



Level Transmitter Series LD377BL

Installation and Maintenance Instructions



1. Safety information
2. Introduction
3. Description
4. Operations
5. Configuration
6. Maintenance and Troubleshooting
7. Marking
8. Data Sheet

1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11 on this document) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

The transmitters object of the present instructions comply with the directive ATEX 2014/34/UE and are characterized by the following methods of protection:

II 1/2G Ex d IIC T6 Ga/Gb

They are suitable for installation in Zone 1, Zone 2.

For connections and installation refer to this manual.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk? Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high /low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Electrical work

Before starting work study the wiring diagram and wiring instructions and note any special requirements. Consider particularly: mains supply voltage and phase, local mains isolation, fuse requirements, earthing, special cables, cable entries / cable glands, electrical screening.

1.13 Commissioning

After installation or maintenance ensure that the system is fully functioning.

Carry out test on many alarms or protective devices

1.14 Disposal

Unwanted equipment should be disposed of in a safe manner.

1.15 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.



Warning!

Exclusively follow the instructions indicated in this document. Failure to comply with this document may cause injury to health or may damage the equipment.

SPIRAX SARCO® do not takes any kind of responsibility for damages due to failure to comply with this document.

2. Introduction

2.1 Product Overview

The Spirax Sarco LD Series electronic transmitters are devices that use a sensor to measure pressure, level and temperature, and transmit a current signal (4 ÷ 20mA) proportional to the measured variable. The LD Series consists of the following models:

TT352	Electronic temperature transmitter
LD256	Electronic pressure transmitter
LD357B	Electronic differential pressure transmitter
LD357BL	Electronic level transmitter



Mandatory!

The accessories used for the cable entries and to close unused shall be certificated according to the standards EN 60079-0 and EN 60079-1 for the gas groups IIC or IIB, according to the type of protection implemented.

2.2 Attention!

This manual does not contain information concerning all type of Transmitter or all different installation and/or working and mounting solutions.

For more information or for particular problems not considered in this manual, please address to our technical office.

The warranty period is the one contemplated in our general servicing conditions.

This warranty is neither increased nor restricted by the contents of this manual.

This Transmitter has to be installed and used only by qualified persons who have first checked the correctness of supply voltage so that both in standard working conditions and in presence of damages of the plant or of any part of it, no dangerous voltage can reach the Transmitter.


As the Transmitter can be utilized both with high pressure values and with aggressive media it must be considered that an incorrect use of it could bring even serious damages to people and things.

A correct and safe working needs an adequate transport, stock and mounting other than an appropriate maintenance service.

So it is necessary for the people handling these Transmitter to have knowledge and experience in mounting, servicing and working and to have title to do their job with reference to "Safety Standards".

2.3 Definitions and Symbols

In this manual are used the following symbols and labels:

	Equipment for use in potentially explosive atmospheres
II 1/2G	Equipment Group II Category 1/2G, suitable for potentially explosive area (gases, vapours or mists) to be installed in a separation wall between Zone 0 (process side) and Zone 1 (external side)
Ex d	Device with Explosion Proof Enclosure
IIC	Group IIC apparatus, fit for substances of group IIC, IIB and IIA (only when used in the ambient temperature range -40°C to 60°C)
IIB	Group IIB apparatus, fit for substances of group IIB and IIA (when used in the ambient temperature range -40°C to 80°C)
T6, T5,	Temperature Class of the transmitter (maximum surface temperature) <ul style="list-style-type: none">➤ only when used in the ambient temperature range -40°C ÷ 60°C➤ only when used in the ambient temperature range -40°C ÷ 80°C
Ga/Gb	Equipment to be installed in the boundary wall between an area requiring EPL Ga and the less hazardous area



Warning!

Warning label, used to warn about hazardous materials, locations, or objects, including electric currents, poisons, and other things.



Prohibition!

Prohibition label, used to indicate something is not permitted.



Mandatory!

Mandatory label, used to set obligation tasks to be performed by the user.



Information!

Information label, used to set general information for the user or warn about hazards for the equipment.

3. Description

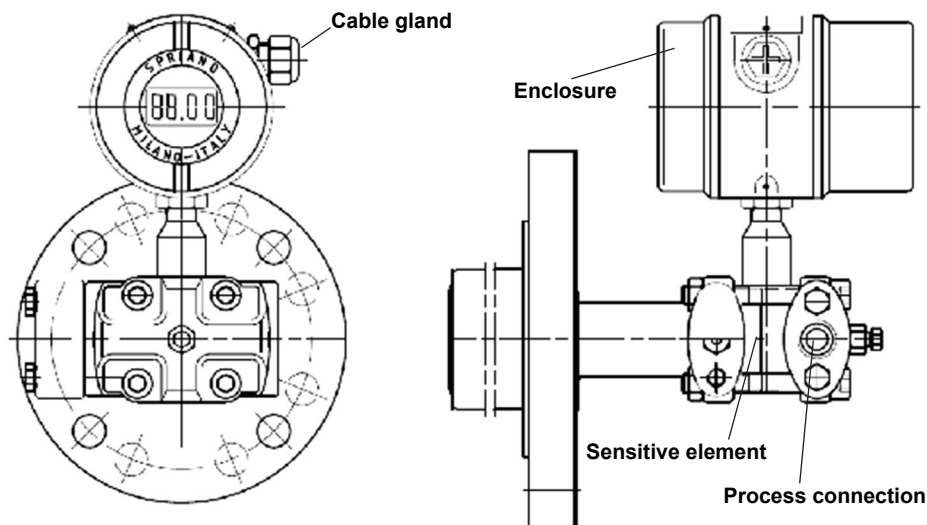
The LD377BL series SMART differential pressure transmitters are microprocessor based instruments that combine the analog signal advantages (4-20mA) together with the flexibility of digital communication using HART® protocol. They can be remotely configured by a universal hand held terminal (HHT) or by a PC with a dedicated interface.

Moreover, it is possible to locally configure the instruments (zero and span) by means of push buttons and to display the data on the wide LCD display.

The transmitter series LD377BL, measure differential pressure with spans from 1.2 to 20000 mbar with a static pressure up to 200 bar. The pressure measuring element is a piezoresistive sensor. It is possible to choose a variety of sensors to satisfy all process conditions.

The Spirax Sarco measuring cell contains the sensor and transmits the pressure to the electronics. Thermal drift is compensated using the temperature signal generated by a PTC thermistor integrated in the sensor itself. Based on these readings the microprocessor generates the 4-20mA analog output "two wires system" and displays the pressure measurement on the LCD. Some of the main characteristics of this microprocessor-based transmitter, are:

- Wide Rangeability;
- Automatic temperature compensation;
- Digital communication using HART® protocol.



Nom Range (mbar)	Span min/max (mbar)	Range Limits min/max (mbar)
0/350	23/350	-350/+350
0/1000	67/1000	-1000/+1000
0/2500	167/2500	-2500/+2500
0/5000	333/5000	-5000/+5000

Fig. 1 - Level transmitter LD377BL

4. Installation

4.1 Transmitter Identification

Transmitter data can be found on the nameplate fixed on the top of transmitter enclosure (see Marking). The Serial Number must be quoted at the occurrence of a specific request to the manufacturer.

4.2 General mounting requirements

Prior installation shall be observed following considerations:

- Check whether Transmitter's operating conditions are within the limits as reported in the nameplate, technical specifications sheets and/or label.
- Make sure that the operating conditions are compatible with the specification given to the manufacturer.



Mandatory!

- For measurement in the presence of particularly hot liquids (e.g. steam) make sure that the Transmitter is supplied with a suitable finned arm.
- For viscous liquids or those containing solid particles in suspension make sure that the connection to the process is a suitable one in order to avoid clogs.



Warning!

Direct sunlight may cause serious damages to the instrument. Never install standard Transmitter under the sun or in any other location which could cause direct overheating through radiation.

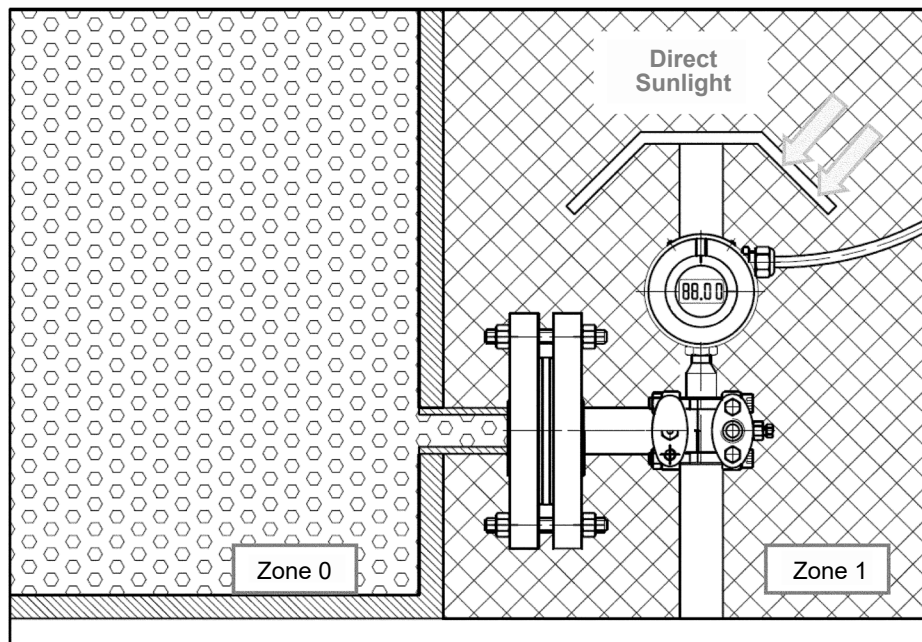


Fig. 2 - Mounting requirements

4.3 Mechanical Installation

The Transmitter should be located, if possible, at some easily accessible, well lighted place on the vessel, in order to allow putting in operations and maintenance work. Location should also be such that ambient temperature at the Transmitter enclosure be not excessive (see MARKING).



Information!

- Plant overpressure / over-temperature: observe rating plate.
- Installation on seismic areas: inform technical department.
- In case of unstable fluids: inform technical department.
- In case of damages: inform technical department.
- Inspection frequency: consideration should be given to applicable national legislation.



Warning!

- The process connection must be realized in such a way that guarantees the hold at the maximum working pressure and temperature.
- Do not overcome the maximum pressure and temperatures indicated in the technical data sheet of the selected model.
- When the device is connected to the process it can be submitted to high pressures and temperatures. To avoid accidents subsequent to sudden discharge of pressure and/or to contact with dangerous or flammable fluids it is necessary to take the maximum attention when the Transmitter is taken off, heated or repaired, verifying that it is isolated from the process and is not submitted to pressure and/or temperature.

4.4 Installation for relative pressure measurement

The transmitters LD377BL may be used for relative pressure measurements or level measurements in tanks or piping. In **Fig. 3** the simplest mounting, direct on piping, is illustrated.



Warning!

- Remember to introduce always a security valve in order to put in maintenance operations when necessary.
- When the connections are located on a vertical process line, the flow should be upward.



Information!

Fig. 3 e Fig. 4 show some of the installations recommended by ISO 2186 Standards. Refer to this Standard for more information.

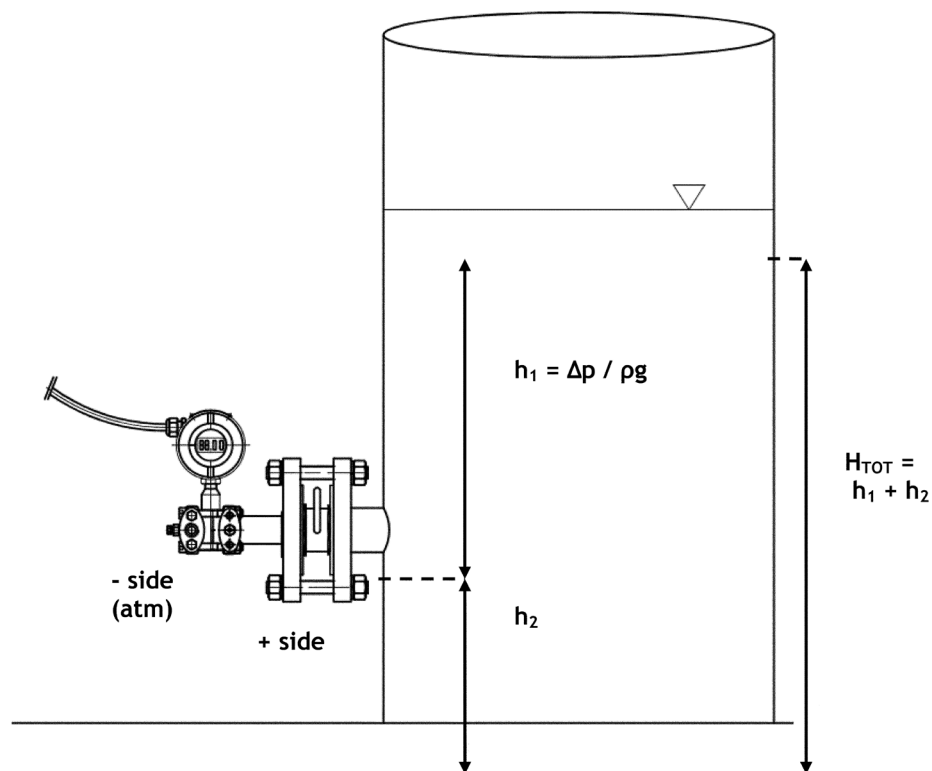


Fig. 3 - Level measurements in open vessels

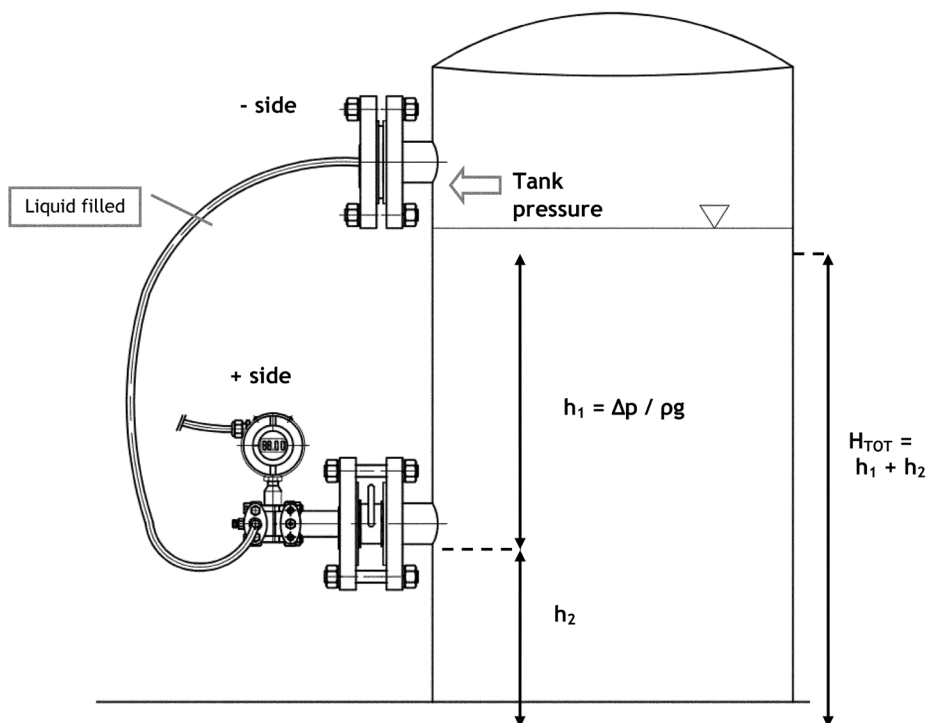


Fig. 4 - Level measurement in closed vessels



Information!

- Referring to **Fig. 4**: the descending pipes can be filled with condensate vapors of the process fluid or with suitable inert liquid to prevent direct contact with the transmitter diaphragm.



Mandatory!

- Pressure connections on model LD377BL are marked with "H" ("+") and "L" ("-"); the higher pressure will be applied to "+" side.
- Always check carefully all manifolds, reducers if any, vents and drain plugs for leaks.

4.5 Electronic head orientation

In order to rotate the electronic head in the desired position you must follow these passages (**Fig. 5**):

- unscrew the nut (A) with key CH.24;
- by hand gently rotate the enclosure (B) in the desired position;
- once the desired position is reached fix the nut (A) again with the same key.

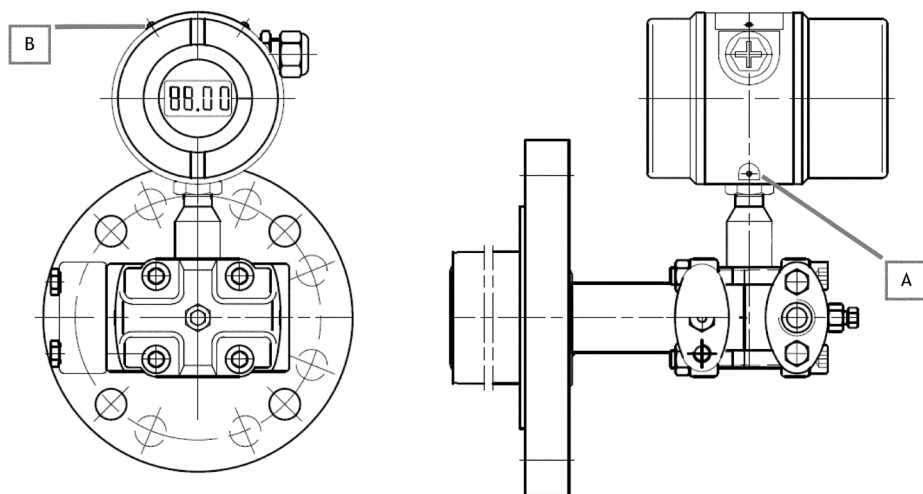


Fig. 5 - Rotating the transmitter head



Information!

It is not necessary to turn off the supply.

4.6 Electrical connection

Under the rear cap is placed the terminal block reporting the electric polarity (Fig. 6). Insert the power supply cable into the enclosure through one of the two threaded openings. Transmitter is protected from accidental inversion of polarity. For a better use is recommended a twisted pair cable (22 AWG min). Avoid placing Transmitter near devices powered in AC or Switching. Connect ground-tap of the Transmitter to the local common earth (PE) as indicated in paragraph Earthing.



Warning!

The threaded opening that is not used must be sealed using a suitable cap. The caps included in the delivery are only for protection during transport.

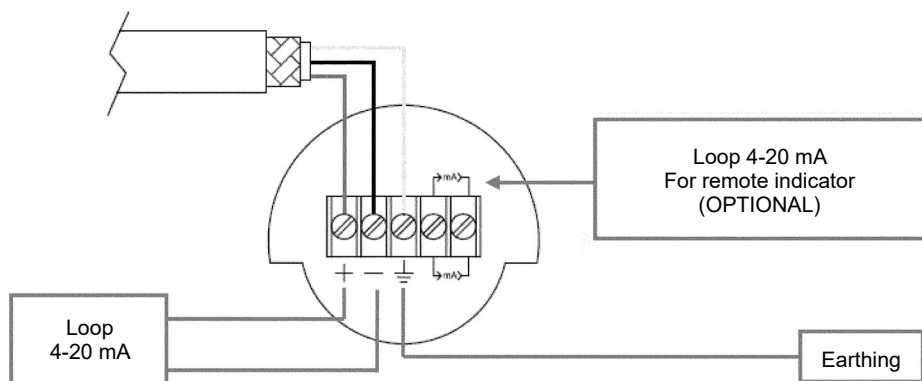


Fig. 6 - Electrical connection of the power cable to the terminal block



Information!

Impedance of the cables defines the possible maximum length for digital communication. It's recommended using cable with a low impedance. The maximum length of the point to point connection, with a load of 250 ohm and single twisted cable 22 AWG-207 pF/m it's about 1000 meters.

The maximum connection length for the analog signal only is limited by the loads (connected devices and cable) present in the current loop.

To obtain output signal of 4-20 mA, you have to determine the minimum supply voltage as a function of the load relation: see Fig. 7. From the following formula you can achieve the right minimum value of supply voltage:

$$V_{dc} = 0.0215 \times R_L + 12$$

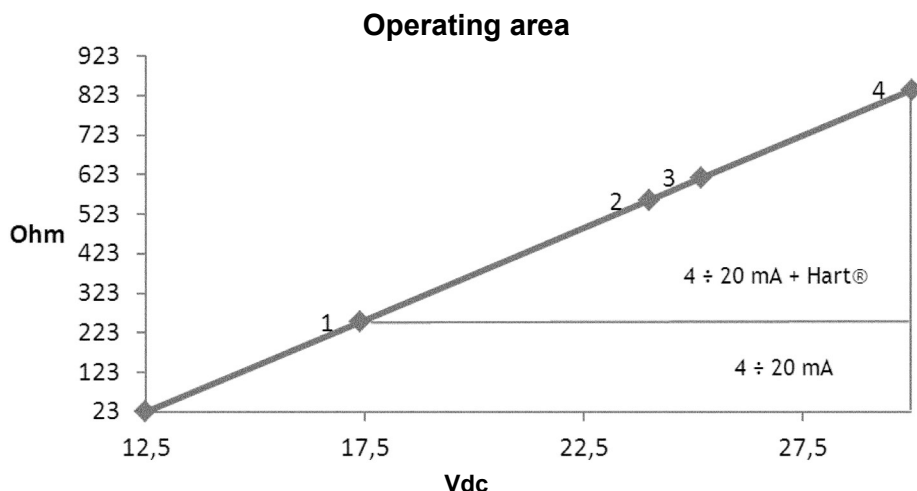
Where: R_L = output load [Ohm].

The power supply source to assure a minimum current value of 24 mA.



Mandatory!

In order to obtain a 4÷20 mA + Hart® output a minimum load of 250 Ohm is required.



TAG	-	1	2	3	4
Vdc	12.5	17.4	24	25.2	30
Ohm	23	250	558	615	837

Fig. 7 - Operating area for Ex d protection

The electronic transmitters totally comply with the HART® protocol specification Revision 6.0, so they include remote process variable interrogation, parameter setting and diagnostics.

The device is a 4÷20mA 2-wire transmitter, with FSK communication.

It is possible to read via HART® the following variables:

- ✓ **PV**: transmitter main measure;
- ✓ **SV**: % of the span;
- ✓ **TV**: analog output;
- ✓ **QV**: electronic board temperature.

Please refer to **Fig. 8** for the Hart® modem connection on transmitter's 4÷20 mA loop.

In **Fig. 9** the multidrop connection type is shown.

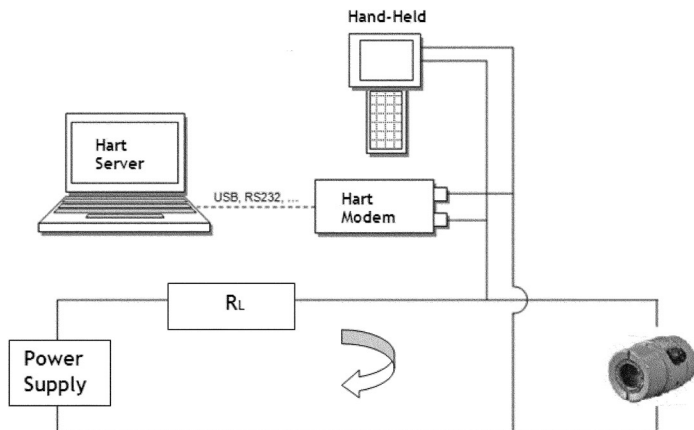


Fig. 8 - 4÷20 mA + Hart® modem connection

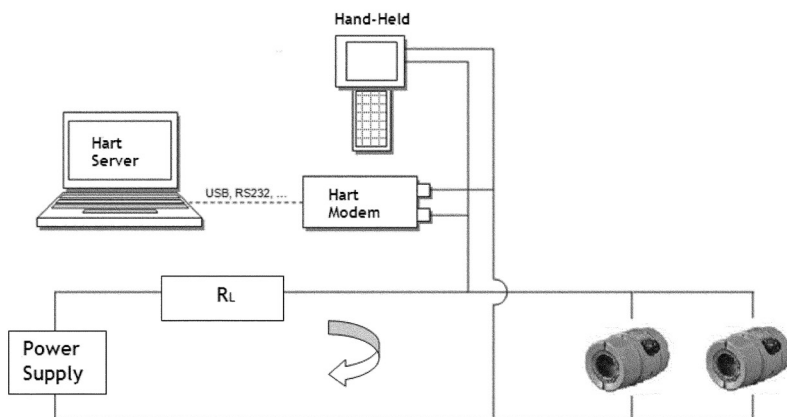


Fig. 9 - Only Hart® Multidrop connection



Information!

At maximum 15 transmitters could be connected in parallel on the same line. Attention: when more transmitters are connected on the same line the current standing on the resistor (250-ohm) is equal to

$4\text{mA} \times N$ of connected instruments.

This could cause a high electric potential. Be sure power supply is sufficient.

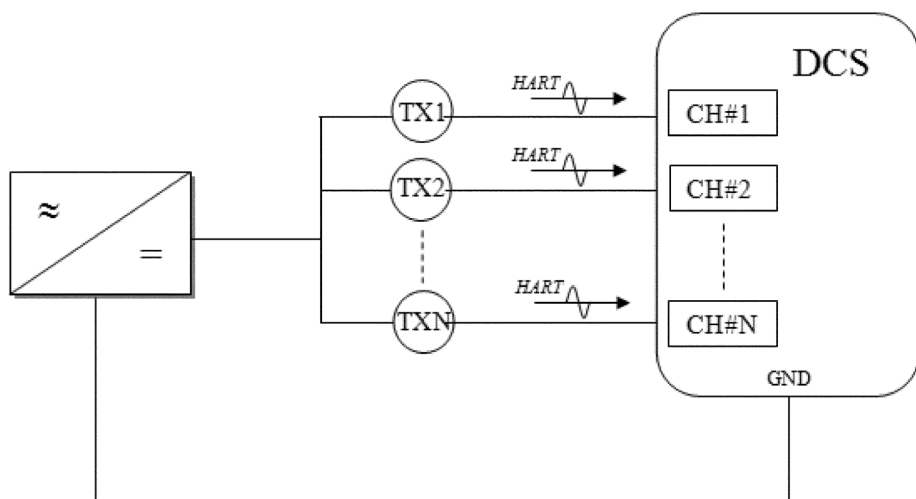


Fig. 10 - DCS connection



Mandatory!

Transmitter response time is <256ms.

DCS POLLING time must be set approximately at 800 ms in order to avoid updating problems both in analog and digital measurement.

On request the transmitter can be supplied in order to support a Polling time of 500 ms but with a minimal consumption of 5 mA.

4.7 Explosion Proof Protection

In case of use in areas with danger of explosion, it must be verified that the identified type of transmitter fits for the classification of the zone and for the presence of flammable substances in the plant (see Marking).

The safety essential requisite against the risk of explosion in the classified areas are fixed from the European Directives 2014/34/EU of 26 February 2014 (as far as it concerns the 'Equipment') and 1999/92/EC of December 16th 1999 (as far as it concerns the 'Working Environment').



Warning!

For the electrical connections please follow the instructions brought in this operator manuals taking care that for the use in classified areas it is necessary to foresee the standard EN 60079-14.

The accessories for cable entry (which must be threaded 1/2" NPT) must be certified following the Standards EN 60079-Series (for Tamb >70°C must be certified for T > 90°C).



Prohibition!

Do not open the covers or any part of the device in dangerous area when circuit alive. For explosion proof safety installation, it is mandatory to disconnect the electric supply before opening the device.

4.8 Earthing



Warning!

The earth connection is required to prevent damage to people and malfunction of the instrument.

- **Case 1: Installing the instrument in a plant devoid of earthing systems**

In the case where the plant devoid of earthing, it is necessary to connect the earth wire to the terminal block through the cable that carries the signal and the power supply (**Fig. 6**).

- **Case 2: Installing the instrument in a plant provided with earthing systems**

Make sure the earthing (GND) of the system has the least resistance possible.

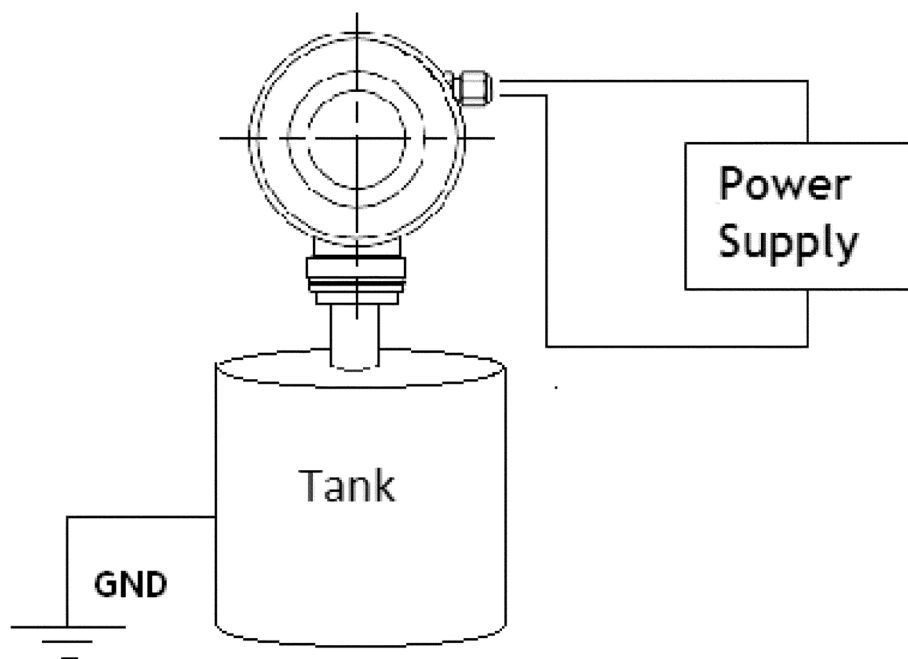


Fig. 11 - 4 ÷ 20 mA loop connection with plant provided with earthing systems

You can add an additional earth wire with section not less than 4 mm² to ensure such connection.



Warning!

In the case represented in **Fig. 12**, within the earth wire may also scroll through the current protection of other instruments where the earthing of the system (GND) had not been carried out in an optimal manner.

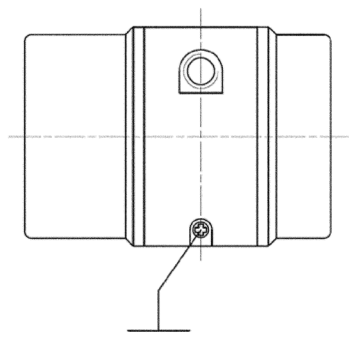


Fig. 12 - Earthing in the housing



Warning!

The hose must not be considered as a protection against electric shock for the protection of security, but as protection against electromagnetic interference of the instrument. Therefore, in the case of long distance cable ($L > 20$ m), both ends of the braid must be connected to the chassis or to the connectors. In the case of cables $L < 20$ meters, will be sufficient to connect the braid only from the side "Power Supply".

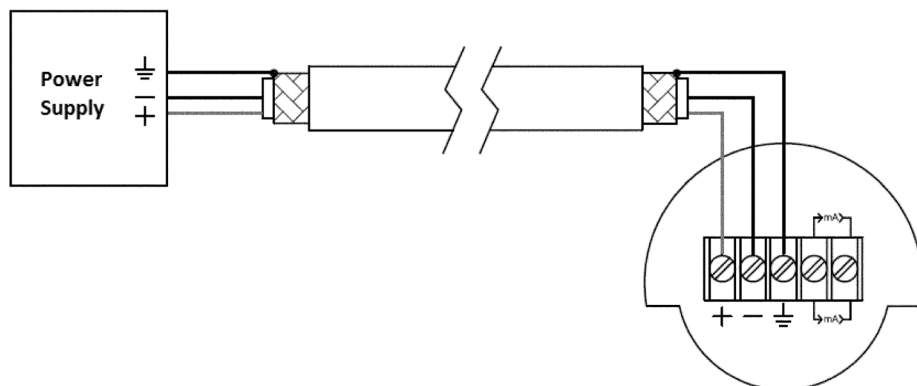


Fig 13 - Earthing of the sock for cables longer than 20 meters

5. Operations

5.1 Operations

Each transmitter is calibrated in factory and has on the nameplate the configuration data. If not differently stated in the purchase order the transmitter is configured as follow:

Upper Range Value (Higher pressure value): refer to the data sheet of unit

Lower Range Value (Lower pressure value): refer to the data sheet of unit

Damping 0 sec.

5.2 Configuration

The transmitter shows the status and the measure on the dot matrix LCD (**Fig. 14**).

The span is from -99999 to 999999.

The input signal to the transmitter can be related to the output signal in the following ways:

Direct mode = 4÷20mA output

Reverse mode = 20÷4mA output

The direct mode is obtained by setting the lower range point with the lowest value of the range (e.g. 0.1 bar) and by setting the upper range point with the highest value (e.g. 0.5 bar).

The reverse mode is obtained by setting the lower range point with the highest value of the range (e.g. 0.5 bar) and by setting the upper range point with the lowest value (e.g. 0.1 bar).

To display the temperature values of the sensor push the following key during transmitter operation:

⇓ = electronic board temperature.

The unit of measure (°C/°K/°F) is defined in the entry TEMP UNIT in the keyboard menu (**Fig. 14**).

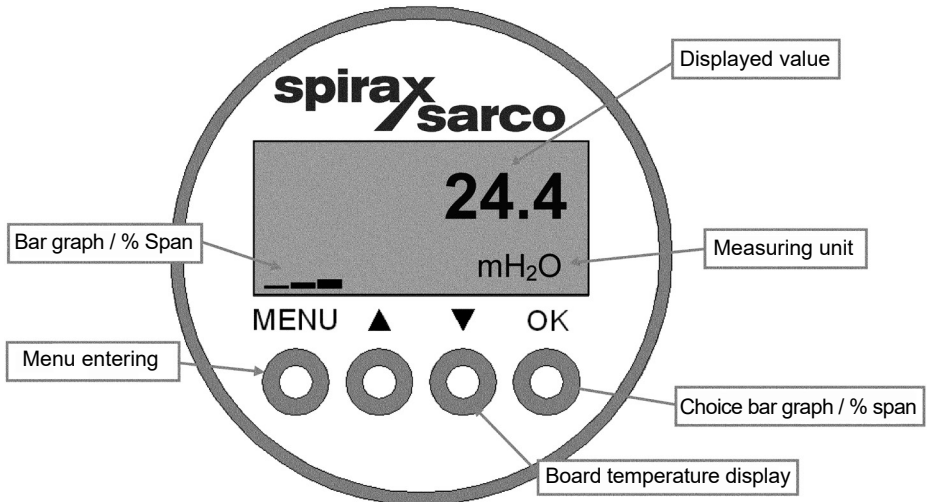


Fig. 14 - LD377BL Display

5.3 Keyboard Configuration

The electronic transmitters have some configuration functions available via keyboard and LCD display, provided with the transmitters themselves.

- ✓ Press the [MENU] button to enter the password entering dialog (the default password is 0000). Confirm by [OK] to enter the configuration menu.
- ✓ The display will allow to choose from the different functions described in the table below. Use the \uparrow and \downarrow buttons to show the sequence of the available functions and press [OK] to confirm the selected function.
- ✓ When the display is in numerical entering mode, the cursor will blink.
- ✓ To move the cursor press the \downarrow button; to raise the value of the digit press the \uparrow button. Press the [OK] button to confirm; use instead the [MENU] button to cancel the modifications and to go back to the standard display.

Function	Display name	Use	Choice span
Zero setting	LRV	Measure linked to the zero and to the 4mA output. The measuring unit is shown in the lower right corner of the display.	Between the sensor limits
Full span setting	URV	Measure linked to the full span and to the 20mA output. The measuring unit is shown in the lower right corner of the display.	Between the sensor limits
Measuring unit selection	PV UNIT (disabled in volumetric flow meters mode)	Measuring unit selection from the available ones. Press \uparrow or \downarrow to scroll.	Pressure: bar, mbar, Pa, hPa, kPa, MPa, mmH ₂ O, mH ₂ O, cmH ₂ O, Kg/cm ² , mmHg, psi, Torr, inHg, Atm, FtH ₂ O, g/cm ² , inH ₂ O Flow m ³ /h
Temperature unit selection	TEMP UNIT	Indicates the choice of the unit of measurement of the temperature.	°C, °K, °F
Transfer function	XFR FUNC (disabled in volumetric flow meters mode)	Selecting of current output in linear or square root mode.	LIN = linear SQRT = volumetric flow meter
Fault configuration	ALARM TYPE	Fault condition analog output selection.	NONE = no action 21mA 3.85mA LAST = last read value
Damping setting	DAMP VALUE	Insert the signal averaging time constant.	0÷60s
Automatic zero elevation	OFFSET	At the button pushing the transmitter performs the zero elevation, in manner to put to zero the actual measure. The elevation is applied to the whole span.	-

Function	Display name	Use	Choice span
4mA input automatic setting (zero)	SET LRV	At button pushing the transmitter will automatically link the 4mA output to the actual reference input.	-
20mA output automatic setting (span)	SET URV	At button pushing the transmitter will automatically link the 20mA output to the actual reference input.	-
Analog output test	LOOP TEST	It is possible to fix the analog output of the transmitter to a required mA value.	3.85÷21mA
Analog output calibration	CAL 4-20mA	The transmitter fixes the output to 4mA and asks by display to check the value (OK? YES/NO). Choose NO if the output is incorrect and insert the value read on an external Ammeter. Do it again until necessary. The same procedure for 20mA follows.	-
Hart® Polling address	ADDRESS	Hart® polling address modification.	0÷15 The minimum polling time is 8ms
Transmitter information	INFO	The polling address, the lower sensor limit (LSL), the upper sensor limit (USL) and the firmware revision are shown.	-
Password setting	PASSWORD	Allows to insert a new password for the transmitter. To be used with care.	0000÷9999
Expert command: Manual zero elevation	ZERO ELEV. (disabled in volumetric flow meters mode)	Manual zero elevation insertion.	6 digits, including "-" sign and decimal point
Expert command: Gain settings	GAIN	Reduce the upper range limit by reducing the current output.	0.1÷10
Factory setting restore	RESTORE	Select and confirm using buttons \uparrow and [OK].	-



Information!

The password is in 4 digits format and spans from 0000 to 9999. If you can't remember or find the password you set, please contact our technical department Spirax Sarco.

— 6. Maintenance and Troubleshooting —

Although transmitters LD series do not require a maintenance on periodical basis, it is good practice to regularly check the general transmitter status, the possible presence of rust or damage on the case or on the measuring diaphragm and the presence of clogging in the process connection.



Prohibition!

Repair, maintenance and/or overhaul of the equipment shall only be conducted by the manufacturer himself, or by a repairer he has qualified or authorized.

Is forbidden during the maintenance operation to use the tool as a handle or step.



Please refer to the following pages scheme for troubleshooting.
In any case contact our technical department Spirax Sarco for help.

Condition	Potential source	Solution
The transmitter doesn't turn on	Supply	Check the supply voltage to be $12.5V_{dc} < V_{supply} < 30V_{dc}$.
	Polarity	Check the transmitter connection polarity.
	Electrical load	Check that the load is less than the maximum allowed.
Measure is incorrect	Process	Accurately verify the compatibility between the process and the connection type.
	Sensor drift	Apply zero input conditions to the transmitter and use the OFFSET command.
	EMC interference	Accurately verify the possible presence of electromagnetic interference on the supply line. Check the PE connection.
Erratic analog output	Wrong span limits	Use the LRV and URV commando (or SET LRV and SET URV) to correct the output.
	Uncalibrated analog output	Use the LOOP TEST command to verify the analog output calibration. If it is not correct, use the CAL4-20mA command to calibrate the output.
	Incorrect HART® settings	Use the ADDRESS command to verify that the polling address is set to 0.
Analog output <4mA or >20mA	Transmitter in fault mode	Check if the output isn't out of the allowed span or check the presence of a failure (e1, e2, ... on display).
	Wrong fault settings	Check the settings using the ALARM TYPE command.
Unstable measure	Measuring disturbs	Set an input average using the DAMP VALUE command (i.e. 10 seconds).
Impossible to access the menu	Wrong / forgotten password	Contact Spirax Sarco for help

6.1 Display error codes

Type of error	Description
OVR	OVER RANGE: this message is shown if PV is greater than URV by 20% of the span.
UDR	UNDER RANGE: this message is shown if PV is lower than LRV by 20% of the span.
LCD OV	LCD OV: this message is shown if PV < -99999 or PV >99999. In this case could depends by damage of sensor or display.
EE CHK ERR	This message depends by an error configuration of the EEPROM memory .
EE ADC ERR	This message is shown if there are PV calculus error in primary ADC input. If it persist contact Spirax Sarco for help.
T EX AD ER	This message is shown if there are on external temperature signal calculus error in secondary ADC input. If it persist contact Spirax Sarco for help.
T IN AD ER	This message is shown if there are on internal temperature signal calculus error in secondary ADC input. If it persist contact Spirax Sarco for help.

6.2 Spare Parts

Together with the request of spare parts it is required to indicate Serial Number of the Transmitter to control that the correct components will be delivered.

Item	Product Code	Description	Quantity
01	Display Cover	Cover with display glass	1
02	Blind Cover	Blind cover terminals side	1
03	Cover O-rings	Gaskets for enclosure covers	2

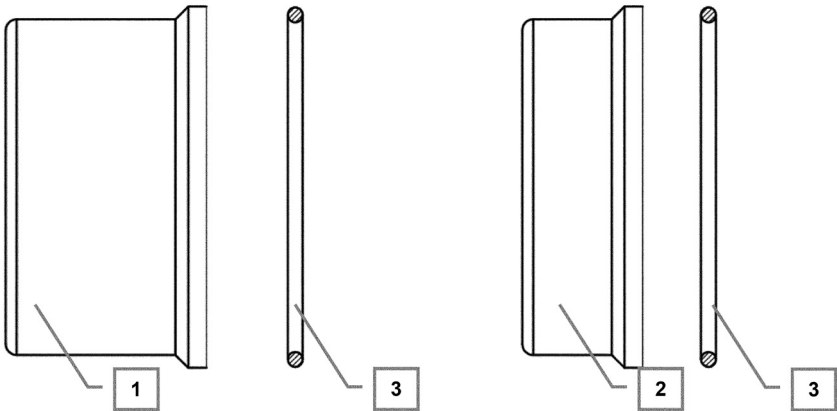


Fig. 15 - Spare parts

7. Marking

On the transmitter enclosure is fixed an identification plate with inscriptions showing the characteristic data of the instrument.

Refer to **Fig. 19**, the Transmitter is provided with the following information:

1. Name and address of the manufacturer
2. CE marking followed by the identification number of the notified body involved in the production phase
3. Designation of series or type
4. Serial number (with the Year of construction)
5. ATEX marking for equipment-group II, followed by the specific marking of explosion protection (see Definitions And Symbols)
6. PED essential allowable limits: allowable Fluids, Maximum working pressure (PS), Nominal size (DN), etc.



Fig. 16 - Marking plate

8. Data sheet

Functional Data

With reference to the following, please note these definitions:

Nominal range: (referred to the sensor mounted in the instrument) the measured pressure range for which the sensor has been designed. Defined as a minimum and maximum value.

Measuring range: the minimum and maximum range values for which the transmitter is to be calibrated.

Measuring span: the interval between minimum and maximum values of the measuring range.

Input scale initial value or zero input: minimum pressure value within in the measuring range.

Input full scale value: maximum pressure value within in the measuring range.

Transmitter Parameters

The parameters that are available for display and setting are:

Measuring span: possibility to change from 3.33% to 200% of the nominal span.

Zero adjustment: digital calibration $\pm 15\%$.

Low/upper range values: they can be set within the nominal range provided that the span > minimum span.

Damping: digitally adjustable from 0 to 60 sec. (minimum response time ~ 0.1 sec.).

Reverse output: automatically obtained via software.

Transfer function: linear/square root via software.

Self test: in case of malfunction the analog output is forced to the fail-safe state 3.85 mA or 21 mA.

Measuring units: 18 different pressure units or % of the measuring span, selectable via software.

Physical Characteristics

Power supply: 12.5 - 30 Vdc

Output signal:

Analog 4-20mA, 2 wires.

Digital using HART® protocol

Response time: <256 ms (Std Hart®)

Measured value update frequency:

4-20 mA + Hart® output: ~ 1 s

Polling time:

4-20 mA + Hart® output: ~ 800 ms

Nominal range 350-10000 mbar:

Max static pressure: 100 bar.

Overpressure limits: 100 bar on either side.

Ambient Conditions

Temperature:

Process fluid: $-40 \div +80^{\circ}\text{C}$ (with extension: up to 150°C)

Housing: $-40 \div +80^{\circ}\text{C}$

Handling and storage: $-40 \div +90^{\circ}\text{C}$

Relative Humidity: 0 a 100% R.H.

LCD display reading: $-10 \div +65^{\circ}\text{C}$

Performance

Total accuracy : $<0.1\%$ FS

Dead band: negligible

Display resolution: 0.1

Influence of Operating Conditions

Thermal drift: it is referred to $-10 \div +80^{\circ}\text{C}$ range.

Zero: $\pm 0.1\%/10^{\circ}\text{C}$.

Span: $\pm 0.1\%/10^{\circ}\text{C}$ at nominal range.

Static pressure effect

Nominal range 350-2500 mbar: Zero: $\pm 0.1\%$ / 10 bar. Span: 0.1% / 10 bar.

Nominal range 5000-10000 mbar: Zero: $\pm 0.2\%$ / 10 bar. Span: 0.2% / 10 bar.

Over range effect

Nominal range 350-2500 mbar: Zero: on either side $\pm 0.1\%$ at 100 bar.

Nominal range 5000 mbar: Zero: on either side $\pm 1\%$ at 100 bar.

Power supply effect:

Negligible between 12.5 and 30 Vdc.

Physical Specifications

Housing: die cast aluminum alloy AW-6082 finished with epoxy resin (RAL 5010). It is dust and sand tight and protected against sea wave effects as defined by IEC IP66. Suitable for tropical climate operation as defined by DIN 50015.

Covers O-ring: EPDM.

Filling fluid: silicone oil.

Nameplate: stainless steel, fixed on housing.

Calibration

Standard: at nominal range, direct action, linear.

Optional: at the conditions specified with the order.

$\frac{1}{2}$ " NPT F on adaptors and $\frac{1}{4}$ " NPT F on process chamber.

Bolts: AISI 316.

Electrical connections: two cable entries on electronic housing: $\frac{1}{2}$ " NPT and cable gland PG 13.5 for 7 to 12 mm diameter cable.

Terminal board: 2 terminals for signal wiring up to 1.5 mm^2 (14 AWG). Connection for ground and cable shield.

Mounting position: any position.

Net weight: about 10 kg.

Process Wetted Parts

Process connections: see ordering information table.

Diaphragm: see ordering information table.

Options

Remote diaphragm seal on (-) side

Stainless Steel Housing: AISI 316 (IP66).

Directive 2014/68/EU (PED)

Pressure equipment until Category III, for fluids (gases, liquids and vapours) in Group 1.

Directive 2014/34/EU (ATEX)

Equipment for explosive atmospheres Group II Category 1/2G suitable for zone 0 (process side), for zone 1 (external side).

Intrinsically Safe: Ex d IIC T6 Ga/Gb ($-40^{\circ}\text{C} \geq T_{\text{amb}} \geq +60^{\circ}\text{C}$)

Ex d IIC T5 Ga/Gb ($-40^{\circ}\text{C} \geq T_{\text{amb}} \geq +80^{\circ}\text{C}$)

Directive 2014/30/EU (EMC)

Equipment with an adequate level of electromagnetic compatibility.

SERVICE

For technical support, please contact our local Sales Engineer or our Head Office directly:

Spirax Sarco S.r.l. - Technical Assistance

Via per Cinisello, 18 - 20834 Nova Milanese (MB) - Italy

Tel.: (+39) 0362 4917 257 - (+39) 0362 4917 211 - Fax: (+39) 0362 4917 315

E-mail: support@it.spiraxsarco.com

LOSS OF GUARANTEE

Total or partial disregard of above instructions involves loss of any rights to guarantee.

Spirax-Sarco S.r.l. - Via per Cinisello, 18 - 20834 Nova Milanese (MB) - Tel.: 0362 49 17.1 - Fax: 0362 49 17 307