MANUAL

INSTALLATION | OPERATION | MAINTENANCE

FOUNDATION FIELDBUS PNEUMATIC CONVERTER

FP302

DEC/24 - VERSION 3

smar
Technology Company

FP302

Foundation Fieldbus Pneumatic Converter

FOUNDATION

Consult our subsidiary

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INTRODUCTION

The **FP302** belongs to the first generation of Foundation Fieldbus devices. It is a converter mainly intended for interfacing a Fieldbus System to a Pneumatic valve or actuator. The **FP302** produces a 3-15 psi or 3-30 psi output proportional to the input received over the Fieldbus network. The digital technology used in the **FP302** enables an easy interface between the field and the control room and several interesting features that reduce considerably the installation, operation and maintenance costs.

The **FP302** is part of Smar's complete 302 line of Foundation Fieldbus devices.

Fieldbus is not only a replacement for 4-20 mA or intelligent / smart transmitter protocols, it contains much more. Fieldbus is a complete system enabling distribution of the control function to equipment in the field.

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

Using Fieldbus technology, with its capability to interconnect several devices, very large control strategies can be designed. In order to be user friendly, the function block concept was introduced (users of Smar CD600 should be familiar with this, since it was implemented many years ago). The user may now easily build and overview complex control strategies. Another advantage is added flexibility; one can edit the control strategy without having to rewire or change any hardware.

The **FP302**, like the rest of the 302 family, has several Function Blocks built in, like PID controller, Input Selector and Splitter/Output Selector, eliminating the need for separate device. Such features improve the communication quality and thereby less dead-time and faster control, not to mention the reduction in cost.

When designing the entire 302 line of Fieldbus devices, Smar considered the needs of both small and large systems. They have in common being able to act as a master on the network and be configured locally using a magnetic tool, eliminating need of a configurator or console in many basic applications.

Get the best result of the FP302 by carefully reading these instructions.

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

Waiver of responsibility

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

Warning

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

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

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

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

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

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

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

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

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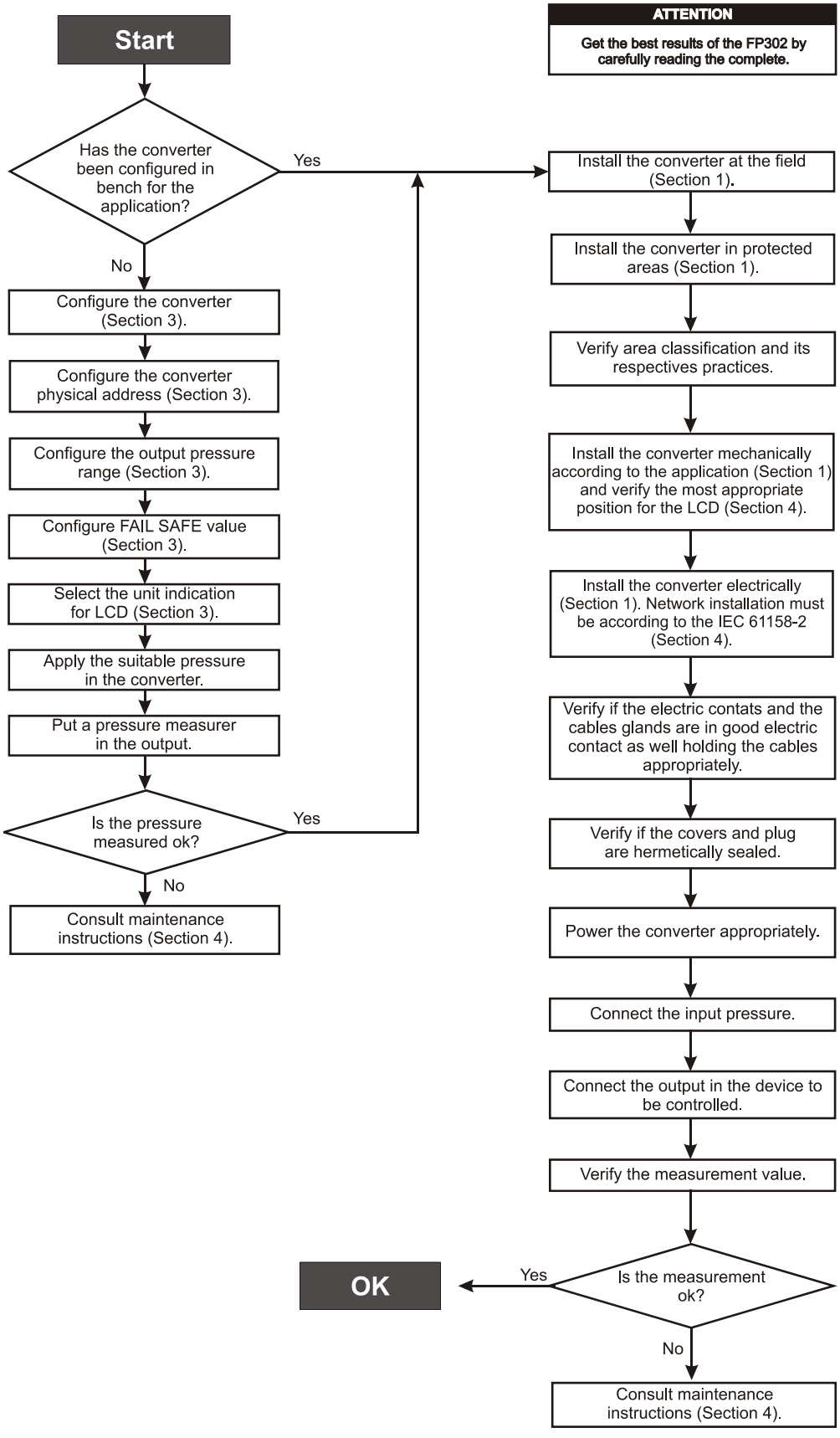


Section 1

INSTALLATION

General

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

The precision of global measuring and control depends on many variables. Although the converter has high-level performance, an adequate installation is necessary for best profiting from the device benefits.

From all the factors possibly affecting the precision of converters, environmental conditions are the most difficult to cope with. However, there are ways to reduce the effects of temperature, humidity and vibration.

The FP302 circuit contains a sensor that compensates temperature variations. On the field, the effect of temperature variation is minimized due to this characteristic.

The effects from temperature variation can be reduced by installing the converter in areas protected from ambient changes.

In warm conditions, the converter must be installed in a way that avoids the maximum possible the direct exposition to solar rays. Also should be avoided the installation near high temperature lines or vases.

Thermal insulation should be used to protect the converter from external heat sources, if necessary.

Humidity is enemy to electronic circuits. The electronic housing cover o-rings must be set correctly mainly on areas with high relative humidity rates. Avoid removing the housing covers on the field, as each time they are open, more humidity penetrates in the circuits.

The electronic circuit is wetness-proof coated, but constant exposition to open air may impair this protection. By the same token, keep covers shut, since every time they are removed corrosion may deteriorate the housing threads, as this area is not painted. Use adequate sealant on the electric connections according to sealing method and the hazardous area classification to avoid the penetration of moisture.

IMPORTANT
Avoid using sealant tape on air inlets and outlets, as this type of material may release residues and block them, and spoil the device performance.

The converter is practically insensitive to vibrations, although it is recommended not to install it near to pumps, turbines or equipments that produce excessive vibration.

Mounting

The converter is designed to be light and robust together. This makes its mounting easier and can be done in a 2” pipe, wall or panel. By using an adequate mounting bracket, it can be mounted in different positions.

Make sure the FP302 is mounted in a way that dust and particles do not obstruct the vents.

The FP302 has filters to protect the in-coming supply pressure and the vent, which must be kept clean. In case of impurity building, replace the filter (consult the recommended spare part),

For more visibility, the digital indicator may rotate at 90” angles, as well as the electronic housing, for better display reading and visibility.

Pneumatic Connections

The instrumentation air must be of better quality than industrial compressed air. Humidity, suspended particles and oil can temporarily harm the device performance or definitely, if the internal parts can be damaged.

In compliance with the *ANSI/ISA S7.0.01 - 1996 - Quality Standard for Instrument Air* standard, the instrumentation air must bear the following characteristics:

Dew Point	10º C below the minimum registered temperature.
Size of particles	40 µm (maximum).
Oil content	1 ppm w/w (maximum).
Contaminants	Must be free from corrosive or inflammable gases.

The standard recommends that the compressor inlet is in a place free from process spills and uses the adequate filter. Also, that non-lubricated compressors are used to prevent contamination from lubricant oil. When lubricated compressors are used, there must be means to clean the contaminated air.

It is recommended the periodical filter cleaning, and more frequent ones in case of bad instrumentation air quality.

For an **output signal from 3 psi (0,2 bar) to 15 psi (1 bar)**, it is required a minimum air supply of 18 psi (1.24 bar) and a maximum 100 psi (7 bar) supply.

For an **output signal from 3 psi (0,2 bar) to 30 psi (2 bar)**, it is required a minimum air supply of 40 psi (1.4 bar) and a maximum 100 psi (7 bar) supply.

NOTE
To get a maximum output pressure value, the converter requires the minimum necessary pressure described above

An excessive pressure supply, above 100 psi, may be harmful.

The air pressure supply for the FP302 must be a minimum of 18 psi and a maximum of 100 psi. If this condition cannot be met, an air pressure regulator is recommended.

The air supply inlet is marked with “IN” and the outlet with “OUT” (See figure 1.3 - Converter Dimensional Drawing and Mounting Position)

The air supply inlet and outlet connections are ¼ “ NPT threaded. Before connecting the piping, purge the lines completely. There must be no leaks, mainly on the outlet. Check all piping parts and connection for leaks. Use good sealing practices before operating the equipment. Thread sealants are recommended instead of PTFE (Teflon) sealant tape.

The vent is used to exhaust the air to relieve the output pressure. This vent must never be obstructed for better air flow.

In case of loss of pressure supply, the output will drop near 0 Kgf/cm³ (0 psi). If the pressure is kept, but communication is lost, the output may be pre-configured for a free value or a safe value.

Electric Connection

To access the terminal block, remove the Electric Connection cover. This cover can be locked with its locking screw. To release it, rotate the locking screw clockwise.

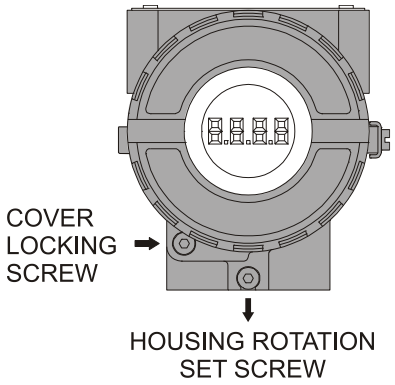


Figure 1.1 - Cover Locking Screw

The access of signal cables and their connection to the terminals are done through one of the two orifices in the electronic housing, by linking them to a electric conduit o cable clamp. The conduit threads must be sealed according to the required method. The unused orifice must be sealed with a plug or sealant.

The electrical orifices must be connected in a way that prevents humidity inside the device. After completing the connections, shut the device cover to avoid humidity.

The terminal block has screws to receive fork or eye terminals.

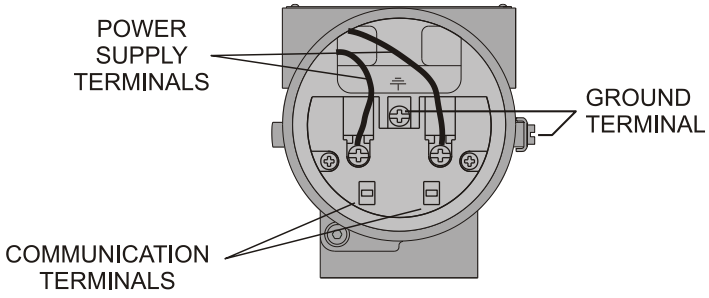


Figure 1.2 – Electric Connections

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

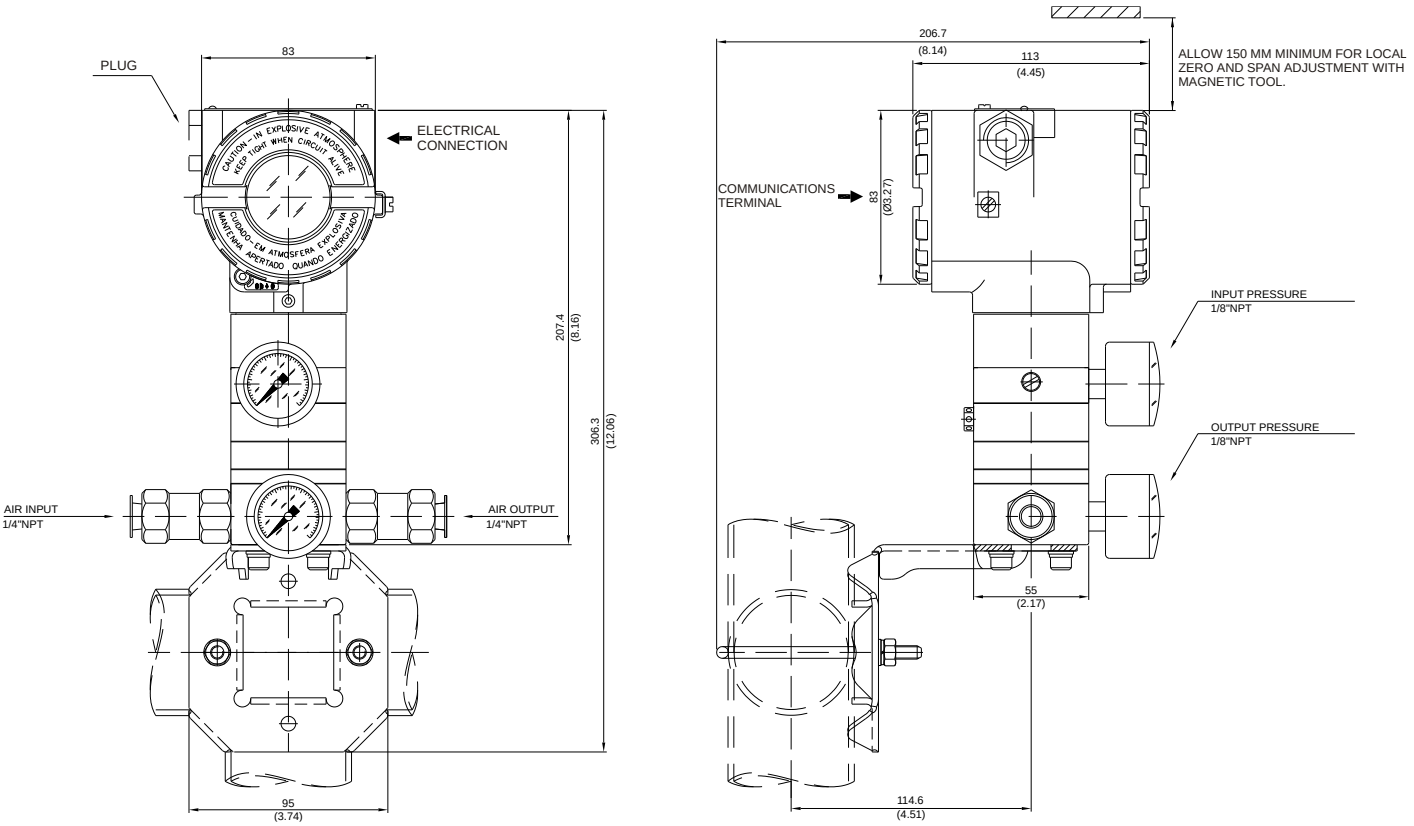


Figure 1.3 – Converter Dimensional Drawing and Mounting Position

For more convenience, there are three ground terminals: an internal one, close to the terminal block and two external ones, located near the conduit inlet.

The FP302 uses the 31,25 Kbit/s voltage mode for physical signalization, and the other devices on the same bus must use the same signals. All devices are connected in parallel on the same line. The several Fieldbus devices can be connected on the same bus.

The FP302 is powered via the bus. The number of devices to be connected on the same bus is 15 for non-intrinsically safe installations.

In classified areas, the number of devices is limited by the intrinsic safety restrictions.

Avoid passing the signal wiring through conduits with power cables or electric commuters.

The FP302 is protected against reverse polarity and can support ± 35 Vdc without being damaged. The reverse polarity does not damage the equipment; however, it will not work.

Network Configuration and Topology

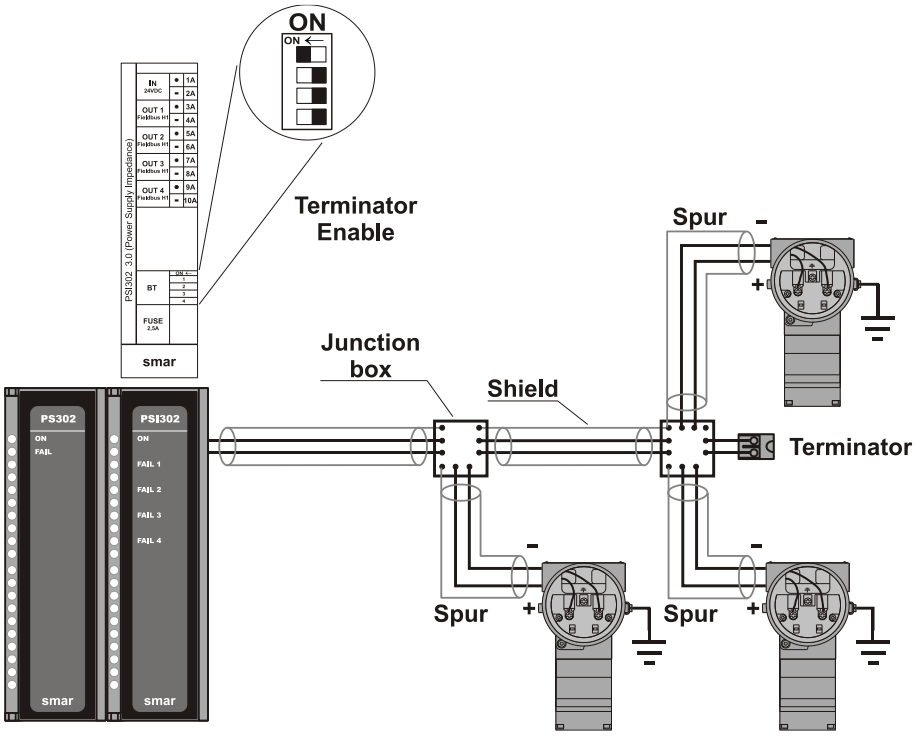


Figure 1.4 - Bus Topology

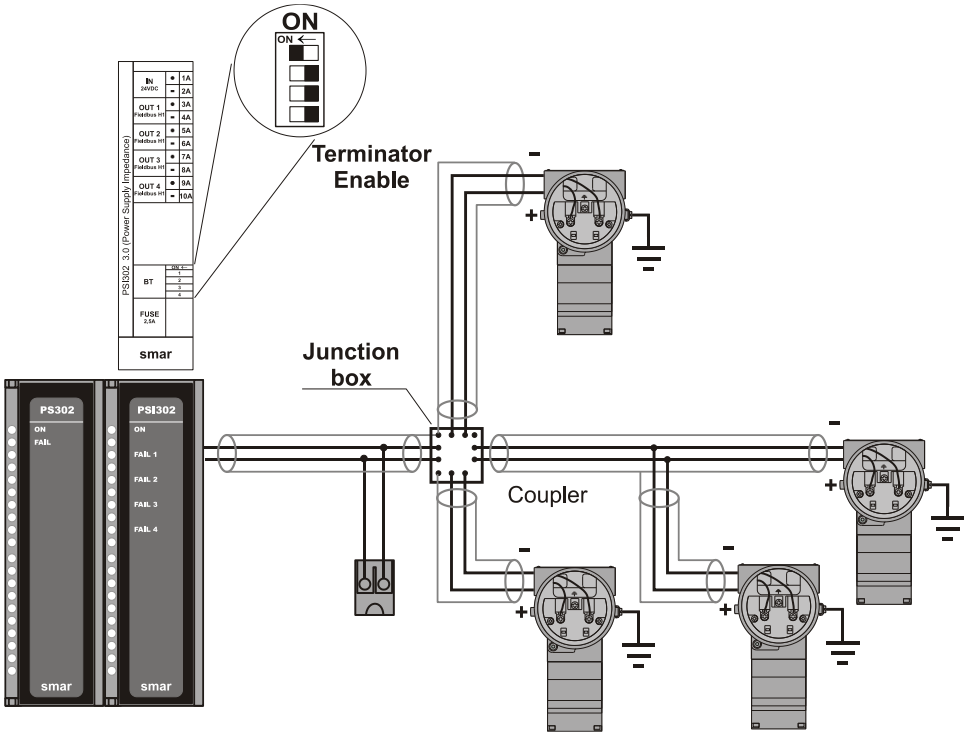


Figure 1.5 – Tree Topology

Installation in Hazardous Areas

See Appendix A for further information.

OPERATION

Output Module Functional Description

The output module main parts are: pilot, servo, pressure sensor and output control circuit.

The pneumatic part is based on a well known technology: pneumatic relay and the nozzle-baffle set, according to the schematic drawing on Figure 2.1.

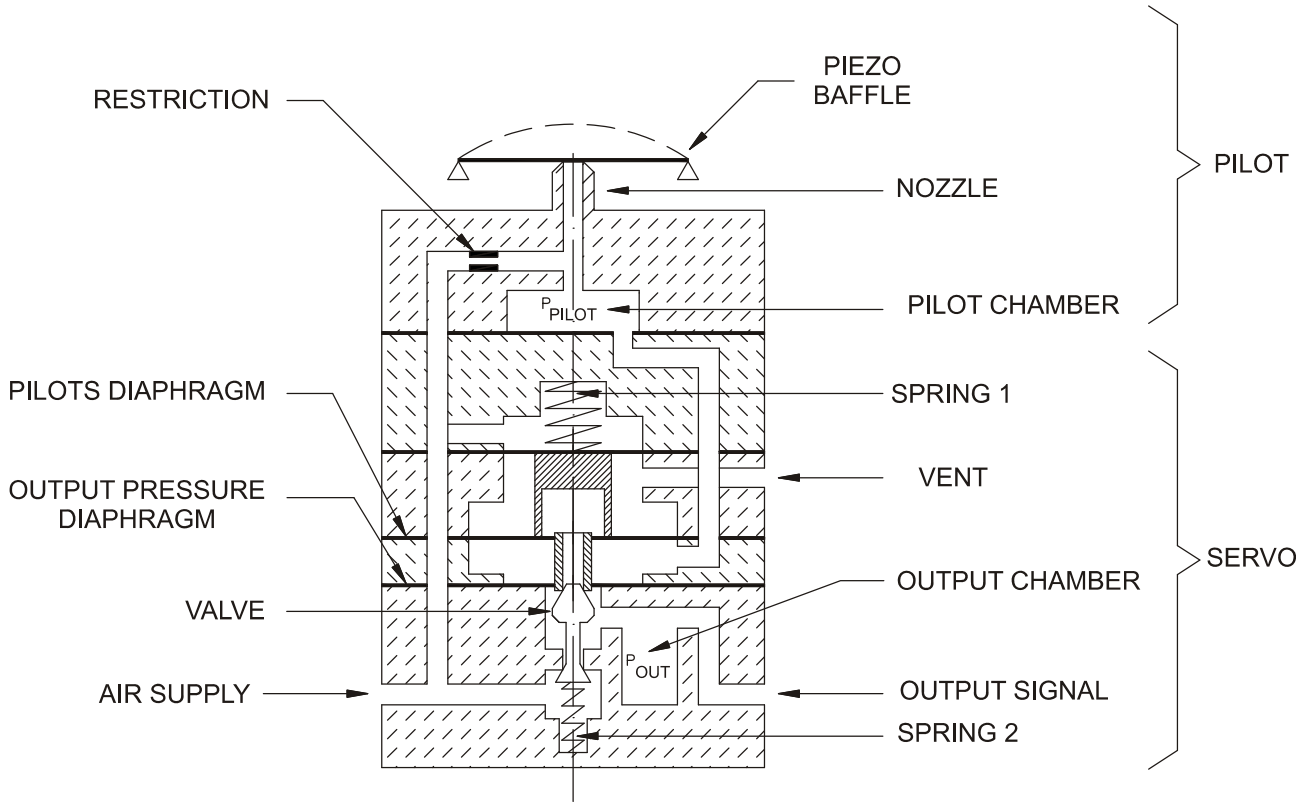


Figure 2.1 – Pneumatic Transducer

A piezoelectric disc is used as a baffle at the pilot stage. The baffle is deflected when it receives a voltage through the control circuit. Approaching or moving away from the piezoelectric disc causes a variation on the small air flow passing through the nozzle and changes the pilot chamber pressure, which is called pilot pressure.

The pilot pressure, for being too low, must be amplified. This is performed in the servo section, which works as pneumatic relay. The servo section has a diaphragm in the pilot chamber and a smaller output diaphragm in the output chamber. The pressure pilot, when applied on the pilot diaphragm results in a force equal to the pressure on the output diaphragm, when in balance.

When an increase is required in the output pressure, the baffle will move away from the nozzle according to value set, and the correction is carried out as described above. Spring 1 forces the valve downwards and increases the output pressure until it reaches a new balance.

If a decrease in pressure is required, the baffle will approach the nozzle and the pilot pressure will increase. The valve will close through the spring 2 and the diaphragms will be pushed upwards by the stronger output flow and pilot pressure.

The air in the system relieves the output pressure through the vent, decreasing the output pressure until reaching balance again.

Functional Electronic Description

The FP302 CPU receives the required output level through the Fieldbus network. The CPU supplies an electronic setpoint signal to the control circuit. The control circuit also receives a feedback from a pressure sensor on the FP302 outlet.

Each block function will be described below.

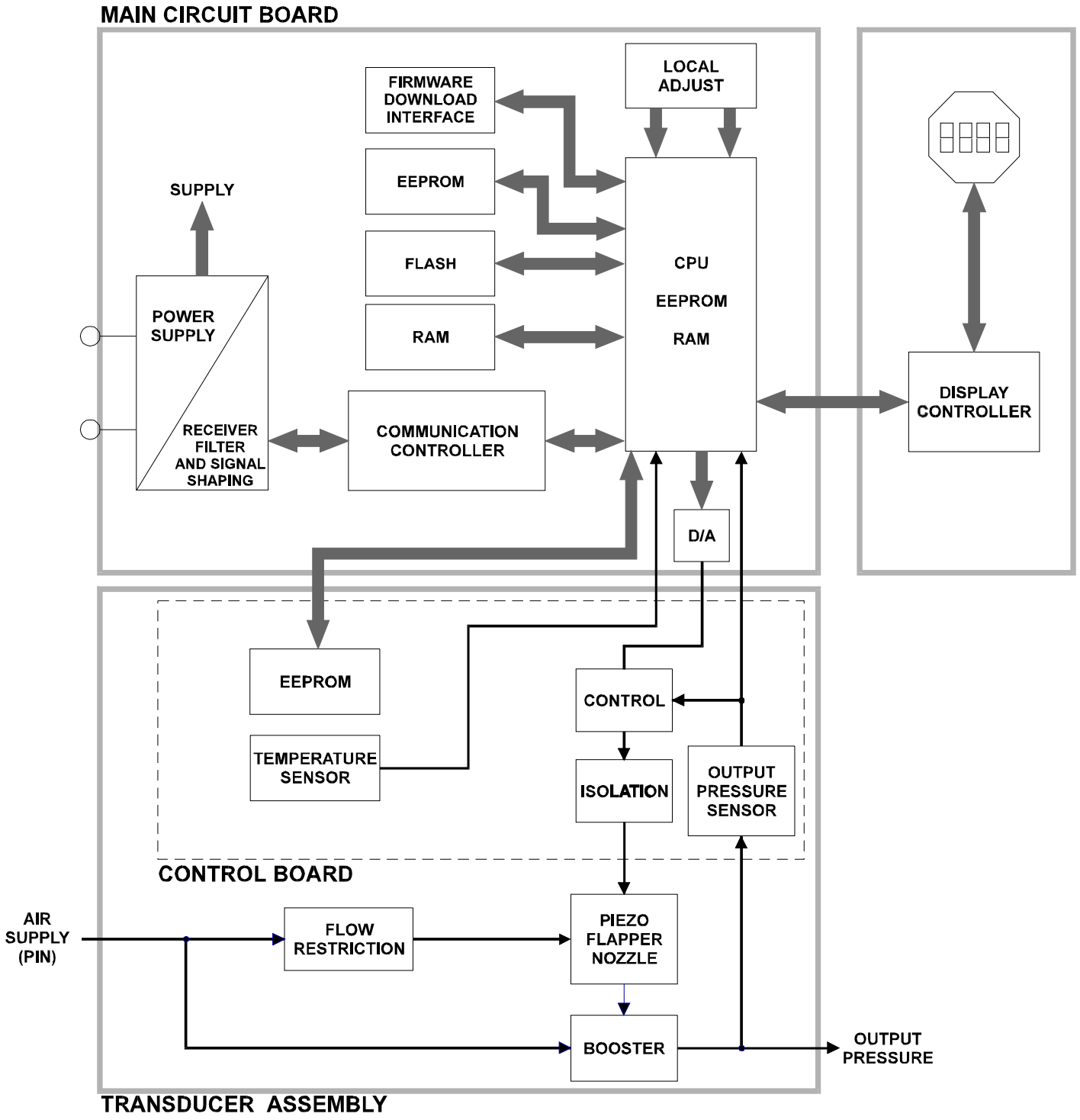


Figure 2.2 – FP302 Block Diagram

Power Supply
The FP302 converter circuit is bus powered via the transmission line (two-wire system).

Communication Controller
Controls the line activity, modulates and demodulates communication signals and inserts or erases initial or final delimitators according to the Fieldbus protocol.

Central Processing Unit (CPU), RAM and PROM
The CPU is the converter intelligent part and is responsible for the management and executing operation of the block, self-diagnosis and communication. The program is stored in the PROM. For the temporary storage of data, the CPU has an internal RAM. The CPU has a non-volatile internal memory (EEPROM) that store data that must be retained in case of power failure. Examples are data calibration, configuration and identification.

Display Controller
Receives data from the CPU and send them to liquid crystal display.

Local Adjustment
Two switches are magnetically activated via the magnetic configuration tool without any external electric or mechanic contact. There is no need for opening the housing cover to access the Local Adjustment.

D/A Block
Receives the CPU signal and convert it into an analog voltage used by the control block.

Control Block
Controls the output pressure, while supplying voltage to the piezoelectric disc, according to the data received from the CPU and the pressure sensor feedback.

Isolation
Its function is to isolate the Fieldbus signal from the piezoelectric signal.

Output Pressure Sensor
Measures the output pressure and sends a feedback to the Control Block and the CPU.

Temperature Sensor
Measures the temperature on the transducer board.

EEPROM
Non-volatile memory that stores data when the FP302 is reinitialized.

Nozzle-Baffle
This unit converts the piezoelectric movement inside a pneumatic signal to a pressure control in the pilot chamber.

Restriction
The restriction and the nozzle form a pressure divisor circuit. The restriction reduces the supply pressure to activate the nozzle-baffle system, as described above on Output Module Functional Description.

Booster
The booster amplifies the pressure changes that occur before the pressure restriction into bigger values with the bigger air volume as described on Output Module Functional Description.

CONFIGURATION

One of the many Fieldbus advantages is that the device configuration is independent from that of the configurator or manufacturer. The FP302 can be configured through a third-party terminal or an operational console. The following text is not meant for any particular configurator and this information are applicable to any type. However, as Smar has its own Syscon configurator, the examples and illustrations are based on this device.

The **FP302** is essentially an output transductor block. Moreover, the equipment has several auxiliary blocks allowing the user to apply basic or advanced configurations.

The **FP302** includes a set of 19 blocks, as shown below. The complete description and configuration of all FP302 blocks are described on the Functional Block Instructions Manual available on the Smar internet page at http://www.smar.com/fieldbus.asp.

In addition, the **FP302** makes possible using block dynamic instantiation. This resource offers more flexibility to build control strategies for the FP302.

RESOURCE	DESCRIPTION
RS	**RESOURCE** – This block contains data specified for the hardware associated to the resource.

TRANSDUCER BLOCKS	DESCRIPTION
DIAG	**DIAGNOSTIC TRANSDUCER** – Supplies online measuring of the block execution time, checks the links between blocks and other features.
DSP	**DISPLAY TRANSDUCER** – This block is supported by devices with LCD display and can be used to monitor and to configure local block parameters.

OUTPUT TRANSDUCER BLOCK	DESCRIPTION
FP302	**FIELDBUS PRESSURE TRANSDUCER** – This is the FP302 transducer block – a Fieldbus Pressure Converter.

CALCULATION AND CONTROL FUNCTIONAL BLOCKS	DESCRIPTION
PID	**PID CONTROL** – This is a standard block with several features, as: setpoint treatment (value limitation and rate), filter and PV alarm, feedforward, output tracking and others.
EPID	**OPTIMIZED PID** – Has all PID features, plus bumpless transfer from manual mode to automatic mode or standard impact plus bias.
APID	**ADVANCED PID** – Has all Standard PID features, plus bumpless transfer option or standard impact from manual mode to automatic mode and bias, adaptable gain, PI sampling, dead error zone, special error treatment, ISA or parallel algorithm.
ARTH	**ARITHMETIC** – This block calculates some ready-to-use pre-defined equations for use on applications like flow compensation, HTG compensation, rate control and others.
SPLT	**DIVISOR** – This block is used on two typical applications: split range and seqüencial. Receives the PID block output, processing it according to the selected algorithm and generates the values for two analog block outputs.
CHAR	**SIGNAL CHARACTERIZER** – Has capacity process two signals, based on the same curve. The second input has an option to exchange “x” for “y “ and provides an easy way to use the inverted function, which can be used to characterize the return.

CALCULATION AND CONTROL FUNCTIONAL BLOCKS	DESCRIPTION
INTG	**INTEGRATOR** – Integrates a variable in relation to time. There is a second flow input that can be used for network flow totalizing, volume/mass variation in vessels, and flow reason accurate control.
AALM	**ANALOG ALARM** – This alarm block has limits of static or dynamic alarm, hysteresis, temporary expansion of alarm limits in setpoint steps to avoid undesirable alarms, two level of alarm limits and delay for alarm detection.
ISEL	**INPUT SELECTOR** – This block has four analog inputs selected by the input parameter or according to a criterion rated for good, maximum, minimum, medium and media.
SPG	**SETPOINT RAMP GENERATOR** – This block generates the setpoint in time function. Typical applications are temperature control, batch reactor, etc.
TIME	**TEMPORIZER AND LOGICAL** – This block has four discrete inputs processed by a logical combination. The selected temporizer for the type of process, works on the combined signal input to produce measuring, delay, extension, pulse or debounce.
LLAG	**LEAD-LAG –** This block provides a dynamic compensation for a variable**.** It is normally used on feedforward control.
OSDL	**OUTPUT SELECTOR / DYNAMIC LIMITATOR** – Has two algorithms: **Output Selector** – selects the output through a discrete input. **Dynamic Limitator** – this algorithm was especially developed for double crossed limit in combustion control.
CT	**CONSTANT** – Provides analog and discrete output parameters with constant values.

FUNCTIONAL BLOCK OUTPUT	DESCRIPTION
AO	**ANALOG OUTPUT** – The AO block provides an analog value to generate an analog output signal. It produces a value and rate limit, scale conversion, failure status mechanism among other features.

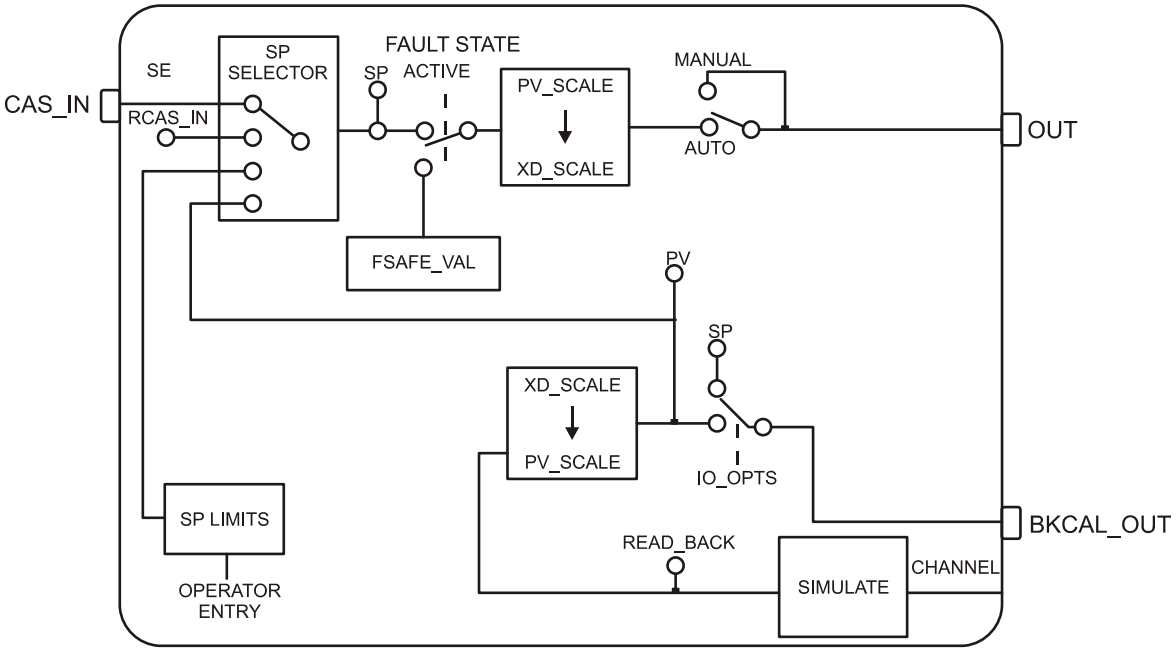
Transducer Block

The transducer block isolates the function block from the I/O hardware, as sensors and actuators. The transducer block controls the I/0 using the manufacturer's specific implementation. This makes possible for the transducer block to execute its tasks and obtain data from the sensors without overloading the function block currently in use. It also isolates function blocks from some specific factory characteristics. When accessing the hardware, the transducer block may receive I/O data or transmit control data to it. The connection between the transducer block and the function block is called channel.These blocks can exchange data through their interface. In addition, the interface with functional blocks works through one or more I/O channels whatever the implementation is.

Normally, the transducer blocks execute functions like: linearization, characterization, temperature compensation, data control and exchange with the hardware.

Output Functional Block Scheme

SCHEME



The Analog Output Block is a functional block used by the equipment working as element on a control loop, as valves, actuators, positioners etc. The AO block receives a signal from another functional block and transmits the result to an output transducer through an internal reference channel.

To configure the communication channel on the FP302, the CHANNEL parameter must be adjusted on the value “1”.

The AO block uses the XD_SCALE to convert the SP value to the engineering unit expected by the transducer block output, which is also the same as the engineering unit of the reading value.

Transducer Block Configuration

Every time a field device is selected on the SYSCON operation menu, a transducer block will be automatically instantiated on the screen. The icon indicates that a transducer block was created. Click twice on it to access.

The transducer block has algorithm, a group of internal parameters and a channel that connects it to a function block.

The algorithm describes the behavior of the transducer as a data that transfer functions between the I/O hardware and other function blocks. The group of internal parameters, namely those that cannot be connected to other blocks and issue the link through communication, defines the user interface with the transducer block. They may be divided in standard blocks and those specified by the manufacturer.

The standard parameters are used in some type of devices such as pressure, temperature devices, actuators etc, whatever the manufacter. Differently, the specific factory parameters are defined only by the manufacturer. Specific common parameters are calibration setting, information on materials, linearization curve etc. When executing a standard routine like calibration, for instance, a step-by-step method is followed. This method is generally defined as instructions to help users to perform common tasks. The Syscon identifies each method associated to the parameters and makes the interface with them possible.

FP302 – Fieldbus Pressure Transducer

Description
The transducer block receives the desired pressure value through the FINAL_VALUE coming from the AO block and returns the pressure value generated via the RETURN parameter. The engineering unit and the final value rate are selected from the XD_SCALE in the AO block.

The allowed units are:

- Pa,
- KPa,
- MPa,
- bar,
- mbar,
- torr,
- atm,
- psi,
- g/cm²,
- kg/cm²,
- in$H_2$0 to 4°C,
- inH_2O to 68°F,
- mm$H_2$0 to 68°F,
- mm$H_2$0 to 4°C,
- ft$H_2$0 to 68°F,
- inHg to 0°C,
- mmHg to 0°C.

The XD_SCALE range must be within the selected unit range (3-30 psi). The supported modes are OOS (Out Of Service) and AUTO. Since the transducer block runs together with the AO block, the transducer block moves to AUTO only if the AO block mode is already on AUTO. The module temperature sensor may be read through the SECONDARY_VALUE parameter.
Warning messages may appear on the RETURN status or on the Error Block in some cases, as explained below.

Supported Modes
OOS and AUTO

BLOCK_ERR
The transducer block BLOCK_ERR will reflect the following causes:
Block Configuration – When the XC-SCALE has an improper range or unit.
Output Failure – When the mechanical module is disconnected on the primary electronic board, or when there is no air suppy.
Out of Service – When the block is on OOS mode.

Return Status
The transducer block RETURN status will reflect the following causes:
- Bad::NonSpecific:NotLimited – when the mechanical module is disconnected from the primary electronic board or there is no air supply.

Parameters
Next follows the list of 92 parameters included in the FP302 transducer block;

Idx	Parameter	Type	Range Valid	Initial Value	Unit	Memory	Description
1	ST_REV	Unsigned16	-	0	None	S	Number of changes of the static parameters
2	TAG_DESC	VisibleString	-	Null	Na	S	Transducer Block Description
3	STRATEGY	Unsigned16	-	0	None	S	This parameter is not checked and not processed by the Transducer Block
4	ALERT_KEY	Unsigned8	1-255	0	Na	S	Plant identification number
5	**MODE_BLK**	**DS-69**	**-**	**O/S**	**None**	**S**	**Transducer Block operation mode**
6	**BLOCK_ERR**	**Bit String**	**-**	**-**	**E**	**D**	**Status associated to the**

Idx	Parameter	Type	Range Valid	Initial Value	Unit	Memory	Description
							hardware or software on the Transducer
7	UPDATE_EVT	DS-73	-	-	Na	D	Alert for any static data.
8	BLOCK_ALM	DS-72	-	-	Na	D	Parameter used for configuration, hardware or other failures.
9	TRANSDUCER_DIRECTORY	Array of Unsigned16	-	-	None	N	Selection of several Transducer Blocks.
10	TRANSDUCER_TYPE	Unsigned16	-	Other	None	N	Type of Transducer per class
11	XD_ERROR	Unsigned8	-	Default value set	None	D	Calibration status.
12	COLLECTION_DIRECTORY	Array of Unsigned 32	-	-	None	S	Transducer index number on the Transducer Block
13	**FINAL_VALUE**	**DS-65**	**-**	**-**	**FRV**	**D**	**AO block desired pressure and status**
14	**FINAL_VALUE_RANGE**	**DS-68**	**-**	**-**	**FRV**	**S**	**Upper and lower values, engineering units and number of decimal places to be used on FINAL_VALUE**
15	CAL_POINT_HI	Float	12-32 psi	30	CU	S	Upper Calibration Value
16	CAL_POINT_LO	Float	2.5-5 psi	3	CU	S	Lower Calibration Value
17	CAL_MIN_SPAN	Float	-	7	CU	S	Minimum allowed span value. This information is needed so that both upper and lower calibration points are not too close after calibrating.
18	CAL_UNIT	Unsigned16	-	Psi	E	S	Engineering unit of the Equipment description for the calibration values.
19	CONV_SN	Unsigned32	-	-	None	S	Converter serial number
20	CAL_METHOD	Unsigned8	-	Factory	None	S	Method used on last sensor calibration.
21	ACT_FAIL_ACTION	Unsigned8	-	-	None	S	Specifies the actuator action in case of failure.
22	ACT_MAN_ID	Unsigned32	-	-	None	N	Actuator manufacturer Identification number.
23	ACT_MODEL_NUM	VisibleString	-	NULL	None	N	Actuator model number
24	ACT_SN	VisibleString	-	-	None	N	Actuator serial number.
25	VALVE_MAN_ID	Unsigned32	-	-	E	N	Valve manufacturer identification number.
26	VALVE_MODEL_NUM	VisibleString	-	NULL	None	N	Valve model number.
27	VALVE_SN	VisibleString	-	-	None	N	Valve serial number.
28	VALVE_TYPE	Unsigned8	-	-	E	N	Valve type
29	XD_CAL_LOC	VisibleString	-	NULL	None	S	Place of last equipment calibration.
30	XD_CAL_DATE	Time of Day	-	-	None	S	Date of last equipment calibration
31	XD_CAL_WHO	VisibleString	-	NULL	None	S	Name of last person who made the Calibration.
32	SECONDARY_VALUE	DS-65	-	-	SVU	D	Secondary value related to the temperature sensor.
33	**SECONDARY_VALUE_UNIT**	**Unsigned16**	**-**	**ºC**	**E**	**S**	**SECONDARY_VALUE engineering unit parameter**
34	**SENSOR_RANGE**	**DS-68**	**-**	**3-30 psi**	**FRV**	**S**	**Pressure sensor upper and lower value, engineering unit and number of decimal points.**
35	BACKUP_RESTORE	Unsigned8	See table	None	None	S	Parameter for backup or to recover configuration data.
36	COEFF_PRESS_POL0	Float	± INF	-	None	S	Pressure Zero coefficient.
37	COEFF_PRESS_POL1	Float	± INF	-	None	S	Pressure 1 coefficient..
38	COEFF_PRESS_POL2	Float	± INF	-	None	S	Pressure 2 coefficient..
39	COEFF_PRESS_POL3	Float	± INF	-	None	S	Pressure 3 coefficient.
40	COEFF_PRESS_POL4	Float	± INF	-	None	S	Pressure 4 coefficient
41	COEFF_PRESS_POL5	Float	± INF	-	None	S	Pressure 5 coefficient..
42	COEFF_PRESS_POL6	Float	± INF	-	None	S	Pressure 6 coefficient.
43	COEFF_PRESS_POL7	Float	± INF	-	None	S	Pressure 7 coefficient.

Idx	Parameter	Type	Range Valid	Initial Value	Unit	Memory	Description
44	COEFF_PRESS_POL8	Float	± INF	-	None	S	8 pressure coefficient
45	COEFF_PRESS_POL9	Float	± INF	-	None	S	Pressure 9coefficient.
46	COEFF_PRESS_POL10	Float	± INF	-	None	S	Pressure 10 coefficient.
47	POLYNOMIAL_PRESS_VERSION	Unsigned8	-	-	None	S	Pressure polynomial version.
48	COEFF_SENS_PRESS_POL0	Float	± INF	-	None	S	Pressure sensor coefficient zero.
49	COEFF_SENS_PRESS_POL1	Float	± INF	-	None	S	Pressure sensor coefficient 1.
50	COEFF_SENS_PRESS_POL2	Float	± INF	-	None	S	Pressure sensor coefficient 2.
51	COEFF_SENS_PRESS_POL3	Float	± INF	-	None	S	Pressure sensor coefficient zero.
52	COEFF_SENS_PRESS_POL4	Float	± INF	-	None	S	Pressure sensor coefficient zero.
53	COEFF_SENS_PRESS_POL5	Float	± INF	-	None	S	Pressure sensor coefficient 5.
54	COEFF_SENS_PRESS_POL6	Float	± INF	-	None	S	Pressure coefficient 6.
55	COEFF_SENS_PRESS_POL7	Float	± INF	-	None	S	Pressure sensor coefficient 7.
56	POLYNOMIAL_SENS_PRESS_VERSION	Unsigned8	-	-	None	S	Pressure sensor polynomial version.
57	CAL_POINT_HI_SENSOR_PRES	Float	-	30.0	psi	S	Pressure sensor upper calibration point.
58	CAL_POINT_LO_SENSOR_PRES	Float	-	3.0	psi	S	Pressure sensor lower calibration point.
59	COEFF_SENS_TEMP_POL0	Float	± INF	-	None	S	Temperature sensor coefficient 0.
60	COEFF_SENS_TEMP_POL1	Float	± INF	-	None	S	Temperature sensor coefficient 1.
61	COEFF_SENS_TEMP_POL2	Float	± INF	-	None	S	Temperature sensor coefficient 2.
62	COEFF_SENS_TEMP_POL3	Float	± INF	-	None	S	Temperature sensor coefficient 3.
63	COEFF_SENS_TEMP_POL4	Float	± INF	-	None	S	Temperature sensor coefficient 4.
64	POLYNOMIAL_SENS_TEMP_VERSION	Unsigned8	-	-	None	S	Temperature sensor polynomial version.
65	**RETURN**	**DS-65**	**-**	**-**	**FRV**	**D**	**Existing valve pressure and status sent to the AO block.**
66	CHARACTERIZATION_TYPE	Unsigned8	-	255	None	S	Type of caracterization curve
67	CURVE_BYPASS	Unsigned8	True/False	True	None	S	Enable and disable the characterization curve.
68	CURVE_LENGTH	Unsigned8	2 to 8	8	None	S	Number of points of the characterization curve.
69	CURVE_X	Array of Float	-	%	%	S	Input points of the characterization curve.
70	CURVE_Y	Array of Float	-	%	%	S	Output points of the characterization curve
71	FEEDBACK _CAL	Float	-	-	FRV	S	Pressure value used by the calibration method.
72	CAL_CONTROL	Unsigned8	En/Dis	Disable	None	D	Parameter used to start and end the calibration method.
73	CAL_POINT_HI_BACKUP	Float	-	30	CU	S	Upper calibration point backup.
74	CAL_POINT_LO_ BACKUP	Float	-	3	CU	S	Lower calibration point backup.
75	CAL_POINT_HI_FACTORY	Float	-	30	CU	S	Factory upper calibration point.
76	CAL_POINT_LO_FACTORY	Float	-	3	CU	S	Factory lower calibration point.
77	PWM_CAL_POINT_HI	Float	-	-	None	S	Pwm value for the upper calibration point.
78	PWM_CAL_POINT_LO	Float	-	-	None	S	Pwm value for the lower alibration point.
79	OUT_POLYN_CAL_POINT_HI _PRES	Float	-	-	None	S	Upper calibration value for the pressure polynomial.
80	OUT_POLYN _CAL_POINT_LO_PRES	Float	-	-	None	S	Lower calibration value for the pressure polynomial.
81	OUT_POLYNOMIAL_PRESS	DS-65	-	-	psi	D	Polynomial output value to generate pressure.
82	SENSOR_PRESSURE	DS-65	-	-	psi	D	Pressure sensor value and status.
83	DIGITAL_PRESSURE	DS-65	-	-	None	D	Pressure sensor digital and status value.
84	OUT_POLYNOMIAL_SENS_PRESS	DS-65	-	-	psi	D	Pressure sensor polynomial output value.
85	DIGITAL_VOLTAGE	DS-65	-	-	None	D	Piezo tension digital and status value.
86	VOLTAGE	DS-65	-	-	Volts	D	Piezo tension value and status.

Idx	Parameter	Type	Range Valid	Initial Value	Unit	Memory	Description
87	PWM_VALUE	Unsigned16	-	-	None	D	Piezo tension pwm generation value.
88	SENSOR_TEMPERATURE	DS-65	-	-	°C	D	Temperature sensor value and status.
89	DIGITAL_TEMPERATURE	DS-65	-	-	None	D	Sensor temperature digital value.
90	CAL_TEMPERATURE	Unsigned8	-40/85 °C	25 °C	°C	S	Reference temperature used to calibrate the sensor temperature.
91	CAL_DIGITAL_TEMPERATURE	Float	-	-	None	S	Digital temperature value during calibration.
92	ORDERING_CODE	VisibleString	-	NULL	Na	S	Factory equipment manufacturing Information

CAPTIONS			
E	– List of parameters	**Sec**	– Seconds
Null	– Empty	**CU**	– CAL_UNIT
Na	– Adimensional parameter	**PVR**	– PRIMARY_VALUE_RANGE
RO	– Reading only	**SR**	– SENSOR_RANGE
D	– Dynamic	**SVU**	– SECONDARY_VALUE_UNIT
N	– Non volatile	**FRV**	– FINAL_VALUE_RANGE
S	– Static		

Note: Lines with grey background are Syscon default monitoring parameters.

Calibration

The calibration conbines a reference source applied or connected to the calibrating device with the desired value. The calibration uses at least four parameters must be used on the process configuration: CAL_POINT_HI (upper calibration point), CAL_POINT_LO (low calibration point), CAL_MIN_SPAN (minimum calibration span, if necessary) and the CAL_UNIT (calibration engineering unit).

Pressure Trim

The work range is defined on the AO Block, as: (3 -15 psi) or (3-30 psi). It is possible to calibrate the transmitter with the CAL_POINT_LO e CAL_POINT_HI parameters.

First, choose a convenient engineering unit before calibration. This engineering unit is configured by the CAL_UNIT parameter. After its configuration, the parameters related to the calibration will be converted to this unit.

Choose the CAL_UNIT or engineering unit among the following options, for calibration purposes:

inH_2O @ 68 °F: 1148
InHg @ 0 °C: 1156
ft H_2O @ 68 °F: 1154
mmH_2O @ 68 °F: 1151
mmHg @ 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 @ 4°C: 1147
mmH_2O @ 4°C: 1150

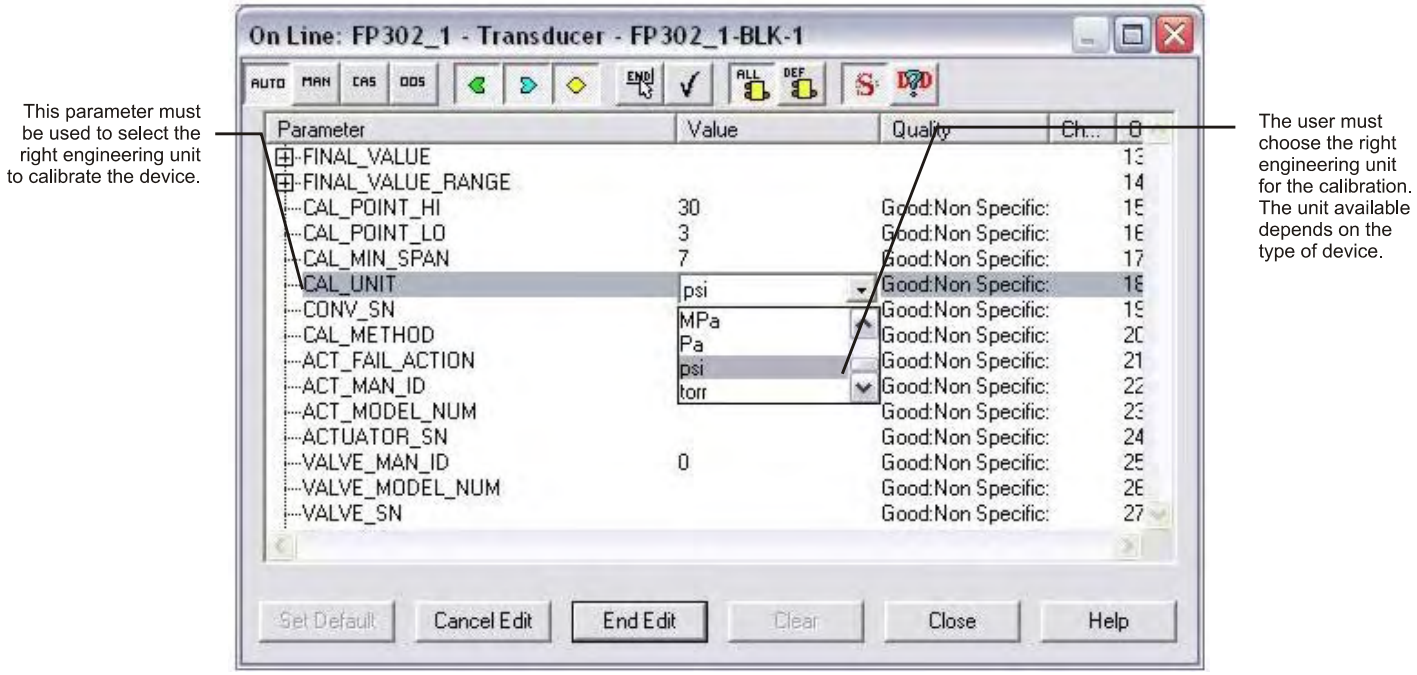


Figure 3.1 – How to choose the Calibration engineering unit

The lower value will be used as an example:

Write 3 psi or the lower value on the CAL_POINT_LO parameter. The trim procedure will initialize.

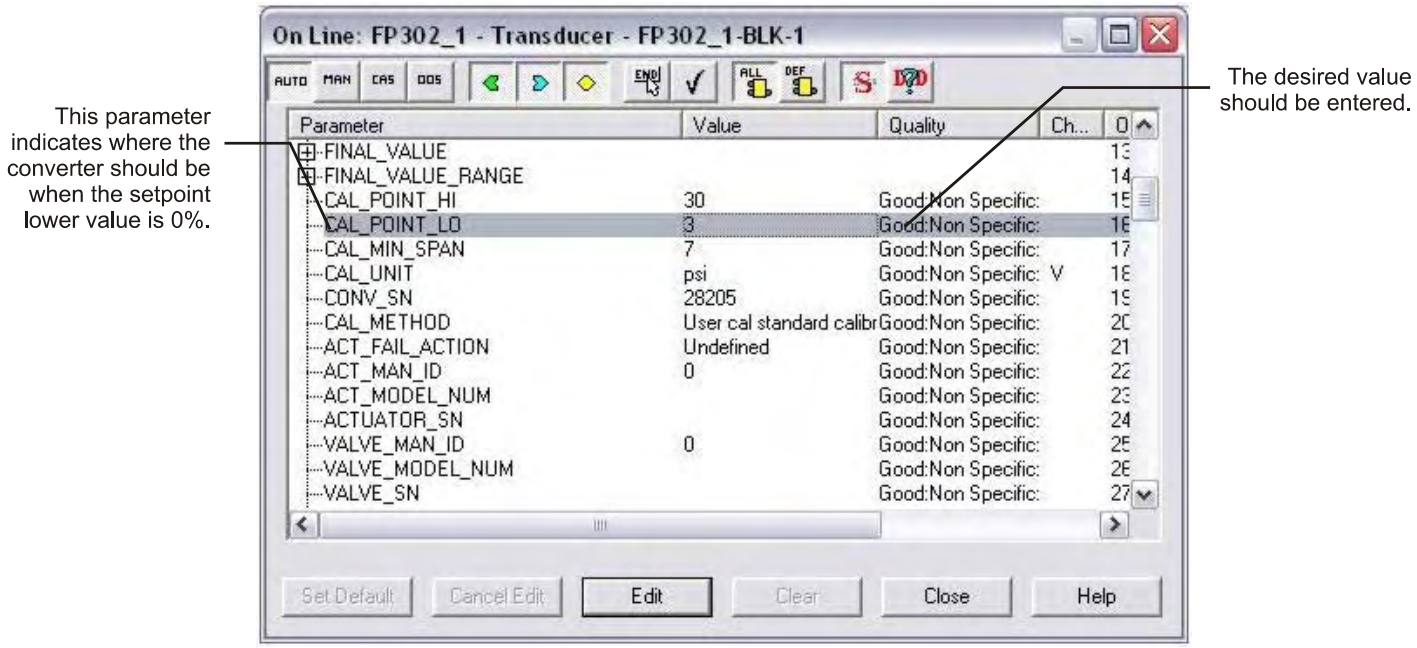


Figure 3.2 – Lower Point Calibration

Check the readout on the pressure meter and write the value on the FEEDBACK_CAL parameter. Keep writing until reading 3.0 psi or the lower value on the pressure meter.

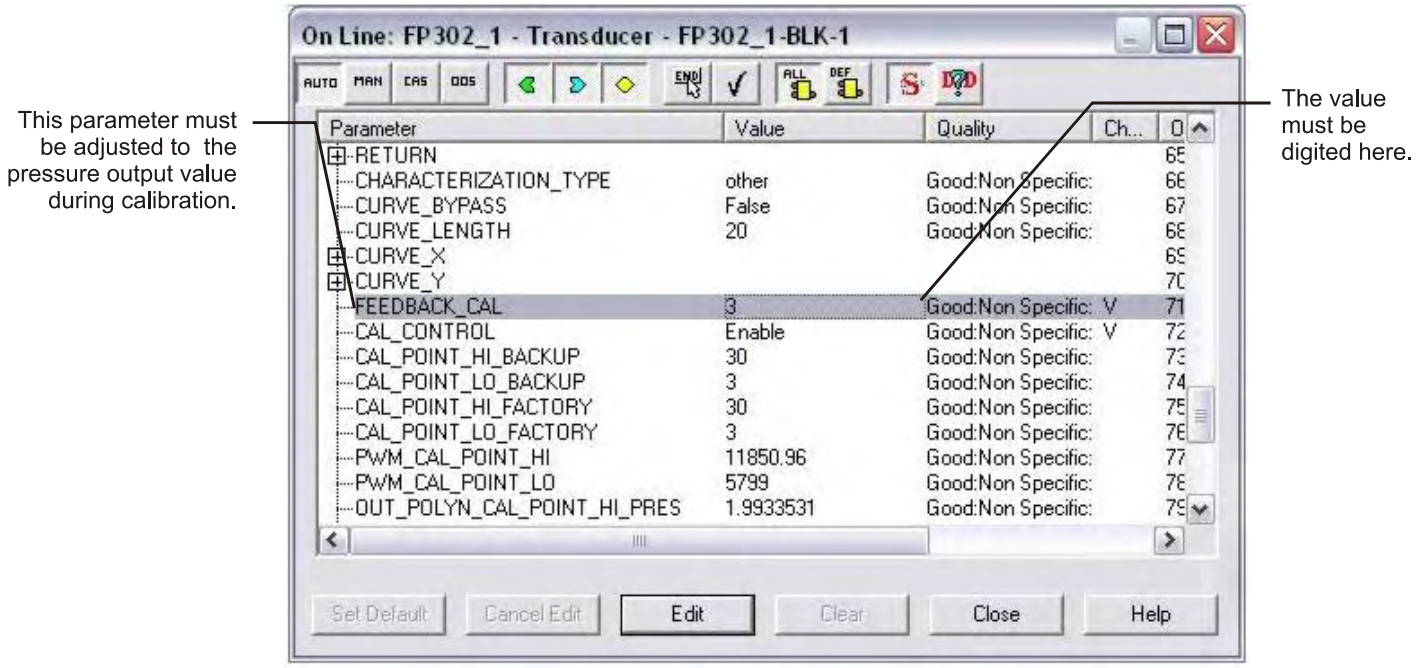


Figure 3.3 – Feedback Cal Point Low

To finish the TRIM procedure, choose the Disable option on the CAL_CONTROL parameter.

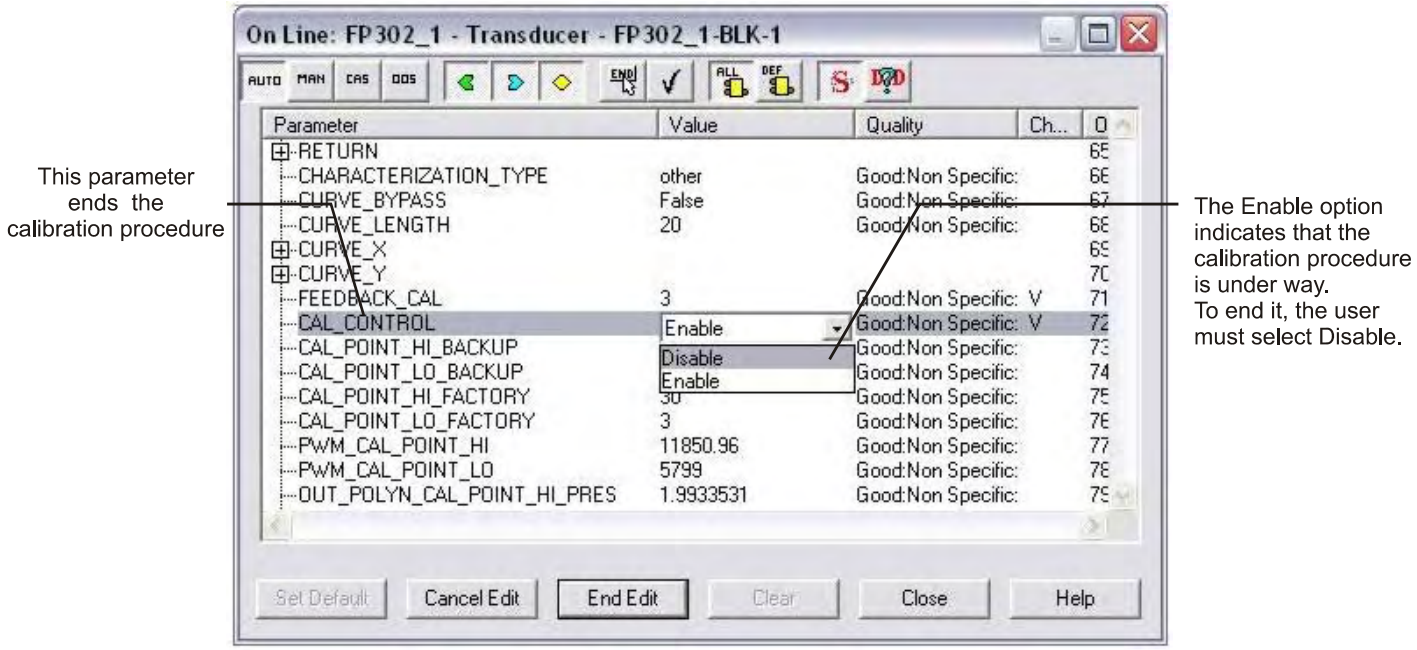


Figure 3.4 – How to finish the Calibration Procedure

Choose the upper value as 30.0 psi and write it on the TRD-CAL_POINT_HI parameter.

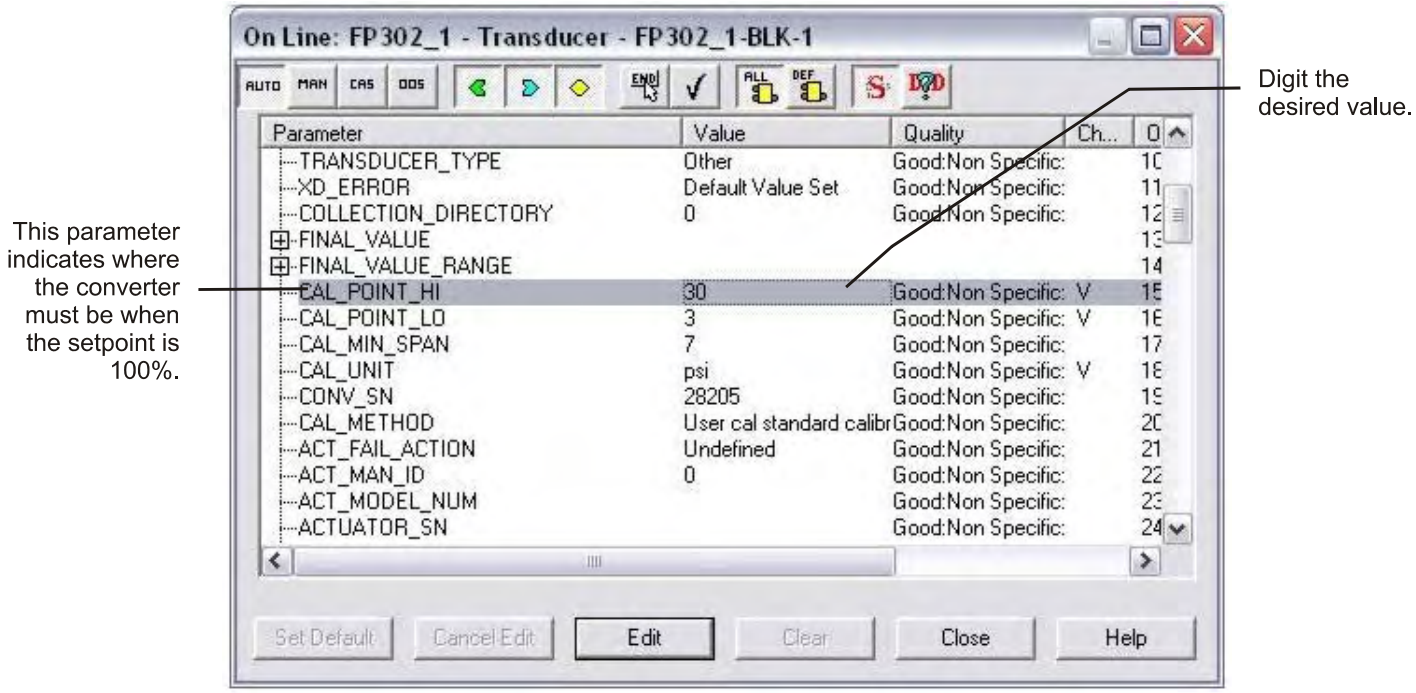


Figure 3.5 – How to calibrate the Upper Point

Note that by writing this parameter, the Trim procedure is initialized. Check the pressure through a reference pressure and write the value on the FEEDBACK_CAL parameter.
Write on this parameter the pressure obtained through the reference pressure until reading 30.0 psi.

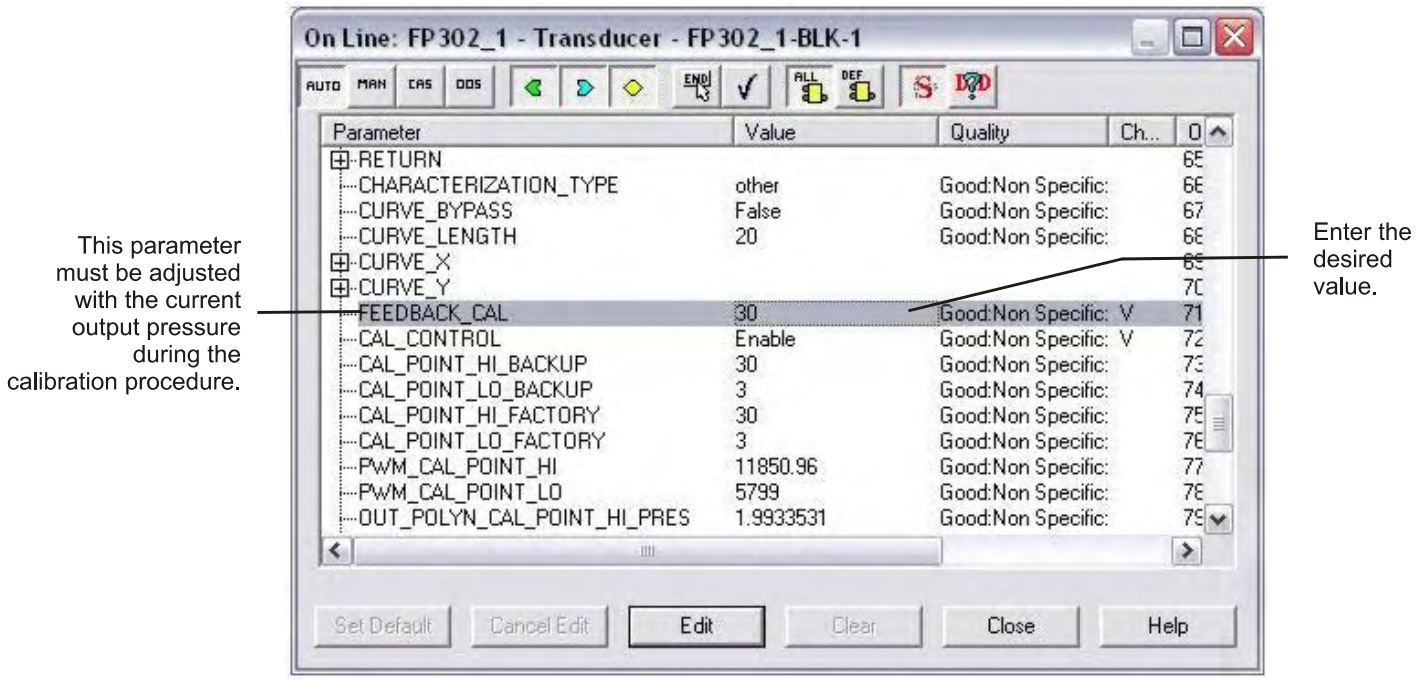


Figure 3.6 – Cal Pont High Feedback

To end the TRIM procedure, choose Disable on the CAL_CONTROL parameter.

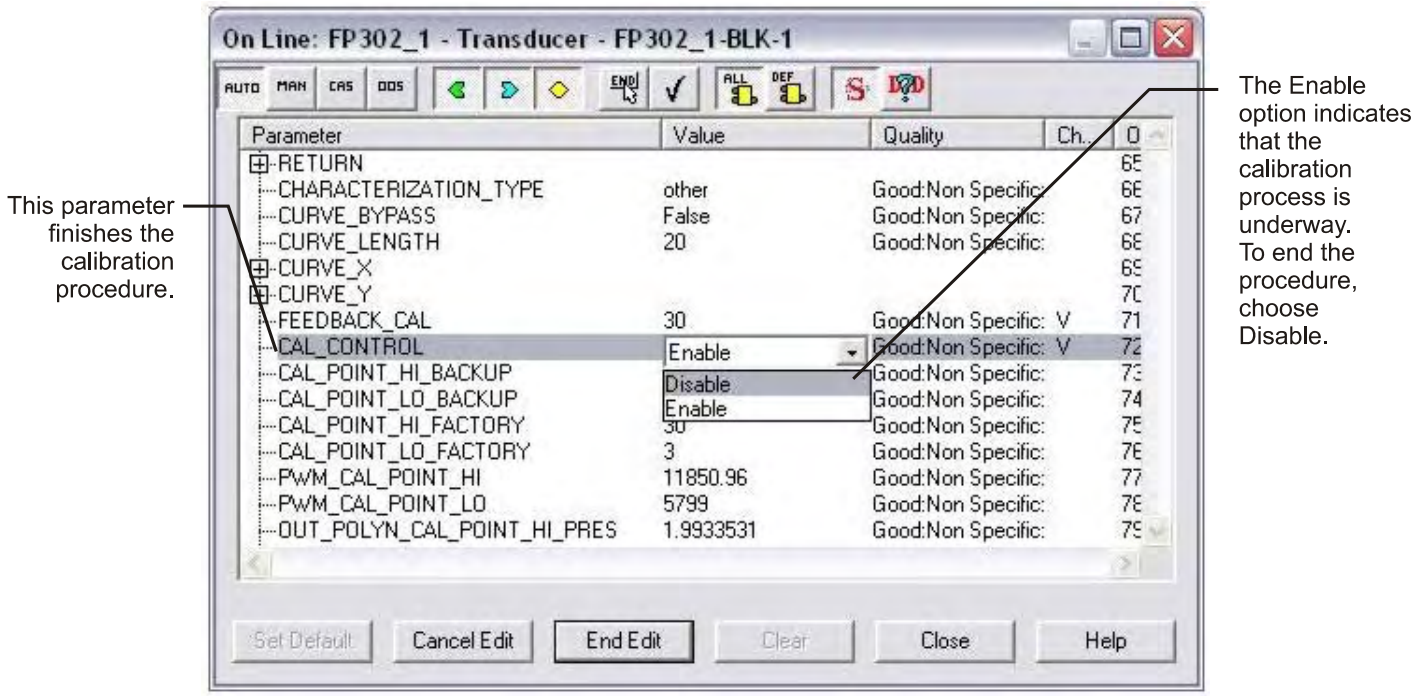


Figure 3.7 – Pressure Trim

Choose the unit to be used on the XD_SCALE parameter for the analog output block observing the sensor 100% and 0% limits.

Also, on every calibration save the trim data on the CAL_POINT_LO_BACKUP and CAL_POINT_HI_BACKUP parameters, through the BACKUP_RESTORE parameter, using the LAST_TRIM_BACKUP option.

Via Local Adjustment

To enter the local adjustment mode, insert the magnetic screwdriver in orifice “Z” until the “MD” readout appears in the display. Remove the magnetic tool and put it in orifice “S”. Remove and re-insert the magnetic tool in “S” until the “Loc Adj” message appears. The message will be displayed for 5 seconds after removing the tool. Insert the magnetic screwdriver in “Z” to access the local adjustment and the monitoring tree.

Move to the “LOWER” parameter. To start the calibration, activate the “LOWER” parameter by inserting a magnetic screwdriver in orifice “S”, and enter the value 3.0 psi or inferior. When removing the magnetic tool from “S”, the output will be adjusted with a value close to the desired one. The user must “sweep” the tree up to the FEEDBACK_CAL parameter and activate it by inserting the magnetic screwdriver in “S” to reach the reference pressure value.

Continue writing on this parameter until reading 3.0 psi or the lower pressure value.

Move to the “UPPER” parameter. To start the calibration actuate on this parameter by inserting the magnetic screwdriver in “S”.

It is possible to enter 30.0 psi or the wanted value wanted. When removing the magnetic screwdriver from “S”, the output will be adjusted with a value close to the desired one. The user must “sweep” the tree up to the FEEDBACK_CAL parameter and activate it by inserting the magnetic screwdriver in “S” to reach the value obtained from the reference pressure.

The user should continue writing on this parameter until reading 30.0 psi.

NOTE
Exiting the Trim mode via the local adjustment is automatically done, if the magnetic screwdriver is not used for approximately 16 seconds.

Limit Calibration Conditions:

Lower:
2.50 psi <NEW_LOWER< 5.0 psi. Differently, XD_ERROR = 22.

Upper:
12.0 psi <NEW_LOWER< 16.0 psi. Differently, XD_ERROR = 22

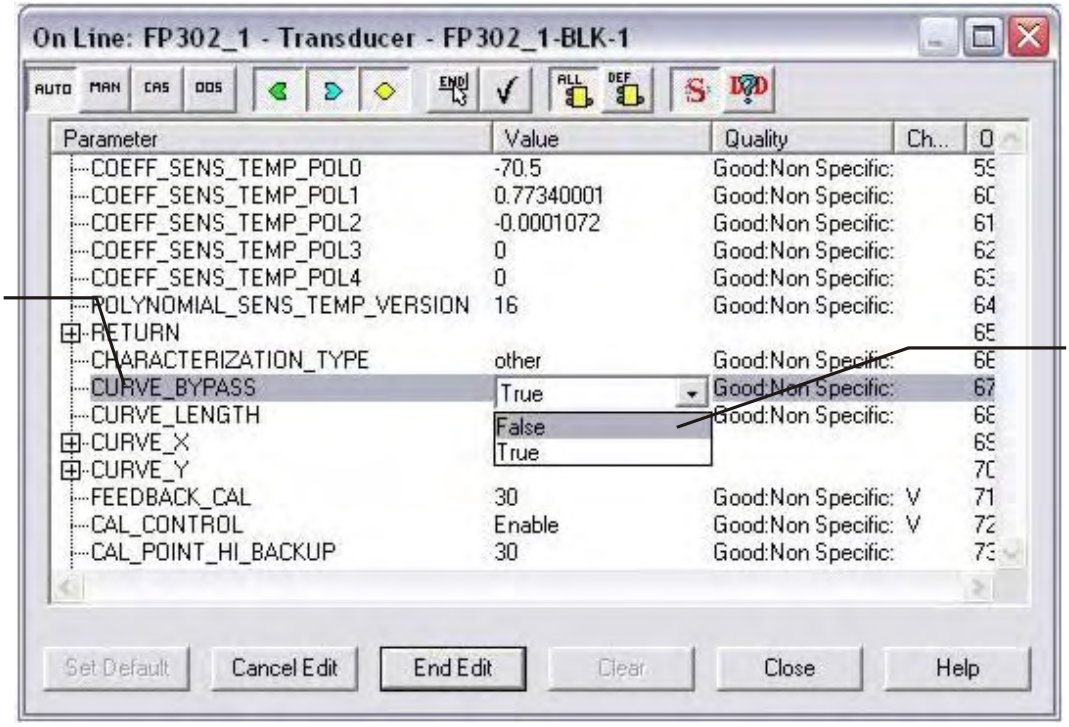
NOTE
XD_ERROR Codes: …16: Default Value …22: Out of Range …26: Invalid Calibration …27: Excessive Correction

Characterization Curve

The transducer block also has a characterization curve to provide the output with a given profile. This is useful if the FP302 is controlling a valve with a non-linear characteristic. The characterization curve, when used, is applied to the input signal and then is converted to analog current by the transducer.

The curve utilization is defined by the CURVE_BYPASS parameter. When CURVE_BYPASS is true (by pass), the curve is not used and the input value is transmitted directly to a current conversion routine. When CURVE_BYPASS is false (no by pass), the curve is used.

The user may select the best characterization curve for each valve type.



The False value indicates that the curve is enabled.

Figure 3.8 – How to Choose the Characterization Curve

The characterization curve has 20 points. Each point has two coordinates (X and Y) that define the X-Y spatial point and the 20 adjacent points forming a curve. The curve is formed by two adjacente points with a linear segment. Leaving the points out, the curve follows the last linear segment.

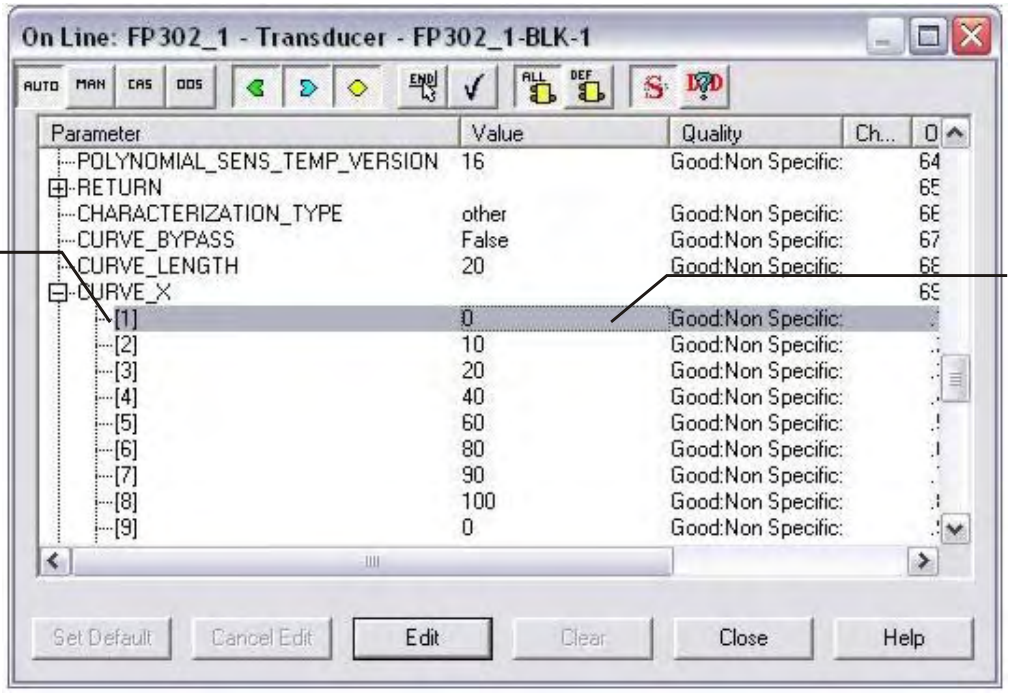


Figure 3.9 – How to Configure the Characterization Curve Table

These 20 points are numbered from 1 to 20, included in CURVE_X parameters (Inside the coordinates) and CURVE_Y (Outside the coordinates). The CURVE_X parameter requires growing order points. For instance, later points must be bigger than previous points, or the parameter will be rejected. The CURVE_Y parameter do not follow this rule and may originate a non-monotonic curve. When writing on CURVE parameters, locate the coordinates in the correct order.

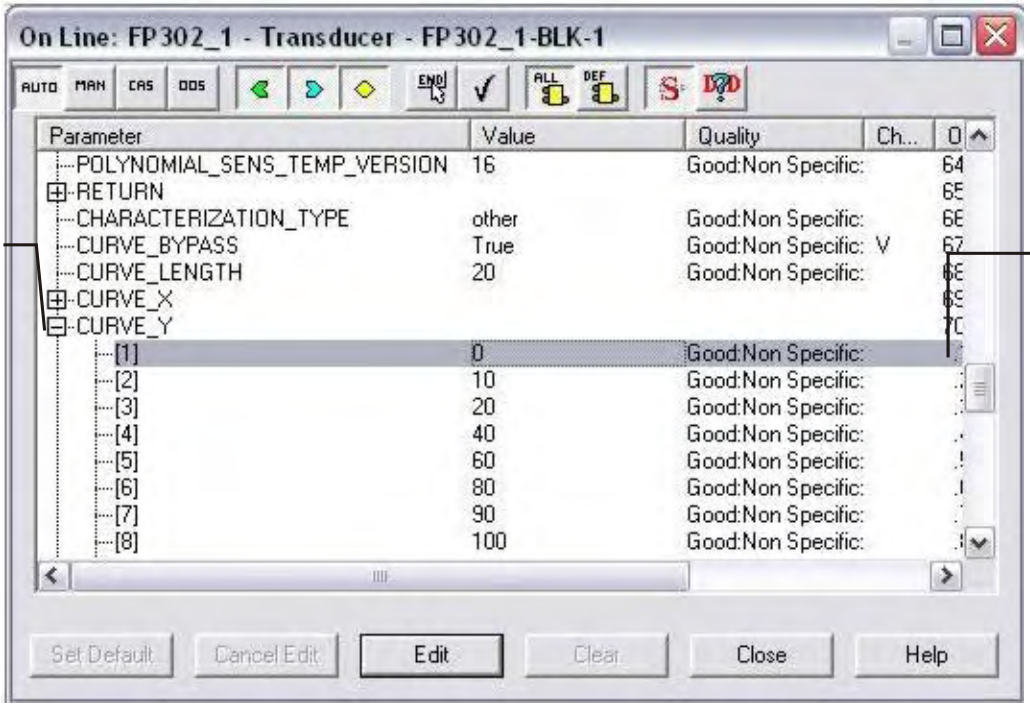


Figure 3.10 – How to Configure the Characterization Table

Temperature Calibration

The CAL_TEMPERATURE parameter may be used to adjust the temperature sensor located on the converter body to improve the temperature measuring accuracy. The temperature range covers from –40 °C to +85 °C. The SECONDARY_VALUE parameter shows value of this measurement.

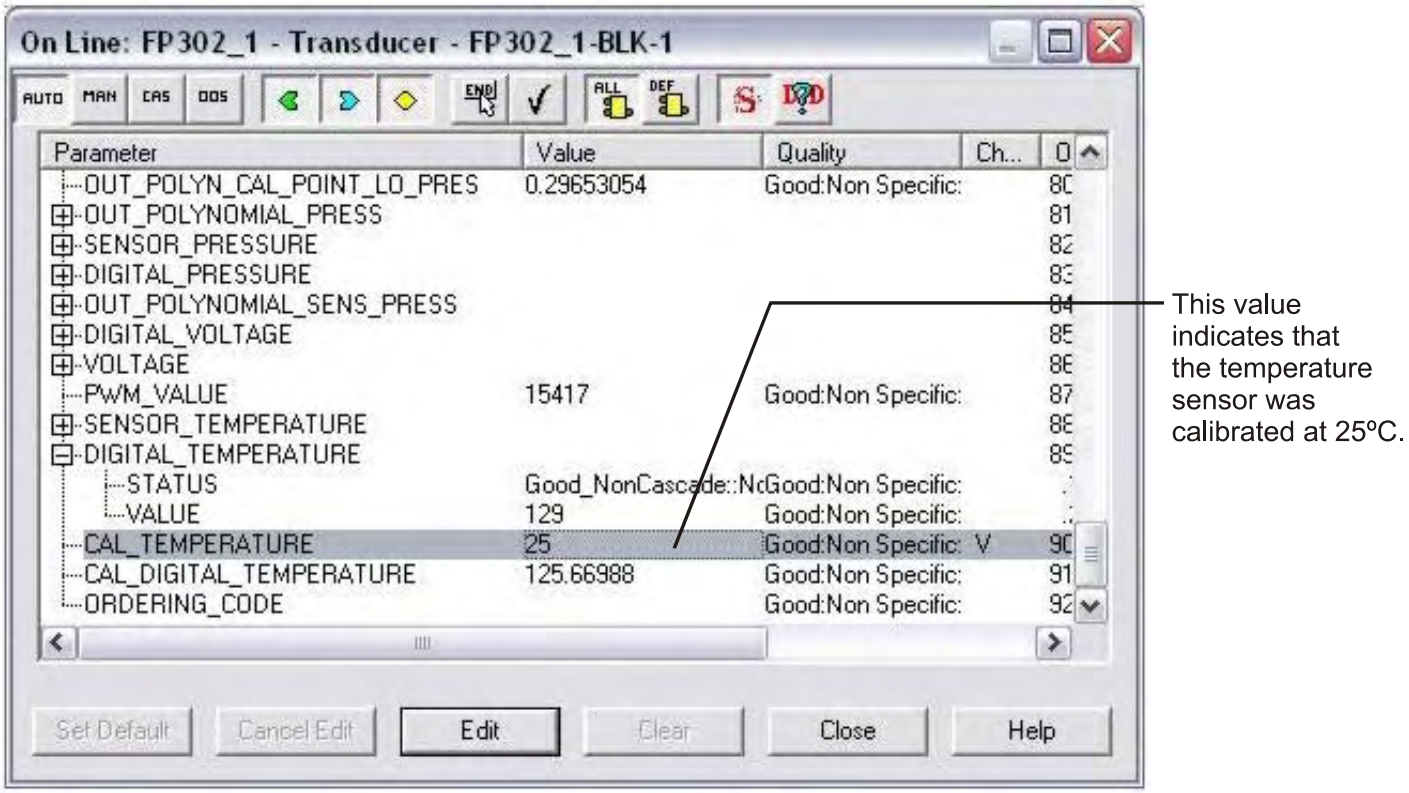


Figure 3.11 – How to Calibrate the Temperature Sensor

Display Transducer Block

The local adjustment tree is entirely configured by the Syscon. This means that the user can select the best option for his application. The Transducer block is factory-configured with options to adjust UPPER and LOWER Trim, to monitor the input transducer and to check the tag. Normally, the FP302 is better configured by the Syscon, but the LCD local functionality allows for easy and quick action on given parameters, since it does not depend on the network communication and connections. Among the possibilities of local adjustment, the following options are emphasized: mode block, outputs monitoring, tag visualization and adjustment of tuning parameters.

The user interface is described in the item on Programation using the local adjustment. It shows in detail the resources of the transducer display. All Smar series 302 field devices have the same operational methodology.Therefore, after using it at the first time, the user will be able to deal with all of them.

All function blocks defined by Foundation Fieldbus™ have a description of their characteristics written on binary files by the Device Description Language. This feature enables third party configurators under the Device Description Service to interpret them and make them ready for configuration. The serie 302 function blocks and transducers were strictly defined to comply with the Foundation Fieldbus™ specifications in order to be interoperable with other parts.

To enable the local adjustment using the magnetic screwdriver you must previously prepare the parameter related to the operation via the Syscon. Figures 3.8 and 3.9 show all parameters and their respective values to be configured according to the local adjustment with the magnetic tool. All figures shown on the display are default values.

There are seven groups of parameters to be pre-configured by the user so as to allow local adjustment configuration. Suppose you do not want to show some parameters; in this case write an invalid tag on the Block_Tag_Param_X parameter. Hence, the device will not recognize the indexed parameter as valid.

Definition of Parameters and Values

Block_Tag_Param
This is the tag of parameter block. Use up to a maximum of 32 characters.

Index_Relative
This index is related to the parameter to be actuated or visualized (0, 1, 2...). See the Function Blocks manual to know the indexes, or see them on the Syscon by opening the selected block.

Sub_Index
In order to visualize a given tag, choose the relative index equal to zero and the sub-index equal to one (see paragraph "Block Structure" on the function block manual).

Mnemonic
This is the figure to identify the parameter (a maximum of 16 characters on the display). Choose preferably a mnemonic with five characters, as it does need to be rotated on the display.

Inc Dec
This parameter is the increment and the decrement number in decimal unit when on Float or Float Status time, or integer, when the parameter is in all units.

Decimal_Point_Number
This is the number of digits after the decimal point (0 to 3 decimal digits).

Access
The access enables the user to read, when monitoring, and write, when the "action" option is selected, while the display show the increment and decrement arrows.

Alpha_Num
These parametersinclude two option: value and mnemonic. If the value option is selected, the data will be displayed on the numerical and alphanumerical fields; thus, if the data is greater than 10000, it appears on the alphanumeric fied. Case of mnemonic, the display shows the data on the numeric field and the mnemonic on the alphanumeric field.

To visualize a given Tag, choose the relative index equal to zero, and the sub-index equal to one (see the Block Structure paragraph on the Function Block manual).

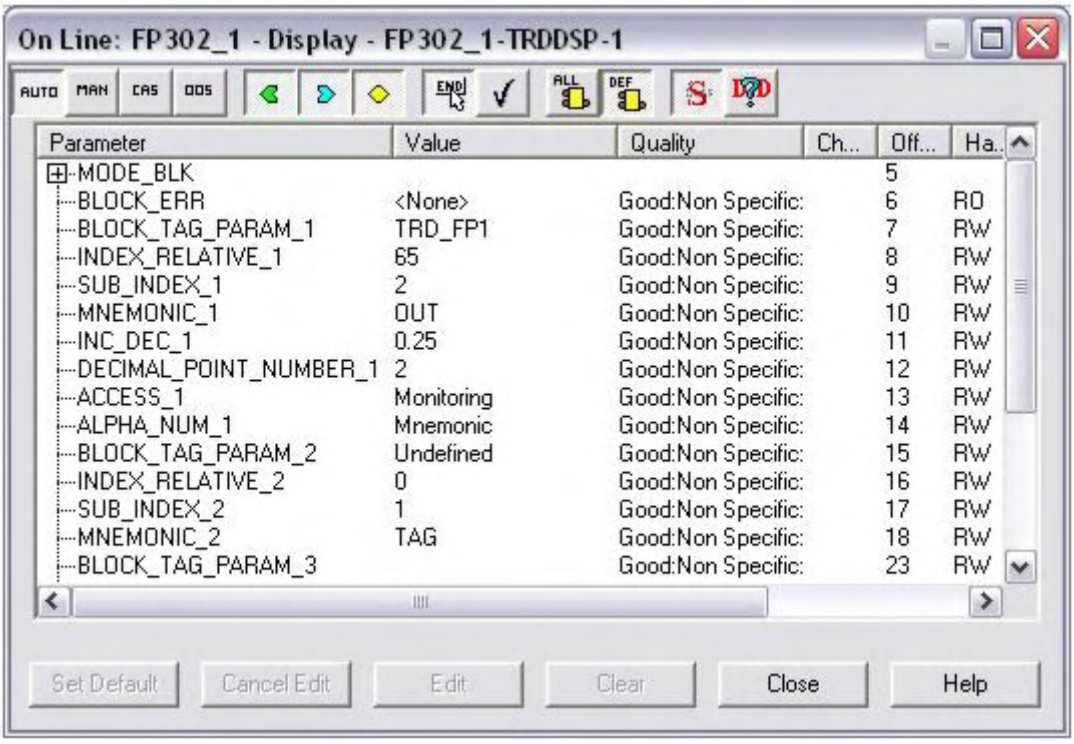


Figure 3.12 – Parameters for Local Adjustment Configuration

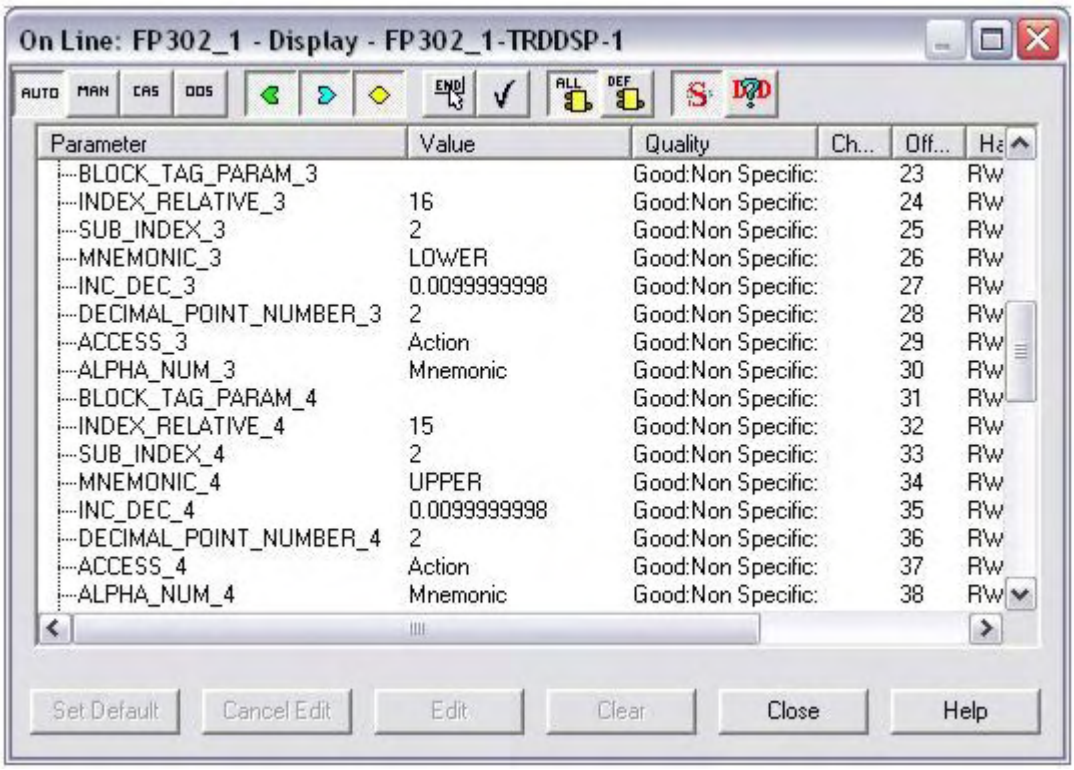


Figure 3.13 – Parameters for Local Adjustment Configuration

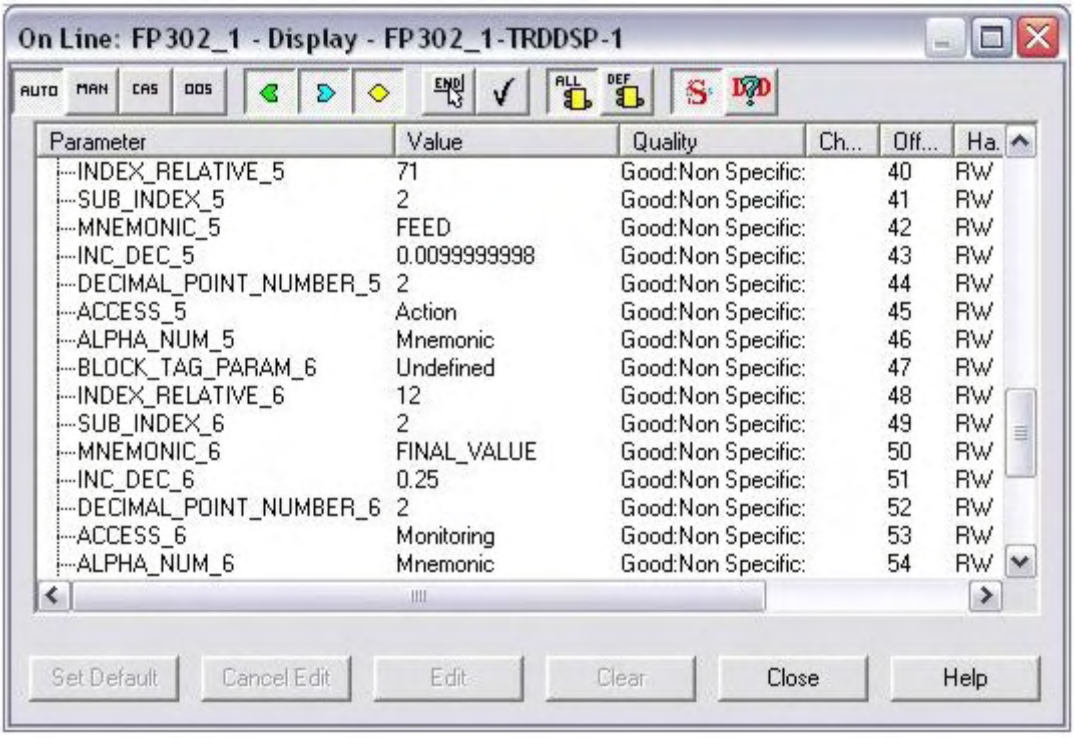


Figure 3.14 – Parameters for Local Adjustment Configuration

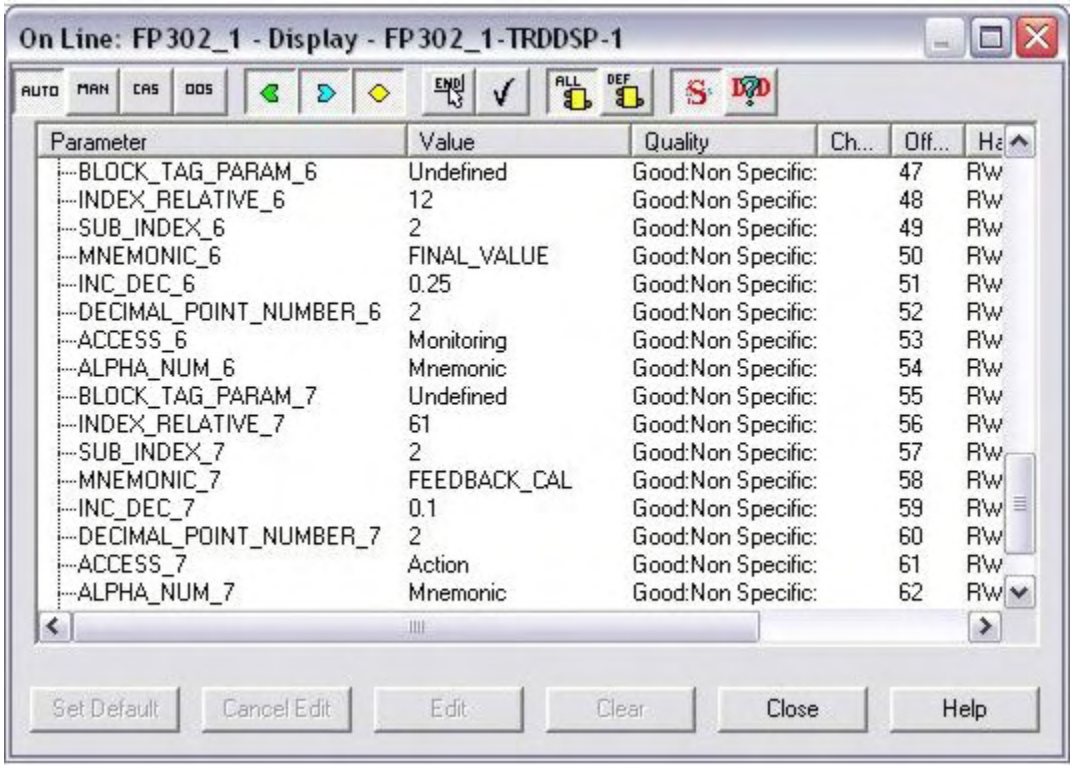
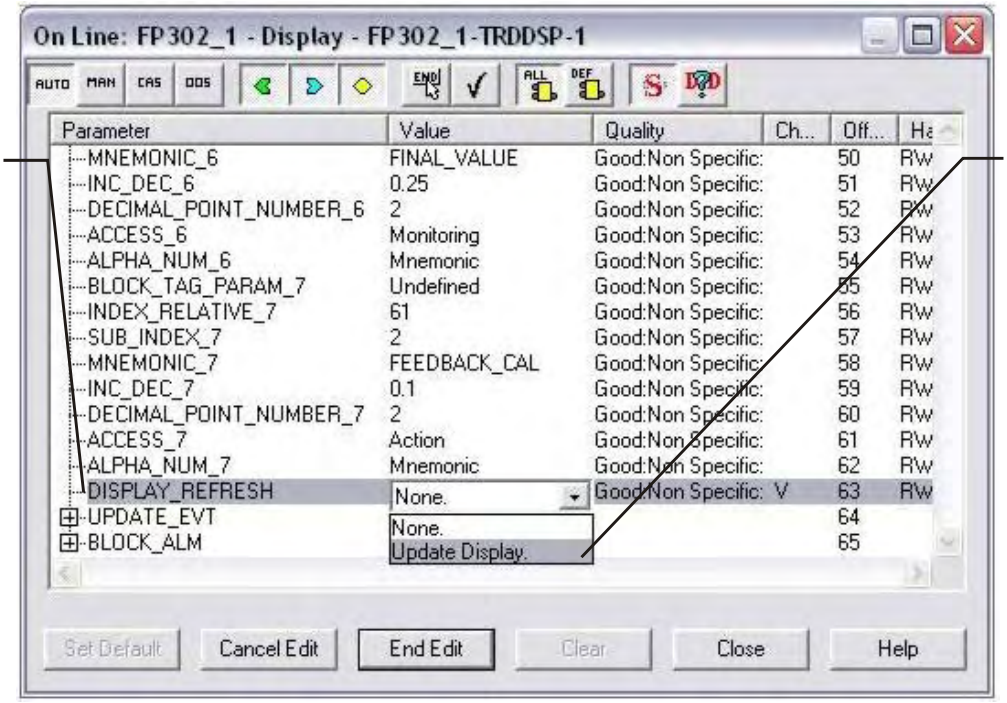


Figure 3.15 – Parameters for Local Adjustment Configuration

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



Select the Update option to update the programming tree of the Local Adjustment. Next, all selected parameters will be shown on the display.

Figure 3.16 – Parameters for Local Adjustment Configuration

Local Adjustment Programation

The converter electronic housing has two orifices to access the magnetic switches located under the identification plate. These switches are activated when inserting the magnetic screwdriver in the housing orifices.

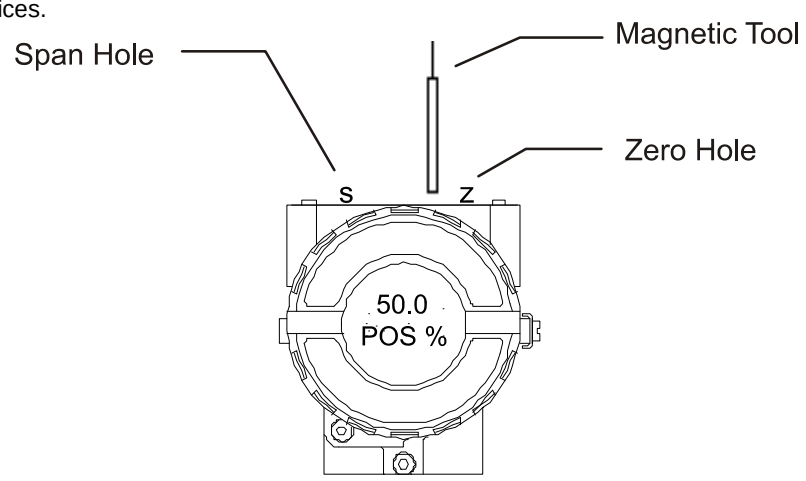
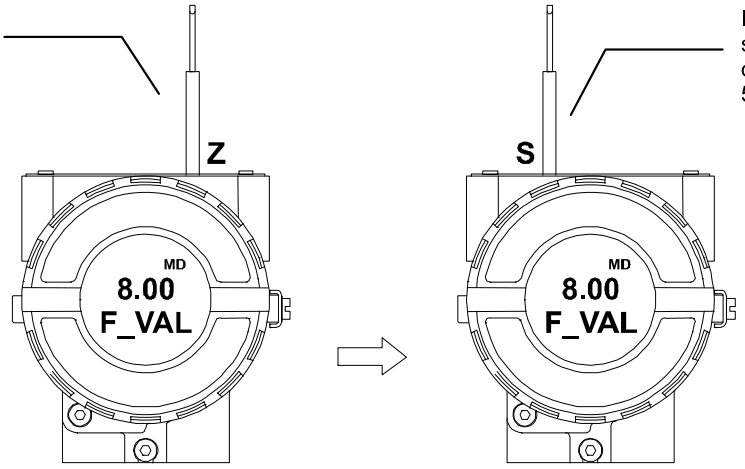


Figure 3.17 - Local Adjustment Tools

The magnetic screwdriver ajusts the most important block parameters. It also enables pré-configuring the communication.

The **J1** Jumper located on the top of the main board must be inserted in the proper place and the converter must have a digital display for local adjustment. Whithout the display, the local adjustment will not be done.

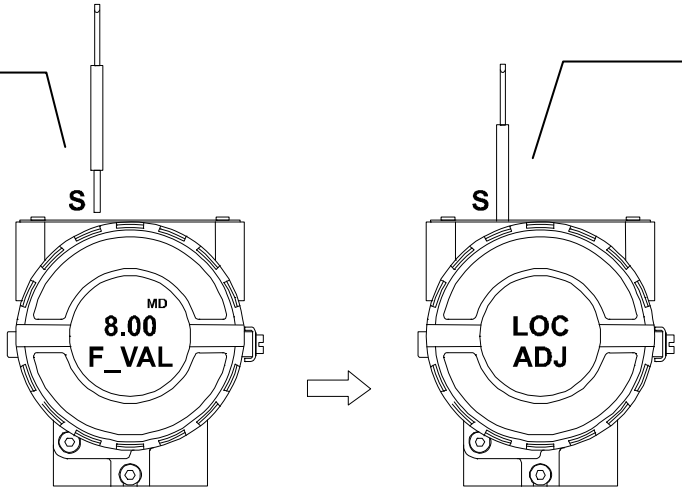
To start the local adjustment, insert the magnetic screwdriver in the orifice **Z** and wait for the letter MD to be displayed.



Insert the magnetic screwdriver in the orifice **S** and wait 5 seconds.

Figure 3.18 – Step 1

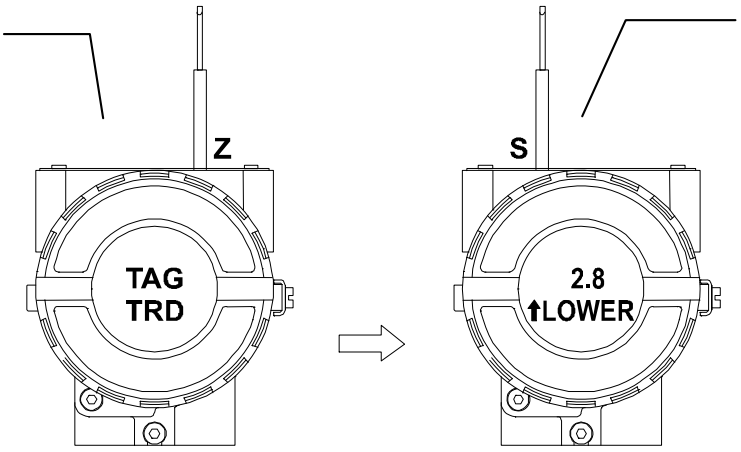
Remove the magnetic screwdriver from orifice **S**.



Insert the magnetic screwdriver in the orifice **S** one more time.

Figure 3.19 – Step 2

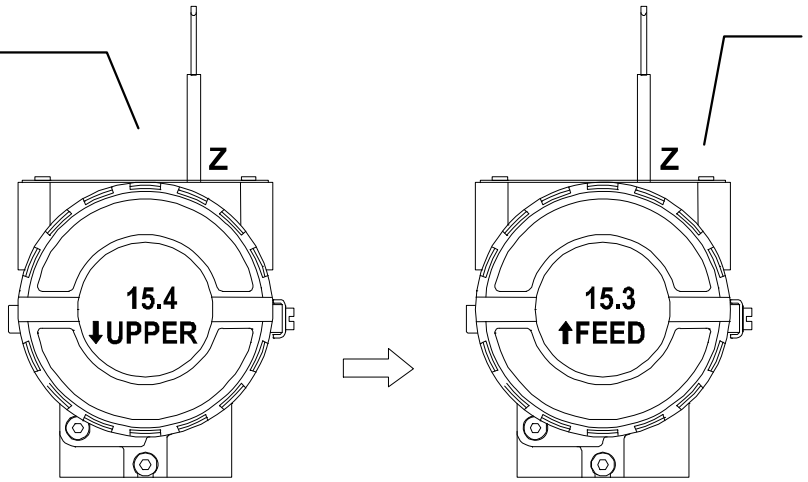
Insert the magnetic screwdriver in the orifice **Z**. As for the first configuration, the option displayed will be the TAG with its mnemonic configured by the Syscon. If not, the option displayed on the LCD will be the previous one. Keep the tool in the orifice to rotate the local adjustment menu.



This parameter is used to calibrate the lower pressure point. To calibrate the lower value, insert the magnetic screwdriver in the orifice S, when reading “lower” on the display. An arrow pointing upwards (↑) will increment the value, and an arrow pointing downwards (↓) will decrement the value. Write 3 psi for the lower parameter, for example. Connect a pressure gauge on the FP302 and read the value of the measured pressure. Go to the FEED parameter and correct the wanted pressure.

Figure 3.20 – Step 3

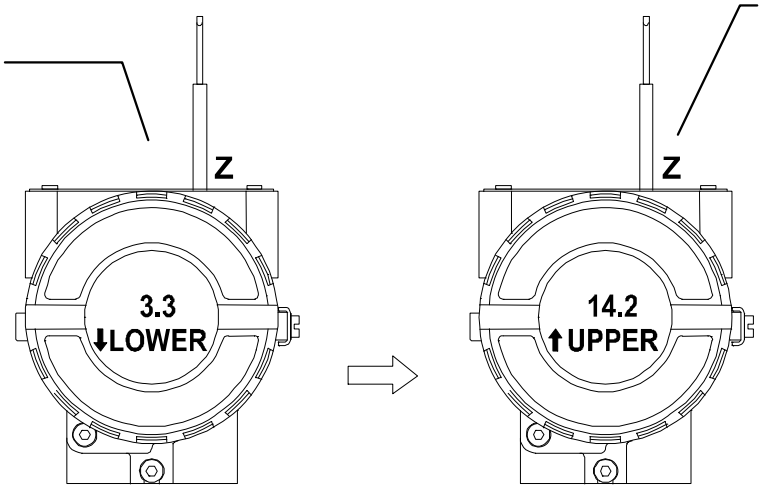
In order to decrement the lower value, place the magnetic tool in **Z** orifice to shift the arrow to the downward position and then, by inserting and keeping the tool in **S** orifice, it is possible to decrement the lower value.



Option **FEED** allows the user to correct the pressure calibration. In order to implement the correction, read the measured pressure on the gage and enter with this value. This option makes it possible to correct lower and upper pressure calibration points. An arrow pointing upward increments the current.

Figure 3.21- Step 4

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



Use this parameter to calibrate the upper current point. Insert the magnetic screwdriver in the "**S**" orifice until read "upper" on the display. The up arrow increases the value. The down arrow decreases the value. Write 15 psi, for instance, as upper value. Check the FP302 pressure with a pressure gauge. Go to the **FEED** parameter and correct this value with the desired pressure.

Figure 3.22 – Step 5

Insert the magnetic screwdriver into the "**S**" orifice to change to revert down the arrow and to decrease the calibration pressure as per the measured value at the pressure gauge. An up arrow will decrease the value.

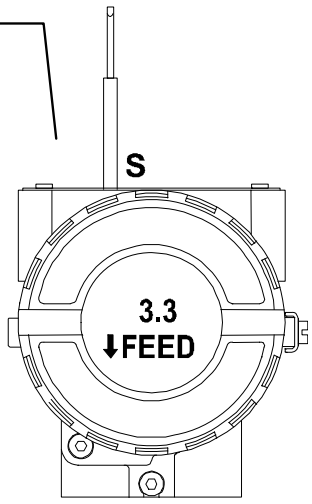


Figure 3.23 – Step 6

NOTE
This local adjustment configuration is just a suggestion. The user can choose the configuration type via Syscon, configuring the Display block (refer to the Display Transducer Block paragraph.

Block Type Availability and Initial Block Set

The table below shows how powerful and flexible the Smar devices are. For example, the user may instantiate up to 20 blocks selected from 17 block types (algorithms) in a field device as LD302. Indeed it means that almost all control strategy may be implemented using only the Smar field devices.

Read carefully the notes in order to fully understand the information in this table.

Block Class	Block Type	FP302
Resource	RS (1)	1
Transducer Blocks	DIAG (1)	1
	DSP (1)	1
Control and Calculation Function Blocks	PID	1
	EPID	0
	APID	0
	ARTH	1
	SPLT	0
	CHAR	1
	INTG	0
	AALM	1
	ISEL	1
	SPG	0
	TIME	0
	LLAG	0
	OSDL	0
	CT	0
Output Function Blocks	AO(*)	1
Output Transducer Blocks	TRD-FP (1)	1

Note 1 – The column “Block type” indicates which block type is available for each type of device.
Note 2 – The number associated to the block type and the device type is the number of instantiated blocks during the factory initialization.
Note 4 – Field devices and FB700 have a capability of 20 blocks, including resource, transducers and function blocks.
Note 6 – The column Block type shows the mnemonics, if it is followed by a number between Parentheses, it indicates the maximum number of block instances. If it is followed by “*”, it indicates the maximum number depends on the device type.

Section 4

MAINTENANCE PROCEDURE

General

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

The Fieldbus **FP302** pressure converters are intensely tested and inspected before reaching the user. However, they were designed for the possibility to be repaired by the user if necessary.

In general, the user is recommended not to repair the printed circuit boards. Instead, he should keep extra repair parts or acquire them from Smar.

DIAGNOSTICS	
SYMPTOM	**PROBABLE CAUSE**
WITHOUT QUIESCENT CURRENT	**Fieldbus Converter Connections** Check the wiring polarity, ground and wiring integrity **Power Source** Check the power source output. The voltage at the FP302 terminals must be between 9 and 32 Vdc. **Electronic Circuit Failure** Check the boards for defects and replace them with spare ones.
NO RESPONSE	**Network Connection** Check the network connections: equipment, power source and terminals. **Network Impedance** Check the network power source and terminators impedance. **Converter Configuration** Check the communication parameters configuration. **Network Configuration** Check the network communication configuration. **Electronic Circuit Failure** Try to replace the converter circuit with spare parts.
INCORRECT PRESSURE OUTPUT	**Output Terminal Connections** Check for possible pressure leaks. **Pressure Supply** Check the air supply. The FP302 input pressure must be between 18 and 100 psi. **Calibration** Check the converter calibration. Use the FYCAL. **Blocked restriction or vent** Use the procedures on the following section about Cleaning the Restriction and the vents

If the current problem is not described on the above table, follow the instructions below.

NOTE
The “Factory Init” must be performed as the last option to recover the control of the equipment when presenting any problem related to functional blocks or the communication. This operation should only be carried out by authorized personnel and with the process disconnected, since the equipment will be configured with factory default data. This procedure erases all the configurations applied on the equipment; after this procedure, it will be necessary to partially download the user configuration via SYSCON. Two magnetic tools are used for this operation. On the equipment, remove the screw that fixes the ID tag on the top of the housing to reach the holes marked with the letters “S” and “Z”. The operations to be performed are: 1) Turn off the equipment, insert the tools in the magnetic part of holes; 2) Power the equipment; 3) When the display shows “Factory Init”, remove the tools; a “S” symbol will appear on the display upper right corner; when it turns off, the equipment reaches indicating the end of the operation. This procedure will recover the entire factory default configuration and eliminate possible problems occurred with the converter communication.

Disassembly Procedure

Refer to the exploded view. Turn off the power and cut the supply air before dismounting the converter.

Transducer

To remove the electronic housing transducer, disconnect the electric connections and the main board connector on the Field Terminals side.

Loosen the housing locking screw (7) and carefully release the transducer from the electronic housing, without twisting the flat cable.

ATTENTION
Do not rotate the electronic housing more than 270” without disconnecting the electronic circuit from the power source.

Figure 4.1 – Transducer Rotation

Electronic Circuit

To remove the circuit (5) and the display (4) boards, first loosen the locking screw from the cover (6) on the side opposite to the “Field terminal”, and release the cover (1).

ATTENTION
The boards have CMOS components that could be damaged by electrostatic discharges. Observe the correct procedure to handle the CMOS components. Also store the circuit boards in electrostatic-proof bags.

Restriction Cleaning Procedures

The instrumentation air is applied to the converter through a restriction. Check periodically the restriction and remove all impurities to ensure the converter high performance.

1. Turn off the converter and remove the air pressure.

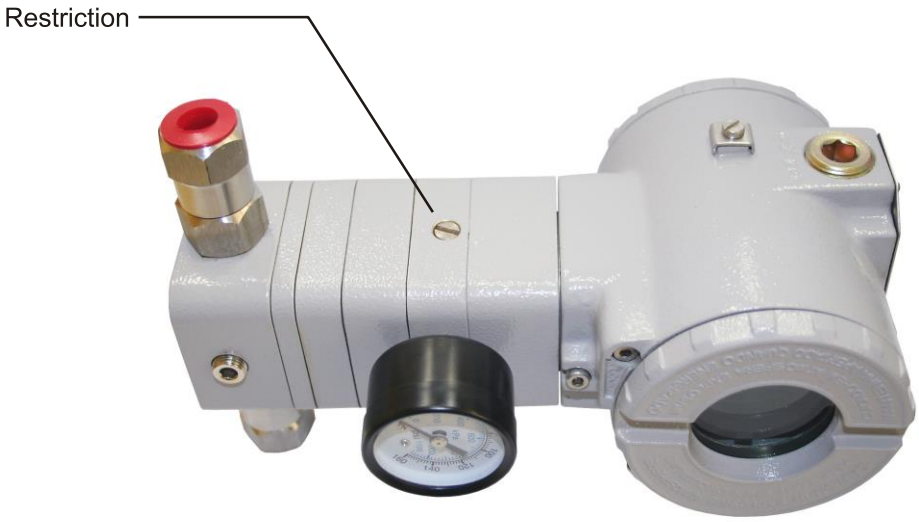


Figure 4.2 – Location of the Restriction on the converter

1. Remove the restriction screw with a screwdriver.

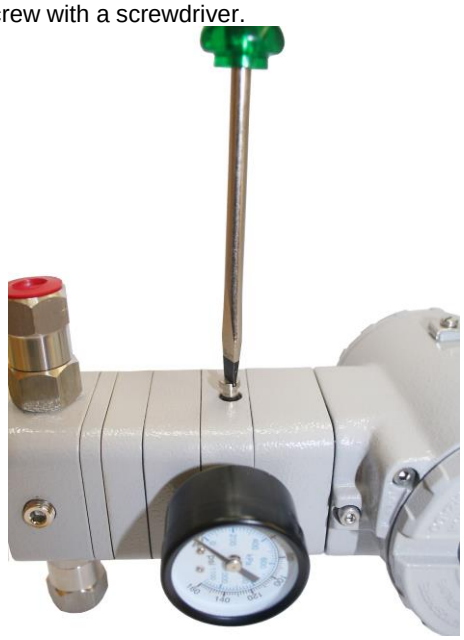


Figure 4.3 – Removing the restriction from the converter

3. Remove carefully the o-rings;

4. Dip the part in oil thinner and dry it with compressed air directly in the smaller hole so that the outlet is on the larger hole.

5. Insert the PNE 400-0726 cleaning tool in the smaller hole to clean and avoid obstructions.

Figure 4.4 – Restriction and cleaning needle

Figure 4.5 – Cleaning Procedure Scheme

6. Reassemble the O-rings and screw the restriction on the converter.
7. The equipment pressurized again.

Assembly Procedure

Transducer

Assemble the transducer on the housing by rotating it clockwise until it stops. Then rotate it anticlockwise until setting the housing front with the transducer front. Tighten the transducer locking screw (7) to lock the housing cover.

Exhausting outputs

The pressure is released into the atmosphere through a vent located on the oposite side of the transducer identification plate. Any interference or blocking the vents will compromise the equipment performance. Clean the vents by spraying proper solvents.

Filtering Elements Replacement

The replacement of the converter filters must be carried out within a minimum of 1 (one) year (see exploded view scheme – position 34). A periodical cleaning is recommended at each 6 (six) months. The converter air supply must be clean, dry and non-corrosive, compliant with "Quality Standard for Instrument Air" - (ANSI / ISA S7.0.01 – 1996).

If the air pressure is not in adequate conditions, the user must consider replacing the filtering element more frequently.

Electronic Circuit

Attach the transducer connector and the power source connector to the main board. Attach the display (4) to the main board (5). Verify the four viable mounting positions. The arrow indicates the upward position.

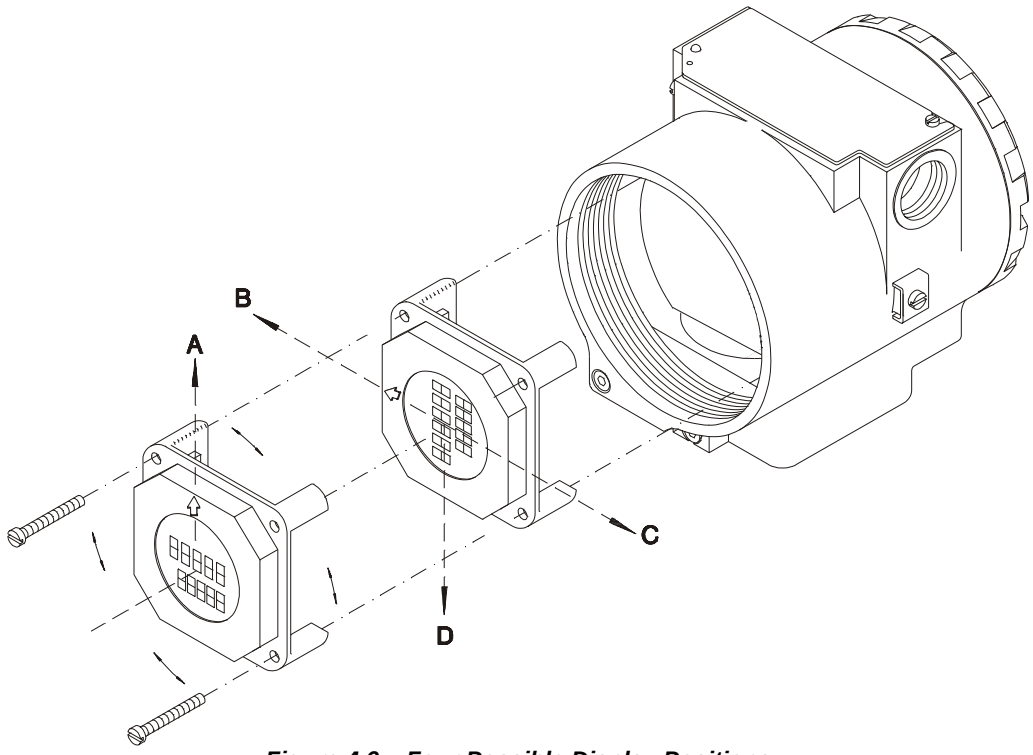


Figure 4.6 – Four Possible Display Positions

Screw the display on the main board (3).

Then tighten the display cover (1) to complete the assembly procedure. The converter is ready for mounting and testing.

Electric Connections

A plug must be installed on the non-used electric connection to avoid humidity. The plug must comply with the equipment area.

Interchangeability

The main board can be replaced by a similar one for the converter to work normally. There is an EEPROM on the transducer that stores the trim value, hence avoiding the need for a re-calibration.

Packaging Contents

Check the packaging content. The supplied quantity marked with a (*)comply with the number of converters.

- Fieldbus Converter
- Mounting Bracket
- Magnetic tools for local configuration (*)
- Restriction Cleaning Needle (*)
- Instructions Manual (*)
- CD with Smar device library.

Exploded View

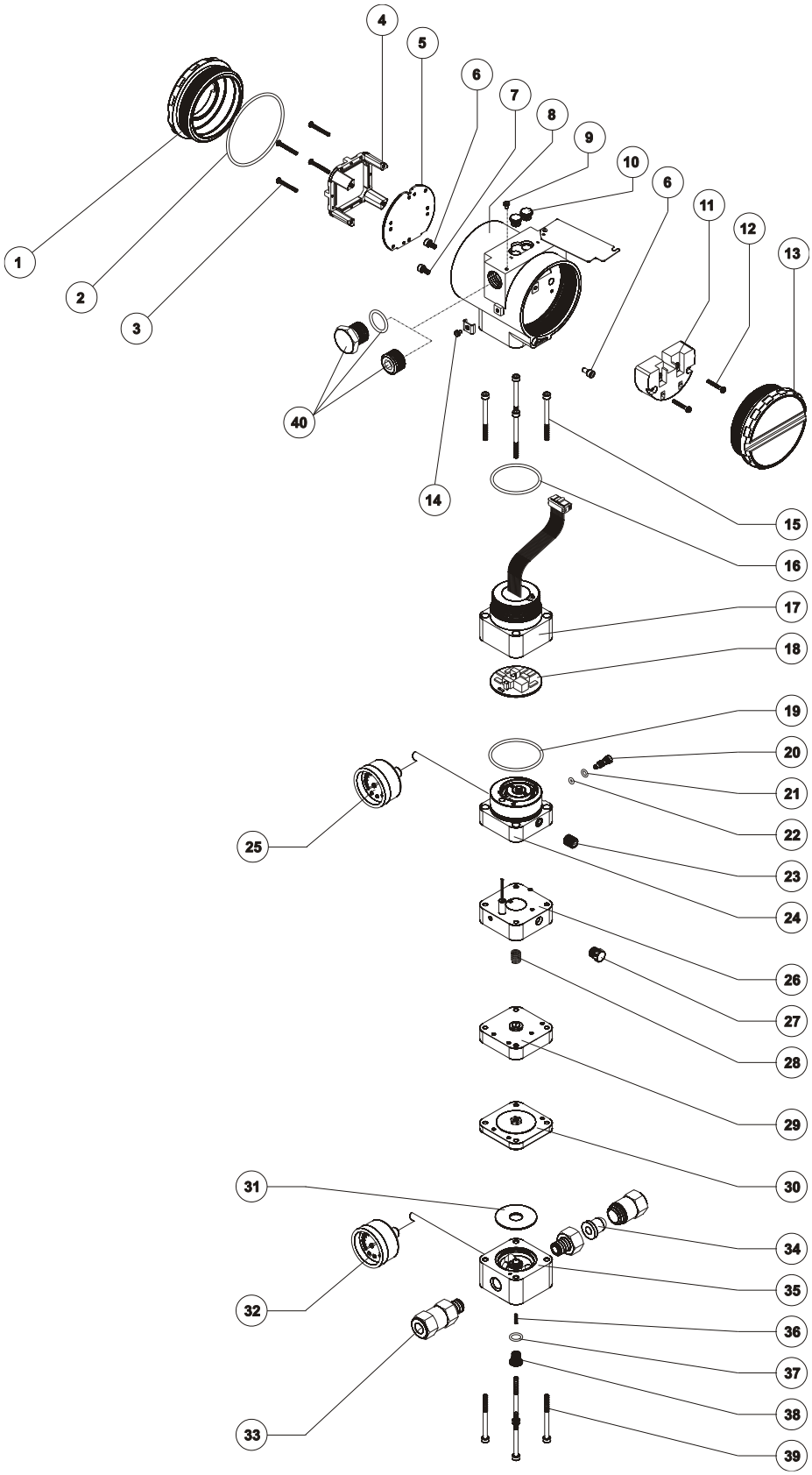


Figure 4.7 – Exploded View

Accessories and Related Products

ACCESSORIES AND RELATED PRODUCTS	
ORDERING CODE	**DESCRIPTION**
SD1	Magnetic Tool for Local Adjustment
SYSCON	System Configurator
PS302/DF52	Power Supply
BT302	Terminator
PCI	Process Control Interface
PSI302/DF53	Power Supply Impedance
400-0726	Restriction Cleaning needle
FYCAL	Calibration Device for Pressure Transducer

Spare Parts List

SPARE PARTS LIST			
PARTS DESCRIPTION	**POSITION**	**CODE**	**CATEGORY (NOTE 4)**
HOUSING - Aluminum **(NOTE 1)**			
- 1/2 - 14 NPT	8	304-0190	-
- M20 x 1.5	8	304-0191	-
- PG 13.5 DIN	8	304-0192	-
HOUSING - 316 Stainless Steel **(NOTE 1)**			
- 1/2 - 14 NPT	8	304-0193	-
- M20 x 1.5	8	304-0194	-
- PG 13.5 DIN	8	304-0195	-
Cover without display (included O-ring)			
- Aluminum	1 e 13	204-0102	-
- 316 Stainless Steel	1 e 13	204-0105	-
Cover with Display (O-ring included)			
- Aluminum	1	204-0103	-
- 316 Stainless Steel	1	204-0106	-
COVER LOCKING BOLT	6	204-0120	-
SENSOR LOCKING BOLT			
- M6 Without Head Screw	7	400-1121	-
EXTERNAL GROUND BOLT	14	204-0124	-
IDENTIFICATION PLATE FIXING BOLT	9	204-0116	-
LOCAL ADJUSTMENT PROTECTION COVER	10	204-0114	-
DIGITAL INDICATOR	4	214-0108	A
TERMINAL INSULATOR	11	400-0059	A
GLL 1007 MAIN BOARD	5	400-0582	A
O-RINGS COVER **(NOTE 2)**			
- Buna-N	2	204-0122	B
TERMINAL HOLDING BOLT HOUSING			
- Housing in 316 Aluminum	12	304-0119	B
- Housing in 316 Stainless Steel	12	204-0119	B
MAIN BOARD BOLT HOUSING IN ALUMINUM			
- Units with indicator	3	304-0118	B
- Units without indicator	3	304-0117	B
MAIN BOARD BOLT HOUSING IN 316 STAINLESS STEEL			
- Units with indicator	3	204-0118	B
- Units without indicator	3	204-0117	B
CONNECTION COVER - ALUMINUM	15,16,17,18	400-1090	A
CONNECTION COVER - 316 STAINLESS STEEL	15,16,17,18	400-1091	A
- Connection Cover Bolt	15	400-1092	-
- Buna-N Neck O-ring **(NOTE 2)**	16	204-0113	B
- Assembled Connection Cover - Aluminum	17	400-0074	-
- Assembled Connection Cover - 316 Stainless Steel	17	400-0391	-
- GLL 1143 Analog Board	18	400-1093	-

SPARE PARTS LIST			
PARTS DESCRIPTION	**POSITION**	**CODE**	**CATEGORY (NOTE 4)**
PIEZO BASE SET – ALUMINUM	19,20,21,22,23,24,25	400-0645	A
PIEZO BASE SET – 316 STAINLESS STEEL	19,20,21,22,23,24,25	400-0646	A
- Base and Block O-ring	19	400-0085	B
- Restriction	20	344-0165	B
- Restriction External O-ring **(NOTE 2)**	21	344-0155	B
- Restriction Internal O-ring **(NOTE 2)**	22	344-0150	B
- Syntherized Bushing	23	400-0033	B
- Assembled Base – Aluminum	24	400-0075	A
- Assembled Base – 316 Stainless Steel	24	400-0392	A
- Analog indicator (Gage – Carbon Steel)	25	209-0400	B
- Analog indicator (Gage - 316 Stainless Steel)	25	400-0395	B
SENSOR BLOCK SET - ALUMINUM	26,27,28	400-1094	-
SENSOR BLOCK SET - 316 STAINLESS STEEL	26,27,28	400-1095	-
- Aluminum Set Sensor Block	26	400-1096	-
- 316 Stainless Steel Set Sensor Block	26	400-1097	-
- Vent Plug - 304 Stainless Steel	27	400-0654	-
- Sensor Spring	28	400-1098	-
ASSEMBLED UPPER DIAPHRAGM – ALUMINUM	29	400-1099	-
ASSEMBLED UPPER DIAPHRAGM – 316 STAINLESS STEEL	29	400-1100	-
ASSEMBLED LOWER DIAPHRAGM – ALUMINUM	30	400-1101	-
ASSEMBLED LOWER DIAPHRAGM – 316 STAINLESS STEEL	30	400-1102	-
BOOSTER HOUSING SET - ALUMINUM	31,32,33,34,35,36,37,38,39	400-1103	-
BOOSTER HOUSING SET - 316 STAINLESS STEEL	31,32,33,34,35,36,37,38,39	400-1104	-
-O-ring Restriction - Aluminum	31	400-1105	-
-O-ring Restriction - 316 Stainless Steel	31	400-1106	-
- Output Analog Indicator (Gage - Carbon Steel)	32	400-1107	-
- Output Analog Indicator (Gage - 316 Stainless Steel) **(NOTES)**	32	400-1108	-
- 304 Stainless Steel Filter- 1/4" NPT	33	101B3403	-
- Filtering Element	34	400-0655	-
- Assembled Boster Housing - Aluminum	31,35,36,37,38	400-1109	-
- Assembled Boster Housing - 316 Stainless Steel	31,35,36,37,38	400-1110	-
- Pin Spring	36	400-1113	-
- Booster O-ring **(NOTE 2)**	37	400-1114	-
- Spring Bolt	38	400-1115	-
- Booster Cover Bolt	39	400-1116	-
1/2" NPT (Ex d) INTERNAL SOCKET SET PLUG IN BICHROMATIZED CARBON STEEL	40	400-0808	-
1/2" NPT (Ex d) INTERNAL SOCKET SET PLUG IN 304 SST	40	400-0809	-
1/2" NPT INTERNAL SOCKET SET PLUG IN BICHROMATIZED CARBON STEEL	40	400-0583-11	-
1/2" NPT INTERNAL SOCKET SET PLUG IN 304 SST	40	400-0583-12	-
M20 X 1.5 (Ex d) EXTERNAL SOCKET SET PLUG IN 316 SST	40	400-0810	-
PG13.5 (Ex d) EXTERNAL SOCKET SET PLUG IN 316 SST	40	400-0811	-
3/4" NPT (Ex d) ADAPTER IN 316 SST	40	400-0812	-
MOUNTING BRACKET FOR 2" PIPE **(NOTE 3)**			
- Carbon Steel	-	344-0140	-
- 316 Stainless Steel	-	344-0141	-
- Carbon Steel Bolts, Nuts, Washers and U-clamp in Stainless Steel	-	344-0142	-
TRANSDUCER SET - ALUMINUM	15 to 39	400-1111	A
TRANSDUCER SET - 316 STAINLESS STEEL		400-1112	A

NOTES
1 - Includes terminal isolator, screws (cover lock, ground, and terminal isolator) and identification plate without certification. **2** - O-rings are packaged with 12 units. **3** - Including U-Clamp, nuts, bolts, and washers. **4** - For category **A** it is recommended to keep in stock a set for each **25** parts installed and a set for each **20** for category **B**.

Isolation Test on Equipment Housings

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

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

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

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

ATTENTION
 Never test with a voltage greater than 500 Vdc.

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

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

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

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

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

Section 5

TECHNICAL CHARACTERISTICS

Functional Specifications

Output Signal
Standard: 3 – 15 psi (0.2 – 1.0 Kgf/cm²);
Extended: 3 – 30 psi (0.2 – 2.0 Kgf/cm²).

Input Signal
Digital only, Fieldbus, voltage mode 31.25 Kbit/s bus powered.

Power Source
Bus powered: 9-32 Vdc;
Quiescent Consumption Current: 12 mA;
Output Impedance @7.8 KHz to 39 KHz:

- Without Intrinsic Safety: > 3 kΩ;
- With Intrinsic Safety: > 400 kΩ; (in the assumption of a S.I. intrinsic bus on the power source).

Air Supply
18 -100 psi (1.24 – 7 Kgf/cm²) – free from oil, dirt and water.

Indication
Digital indicator (LCD) with 4½ numerical digits.

Classified Area Certification
According to ordering code.

Temperature Limits

Ambiente:	-40	to	85 °C	-40	to	185 °F	
Storage:	-40	to	90 °C	-40	to	194 °F	
Process:	-10	to	60 °C	-14	to	140 °F	
Digital Display:	-40	to	85 °C	-40	to	185 °F	Without damage.

Humidity Limits
0 to 100% Relative Humidity.

Connecting Time
Approximately 10 sec.

Update Time
Approximately 0.5 sec.

Configuration
Via the local adjustment and System302-7 or other FF (FOUNDATION™ fieldbus) configurator.

Performance Specifications

Precision
0.4% of Spam; includes hysterisis and stability effects.

Air Consumption
0.30 Nm³/h (0.18 scfm) for 1.24 bar (18 psi) supply;
0.45 Nm³/h (0.26 scfm) for 2.8 bar (40 psi) supply;
0.80 Nm³/h (0.47 scfm) for 7 bar (100 psi) supply.

Maximum Air Flow Capacity
3.40 Nm³/h (2 scfm) for 1.24 bar (18 psi) supply;
6.80 Nm³/h (4 scfm) for 2.8 bar (40 psi) supply;
15.30 Nm³/h (9 scfm) for 7 bar (100 psi) supply.

Ambient Temperature Effect

$$\text{Error\_Sp (pressure sensor)} = \frac{\text{Temperature Range (ºC) x K (0.07) x Pressure Range psi}}{100}$$

$$\text{Error\_Ps (output pressure)} = \frac{\text{Temperature Range (ºC) x K (0.06) x Pressure Range psi}}{100}$$

Air Supply Effect
Negligible.

Vibration Effect
± 0.3 %/g of span during the following conditions:
5-15 Hz for 4 mm constant displacement;
15-150 Hz for 2g;
150 - 2000 Hz for 1g;
According to IEC60770-1 standard.

Electromagnetic Interference Effect
Designed according to the IEC 801, European EN50081 and EN50082 standards.

Physical Specifications

Electric Connections
1/2 - 14 NPT, PG 13.5 DIN; M20 x 1.5 or ½ -14 NPT x ¾ NPT (AI316) with adapter.

Pneumatic Connections
Power supply and output: 1/4 - 18 NPT.
Gauge: 1/8 – 27 NPT.

Construction Materials
Injected aluminum with low copper content and finishing in polyester paint or stainless steel 316, with Buna N gaskets on the cover.

Mounting
With additional bracket; may be installed in a 2” pipe or attached to walls or panels.

Equipment Weight

Without display and no mounting bracket:	2.0 Kg (aluminum); 4.3 Kg (stainless steel).
Add for the display:	0.1 Kg.
Add for mounting bracket:	0.6 Kg (carbon steel); 1.3 Kg (stainless steel).

Ordering Code

MODEL	FOUNDATION™ fieldbus PNEUMATIC CONVERTER
FP302	FOUNDATION™ fieldbus

COD.	Digital Indicator
0	Without indicator
1	With indicator

COD.	Mounting Bracket
0	Without bracket
1	Carbon Stell bracket and accessories
2	SS316 bracket and accessories
7	Carbon steel bracket and SS316 accessories
9	Carbon Steel “L” shape bracket and SS316 accessories

COD.	Electrical Connection
0	1/2" - 14 NPT **(3)**
1	1/2" - 14 NPT X 3/4 NPT (AI316) - with adapter **(3)**
2	1/2" - 14 NPT X 3/4 BSP (AI316) - with adapter **(2)**
3	1/2" - 14 NPT X 1/2 BSP (AI316) - with adapter **(2)**
A	M20 X 1.5 **(5)**
B	PG 13.5 DIN **(4)**

SPECIAL OPTIONS

COD.	Housing Material
H0	Aluminum (Default) (IP/TYPE)
H1	SS 316 (IP/TYPE)
H2	Aluminium for saline atmospheres (IPW/TYPE X) **(1)**
H3	316 SST for saline atmospheres (IPW/TYPE X) **(1)**
H4	Aluminium Copper Free for saline atmospheres (IPW/Type X) **(1)**

COD.	Identification Plate	COD.	
I1	FM: XP, IS, NI, DI	I7	EXAM (DMT): Ex-ia; NEMKO: Ex-d
I3	CSA: XP, IS, NI, DI	ID	NEPSI: Ex-ia, Ex-d
I4	EXAM (DMT): EX-IA, NEMKO: Ex-d	IE	NEPSI: Ex-ia
I5	CEPEL: Ex-D, Ex-ia	IM	BDSR – GOST: Ex-d, Ex-ia
I6	Without certification		

COD.	Painting
P0	Gray Munsell N 6,5
P3	Black Polyester
P8	Without Painting
P9	Safety Blue Epoxy - Electrostatic Painting

COD.	TAG Plate
J0	With tag
J1	Blank
J2	According to the user´s note

COD.	Special
ZZ	See notes

COD.	Range
G0	3 (min) to 15 (max) psi.
G1	3 (min) to 30 (max) psi.

FP302	1	1	0	H0	I1	P0	J1	*	G0

TYPICAL ORDERING CODE

* Leave blank for no Special Option

NOTE

(1) IPW/TYPEX tested for 200 hours according to NBR 8094 / ASTM B 117 standard.
(2) Options not certified for Hazardous Locations.
(3) Certificate for use in Hazardous Locations (CEPEL, CSA e FM).
(4) Certificate for use in Hazardous Locations (CEPEL).
(5) Certificate for use in Hazardous Locations (CEPEL e FM).

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
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 3D9A2.AX
XP Class I, Division 1, Groups A, B, C, D
DIP Class II, III Division 1, Groups E, F, G
IS Class I, II, III Division 1, Groups A, B, C, D, E, F G
NI Class I, Division 2, Groups A, B, C, D
T4; Ta = -20 ºC < Ta < 60 ºC; Type 4, 4X

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

Drawing 102A-0119, 102A-1205, 102A-1328

DNV
Explosion Proof (Nemko 00ATEX308X)
II 2G Ex d IIC T6 Gb
Ambient Temperature: -20 ºC to +60 ºC
Working Pressure: 18-100 psi
Options: IP66W or IP66

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 60079-0:2012 General Requirements
EN 60079-1:2007 Flameproof Enclosures “d”

Drawing 102A-1273, 102A-1488

DEKRA
Intrinsic Safety (DMT 01 ATEX E 013)
II 2G Ex d [ia] IIC T6 Gb

FISCO Field Device
Supply circuit for the connection to an intrinsically safe FISCO fieldbus-circuit
Ui = 24Vdc, Ii = 380 mA, Pi = 5.32 W, Ci ≤ 5 nF, Li = neg
Ambient Temperature: -20ºC ≤ Ta ≤ +60ºC

The Essential Health and Safety Requirements are assured by compliance with:
EN 60079-0:2009 General Requirements
EN 60079-1:2007 Flameproof Enclosures “d”
EN 60079-11:2007 Intrinsic Safety “i”
EN 60079-27:2008 Fieldbus intrinsically safe concept (FISCO)

Drawing 102A-1273, 102A-1488

INMETRO NCC
Segurança Intrínseca (NCC 24.0149)
Ex db ia IIC T* Gb
Ex tb IIIC T* Db
Ui = 30 V Ii = 380 mA Pi = 5,32 W Ci = 5 nF Li = desp
Tamb: -20 °C a +65 °C para T4 ou T135 °C
Tamb: -20 °C a +50 °C para T5 ou T100 °C
Tamb: -20 °C a +40 °C para T6 ou T85 °C
IP66 ou IP66W

Prova de Explosão (NCC 24.0143)
Ex db IIC T6 Gb
Ex tb IIIC T85 ºC Db
Tamb: -20 °C a +40 °C
IP66 ou IP66W

Observações:

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.

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"

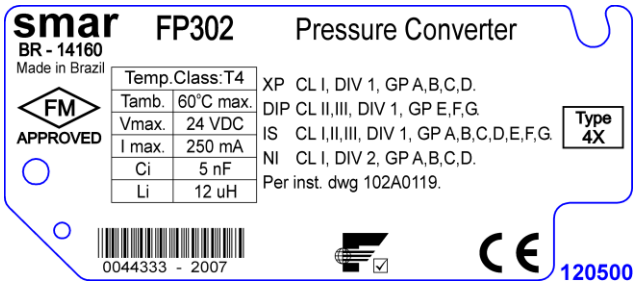
ABNT NBR IEC 60079-31:2022 Atmosferas explosivas - Parte 31: Proteção de equipamentos contra ignição de poeira por invólucros “t”

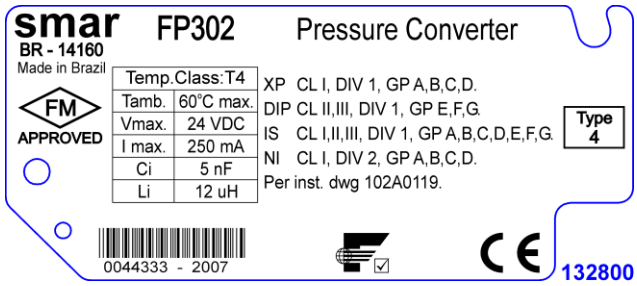
ABNT NBR IEC 60529:2017 Graus de proteção providos por invólucros (Código IP)

Desenhos 102A1363, 102A1239, 102A2004, 102A2003, 102A2094

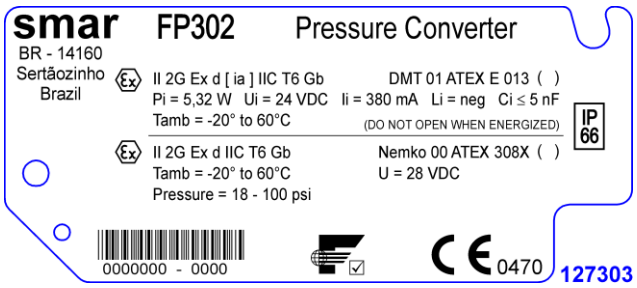
Identification Plates

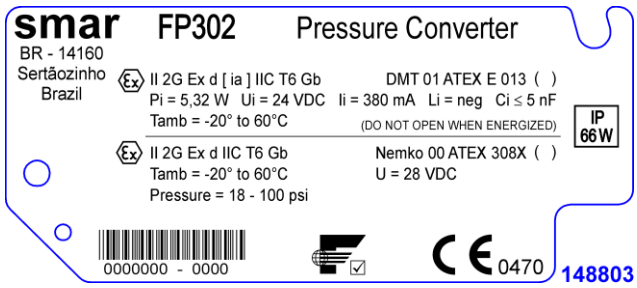
FM Approvals



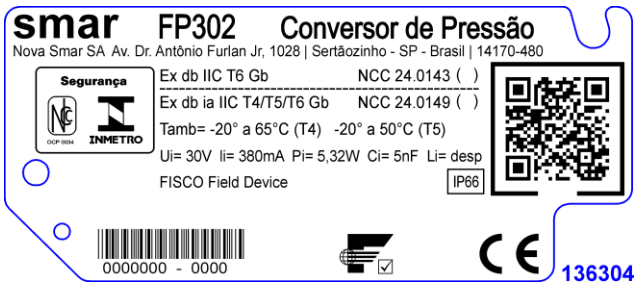


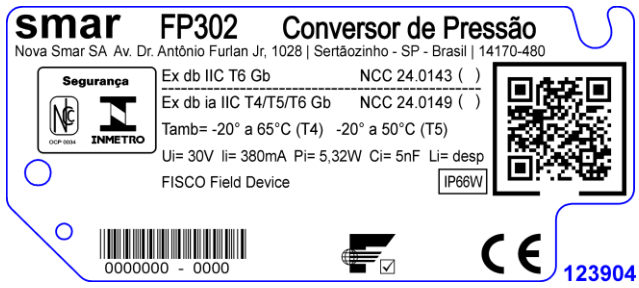
ATEX / IECEx

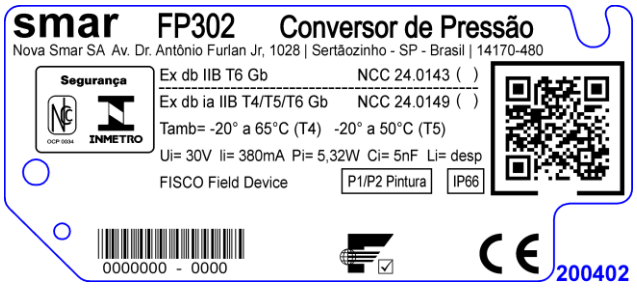




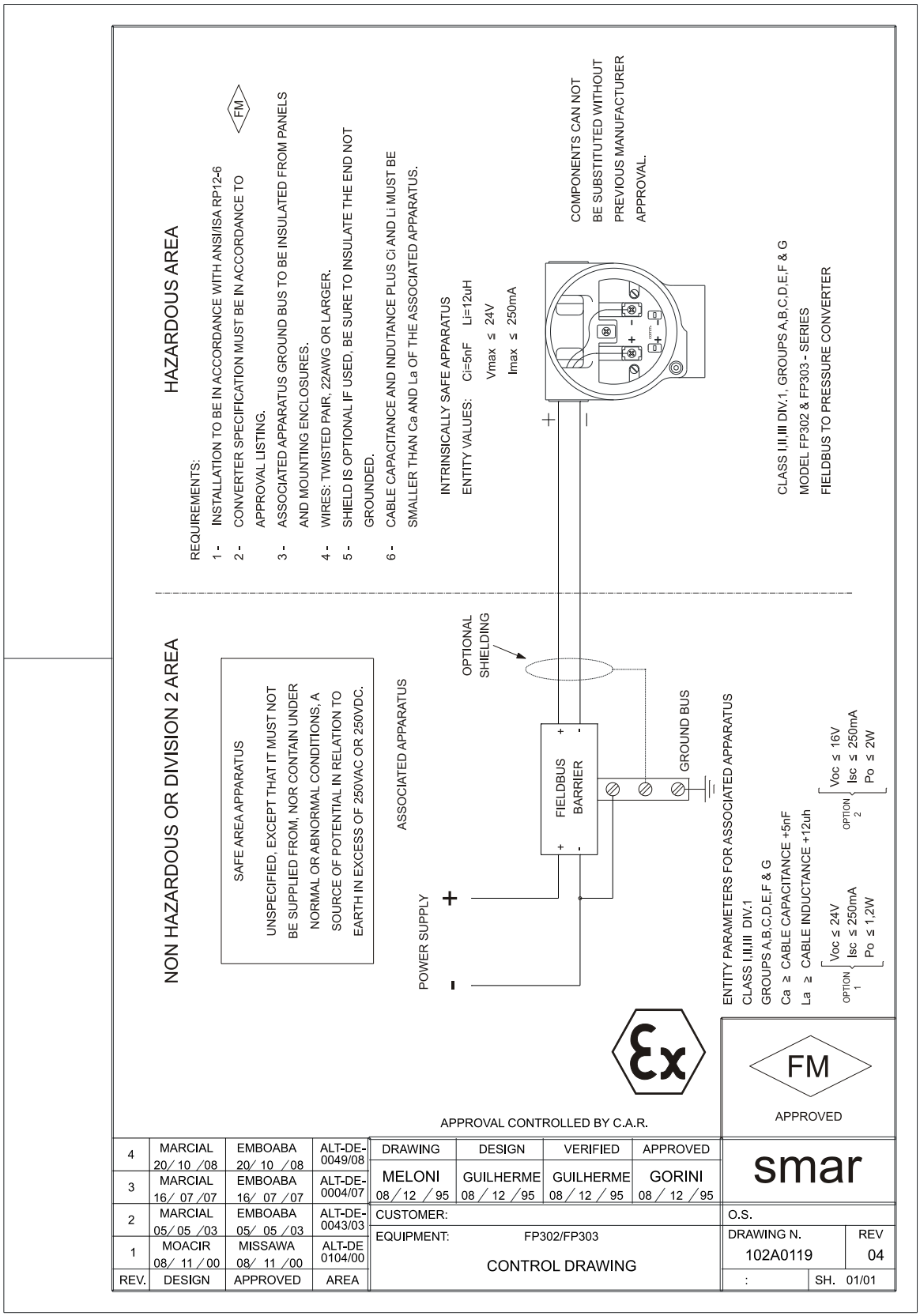
INMETRO NCC







FM Approvals



Appendix B

SRF – Service Request Form

Fieldbus Pressure Converter - FP

GENERAL DATA

Model: FP302 ( ) FP303 ( ) Firmware Version: _____

Serial Number: _____

Sensor Number: _____

TAG: _____

Output Pressure: 3 to 15 psi ( ) 3 to 30 psi ( )

Configuration: Magnetic Tool ( ) PC ( ) Software: _____ Version: _____

APPLICATION DATA

Type/Model/Manufacturer: _____

_____

_____

Host System/Model/Manufacturer:_____

_____

AIR SUPLLY

Conditions: Dry and Clean ( ) Oil ( ) Water ( ) Others: _____

Work Pressure: 18 psi ( ) 40 psi ( ) 100 psi ( ) Others : _____ psi

PROCESS DATA

Hazardous Area Classification: Non-Classified ( ) Chemical ( ) Explosive ( ) Other: _____

Interference Types: None ( ) Vibration ( ) Temperature ( ) Electromagnetic ( ) Others: _____

Ambient Temperature: From _____ ºC to _____ ºC.

SITUATION DESCRIPTION

_____

_____

_____

_____

SERVICE SUGGESTION

Adjustment ( ) Cleaning ( ) Preventive Maintenance ( ) Update / Upgrade ( )

Other: _____

USER INFORMATION

Company: _____

Contact: _____

Title: _____

Sector: _____

Telephone: _____ _____ _____ _____ **Extension:** _____

E-mail: _____ **Date:** _____/ _____/ _____

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.

Returning Materials

If necessary to return the converter and/or configurator to SMAR, simply contact our office, informing the defective instrument serial number, and return it to our factory.

In order to speed up analysis and solution of the problem, the defective item should be returned with a description of the failure observed, with as much details as possible. Other information concerning 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.