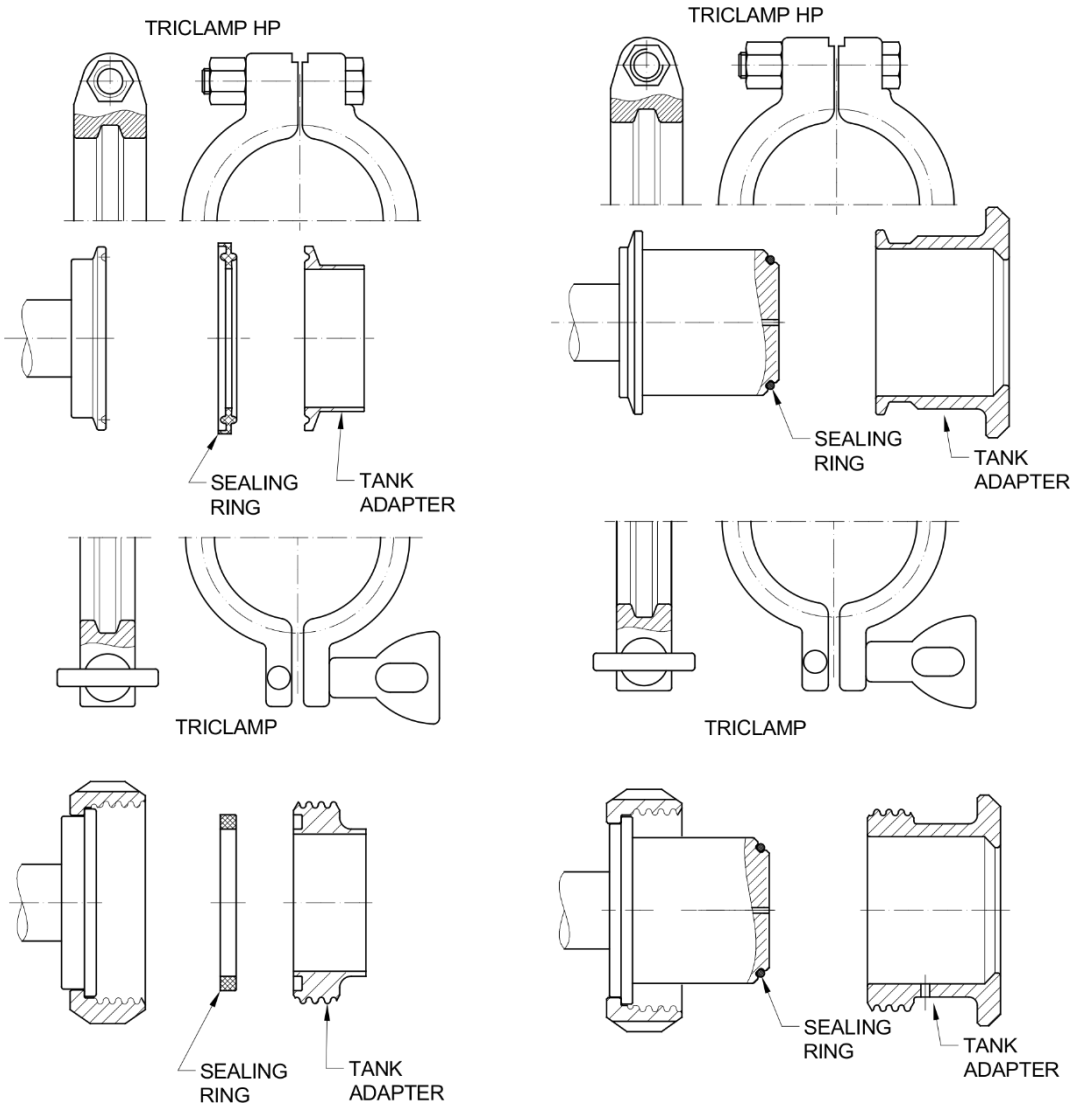


Figure 4.7 – Sanitary Connections

400-1331 SANITARY SEALING RING

Option	Mounting
0	Without Extension
1	With Extension

Option	Nominal Diameter	Option	Nominal Diameter
0	DN25	4	DN40
1	1 ½"	5	DN50
2	2"	6	DN80
3	3"		

Option	Connection
0	Oring (connection with extension)
1	Tri-clamp
2	SMS
3	RJT
4	IDF
5	DIN

Option	Material
B	Buna N
T	Teflon
V	Viton

400-1331	0	2	2	B

400-1332 SANITARY TANK ADAPTER

Option	Mounting
0	Without Extension
1	With Extension

Option	Nominal Diameter	Option	Nominal Diameter
0	DN25	4	DN40
1	1 ½"	5	DN50
2	2"	6	DN80
3	3"		

Option	Connection
1	Tri-clamp
2	SMS
3	RJT
4	IDF
5	DIN

400-1331	0	2	2

400-1333 TRI-CLAMP

Option	Diameter
1	1 ½"
2	2"
3	3"

Option	Pressure
H	HP (High pressure)
N	Standard

400-1333	2	N

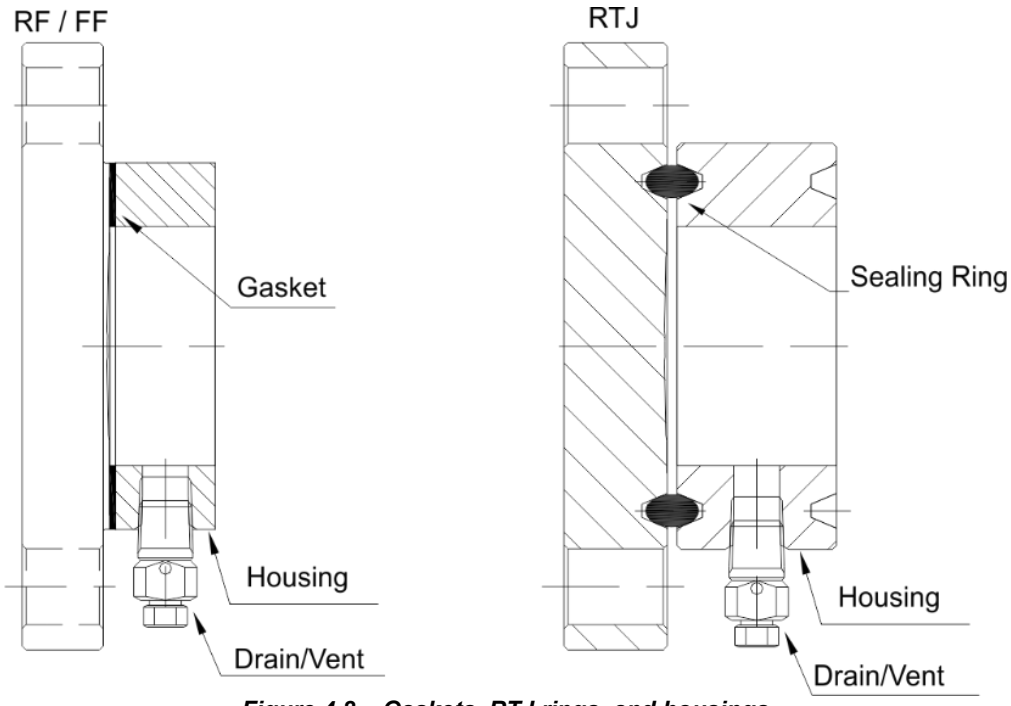


Figure 4.8 – Gaskets, RTJ rings, and housings

400-1337	SEALING GASKET FOR FLANGE ASME/DIN – FACE RF-FF (PACKAGE WITH 10 UNITS);			
	Option	**Diameter**		
	1	1” (ASME)	**6**	DN25 (DIN)
	2	1 1/2” (ASME)	**7**	DN40 (DIN)
	3	2” (ASME)	**8**	DN50 (DIN)
	4	3” (ASME)	**9**	DN80 (DIN)
	5	4” (ASME)	**A**	DN100 (DIN)
		Option	**Material**	
		G	Grafoil	
		T	Teflon	

400-1337	3	T

Drain Valve (Plug 1/4 NPT + Vent screw)	
400-0792	SST AISI 316L
400-0793	Hastelloy C276
400-0794	Monel 400

400-0258	HOUSING OF FLANGED REMOTE SEAL

CODE	Size	CODE	Size
1	1" ASME B16.5	6	DN25 DIN EN 1092-1
2	1.1/2" ASME B16.5	7	DN40 DIN EN 1092-1
3	2" ASME B16.5	8	DN50 DIN EN 1092-1
4	3" ASME B16.5	9	DN80 DIN EN 1092-1
5	4" ASME B16.5	A	DN100 DIN EN 1092-1

CODE	Pressure Class	CODE	Pressure Class
0	Do Not Vary With Pressure Class	3	600 # ASME B-16.5
1	150 # ASME B-16.5	4	1500 # ASME B-16.5
2	300 # ASME B-16.5	5	2500 # ASME B-16.5

CODE	Housing Material
1	SST 316
2	Hastelloy C276
3	Super Duplex (UNS 32750)
4	Duplex (UNS 31803)

CODE	Gasket Material	CODE	Gasket Material
0	Without Gasket	T	Teflon
G	Grafoil		
I	SST 316L		

400-0258	1	0	1	T

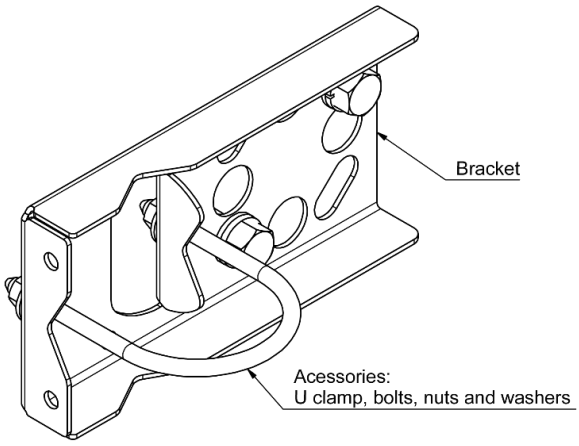
Special Options	
CODE	Size
ZZ	See notes

CODE	Housing Connection
G0	WITH 1 1/4" NPT FLUSH CONNECTION (IF SUPPLIED WITH HOUSING)
G1	WITH 2 1/4" NPT TO 180 DEGREES FLUSH CONNECTIONS
G3	WITH 2 1/2"- 14 NPT TO 180 DEGREES CONNECTIONS (WITH PLASTIC PLUG)
G5	WITH 1 1/2'' NPT FLUSH CONNECTION

CODE	Face
H0	Grooved Face RF FF (ASME, DIN) **(1)**
H2	Flat Face With Sealing Channel - RTJ (ASME B 16.20) **(1)**

ZZ	G1	H0

Note
(1) Only housing RTJ face vary by pressure class. RF and FF do not vary with the flange pressure class.



PART NUMBER	DESCRIPTION
203-0801	CARBON STEEL BRACKET AND ACESSORIES
203-0802	STAINLESS STEEL BRACKET AND ACESSORIES
203-0803	CARBON STEEL BRACKET AND SS ACESSORIES

Figure 4.9 – Flat Bracket LD303

RTJ SPARE PARTS (ASME B 16.20)			
ØN	**CLASS**	**RING**	**METALLIC RING**
			SST 316L
1”	**150**	**R15**	400-0887
	300	**R16**	400-0888
	600	**R16**	400-0888
	1500	**R16**	400-0888
	2500	**R18**	400-0889
1.1/2”	**150**	**R19**	400-0890
	300	**R20**	400-0891
	600	**R20**	400-0891
	1500	**R20**	400-0891
	2500	**R23**	400-0893
2”	**150**	**R22**	400-0892
	300	**R23**	400-0893
	600	**R23**	400-0893
	1500	**R24**	400-0894
	2500	**R26**	400-0895
3”	**150**	**R29**	400-0896
	300	**R31**	400-0897
	600	**R31**	400-0897
4”	**150**	**R36**	400-0900
	300	**R37**	400-0901
	600	**R37**	400-0901

Table 4.2 - LD303L – Spare parts codes for SST gasket (without extension)

RTJ SPARE PARTS (ASME B 16.20): LD300L (without extension) / SR301T / SR301E			
øN	**CLASS**	**RING**	**METALLIC RING**
			316L SST
3”	1500	R35	400-0899
	2500	R32	400-0898
4”	1500	R39	400-0903
	2500	R38	400-0902

Table 4.3 - LD303L – Special models for SST gasket (without extension)

Ordering Code for the Sensor

204 – 0301 — SENSOR FOR DIFFERENTIAL, FLOW, GAGE, ABSOLUTE AND HIGH STATIC PRESSURE TRANSMITTER

COD	Type	Range Limits Min.	Range Limits Max.	Min. Span	Unit	Range Limits Min.	Range Limits Max.	Min. Span	Unit
D0	Differential and Flow	-1	1	0.05	kPa	-4	4	0.2	inH_2O
D1	Differential and Flow	-5	5	0.13	kPa	-20	20	0.5	inH_2O
D2	Differential and Flow	-50	50	0.42	kPa	-200	200	1.67	inH_2O
D3	Differential and Flow	-250	250	2.08	kPa	-36	36	0.3	psi
D4	Differential and Flow	-2500	2500	20.83	kPa	-360	360	3	psi
M0	Gage	-1	1	0.05	kPa	-4	4	0.2	inH_2O
M1	Gage	- 5	5	0.13	kPa	-20	20	0.5	inH_2O
M2	Gage	- 50	50	0.42	kPa	-200	200	1.67	inH_2O
M3	Gage	-100	250	2.08	kPa	-14.50	36	0.3	psi
M4	Gage	-100	2500	20.83	kPa	-14.50	360	3	psi
M5	Gage	- 0.1	25	0.21	Mpa	-14.50	3600	30	psi
M6	Gage	- 0.1	40	0.33	Mpa	-14.50	5800	48.3	psi
A1	Absolute	0	5	2.00	kPa	0	37	14.8	mmHga
A2	Absolute	0	50	2.50	kPa	0	7.2	0.36	psia
A3	Absolute	0	250	5.00	kPa	0	36	0.73	psia
A4	Absolute	0	2500	20.83	kPa	0	360	3	psia
A5	Absolute	0	25	0.21	Mpa	0	3600	30	psia
A6	Absolute	0	40	0.33	Mpa	0	5800	48.3	psia
H2	Differential – High Static Pressure	-50	50	0.42	kPa	-200	200	1.67	inH_2O
H3	Differential – High Static Pressure	-250	250	2.08	kPa	-36	36	0.3	psi
H4	Differential – High Static Pressure	-2500	2500	20.83	kPa	-360	360	3	psi
H5	Differential – High Static Pressure	-25	25	0.21	Mpa	-3600	-3600	30	psi

NOTE: The range can be extended up to 0.75 LRL* and 1.2 URL* with small degradation of accuracy.

For range 6, the pressure range above URL must be assessed according to the maximum pressure approved in the competent hazardous area certification.

*LRL = Lower Range Limit.
*URL = Upper Range Limit.

COD.	Diaphragm Material and Fill Fluid		COD.			COD.		
1	316 SST	Silicone Oil **(4)**	8	Tantalum	Inert Oil Fluorolube **(2)(3)(5)**	K	Monel 400	Inert Oil Krytox **(1) (3) (5)**
2	316 SST	Inert Oil Fluorolube **(2) (5)**	9	316L SST	Fomblim Oil	M	Monel 400 Gold Plated	Silicone Oil **(1) (3) (4)**
3	Hastelloy C276	Silicone Oil **(1) (4)**	A	Monel 400	Fomblim Oil **(1) (3)**	P	Monel 400 Gold Plated	Inert Oil Krytox **(1) (3) (5)**
4	Hastelloy C276	Inert Oil Fluorolube **(1)(2)(5)**	D	316L SST	Inert Oil Krytox **(3) (5)**	Q	316 SST	Inert Oil Halocarbon 4.2 **(2) (3) (5)**
5	Monel 400	Silicone Oil **(1) (3) (4)**	E	Hastelloy C276	Inert Oil Krytox **(1) (3) (5)**	R	Hastelloy C276	Inert Oil Halocarbon 4.2 **(2) (3) (5)**
7	Tantalum	Silicone Oil **(3) (4)**	G	Tantalum	Inert Oil Krytox **(3) (5)**	S	Tantalum	Inert Oil Halocarbon 4.2 **(2) (3) (5)**

COD.	Special Procedures
C0	Standard
C1	For use in oxygen / hydrogen peroxide / chlorine
C6	Test of Overpressure at 380 bar and static pressure at 480 bar (6)

204 – 0301	D2	1	C0

← TYPICAL MODEL NUMBER

NOTES

(1) Meets NACE MR – 01 – 75/ISO 15156 recommendations.
(2) Not available for absolute models nor for vacuum applications.
(3) Not available for range 0 and 1.
(4) Silicone Oil is not recommended for oxygen (O_2) or Chlorine service.
(5) Inert Fluid: Oxygen Compatibility, safe for oxygen service.
(6) Available only for H Class.

204-0301 SENSOR FOR FLANGED PRESSURE TRANSMITTER

COD.	Range Limits Min.	Range Limits Max.	Min. Span	Unit	Range limits Min.	Range limits Max.	Min. Span	Unit
L2	-50	50	1.25	kPa	-200	200	5	inH_2O
L3	-250	250	2.08	kPa	-36	36	0.3	psi
L4	-2500	2500	20.83	kPa	-360	360	3	psi
L5	-25000	25000	208.3	kPa	-3625	3625	30.2	psi

Notes: 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.
Sensor range 2, in stainless steel or Hastelloy C276, has a diaphragm in Hastelloy C276.

COD. Diaphragm material and Fill Fluid (Low Side)

COD.		
1	316L SST	Silicone Oil **(2)**
2	316L SST	Inert Oil Fluorolube **(3) (12)**
3	Hastelloy C276	Silicone Oil **(1) (2)**
4	Hastelloy C276	Inert Oil Fluorolube **(1)(3)(12)**
5	Monel 400	Silicone Oil **(1) (2)**
7	Tantalum	Silicone Oil **(2)**
8	Tantalum	Inert Oil Fluorolube **(3) (12)**
9	316L SST	Fomblim Oil
A	Monel 400	Fomblim Oil **(1)**
D	316L SST	Inert Oil Krytox **(12)**
E	Hastelloy C276	Inert Oil Krytox **(1) (12)**
G	Tantalum	Inert Oil Krytox **(12)**
K	Monel 400	Inert Oil Krytox **(1) (12)**
M	Monel 400 Gold Plated	Silicone Oil **(1) (2)**
P	Monel 400 Gold Plated	Inert Oil Krytox **(1) (12)**
Q	316L SST	Inert Oil Halocarbon 4.2 **(12)**
R	Hastelloy C276	Inert Oil Halocarbon 4.2 **(1) (12)**
S	Tantalum	Inert Oil Halocarbon 4.2 **(12)**
H	Titanium	Inert Oil Krytox **(12)**
I	316L SST Gold Plated	Silicone Oil **(2)**
J	316L SST Gold Plated	Fluorolube **(3) (12)**
L	316L SST Gold Plated	Inert Oil Krytox **(12)**
T	316L SST Gold Plated	Halocarbon 4.2 **(12)**
U	Integral 316L SST	Silicone Oil **(2)**
V	Integral 316L SST	Fluorolube Oil **(3) (12)**
W	Integral 316L SST	Krytox Oil (12)
X	Integral 316L SST	Halocarbon 4.2 Oil (12)
Z	Special	See notes

COD. Flange, Adapter and Drain/Vent Valves material (Low Side)

COD.	
A	304L SST
C	Plated CS (Drain/Vent in Stainless Steel) **(16)**
H	Hastelloy C276 (CW – 12MW, ASTM – A494) **(1)**
I	316 SST – CF8M (ASTM – A351)
M	Monel 400 **(1)**
N	316 SST – CF8M (ASTM – A351) (Drain/Vent in Hastelloy C276) **(1)**

COD. Wetted O'Ring Material (Low Side)

COD.				
0	Without O'Rings	T	Teflon	**Note**: O'rings are not available on the sides with remote seals.
B	Buna N	V	Viton	
E	Ethylene – Propylene			

COD Drain/Vent Position (Low Side)

COD				
0	Without Drain/Vent	D	Bottom	**Note**: For better Drain/Vent operation, vent valves are strongly recommended.
A	Drain/Vent (Opposite to Process Connection)	U	Top	Drain/Vent valve not available on the sides with remote seals.

COD. Process Connection (Low Side)

COD.					
0	¼ - 18 NPT (Without Adapter)	9	Remote Seal (Low Volume Flange) **(3) (7)**	U	Low Volume Flange For Level Welded
1	1/2 - 14 NPT (Without Adapter)	T	1/2 14 BSP (With Adapter)	V	Without Connection (Mounting With Gage Flange)
3	Remote Seal (With Plug) **(7)**			W	Without Connection (Absolut Reference)

COD. Process Connection (Level Tap)

COD.			
U	1" 150 # (ANSI B16.5) **(18)**	C	3" 600 # (ANSI B16.5)
V	1" 300 # (ANSI B16.5) **(18)**	3	4" 150 # (ANSI B16.5)
W	1" 600 # (ANSI B16.5) **(18)**	4	4" 300 # (ANSI B16.5)
O	1.1/2" 150 # (ANSI B16.5)	D	4" 600 # (ANSI B16.5)
P	1.1/2" 300 # (ANSI B16.5)	5	DN 25 PN 10/40 **(18)**
Q	1.1/2" 600 # (ANSI B16.5)	R	DN 40 PN 10/40
9	2" 150 # (ANSI B16.5)	E	DN 50 PN 10/40
A	2" 300 # (ANSI B16.5)	6	DN 80 PN 10/40
B	2" 600 # (ANSI B16.5)	7	DN 100 PN 10/16
1	3" 150 # (ANSI B16.5)	8	DN 100 PN 25/40
2	3" 300 # (ANSI B16.5)		

COD. Type and Flange Material (Level Tap)

COD.			
2	316 SST (Integral Flange)	D	Duplex (UNS S31803/S32205)
3	Hastelloy C276 (Integral Flange)	S	Super Duplex (UNS S32750/S32760)
		Z	User's specification

COD. Extension Length

COD.			
0	0 mm (0")	3	150 mm (6")
1	50 mm (2")	4	200 mm (8")
2	100 mm (4")	Z	User's specification

COD. Diaphragm Material / Extension (Level Tap)

COD.			
1	316L SST / 316 SST	7	316L SST Gold Plated
2	Hastelloy C276 / 316 SST	8	Super Duplex S32750
3	Monel 400 / 316 SST	L	316L SST Halar Plated **(11)**
4	Tantalum / 316 SST **(9)**	S	Super Duplex (UNS S32750/S32760) (Only Diaphragm)
5	Titanium / 316 SST **(9)**	Z	Special – See notes

COD. Fill Fluid

COD.	
1	DC – 200/20 Silicone Oil
3	DC704 Silicone Oil
2	MO – 10 Fluorolube Oil **(8)**
4	Krytox Oil
N	Neobee M20 Propylene Glycol Oil

COD. Flange Face Finish

COD.	
0	Face RF (Raised Face)
1	Face FF (Flat Face)
2	Face RTJ (Ring Joint Face)

COD. Continues next page

204-0301	L2	1	I	B	U	0	1	2	2	1	1	1	*

⬅ TYPICAL MODEL NUMBER

204-0301 SENSOR FOR FLANGED PRESSURE TRANSMITTER (CONTINUATION)

CODE	Special Procedure
C0	Without special procedure
C1	Decrease cleaning (8)
C2	For vacuum service

CODE	Manufacturing Standard
S0	Smar

CODE	Bolts and Nuts Material
A1	316 SST
A2	Carbon Steel compatible with NACE MR 01-75
A5	Hastelloy C276
A7	SST Super duplex compatible with NACE (1) (1a)

204-0301 C0 S0 A1 ← TYPICAL MODEL NUMBER

NOTES

(1) Meets NACE MR – 01 – 75/ISO 15156 recommendations.
(1a) Meets NACE MR-0103
(2) Silicone Oils not recommendations for Oxygen (O_2) or Chlorine service.
(3) Not applicable for vacuum service.
(4) Fluorolube fill fluid is not available for Monel diaphragm.
(5) Attention, check corrosion rate for the process, AISI 316L extension 3 to 6mm. Tantalum, Monel, and Titanium diaphragms 0.1 mm.
(6) Item by inquiry.
(7) Not applicable for saline atmosphere.
(8) Degreasing cleaning is not available for Carbon Steel flanges.
(9) Drain/Vent not applicable
(10) Finishing of the sealing areas of the flange faces in accordance with specific standards.
(11) Diameter/capillary length:
2” ASME B 16.5 DN 50 DIN, JIS 50 A, for seals up to 3 meters of capillary and level models (by inquiry).
3” ASME B 16.5 DN 80 DIN, JIS 80 A, for seals up to 5 meters of capillary and level models.
4” ASME B 16.5, DN 100 DIN, JIS 100 A, for seals up to 8 meters of capillary and level models.
- Faces: RF and FF;
- Temperature Range:
+10 to 100 ºC
+ 101 to 150 ºC (by inquiry)
- Not applicable for diaphragm thickness: N1 – 0,10mm;
- Not applicable for use with gaskets.
(12) Inert Fluid: safe for oxygen service.

204-0301 — **SENSOR FOR SANITARY PRESSURE TRANSMITTER**

COD.	Range Limits Min.	Range Limits Max.	Min. Span	Unit	Range limits Min.	Range limits Max.	Min. Span	Unit
S2	-50	50	1.25	kPa	-200	200	5	inH_2O
S3	-250	250	2.08	kPa	-36	36	0.3	psi
S4	-2500	2500	20.83	kPa	-360	360	3	psi
S5	-25000	25000	208.3	kPa	-3625	3625	30.2	psi

Notes: 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.
Sensor range 2, in stainless steel or Hastelloy C276, has a diaphragm in Hastelloy C276.

COD. — Diaphragm material and Fill Fluid (Low Side)

1	316L SST	Silicone Oil **(2)**
2	316L SST	Inert Oil Fluorolube **(3) (1)**
3	Hastelloy C276	Silicone Oil **(2)**
4	Hastelloy C276	Inert Oil Fluorolube**(1)(3)**

COD. — Flange, Adapter and Drain/Vent Valves material (Low Side)

I	316 SST – CF8M (ASTM – A351)

COD. — Wetted O'Ring Material (Low Side)

0	Without O'Rings	T	Teflon	**Note**: O'rings are not available on the sides with remote seals.
B	Buna N	V	Viton	
E	Ethylene – Propylene			

COD — Drain/Vent Position (Low Side)

0	Without Drain/Vent	D	Bottom	**Note**: For better Drain/Vent operation, vent valves are strongly recommended.
A	Drain/Vent (Opposite to Process Connection)	U	Top	Drain/Vent valve not available on the sides with remote seals.

COD. — Process Connection (Low Side)

0	¼ - 18 NPT (Without Adapter)	9	Remote Seal (Low Volume Flange) **(3) (4)**	V	Without Connection (Mounting With Gage Flange) (4)
1	1/2 - 14 NPT (Without Adapter)	T	1/2 14 BSP (With Adapter)	W	Without Connection (Absolut Reference) (4)
3	Remote Seal (With Plug) **(4)**				

COD. — Process Connection (Level tap)

8	Threaded DN25 DIN 11851 – with extension **(9)**	E	Threaded SMS 2" – without extension **(6)**
9	Threaded DN40 DIN 11851 - with extension **(9)**	M	Threaded SMS 3" - with extension **(6)**
H	Threaded DN40 DIN 11851 – without extension **(9)**	1	Threaded SMS 3" - without extension **(6)**
V	Threaded DN50 DIN 11851 - with extension **(9)**	F	Tri-Clamp 1 1/2" – without extension
U	Threaded DN50 DIN 11851 - without extension **(9)**	Q	Tri-Clamp 1 1/2" HP (High Pressure) - without extension **(5)**
X	Threaded DN80 DIN 11851 - with extension **(9)**	6	Tri-Clamp 2" - with extension
W	Threaded DN80 DIN 11851 - without extension (**9**)	D	Tri-Clamp 2" – without extension
4	Threaded IDF 2" - with extension **(9)**	N	Tri-Clamp 2" HP (High Pressure) - with extension **(5)**
B	Threaded IDF 2" – without extension **(9)**	P	Tri-Clamp 2" HP (High Pressure) – without extension **(5)**
K	Threaded IDF 3" - with extension **(9)**	I	Tri-Clamp 3" - with extension
3	Threaded IDF 3" - without extension **(9)**	G	Tri-Clamp 3" – without extension
5	Threaded RJT 2" - with extension **(9)**	J	Tri-Clamp 3" HP (High Pressure) - with extension **(5)**
C	Threaded RJT 2" - without extension **(9)**	R	Tri-Clamp 3" HP (High Pressure) – without extension o **(5)**
L	Threaded RJT 3" - with extension **(9)**	A	Tri-Clamp DN50 - with extension
2	Threaded RTJ 3" - without extension **(9)**	O	Tri-Clamp DN50 HP (High Pressure) - with extension **(5)**
S	Threaded SMS 1 1/2" – without extension **(9)**	T	Tri-Clamp DN50 – without extension
7	Threaded SMS 2" - with extension **(9)**	Z	User's specification

COD. — Diaphragm Material (Level Tap)

H	Hastelloy C276
I	316 SST

COD. — Fill Fluid (Level Tap)

D	Silicone DC-704 Oil (2)	S	Silicone DC-200/20 Oil (2)
F	Fluorolube MO-10 Oil (1)(3)	T	Syltherm 800 Oil
N	Neobee Max. 200ºC	Z	Special – See notes

COD. — O´Ring Material

0	Without o´ring
B	Buna N
Y	Teflon
V	Viton
Z	special – See notes

COD. — Tank Adapter

0	No (Supplied by Client)
1	316L SST Tank Adapter
2	Special – See notes

COD. — Tri-Clamp

0	Without Tri-Clamp
2	304 SST Tri-Clamp
Z	Special – See notes

COD. — Continues next Page

204-0301	S2	1	I	B	U	0	1	I	D	B	0	0	*

← TYPICAL MODEL NUMBER

204-0301	SENSOR FOR SANITARY PRESSURE TRANSMITTER (CONTINUATION)

CODE	Special Procedure
C0	Without special procedure
C1	Decrease cleaning (8)
C2	For vacuum service

CODE	Manufacturing Standard
S0	Smar

CODE	Bolts and Nuts Material
A1	316 SST
A2	Carbon Steel compatible with NACE MR 01-75
A5	Hastelloy C276
A7	SST Super duplex compatible with NACE MR0175 / MR0103

204-0301	C0	S0	A1

⬅ TYPICAL MODEL NUMBER

NOTES

(1) Inert Fluid: Oxygen Compatibility, safe for oxygen service.
(2) Silicone Oils not recommendations for Oxygen (O_2) or Chlorine service.
(3) Not applicable for vacuum service.
(4) Drain/Vent not applicable.
(5) HP – High Pressure.
(6) Not available for tri-clamp connections.
(7) Item by inquire.

Isolation Test on Equipment Housing

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 CHARACTERISTIC

Functional Specifications	
Process Fluid	Liquid, gas, or vapor.
Output	Digital only. Complies with IEC 61158-2 (H1): 31.25kbit/s voltage mode, bus powered.
Power Supply	Bus powered: 9 – 32 Vdc. Quiescent current consumption: 12 mA
Indicator	4 1/2 -digit numerical and 5-character alphanumerical LCD indicator (optional).
Hazardous Area Certifications	See Appendix A.
Zero and Span Adjustments	No interactive, via digital communication and local adjustment.
Failure Alarm (Diagnostics)	For sensor or circuit failures, status is sent to output parameters. Detailed diagnostics are available in the contained parameters.
Temperature Limits	Ambient: -40 to 85 °C (-40 to 185 °F) Process: -40 to 100 °C (-40 to 212 °F) (Silicone oil) 0 to 85 °C (32 to 185 °F) (Fluorolube oil) -20 to 100 °C (-4 to 212 °F) (Krytox oil and Fomblim oil) -40 to 150 °C (-40 to 302 °F) (**LD303L**) *Attention to the Fluid* Storage: -40 to 85 °C (-40 to 185 °F) Display: -20 to 80 °C (-4 to 176 °F) -40 to 85 °C (-40 to 185 °F) (Without damage)
Turn-on Time	Performs within specifications in less than 10 seconds after power is applied to the transmitter.
Configuration	Basic configuration may be done using the local adjustment magnetic tool if the device has display. Complete configuration is possible using configuration tools.
Volumetric Displacement	Less than 0.15 cm^3 (0.01 in^3)
Static Pressure Limits	70 psi (5 bar) for range 0 1200 psi (80 bar) for range 1 2300 psi (160 bar) for ranges 2, 3 and 4 4600 psi (320 bar) for models H2 to H5 Except for LD303A and LD303M models *Static pressure, in differential pressure measurement, is the pressure applied on both measuring chambers, simultaneously. For example, in flow measurement with restriction elements, the static pressure is the line pressure, present in both measuring chambers, simultaneously.*
Overpressure Limits	70 psi (5 bar) for range 0 1200 psi (80 bar) for range 1 2300 psi (160 bar) for ranges 2, 3 and 4 5800 psi (400 bar) for range 5 7500 psi (520 bar) for range 6 Flange Test Pressure: 68.95 MPa (10,000 psi) *Flange test is the maximum pressure applied to the transmitter without damage to the measuring set.* Overpressures described above will not damage the transmitter, but a new calibration may be necessary. *Overpressure is the pressure applied to only one of the transmitter chambers when this pressure is higher than the sensor's reading pressure limit (URL). The concept applies to differential, gauge or absolute pressure transmitters.*
Pressure Limits for Flanges	**WARNING** It is described here only the maximum pressures of some materials referenced in each standard, other materials on request. Temperatures above 150 ° C are not available in standard models.

Functional Specifications

Pressure Limits for Flanges (continuation)

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

Material Group	Pressure Class	Maximum Temperature Allowed						
		RT*	100	150	200	250	300	350
		Maximum Pressure Allowed (bar)						
10E0 AISI 304/304L	PN 16	16	13.7	12.3	11.2	10.4	9,6	9.2
	PN 25	25	21.5	19.2	17.5	16.3	15.1	14.4
	PN 40	40	34.4	30.8	28	26	24.1	23
	PN 63	63	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

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 2017 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

Functional Specifications

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

PRESSURES TABLE FOR SEAL AND LEVEL FLANGES JIS 2220 – 2012 STANDARD

Material Group	Pressure Class	Maximum Temperature Allowed			
		Tamb at 120º	220º	300º	350º
		Maximum Pressure Allowed (bar)			
AISI316L	10k	14	12	10	--
	20k	34	31	29	26
	40k	68	62	57	52

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 Pressure Allowed (bar)			
1.1/2”	34	20	100	60
2” – DN50	28	17	70	42
3”	22	13	70	42

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 Pressure 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).

Performance Specifications	
Reference Conditions	Span starting at zero, temperature of 25°C (77°F), 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 range 0, and differential or gage models and 316L SST or Hastelloy diaphragm with silicon or halocarbon filling fluid:** **0.2 URL ≤ span ≤ URL:** ± 0.1% of span **0.05 URL ≤ span < 0.2 URL:** ± [0.025+0.015 URL/span]% of span **For ranges 1, 2, 3, 4, 5 or 6, differential or gage models, and 316L SST or Hastelloy diaphragm with silicon or halocarbon filling fluid:** **0.1 URL ≤ span ≤ URL:** ± 0.075% of span **0.025 URL ≤ span < 0.1 URL:** ± [0.0375+0.00375.URL/span]% of span **0.0083 URL ≤ span < 0.025 URL:** ± [0.0015+0.00465.URL/span]% of span **For ranges 2 to 6 and absolute model. For tantalum or monel diaphragm. For fluorolube filling fluid:** **0.1 URL ≤ span ≤ URL:** ± 0.1% of span **0.025 URL ≤ span < 0.1 URL:** ± [0,05+0,005 URL/span]% of span **0.0083 URL ≤ span < 0.025 URL:** ± [0.01+0.006 URL/span]% of span **For range 1 and absolute model:** ± 0.2% of span **For ranges 2, 3 or 4 and level model and 316L SST diaphragm with silicon or halocarbon filling fluid with maximum pressure matching the flange pressure class:** **0.1 URL ≤ span ≤ URL:** ± 0.075% of span **0.025 URL ≤ span < 0.1 URL:** ± [0.0375+0.00375.URL/span]% of span **0.0083 URL ≤ span < 0.025 URL:** ± [0.0015+0.00465.URL/span]% of span Linearity effects, hysteresis and repeatability are included.
Stability	**For ranges 1, 2, 3, 4, 5 and 6:** ± 0.15% of URL for 5 years at 20 °C temperature change and up 7 MPa (1000 psi) of static pressure **For range 0:** ± 0.2% of URL for 12 months at 20 °C temperature change and up to 100 kPA (1 bar) of static pressure **For level transmitters:** ± 0.2% of URL for 12 months at 20 °C temperature change
Temperature Effect	**For ranges 2, 3, 4, 5 and 6:** **0.2 URL ≤ span ≤ URL:** ± [0.02% URL + 0.06% span] per 20 °C (36 °F) **0.0085 URL ≤ span < 0.2 URL:** ± [0.023% URL + 0.045% span] per 20 °C (36 °F) **For range 1:** **0.2 URL ≤ span ≤ URL:** ± [0.08% URL + 0.05% span] per 20 °C (36 °F) **0.025 URL ≤ span < 0.2 URL:** ± [0.06% URL + 0.15% span] per 20 °C (36 °F) **For range 0:** **0.2 URL ≤ span ≤ URL:** ± [0.15% URL + 0.05% span] per 20 °C (36 °F) **0.05 URL ≤ span < 0.2 URL:** ± [0.1% URL + 0.3% span] per 20 °C (36 °F) **For LD303L:** 6 mmH_2O per 20 °C for 4” and DN100 17 mmH_2O per 20 °C for 3” and DN80 Consult for other flange dimensions and fill fluid.
Static Pressure Effect	**Zero error:** **For ranges 2, 3, 4, 5 and 6:** ± 0.033% of URL per 7MPa (1000 psi) **For range 1:** ± 0.05% of URL per 1.7 MPa (250 psi) **For range 0:** ± 0.1% of URL per 0.5 MPa (5 bar) **For level transmitters:** ± 0.1% of URL per 3.5 MPa (500 psi) The zero error is a systematic error that can be eliminated by calibrating at the operating static pressure. **Span error:** **For ranges 2, 3, 4, 5 and 6:** correctable to ± 0.2% of reading per 7MPa (1000 psi) **For range 1and level transmitters:** correctable to ± 0.2% of reading per 3.5 MPa (500 psi) **For range 0:** correctable to ± 0.2% of reading per 0.5 MPa (5 bar)

Performance Specifications	
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	Approved according to IEC61326-1:2006, IEC61326-2-3:2006, IEC61000-6-4:2006, IEC61000-6-2:2005.

NOTE
URL = Upper range limit. **LRL =** Lower range limit.

Physical Specifications	
Electrical Connection	1/2 - 14 NPT M20 X 1.5 PG 13.5 DIN 3/4 - 14 NPT (with 316 SST adapter for 1/2 - 14 NPT) 3/4 - 14 BSP (with 316 SST adapter for 1/2 - 14 NPT) 1/2 - 14 BSP (with 316 SST adapter for 1/2 - 14 NPT) **Note:** Explosion Proof approvals do not apply to adapter, only to Transmitter.
Process Connection	1/4 - 18 NPT or 1/2 -14 NPT (with adapter) For L models see Ordering Code. See Ordering Code for more options.
Wetted Parts	**Isolating Diaphragms:** 316L SST, Hastelloy C276, Monel 400 or Tantalum **Drain/Vent Valves and Plug:** 316 SST, Hastelloy C276 or Monel 400 **Flanges:** Plated Carbon Steel, 316 Stainless Steel (ASTM - A351 CF8M), Hastelloy C276 (CW-12MW, ASTM - A494) or Monel 400 **Wetted O-Rings (For Flanges and Adapters):** Buna N, Viton™, PTFE or Ethylene-Propylene. **Level Flanges (LD303L – ASME / DIN / JIS)** 316L SST; 304L SST; Hastelloy C276; Duplex UNS S31803 / S32205; Super Duplex UNS S32750 / S32760 **Flanges Isolating Diaphragms** 316L SST; 304L SST; Hastelloy C276; Super Duplex UNS S32750 / S32760; 316L SST with Halar coating; 316L SST gold plated; Monel gold plated **Flange's Gaskets** PTFE; Grafoil **Sanitary connections (TC, SMS, RTJ, IDF, DIN 11851):** 316L SST (without extension) 316L SST; Hastelloy C276 (extension end of connection) **Sanitary Diaphragms** 316L SST; Hastelloy C276 **Sanitary connections - Sealing rings** Buna N; PTFE; Viton The LD303 is available in NACE MR-01-75/ISO 15156 compliant materials.
Nonwetted Parts	**Electronic Housing:** Injected aluminum with polyester painting, epoxy painting or 316 SST - CF8M (ASTM - A351) housing. Complies with NEMA 4X/6P, IP66 or IP66W*, IP68 or IP68W*. **The IP66/68W sealing test (immersion) was performed at 1 bar for 24 hours. For any other situation, please consult Smar. IP66/68W tested for 200h to according NBR 8094 / ASTM B 117 standard.* **Absolute/Gage Flange; reduced volume flange and Plug Flange** 316 SST - CF8M (ASTM - A351 CF8M)

Physical Specifications	
Nonwetted Parts (continuation)	**Fill Fluid:** Silicone, Fluorolube, Krytox, Halocarbon 4.2 or Fomblim oils **O-Rings (cover/housing and sensor/housing):** Buna N **Mounting Bracket:** Plated carbon steel or 316 SST Accessories (bolts, nuts, washers and U-clamps) in carbon steel or 316 SST **Flange Bolts and Nuts:** 316 SST For NACE applications: carbon steel B7M; Hastelloy; Super duplex **Identification Plate:** 316 SST
Mounting	a) Flange mounted for Level models. b) Optional universal mounting bracket for surface or vertical/horizontal 2"-pipe (DN 50). c) Manifold Valve integrated to the transmitter. d) Directly on piping for closely coupled transmitter/orifice flange combinations. e) L mounting bracket
Approximate Weights	3.15 kg (7 lb): all models, except L models. 4.6 to 23.5 kg (10 lb to 52 lb): L models depending of diameter; class and material flanges and extension.
Control Functions Characteristics (Optional)	Resource (RS), Transducer (TRD), Display Transducer (DSP), Diagnostics (DIAG), Analog Input (AI), Control Block (PID), Advanced Control Block (APID), Arithmetic (ARTH), Integrator (INTG), Input Selector (ISEL), Character (CHAR), Analog Alarm (AALM), Timer (TIME), Lead Lag (LLAG), Output Selector or Dynamic Limiter (OSLD), Constant (CT) and Density (DENS).

Technical Characteristics of High Performance - CODE L1

High Performance option (code L1) is available under the following conditions only:

Application	Differential and Gage

Range

COD	Range Limits Min.	Range Limits Max.	Unit	Range Limits Min.	Range Limits Max.	Unit
D0	-1	1	kPa	-10	10	mbar
D1	-5	5	kPa	-50	50	mbar
D2	-50	50	kPa	-500	500	mbar
D3	-250	250	kPa	-2500	2500	mbar
D4	-2500	2500	kPa	-25	25	bar
M0	-1	1	kPa	-10	10	mbar
M1	-5	5	kPa	-50	50	mbar
M2	-50	50	kPa	-500	500	mbar
M3	-100	250	kPa	-1000	2500	mbar
M4	-100	2500	kPa	-1	25	bar
M5	-0,1	25	MPa	-1	250	bar
M6	-0,1	40	MPa	-1	400	bar
H2	-50	50	kPa	-500	500	mbar
H3	-250	250	kPa	-2500	2500	mbar
H4	-2500	2500	kPa	-25	25	bar
H5	-25	25	MPa	-250	250	bar

Diaphragm Material	316L SST Hastelloy C276
Fill fluid	Silicone

Performance Specifications	
Reference Conditions	Span starting at zero, temperature of 25 °C (77 °F), 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	**All ranges** **0.2 URL ≤ span ≤ URL:** ± 0.04% of span **0.05 URL ≤ span < 0.2 URL:** ± [0.021667 + 0.003667 URL/span]% of span **0.0085 URL ≤ span < 0.05 URL:** ± [0.0021 + 0.004645 URL /span]% of span
Stability	**For range 2:** ± 0.05% of URL for 6 months **For range 3:** ± 0.075% of URL for 12 months **For range 4:** ± 0.1% of URL for 24 months For all M, D, and H transmitters: ± 0.15% of URL for 12 years, at 20 °C temperature change and up to 7 MPa (1000 psi) {70 bar} of static pressure, environment free of hydrogen migration.
Temperature Effect	**From -10 °C to 50 °C, protected from direct sun radiation:** **0.2 URL ≤ span ≤ URL:** ± [0.018% URL + 0.012% span] per 20 °C (68 °F) **0.0085 URL ≤ span < 0.2% URL:** ± [0.002% URL + 0.002% span] per 20 °C (68 °F)
Zero Error and Span Error	**Zero error:** ± 0.025% URL per 7MPa (1000 psi) The zero error is systematic and can be eliminated by calibrating at the operating static pressure. **Span error:** Correctable to ± 0.2% of reading per 7 MPa (1000 psi)

NOTES

Hasteloy is a trademark of the Cabot Corp.
Monel is a trademark of International Nckel Co.
Viton and Teflon are trademarks of E. I. DuPunt de Nemours & Co
Fluorolube is a trademark of Hooker Chemical Corp.
Halocarbon is a trademark of Halocarbon.
Profibus is a trademark of Profibus International
Smar Pressure Transmitters are protected by US patent number 6,433,791

Ordering Code

MODEL	DIFFERENTIAL, FLOW, GAGE, ABSOLUTE AND HIGH STATIC PRESSURE TRANSMITTER
LD303	PROFIBUS PA

COD.	Type	Range Limits Min.	Range Limits Max.	Min. Span	Unit	Range Limits Min.	Range Limits Max.	Min. Span	Unit
D0	Differential and Flow	-1	1	0.05	kPa	-4	4	0.2	inH_2O
D1	Differential and Flow	-5	5	0.13	kPa	-20	20	0.5	inH_2O
D2	Differential and Flow	-50	50	0.42	kPa	-200	200	1.67	inH_2O
D3	Differential and Flow	-250	250	2.08	kPa	-36	36	0.3	psi
D4	Differential and Flow	-2500	2500	20.83	kPa	-360	360	3	psi
M0	Gage	-1	1	0.05	kPa	-4	4	0.2	inH_2O
M1	Gage	- 5	5	0.13	kPa	-20	20	0.5	inH_2O
M2	Gage	- 50	50	0.42	kPa	-200	200	1.67	inH_2O
M3	Gage	-100	250	2.08	kPa	-14.50	36	0.3	psi
M4	Gage	-100	2500	20.83	kPa	-14.50	360	3	psi
M5	Gage	- 0.1	25	0.21	MPa	-14.50	3600	30	psi
M6	Gage	- 0.1	40	0.33	MPa	-14.50	5800	48.3	psi
A1	Absolute	0	5	2.00	kPa	0	37	14.8	mmHga
A2	Absolute	0	50	2.50	kPa	0	7.2	0.36	psia
A3	Absolute	0	250	5.00	kPa	0	36	0.73	psia
A4	Absolute	0	2500	20.83	kPa	0	360	3	psia
A5	Absolute	0	25	0.21	Mpa	0	3600	30	psia
A6	Absolute	0	40	0.33	MPa	0	5800	48.3	psia
H2	Differential – High Static Pressure	-50	50	0.42	kPa	-200	200	1.67	inH_2O
H3	Differential – High Static Pressure	-250	250	2.08	kPa	-36	36	0.3	psi
H4	Differential – High Static Pressure	-2500	2500	20.83	kPa	-360	360	3	psi
H5	Differential – High Static Pressure	-25	25	0.21	MPa	-3600	-3600	30	psi

NOTES: The range can be extended to 0.75 LRL* and 1.2 URL** with small degradation of accuracy.

For range 6, the pressure range above URL must be assessed according to the maximum pressure approved in the competent hazardous area certification.

*LRL = Lower Range Limit.
**URL = Upper Range Limit.

Minimum allowable pressure:
0.001 kPa (0.01 mbar)

Sensors ranges 0, 1 and 2, in stainless steel or Hastelloy C276, have a diaphragm in Hastelloy C276.

COD.	Diaphragm Material and Fill Fluid		COD.			COD.		
1	316 SST	Silicone Oil **(9)**	D	316L SST	Oil Krytox **(3)(15)**	F	Hastelloy C276 gold plated	Silicone Oil (1) (9)
2	316 SST	Inert Oil Fluorolube **(2) (15)**	E	Hastelloy C276	Oil Krytox **(1)(3)(15)**	P	Monel 400 Gold Plated	Inert Oil Krytox **(1) (3) (15)**
3	Hastelloy C276	Silicone Oil **(1) (9)**	G	Tantalum	Oil Krytox **(3)(15)**	Q	316 SST	Inert Oil Halocarbon 4.2 **(2) (3) (15)**
4	Hastelloy C276	Inert Oil Fluorolube **(1) (2) (15)**	I	Int 316LSST gold plated	Silicone **(3) (9)**	R	Hastelloy C276	Inert Oil Halocarbon 4.2 (1) **(2) (3) (15)**
5	Monel 400	Silicone Oil **(1) (3) (9)**	J	Int 316LSST gold plated	Fluorolube(2)(3)(4)(15)	S	Tantalum	Inert Oil Halocarbon 4.2 **(2) (3) (15)**
7	Tantalum	Silicone Oil **(3) (9)**	K	Monel 400	Krytox **(1) (3) (15)**	T	Int 316LSST gold plated	Inert Oil Halocarbon 4.2 **(15)**
8	Tantalum	Inert Oil Fluorolube **(2) (3) (15)**	L	Int 316LSST gold plated	Krytox **(3)(15)**	U	Integral 316L SST	Silicone Oil (3) (9)
9	316L SST	Fomblim Oil (12)	M	Monel 400 gold plated	Silicone **(1) (3) (9)**	V	Integral 316L SST	Fluorolube Oil (15)
A	Monel 400	Fomblim Oil **(1) (3)**				W	Integral 316L SST	Krytox Inert Oil (3) (15)
						X	Integral 316L SST	Halocarbon 4.2 Oil (15)

COD.	Flange(s), Adapter(s) and Drain/Vent Valves Material	COD.	
0	Without flanges, adapters, and drain/vent	F	Monel Laminated Bar **(1)**
C	Plated CS (Drain/Vent in Stainless Steel) **(16)**	N	316 SST – CF8M (ASTM A351) (Drain/Vent in Hastelloy C276) **(1)**
H	Hastelloy C276 (CW-12MW, ASTM-A494) **(1)**	O	316 SST – CF8M (Drain/Vent and plug in Monel)
I	316 SST – CF8M (ASTM A351)	P	316 SST – CF8M (ASTM A351) Flange with PVDF (Kynar) Insert **(4) (5) (7) (11)**
Z	User's specification		

COD.	Wetted O-Rings Materials	COD.	
0	Without O'Rings	K	Kalrez
B	Buna N	T	Teflon
E	Ethylene – Propylene **(12)**	V	Viton

Note: O-Rings are not available on the sides with remote Seals.

COD.	Drain/Vent Position	COD.	
O	Without Drain/Vent	D	Bottom
A	Drain/Vent (Opposite to Process Connection)	U	Top

Note: For better drain/vent operation, vent valves are strongly recommended. Drain/Vent valve are not available on the sides with remote seals

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

COD.	Process Connections	COD.	
0	1/4 - 18 NPT (Without Adapter)	B	High Side: 1/2 - 14 NPT and Low Side: Remote Seal (With Plug) (10)(12)
1	1/2 - 14 NPT With Adapter)	D	High Side: Remote Seal (With Plug) and Low Side – 1/2 - 14 NPT (10)(12)
2	CF-16 (Only Absolute)	E	High Side: Remote Seal (With Plug) and Low Side – 1/4 NPT (10) (12)
3	Remote Seal (With Plug) (3) (7) (8)	F	High Side: 1/2 - 14 NPT and Low Side - Remote Seal (Low Volume Flange) (10)(12)
5	1/2 - 14 NPT Axial with PVDF Insert (5) (7) (14)	G	High Side: 1/4 NPT and Low Side - Remote Seal (Low Volume Flange) (10) (12)
6	Low Volume Flange	H	High Side: Remote Seal (Low Volume Flange) and Low Side -1/2 NPT (10)(12)
8	Low Volume Flange - welded	I	High Side: Remote Seal (Low Volume Flange) and Low Side -1/4 NPT (4)(10)(12)
9	Remote Seal (Low Volume Flange (3) (4) (7) (8)	J	High Side: 1/2 NPT and Low Side - Remote Seal (Low Volume Flange) 1/4 NPT (4)(10)
A	High Side: 1/4 NPT/Low Side: Rem. Seal (With Plug)	L	High Side: Remote Seal (Low Volume Flange) 1/4 NPT and Low Side -1/2 NPT (4)(10)
T	1/2 - 14 BSP (With Adapter)	N	High Side: 1/2 NPT and Low Side Low Volume Flange – welded (4)(10)
V	Manifold Valve integrated to transmitter	P	High Side: Low Volume Flange – welded and Low Side 1/2 NPT (4)(10)
Z	User's specification	Q	8mm hole without thread. According to DIN 19213 (13)

COD.	Electrical Connections	COD.	
0	1/2 - 14 NPT **(17)**	A	M20 X 1.5 **(17)**
1	3/4 - 14 NPT with 316 SST adapter for 1/2 - 14 NPT) **(18)**	B	PG 13.5 DIN **(6)**
2	3/4 - 14 BSP with 316 SST adapter for 1/2 - 14 NPT) **(6)**	Z	User's specification
3	1/2 - 14 BSP with 316 SST adapter for 1/2 - 14 NPT) **(6)**		

COD.	Mounting Bracket for 2" Pipe or Surface Mounting	COD.	
0	Without Bracket	7	Carbon steel bracket. Accessories: 316 SST
1	Carbon steel bracket and accessories	9	L Type, carbon steel bracket. Accessories: 316 SST
2	316 SST bracket and accessories	A	Flat, 304 SST bracket and 316 SST accessories
5	L type, carbon steel bracket and accessories	Z	User's specification
6	L type, 316 SST bracket and accessories		

COD.	Continues next page

LD303	D2	1	I	B	U	1	0	0	1	

⬅ TYPICAL MODEL NUMBER

LD303 — DIFFERENTIAL, FLOW, GAGE, ABSOLUTE AND HING STATIC PRESSURE TRANSMITTERS (CONTINUATION)

Flanges Bolts and Nuts Material

COD.	
A0	Plated Carbon Steel (Default) **(4)**
A1	316 SST
A7	Super Duplex SST (1)

Special Procedure

COD.	
C1	Degrease Cleaning (oxygen or chlorine service)
C5	Assembly Conforming NACE

Flange Thread for Fixing Accessories (Adapters, Manifolds, Mounting Brackets, etc)

COD.	
D0	7/16" UNF (Default)
D1	M10 X 1.5
D2	M12 X 1.75

Housing Material

COD.	
H0	Aluminum (Default) (IP/TYPE)
H1	316 SST – CF8M (ASTM – A351) IP/TYPE)
H2	Aluminum for saline atmosphere (IPW/TYPEX) **(9)**
H3	316 SST for saline atmosphere (IPW/TYPEX) **(9)**
H4	Copper Free Aluminum (IPW/TYPEX) **(9)**

Identification Plate

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

Memory Configuration

COD.	
M4	Calibration with reading on the top and bottom (Hysteresis)
M5	Calibration with 10 points

Painting

COD.	
P0	Gray Munsell N 6.5 Polyester
P2	Safety Blue Epoxy – Atmospheric Zone Petrobras N1021 Standard
P3	Black Polyester
P8	Without Painting
P9	Blue Safety Epoxy – Electrostatic Painting
PG	Orange Safety Polyester
PZ	See notes

Manufacturing Standard

COD.	
S0	Smar

Tag Plate

COD.	
J0	With tag, when specified (Default)
J1	Blank
J2	According to user's notes

Characteristics

COD.	
ZZ	Special – See notes

Performance

COD.	
OP	Standard
L1	High Performance

Flange Mounting

COD.	
R1	Process connection rotated 90º with internal hexagonal plug

Output Function

COD	
X0	Linear
X1	Table
X2	Square root

Totalization

COD	
T0	Disabled
T1	Enabled

LD303...	A1	C0	D0	H0	I6	M4	P0	S0	J0	ZZ	OP	R1	X0	T0

TYPICAL MODEL

NOTES

(1) Meets NACE MR-0175 / ISO15156 standard.
(1a) Meets NACE MR-0103
(2) Silicone Oils is not recommended for Oxygen (O_2) or Chlorine service.
(3) Not applicable for vacuum service.
(4) Drain/Vent not applicable.
(5) Not applicable for saline atmosphere.
(6) Fluorolube fill fluid is not available for Monel diaphragm.
(7) Certification Ex d for FM / ATEX / IECEx / INMETRO.
(7a) Certification Ex d for INMETRO.
(8) Attention, check corrosion rate for the process, AISI 316L extension 3 to 6mm. Diaphragms of Titanium and Monel available only in 0.1 mm.
(9) Item by inquiry.
(10) Supplied without Gasket.
(11) Without certification for Explosion proof certification or intrinsically safe.
(12) Limited values to 4 1/2 digits; unit limited to 5 characters.
(13) Degrease cleaning is not available for carbon steel flanges.
(14) Gasket for housing, available only in Stainless 316.
(15) Finishing of the flange faces according to specific standards.
(16) Range of application of temperature from -40 ºC to 150 ºC.
(17) Applicable only to:
- Diameter/capillary length:
2" ASME B 16.5 DN 50 DIN, JIS 50 A, for seals up to 3 meters of capillary and level models (by inquiry).
3" ASME B 16.5 DN 80 DIN, JIS 80 A, for seals up to 5 meters of capillary and level models.
4" ASME B 16.5, DN 100 DIN, JIS 100 A, for seals up to 8 meters and level models.
- Faces: RF and FF;
- Temperature Range: +10 ºC to 100 ºC
+ 101 to 150 º C (by inquiry)
- Not applicable for use with gasket.
- Not applicable for diaphragm thickness: N1 – 0.10mm

(18) Inert Fluid: Oxygen Compatibility, safe for oxygen service.

MODEL	FLANGED PRESSURE TRANSMITTERS
LD303	PROFIBUS PA

COD.	Range Limits Min.	Range Limits Max.	Min. Span	Unit
L2	-50	50	1.25	kPa
L3	-250	250	2.08	kPa
L4	-2500	2500	20.83	kPa
L5	-25000	25000	208.3	kPa

Range limits Min.	Range limits Max.	Min. Span	Unit
-200	200	5	inH_2O
-36	36	0.3	psi
-360	360	3	psi
-3625	3625	30.2	psi

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.
Sensors range 2, in stainless steel or Hastelloy C276, have a diaphragm in Hastelloy C276.

COD. Diaphragm material and Fill Fluid (Low Side)

COD.		
1	316L SST	Silicone Oil **(2)**
2	316L SST	Inert Oil Fluorolube**(3)(18)**
3	Hastelloy C276	Silicone Oil **(1) (2)**
4	Hastelloy C276	Inert Oil Fluorolube **(1)(3)(18)**
5	Monel 400	Silicone Oil **(1) (2)**
Z	Special	**See notes**
7	Tantalum	Silicone Oil **(2)**
8	Tantalum	Inert Oil Fluorolube **(3) (18)**
9	316L SST	Fomblim Oil
A	Monel 400	Fomblim Oil **(1)**
D	316L SST	Inert Oil Krytox **(18)**
E	Hastelloy C276	Inert Oil Krytox **(1)(18)**
G	Tantalum	Inert Oil Krytox **(18)**
K	Monel 400	Inert Oil Krytox **(1) (18)**
M	Monel 400 Gold Plated	Silicone Oil **(1) (2)**
P	Monel 400 Gold Plated	Inert Oil Krytox **(1) (18)**
Q	316SST	Halocarbon 4.2 **(18)**
R	Hastelloy C276	Inert Oil Halocarbon 4.2 **(1) (18)**
S	Tantalum	Inert Oil Halocarbon 4.2 **(18)**
U	Integral 316SST	Silicone Oil (2)
V	Integral 316SST	Inert Oil Fluorolube (3) (18)
W	Integral 316SST	Inert Oil Krytox (18)
X	Integral 316SST	Inert Oil Halocarbon 4.2 (18)

COD. Flange, Adapter and Drain/Vent Valves material (Low Side)

COD.	
A	304L SST
C	Plated CS (Drain/Vent in Stainless Steel) **(5)**
H	Hastelloy C276 (CW – 12MW, ASTM – A494) **(1)**
I	316 SST – CF8M (ASTM – A351)
M	Monel 400 **(1)**
N	316 SST – CF8M (ASTM – A351) (Drain/Vent in Hastelloy C276) **(1)**
P	316 SST – CF8M (ASTM – A351) Flange with PVDF (Kynar) insert **(4)**

COD. Wetted O'Ring Material (Low Side)

COD.			
0	Without O'Rings	K	Kalrez
B	Buna-N	T	Teflon
E	Ethylene - Propylene	V	Viton

Note: O'rings are not available on the sides with remote seals.

COD. Drain/Vent Position (Low Side)

COD.			
0	Without Drain/Vent	D	Bottom
A	Drain/Vent (Opposite to Process Connection)	U	Top

Note: For better Drain/Vent operation, vent valves are strongly recommended. Drain/Vent valve are not available on the sides with remote seals.

COD. Local Indicator

COD.			
0	Without Indicator	1	With Digital indicator

COD. Process Connection (Low Side)

COD.			
0	1/4 - 18 NPT (Without Adapter)	T	1/2 14 BSP (With Adapter)
1	1/2 - 14 NPT (With Adapter)	V	Without Connection (Mounting with Gage Flange) (4)
3	Remote Seal (With Plug) **(7)**	W	Without Connection (Absolut Reference) (4)
5	1/2 - 14 NPT Axial with PVDF Insert **(4)**		
9	Remote Seal (Low Volume Flange) (3) **(4)**		

COD. Electrical Connection

COD.			
0	1/2 – 14 NPT **(25)**	A	M20 x 1.5 **(26)**
1	3/4 – 14 NPT (with 316 SST adapter for ½ - 14 NPT) **(22)**	B	PG 13.5 DIN **(27)**
2	3/4 – 14 BSP (with 316 SST adapter for ½ - 14 NPT) **(9)**	Z	User's specification
3	1/2 – 14BSP (with 316 SST adapter for ½ - 14 NPT) **(9)**		

COD. Process Connection

COD.					
U	1" 150 # (ANSI B16.5) **(30)**	C	3" 600 # (ANSI B16.5)	S	JIS 40A 20K **(23)**
V	1" 300 # (ANSI B16.5) **(30)**	N	3" 600 # (ANSI B16.5 RTJ)	F	JIS 50A 10K **(23)**
W	1" 600 # (ANSI B16.5) **(30)**	3	4" 150 # (ANSI B16.5)	T	JIS 50A 40K **(23)**
O	1.1/2" 150 # (ANSI B16.5)	4	4" 300 # (ANSI B16.5)	K	JIS 50A 20K **(23)**
P	1.1/2" 300 # (ANSI B16.5)	D	4" 600 # (ANSI B16.5)	G	JIS 80A 10K **(23)**
Q	1.1/2" 600 # (ANSI B16.5)	5	DN 25 PN 10/40 **(30)**	L	JIS 80A 20K **(23)**
9	2" 150 # (ANSI B16.5)	R	DN 40 PN 10/40	H	JIS 100A 10K **(23)**
A	2" 300 # (ANSI B16.5)	E	DN 50 PN 10/40	M	JIS 100A 10K **(23)**
B	2" 600 # (ANSI B16.5)	6	DN 80 PN 10/40	Z	User's specification
1	3" 150 # (ANSI B16.5)	7	DN 100 PN 10/16		
2	3" 300 # (ANSI B16.5)	8	DN 100 PN 25/40		

COD. Extension Length

COD.			
0	0 mm (0")	3	150 mm (6")
1	50 mm (2")	4	200 mm (8")
2	100 mm (4")	Z	User's specification

Note: Extension Material 316L SST

COD. Diaphragm Material / Extension (Level Tap)

COD.			
A	304L SST / 304L SST	6	316L SST with Teflon Lining (For 2"and 3")
1	316L SST / 316 SST	7	316L SST Gold plated (9)
2	Hastelloy C276 / 316 SST	B	Tantalum with Teflon Lining
3	Monel 400 / 316 SST (8)	L	316L SST Halar Plated **(17)**
4	Tantalum / 316 SST **(8)**	C	Hastelloy Teflon Plated
5	Titanium / 316 SST **(8)**	S	Super Duplex UNS S32750/S32760

COD Fill Fluid

COD			
1	DC – 200/20 Silicone Oil (2)	4	Krytox 1506
3	DC704 Silicone Oil (2)	N	Neobee M20
2	MO – 10 Fluorolube Oil **(3)(6)**	T	Sylltherm 800

COD. Type and Flange Material (Level Tap)

COD.			
2	316L SST (Integral Flange)	S	Super Duplex UNS S32750/S32760 **(9)**
3	Hastelloy C276 (Integral Flange) (9)	Z	User's specification
D	Duplex (UNS S31803/S32205 **(9)**		

COD. Lower Housing Material

COD.			
0	Without Gaskets **(10)**	3	Super Duplex (UNS 32750) **(9)**
1	316 SST	4	Duplex (UNS 31803) **(9)**
2	Hastelloy C276	M	Monel 400

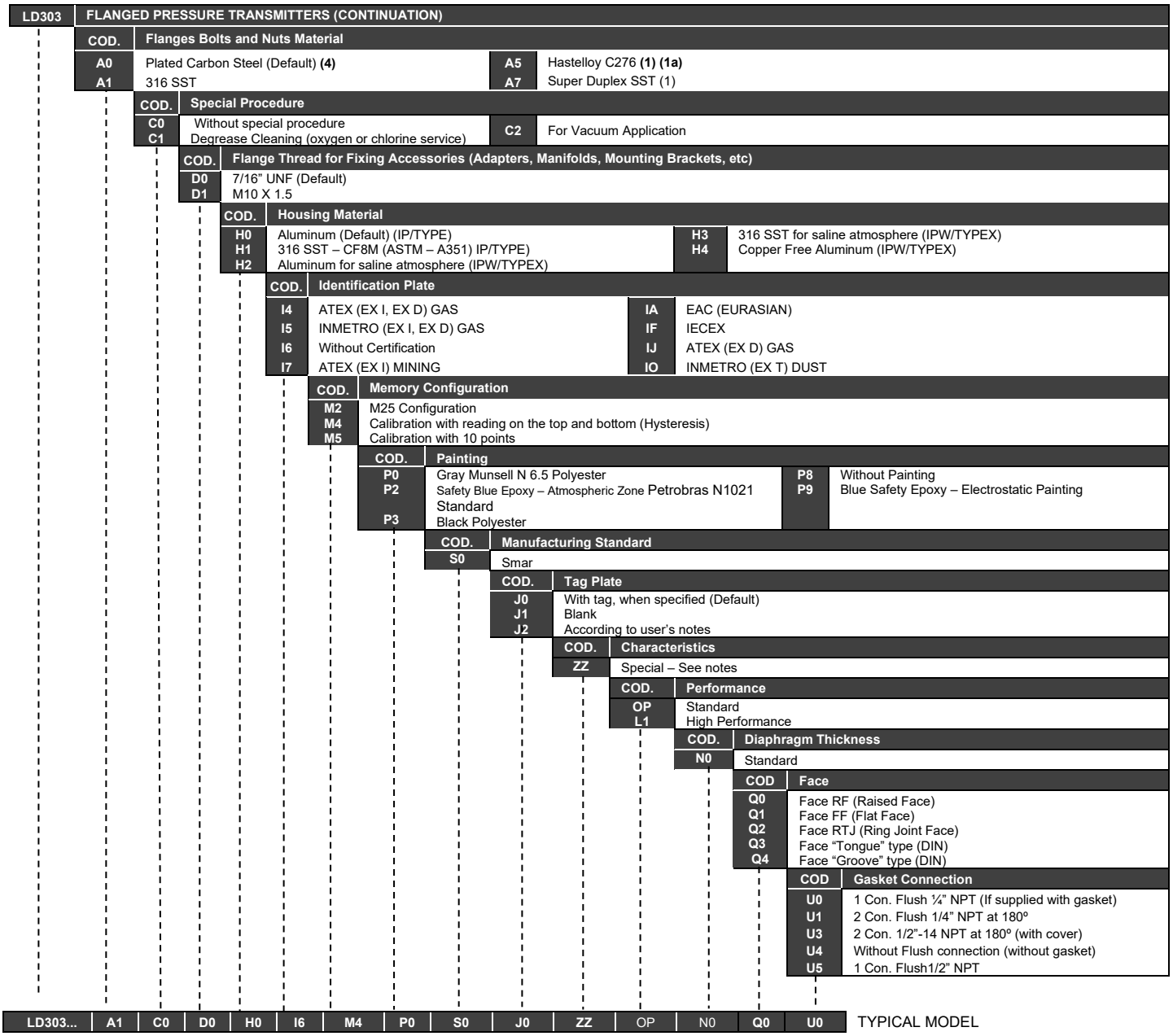
COD. Gasket Material

COD.			
0	Without gasket	I	316 L SST
T	Teflon (PTFE)		
G	Grafoil (Flexible lead)		

COD. Continues Next Page

LD303	L2	1	I	B	U	1	0	0	1	1	2	2	1	1	T	*

⬅ TYPICAL MODEL NUMBER



NOTES

(1) Meets NACE MR – 0175/ISO 15156.
(1a) Meets NACE MR –0153.
(2) Silicone Oils not recommendations for Oxygen (O_2) or Chlorine service.
(3) Not applicable for vacuum service.
(4) Drain/Vent not applicable.
(5) Not applicable for saline atmosphere.
(6) Fluorolube fill fluid is not available for Monel diaphragm.
(7) Certification Ex d for FM / ATEX / IECEx / INMETRO.
(7a) Certification Ex d for INMETRO.
(8) Attention, check corrosion rate for the process, AISI 316L extension 3 to 6mm. Diaphragms of Titanium and Monel available only in 0.1 mm.
(9) Item by inquiry.
(10) Supplied without Gasket.
(11). Options not certified for use in hazardous locations
(12) Limited values to 4 1/2 digits; unit limited to 5 characters.
(13) Degreaser's cleaning is not available for carbon steel flanges
(14) Gasket for housing, available only in Stainless 316
(15) Finishing of the flange faces according to specific standards.
(16) Range of application of temperature from -40 ºC to 150 ºC
(17) Applicable only to:
- Diameter/capillary length:
2" ANSI B 16.5 DN 50 DIN, JIS 50 A, for seals up to 3 meters of capillary and level models (by inquiry).
3" ANSI B 16.5 DN 80 DIN, JIS 80 A, for seals up to 5 meters of capillary and level models.
4" ASME B 16.5, DN 100 DIN, JIS 100 A, for seals up to 8 meters and level models.
- Faces: RF and FF;
- Temperature Range: +10 ºC to 100 ºC
+ 101 to 150 º C (by inquiry)
- Not applicable for diaphragm thickness: N1 – 0,10mm;
- Not applicable for use with gaskets.

(18) Inert Fluid: Oxygen Compatibility, safe for oxygen service.

MODEL | **SANITARY PRESSURE TRANSMITTERS**

LD303 | **PROFIBUS PA**

CODE	Range Limits Min.	Range Limits Max.	Min. Span	Unit	Range Limits Min.	Range Limits Max.	Min. Span	Unit
S2	-50	50	1.25	kPa	-200	200	5	inH_2O
S3	-250	250	2.08	kPa	-36	36	0.3	psi
S4	-2500	2500	20.83	kPa	-360	360	3	psi
S5	-25000	25000	208.30	kPa	-3625	3625	30.2	psi

Notes: The range can be extended to 0.75 LRL and 1.2 URL with small degradation of accuracy. The upper range value must be limited to the connection. Sensors range 2, in stainless steel or Hastelloy C276, have a diaphragm in Hastelloy C276.

COD | Diaphragm Material and Fill Fluid (Low Side)

1	316L SST	Silicone Oil **(2)**
2	316L SST	Inert Fluorolube Oil **(3) (1)**
3	Hastelloy C276	Silicone Oil **(2)**
4	Hastelloy C276	Inert Fluorolube Oil **(1) (3)**

CODE | Flange(s), Adapter (s) and Drain Valve(s) Material (Low Side)

I 316 SST - CF8M (ASTM - A351)

CODE | Wetted O-Ring Material (Low Side)

0	Without O-Ring	K	Kalrez
B	Buna-N	T	Teflon (Approved 3A)
E	Ethylene - Propylene	V	Viton (Approved 3A)

Note: O-Rings are not available on the sides with remote seal.

CODE | Drain Position (Low Side)

0	Without Drain	D	Bottom
A	Drain (Opposite to process connection)	U	Top

Note: For better drain operation, drain valves are strongly recommended. Drain valves are not available on the sides with remote seal.

CODE | Local Indicator

0 Without Indicator | 1 With Digital Indicator

CODE | Process Connection (Low Side)

0	1/4 - 18 NPT (Without Adapter)	T	1/2-14 BSP (With Adapter)
1	1/2 - 14 NPT (With Adapter)	V	Without Connection (Mounting With Gage Flange)
3	Remote Seal (With Plug – Vacuum Assembly) **(4)**	W	Without Connection (Absolut Reference)
5	1/2 - 14 NPT Axial with PVDF insert		
9	Remote Seal (Low Volume Flange) **(3) (4)**		

CODE | Electrical Connection

0	1/2 - 14 NPT **(10)**	A	M20 X 1.5 **(10)**
1	3/4 - 14 NPT (With 316 SST adapter for 1/2 - 14 NPT) **(5)**	B	PG 13.5 DIN **(7)**
2	3/4 - 14 BSP (With 316 SST adapter for 1/2 - 14 NPT) **(7)**	Z	User's Specification
3	1/2 - 14 BSP (With 316 SST adapter for 1/2 - 14 NPT) **(7)**		

CODE | Process Connection

8	Threaded DN25 DIN 11851 – with extension **(8)**	E	Threaded SMS 2" **(8)**
9	Threaded DN40 DIN 11851 - with extension **(8)**	M	Threaded SMS 3" - with extension **(8)**
H	Threaded DN40 DIN 11851 **(8)**	1	Threaded SMS 3" **(8)**
V	Threaded DN50 DIN 11851 - with extension **(8)**	F	Tri-Clamp 1 1/2"
U	Threaded DN50 DIN 11851 **(8)**	Q	Tri-Clamp 1 1/2" HP (High Pressure) **(6)**
X	Threaded DN80 DIN 11851 - with extension **(8)**	6	Tri-Clamp 2" - with extension
W	Threaded DN80 DIN 11851 **(8)**	D	Tri-Clamp 2"
4	Threaded IDF 2" - with extension **(8)**	N	Tri-Clamp 2" HP (High Pressure) - with extension **(6)**
B	Threaded IDF 2" **(8)**	P	Tri-Clamp 2" HP (High Pressure) **(6)**
K	Threaded IDF 3" - with extension **(8)**	I	Tri-Clamp 3" - with extension
3	Threaded IDF 3" **(8)**	G	Tri-Clamp 3"
5	Threaded RJT 2" - with extension **(8)**	J	Tri-Clamp 3" HP (High Pressure) - with extension **(6)**
C	Threaded RJT 2" **(8)**	R	Tri-Clamp 3" HP (High Pressure) **(6)**
L	Threaded RJT 3" - with extension **(8)**	A	Tri-Clamp DN50 - with extension
2	Threaded RTJ 3" **(8)**	O	Tri-Clamp DN50 HP (High Pressure) - with extension **(6)**
S	Threaded SMS 1 1/2" **(8)**	T	Tri-Clamp DN50
7	Threaded SMS 2" - with extension **(8)**	Z	User's specification

CODE | Diaphragm Material

H	Hastelloy C276
I	316L SST

CODE | Fill Fluid

S	DC 200 – silicone oil (2)
D	DC 704 – silicone oil (2)
F	Fluorolube MO-10 (3)(11)
T	Sylltherm 800
N	Neobee M20
Z	User's specification

COD | Wet O-ring

0	Without O-ring	T	Teflon
B	Buna-N	V	Viton
K	Kalrez		

CODE | Tank Adapter

0	Without Tank Adapter
1	With Tank Adapter in 316 SST
Z	User's specification

CODE | Tri-Clamp

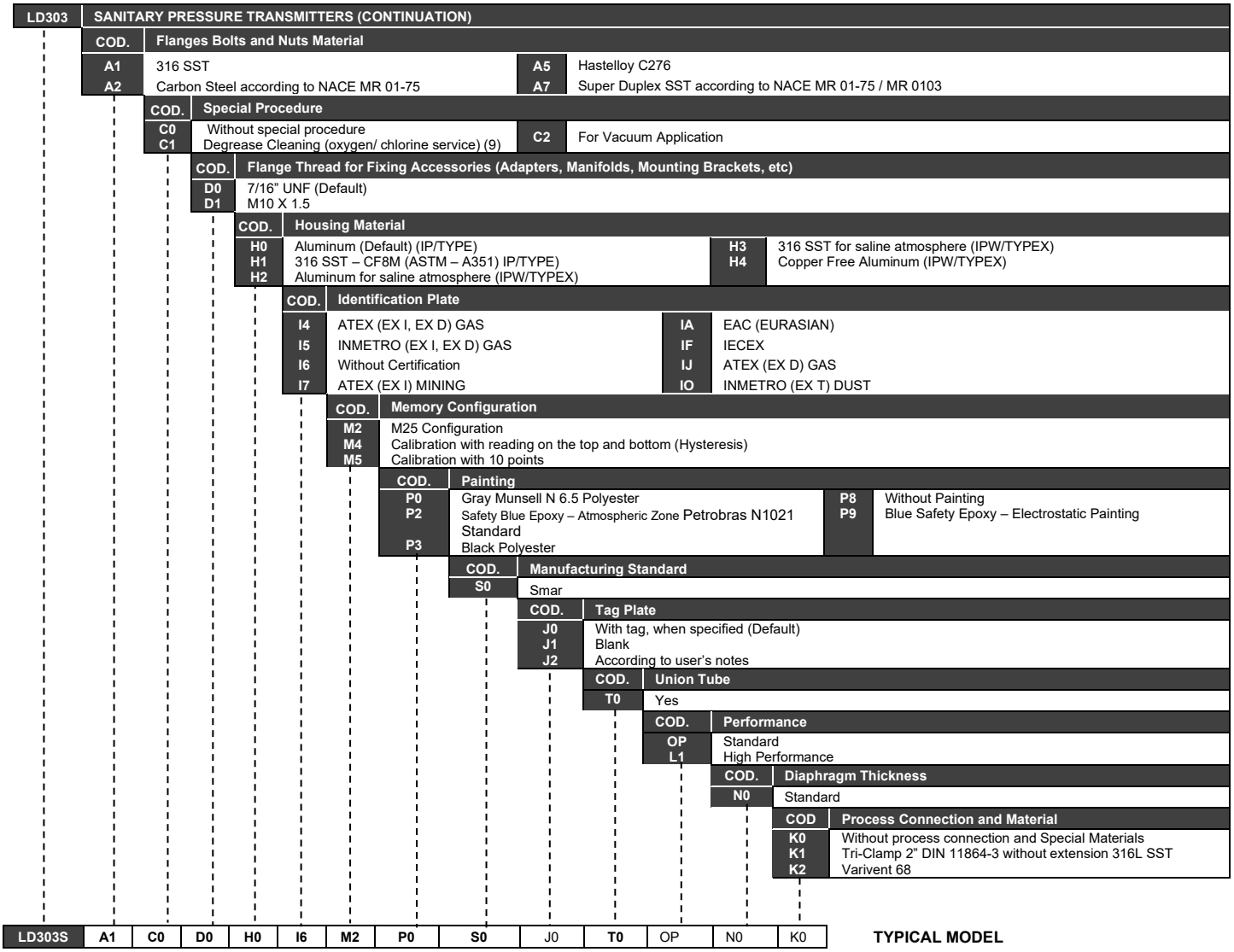
0	Without Tri-Clamp
1	With Tri-Clamp in 304 SST
Z	User's specification

CODE | Continues next page

LD303	S2	1	I	B	U	1	0	0	1	I	D	B	1	1	*

TYPICAL MODEL NUMBER

* Leave it blank when there are no optional items.



TYPICAL MODEL

NOTES

(1) The inert fluid guarantees safety for Oxygen (O_2) service.
(2) Silicone oil not recommended for Oxygen (O2) or Chlorine Service.
(3) Not applicable for vacuum service.
(4) Drain not applicable.
(5) Certification Ex d for INMETRO.
(6) HP – High Pressure.
(7) Options not certified for use in hazardous locations.
(8) Not available for Tri-clamp.
(9) Degrease cleaning is not available for Carbon Steel Flanges.
(10) Certification Ex d for FM / ATEX / IECEx / INMETRO.
(**11**) Fluorolube fill fluid is not available for Monel diaphragm.

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 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 4Y3A4.AX
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: 5800 psi (report 3024465)
The range H2 to H5 are similar to D2 to D5, the H ranges are differential type with high static pressure feature. The ranges H, A5, A6, M5 and M6 need parback for correct and safe operation.

Drawing 102A-0078, 102A-1220, 102A-1343, 102A-1642, 102A-1643

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-1467, 102A-1523

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-2115, 102A-2116

ATEX DEKRA
Intrinsic Safety (DMT 00 ATEX E 067)
Ex I M1 Ex ia I Ma
Ex II 1/2 G Ex ia IIC T4/T5/T6 Ga/Gb

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-1467, 102A-1523, 102A-1469, 102A-1525

INMETRO NCC
Segurança Intrínseca (NCC 24.0166X)
Ex ia IIC T* Ga
Ex ia IIIC T* Da
Ui = 30 V Ii = 380 mA Pi = 5,32 W Ci = 5,0 nF Li = desp
Tamb: -20 °C a +50 °C para T5 ou T_{200}100 ºC
Tamb: -20 °C a +65 °C para T4 ou T_{200}135 ºC
IP66/68 ou IP66W/68W

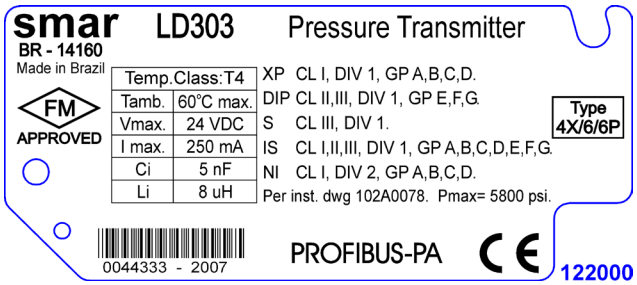
Prova de Explosão (NCC 24.0173)
Ex db IIC T6 Ga/Gb
Ex tb IIIC T85 ºC Da/Db
Tamb: -20 °C a +40 °C
IP66/68 ou IP66W/68W

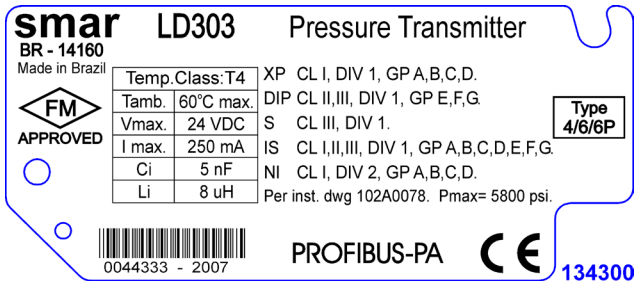
Observações:
O número do certificado é finalizado pela letra "X": Indicar que para a versão do Transmissor de pressão, intrinsecamente seguro, modelos: LD292, LD293, LD302 e LD303 equipado com invólucro fabricado em liga de alumínio, somente pode ser instalado em localização que exigem o “EPL Ga”, se durante a instalação for excluído o risco de ocorrer impacto ou fricção entre o invólucro e peças de ferro/aço.
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 planos de pintura P1 são permitidos apenas para equipamento fornecido com plaqueta de identificação com marcação para grupo de gás IIB.
O grau de proteção IP68 só é garantido se nas entradas roscadas de ½” NPT for utilizado vedante não endurecível à base de silicone.
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.
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.
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, invalidará este certificado.
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.

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 102A1376, 102A1256, 102A2036, 102A2035, 102A2090

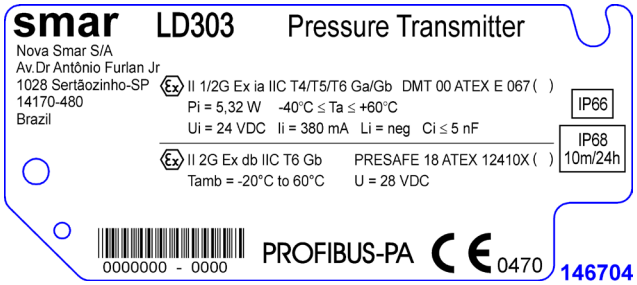
Identification Plate

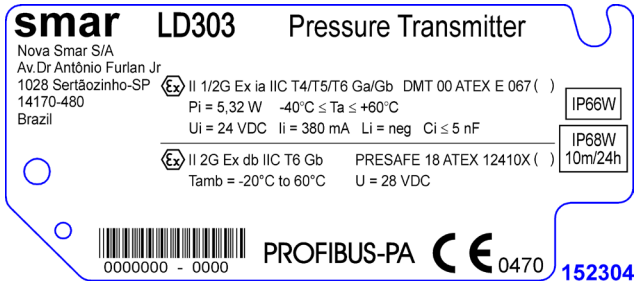
FM Approvals

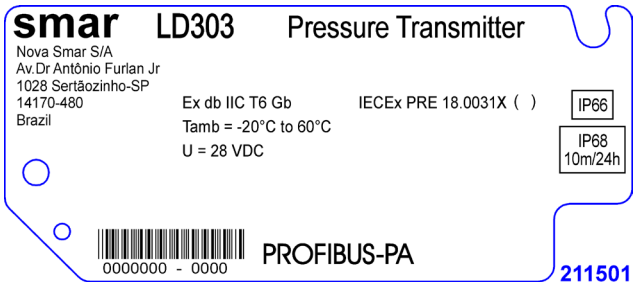


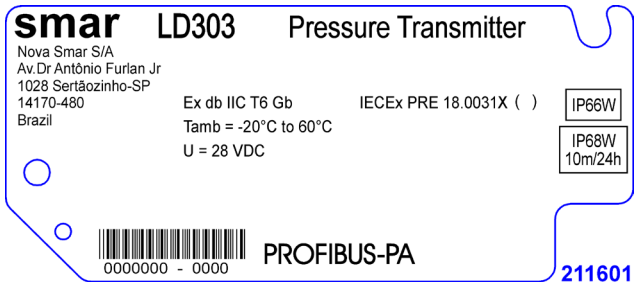


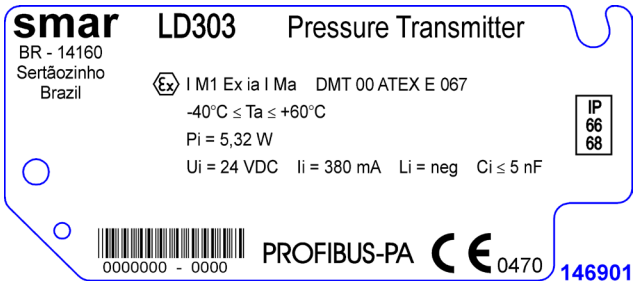
ATEX/ IECEx

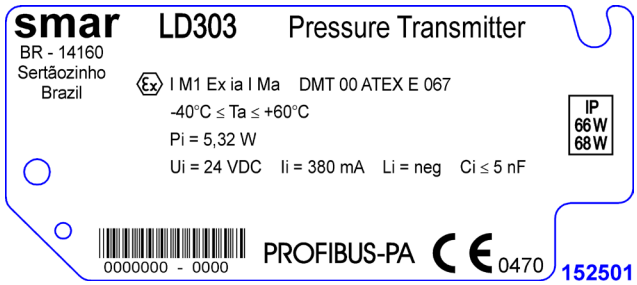




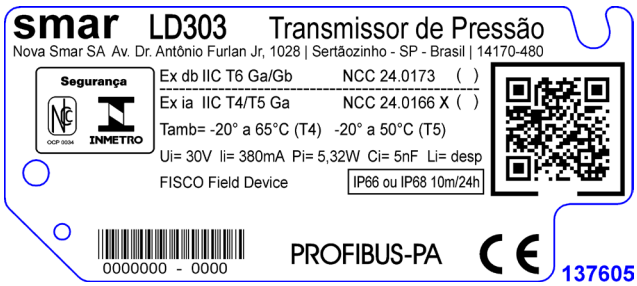


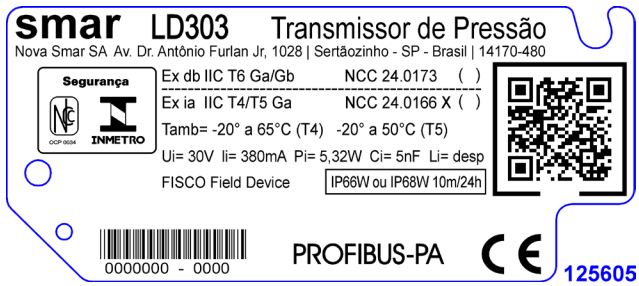


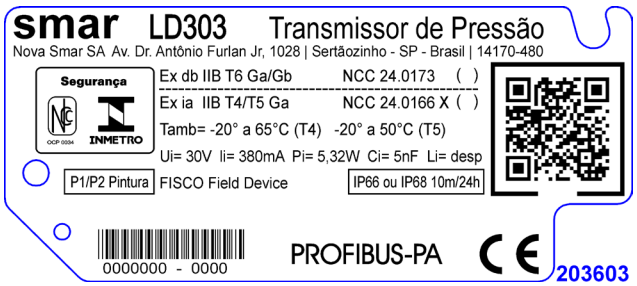


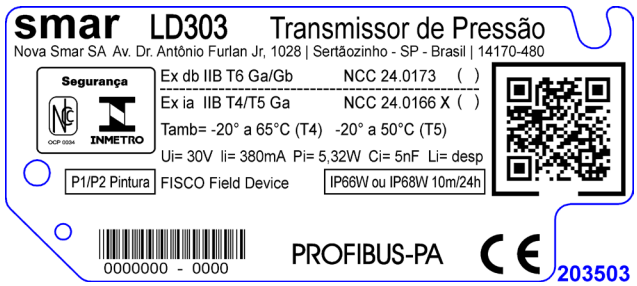


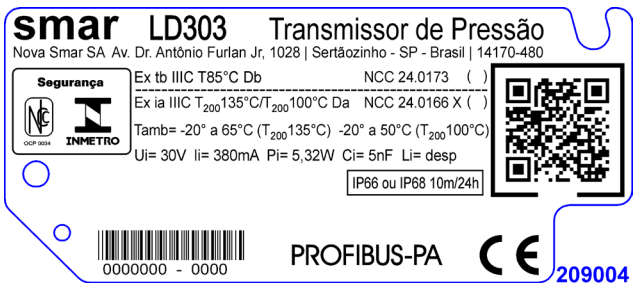
INMETRO NCC



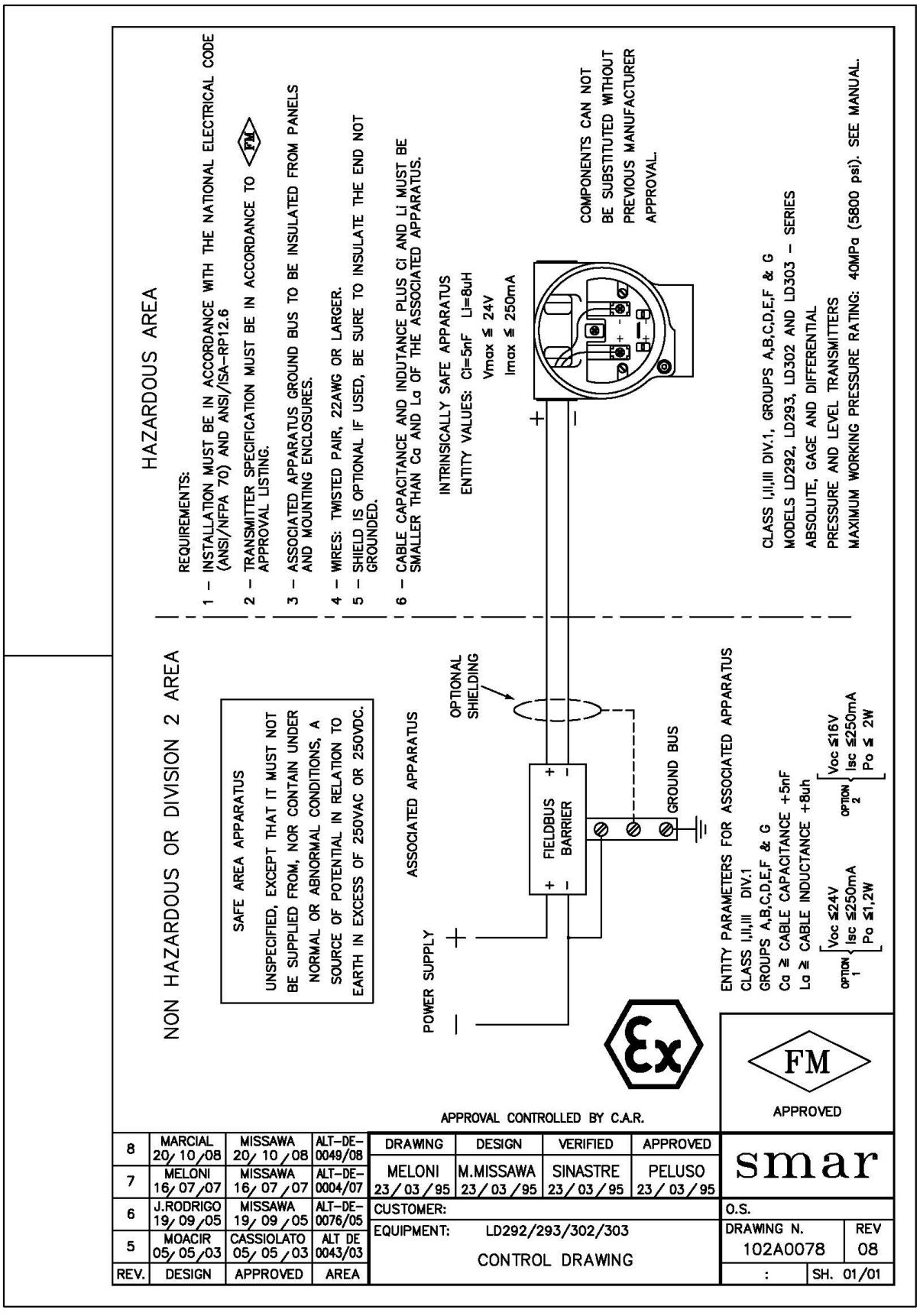



smar LD303 Transmissor de Pressão
Nova Smar SA Av. Dr. Antônio Furlan Jr, 1028 | Sertãozinho - SP - Brasil | 14170-480
Segurança
INMETRO
Ex db IIB T6 Ga/Gb NCC 24.0173 ( )
Ex ia IIB T4/T5 Ga NCC 24.0166 X ( )
Tamb= -20° a 65°C (T4) -20° a 50°C (T5)
Ui= 30V Ii= 380mA Pi= 5,32W Ci= 5nF Li= desp
P1/P2 Pintura
FISCO Field Device
IP66 ou IP68 10m/24h
0000000 - 0000
PROFIBUS-PA
203603


smar LD303 Transmissor de Pressão
Nova Smar SA Av. Dr. Antônio Furlan Jr, 1028 | Sertãozinho - SP - Brasil | 14170-480
Segurança
INMETRO
Ex db IIB T6 Ga/Gb NCC 24.0173 ( )
Ex ia IIB T4/T5 Ga NCC 24.0166 X ( )
Tamb= -20° a 65°C (T4) -20° a 50°C (T5)
Ui= 30V Ii= 380mA Pi= 5,32W Ci= 5nF Li= desp
P1/P2 Pintura
FISCO Field Device
IP66W ou IP68W 10m/24h
0000000 - 0000
PROFIBUS-PA
203503


smar LD303 Transmissor de Pressão
Nova Smar SA Av. Dr. Antônio Furlan Jr, 1028 | Sertãozinho - SP - Brasil | 14170-480
Segurança
INMETRO
Ex tb IIIC T85°C Db NCC 24.0173 ( )
Ex ia IIIC T200135°C/T200100°C Da NCC 24.0166 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
IP66 ou IP68 10m/24h
0000000 - 0000
PROFIBUS-PA
209004

FM Approvals



Appendix B

smar	SRF – Service Request Form Pressure Transmitters	Proposal No.: (1)

Company:	Unit:	Invoice:

COMMERCIAL CONTACT	CUSTUMER 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® ( ) HART® SIS ( ) WIRELESSHART® ( ) ISP ( ) FOUNDATION fieldbus ( ) PROFIBUS PA	Firmware Version:

PROCESS DATA

Process Fluid:

Calibration Range (4)		Ambient Temperature (ºF)		Process Temperature (ºF)	
Min.:	Max.:	Min.:	Max.:	Min.:	Max.:

Process Pressure (4)		Static Pressure (4)		Vacuum (4)		Application (3)
Min.:	Max.:	Min.:	Max.:	Min.:	Max.:	( ) Transmitter ( ) Repeater

Normal Operation Time:	Failure Date:

FAILURE DESCRIPTION
(Please, describe the observed behavior. Is it repetitive?)

Did device detect the fail? (2) ( ) Yes ( ) No	What is the final value of the current? (2) _____ mA	What is the message in the display? (2)

MAINTENANCE INFORMATION

Did you allow the upgrade in the firmware? ( ) Yes ( ) No	Certification plate: Will it maintained the certification? ( ) Yes ( ) No

Main board configuration:
( ) Original factory configuration ( ) Default configuration
( ) Special configuration (should be informed by the client. Please, use the space below)

OBSERVATIONS

SUBMITTER INFORMATION

Company:

Submitted by: 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 https://www.smar.com.br/en/contact-us.

NOTE

(1) This field should be filled out by the Smar.
(2) Required for SIS devices.
(3) Required for Wireless HART® devices.
(4) Required to specify the pressure unit.