FY302 - I

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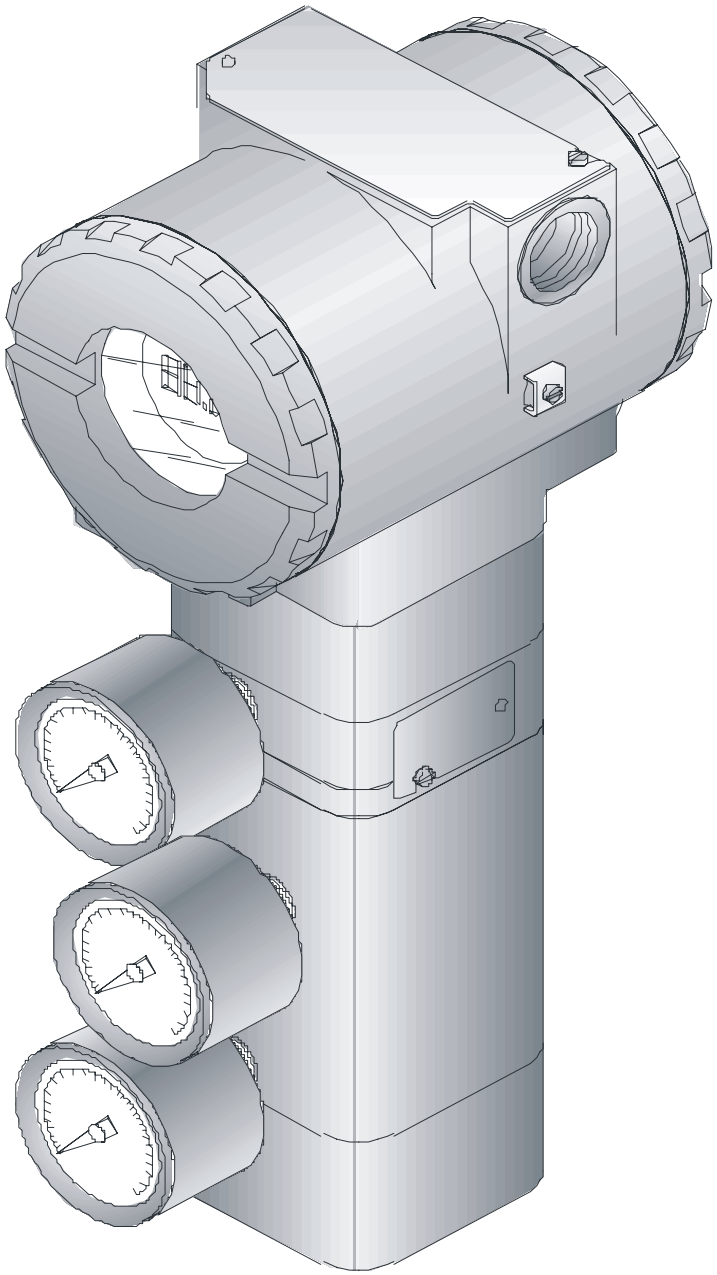
FY302
VERSION 3

FOUNDATION

OPERATION & MAINTENANCE INSTRUCTIONS MANUAL

FIELDBUS VALVE POSITIONER



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INTRODUCTION

The FY302 is a Fieldbus valve positioner for Single (spring return) or Double acting Linear motion type control valves e. g. Globe, Gate, Diaphragm, Pinch or Clamp and Rotary motion type control valves e. g. Ball, Butterfly or Plug with pneumatic type actuators e. g. Diaphragm, Piston, Vane, or Bellows. It is based on a field-proven piezo flapper and non-contacting Hall-effect position sensor that provides reliable operation and high performance. The digital technology used in the FY302 enabled the choice of several types of flow characterizations, an easy interface between the field and the control room and several interesting features that considerably reduce the installation, operating and maintenance costs.

The FY302 is part of Smar's complete 302 line of 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.

The main requirements for Fieldbus were to overcome these problems. Closed loop control with performance like a 4-20 mA system requires higher speed. Since higher speed means higher power consumption, this clashes with the need for intrinsic safety. Therefore a moderately high communication speed was selected, and the system was designed to have a minimum of communication overhead. Using scheduling the system controls variable sampling, algorithm execution and communication so as to optimize the usage of the network, not loosing time. Thus, high closed loop performance is achieved.

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

The FY302, 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. This takes to reduced communication and thereby less dead-time and tighter control, not to mention the reduction in cost.

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

Get the best result of the FY302 by carefully reading these instructions.

WARNING
Throughout the operation of the positioner, including self-setup, do not touch the moving parts of valve/actuator/positioner assembly as they may unexpectedly move automatically. Make sure to disconnect supply air before touching any moving parts.

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

TABLE OF CONTENTS

Section 1

INSTALLATION

General

The overall accuracy of measurement and control depends on several variables. Although the converter has an outstanding performance, proper installation is essential, in order to maximize its performance.

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

The **FY302** has a built-in temperature sensor to compensate for temperature variations. At the field, this feature minimizes the temperature variation effect.

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

In warm environments, the positioner should be installed to avoid, as much as possible, direct exposure to the sun. Installation close to lines and vessels subjected to high temperatures should also be avoided.

Use of sunshades or heat shields to protect the positioner from external heat sources should be considered, if necessary.

Humidity is fatal to electronic circuits. In areas subjected to high relative humidity, the O-rings for the electronics cover must be correctly placed. Removal of the electronics cover in the field should be reduced to the minimum necessary, since each time it is removed; the circuits are exposed to humidity. The electronic circuit is protected by a humidity proof coating, but frequent exposures to humidity may affect the provided protection. It is also important to keep the covers tightened in place. Every time they are removed, the threads are exposed to corrosion, since painting cannot protect these parts. Code approved sealing methods on conduit entering the positioner should be employed.

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

Mounting

The mounting of positioner **FY302** will depend on actuator type, single (spring return) action or double action and on actuator movement, if it is linear or rotary. Two supports are required for mounting, one for the magnet and the other for the positoner itself. Smar may supply them both since they are specified in the order code. (See Table 5.2 – Bracket Ordering Code).

Rotary Movement

Install the magnet on the valve stem using the magnet support (See Figure 1.2 - Positioner on Rotary Actuator).

Install the positioner support on the actuator. The actuator should be in accordance with standard VDI/VDE 5845, all you have to do is tighten the four screws with the lock washers on the standard support.

For special supports, refer to specify instructions. After installing the support on the actuator, it is possible to mount the positioner **FY302** on the support by means of the four screws with lock washers.

Make sure that the arrow engraved on the magnet coincides with the arrow engraved on the positioner when the valve is in mid travel.

If the installation of the positioner or magnet should be altered, or if there should be any other modification, the positioner will require a recalibration.

As to the type of valve action, refer to paragraph "Pneumatic Connections".

Linear Movement

Install the magnet on the valve stem using the magnet support (See Figure 1.3 - Positioner on Linear Actuator).

Install the positioner support on the actuator. The actuator support may be secured in place as per standard NAMUR/IEC 536-4 or in accordance with user specified boring. Install the positioner on the support and tighten the four screws in the threaded bores located on the side opposite to the pressure gages (See Figure 1.3 - Positioner on Linear Actuator). Use lock washers in order to prevent screw slackening.

Make sure that the support is not obstructing the exhaustion outlets.

NOTE
Make sure that arrow engraved on the magnet coincides with the arrow engraved on the positioner when the valve is in mid travel. The magnet mounting in relation to the hall sensor: 1 . Must not have attrict between the internal magnet face and the hall sensor salience during the travel (rotary or linear), through the magnet. 2. The magnet and the salience of hall sensor must not be distant. A minimum distance of 2mm and a maximum distance of 4mm is recommended between the magnet external face and the positioner face. For that, a centralizer device (linear or rotary) must be used. The centralizer device is in the positioner packing.

If the installation of the positioner or magnet should be altered, or if there should be any other modification, the positioner will require a recalibration.

Pneumatic Connections

Air supplied to the positioner **FY302** shall be quality instrument air, i. e., dry, clean and non-corrosive. Refer to the American National Standard. “Quality Standard for Instrument Air” (ANSI/ISA S7.0.01 - 1996).

The **FY302** is supplied with input and outputs air filters; but these filters do not substitute a preliminary instrumentation air treatment. We recommend a periodic cleaning of such filters each 6 months or less, case the air instrument quality is not good.

Air supply pressure to the **FY302** shall be between 1.4 bar (20 psi) and 7 bar (100 psi). In case such requirements can not be fulfilled, the use of an air pressure regulator is acceptable.

Use sealant on threads. Sealants like PTFE (Teflon) tape shall be avoided because they may fragment and eventually obstruct internal parts.

The positioner **FY302** may be supplied with pressure gages. There are taps available for IN, OUT1 and OUT2. Before connecting the pressure gages, make sure that all lines be completely purged.

Valve positioner **FY302** has two pneumatic outputs. They work on opposite directions to open or close the valve.

WARNING
The **FY302** should fail, for example, because of a power failure. The output identified as OUT1 (output 1) goes to nearly zero; while the output identified as OUT2 (output 2) goes to nearly the air supply pressure.

Pneumatic connections are identified as IN (input) for the air supply, and OUT1 and OUT2 for Output 1 and Output 2 respectively (See Figure 1.1 - FY302 Dimensional Drawing). Use 1/4 NPT connections. Sealant may be used NPT threads. Connect the air supply tubing to the connection identified as IN. Make sure that the air supply pressure does not exceed the maximum rating accepted by the positioner or actuator. The tubing used to connect the positioner **FY302** to the actuator shall be as short as possible. The manometer supply is optional.

NOTE
When ordering the positioner in stainless steel 316, combined with the local pressure gauges, the gauge case is in SS 316. For wet parts and threads in SS 316, please, consult Smar.

ATTENTION
Make sure that sealant does not enter the positioner.

There are six exhaust outputs in the **FY302**, all of them fitted with filters (See Figure 1.1 - FY302 Dimensional Drawing).

It is very important that such outputs are neither blocked nor obstructed, because the air must circulate freely.

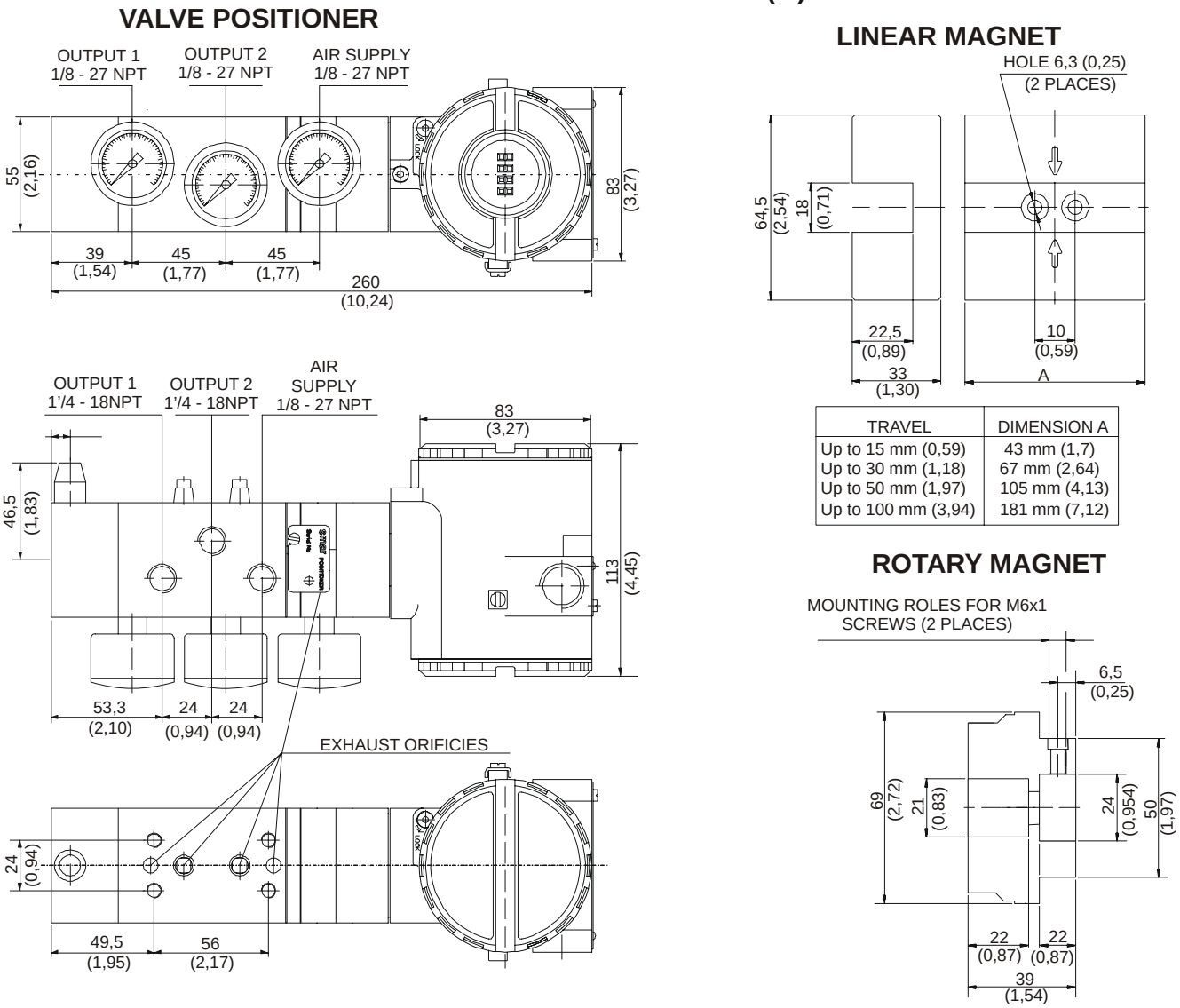
All filters shall be inspected to make sure they will not obstruct the outputs (Refer to Section 4 - Maintenance Procedures).

Double Action - Air to Open (Fail Close)
Connect Output 1 (OUT1) of the positioner to the input identified as OPEN in the actuator, and connect Output 2 (OUT2) of the positioner to the input CLOSE in the actuator (See Figure 1.1 - FY302 Dimensional Drawing).

Double Action - Air to Close (Fail Open)
Connect Output 2 (OUT2) of the positoner to the input identified as OPEN in the actuator, and connect Output 1 (OUT 1) of the positioner to the input CLOSE of the actuator.

Single Action
Connect Output 1 (OUT1) of the positioner to the input of the actuator. Use a plug to block Output 2 (OUT2). (The Figure 1.2 - Positioner on Rotary Actuator and Figure 1.3 - Positioner on Linear Actuator show the positioner in rotary and linear actuators).

All dimensions are in mm (in)



TRAVEL	DIMENSION A
Up to 15 mm (0,59)	43 mm (1,7)
Up to 30 mm (1,18)	67 mm (2,64)
Up to 50 mm (1,97)	105 mm (4,13)
Up to 100 mm (3,94)	181 mm (7,12)

Figure 1.1 - FY302 Dimensional Drawing

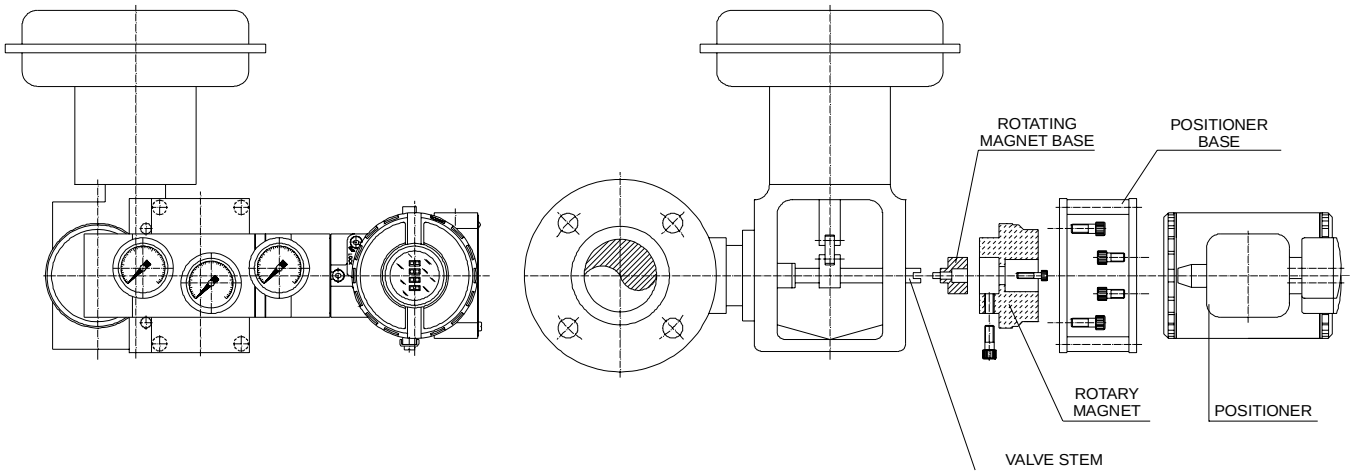


Figure 1.2 - Positioner on Rotary Actuator

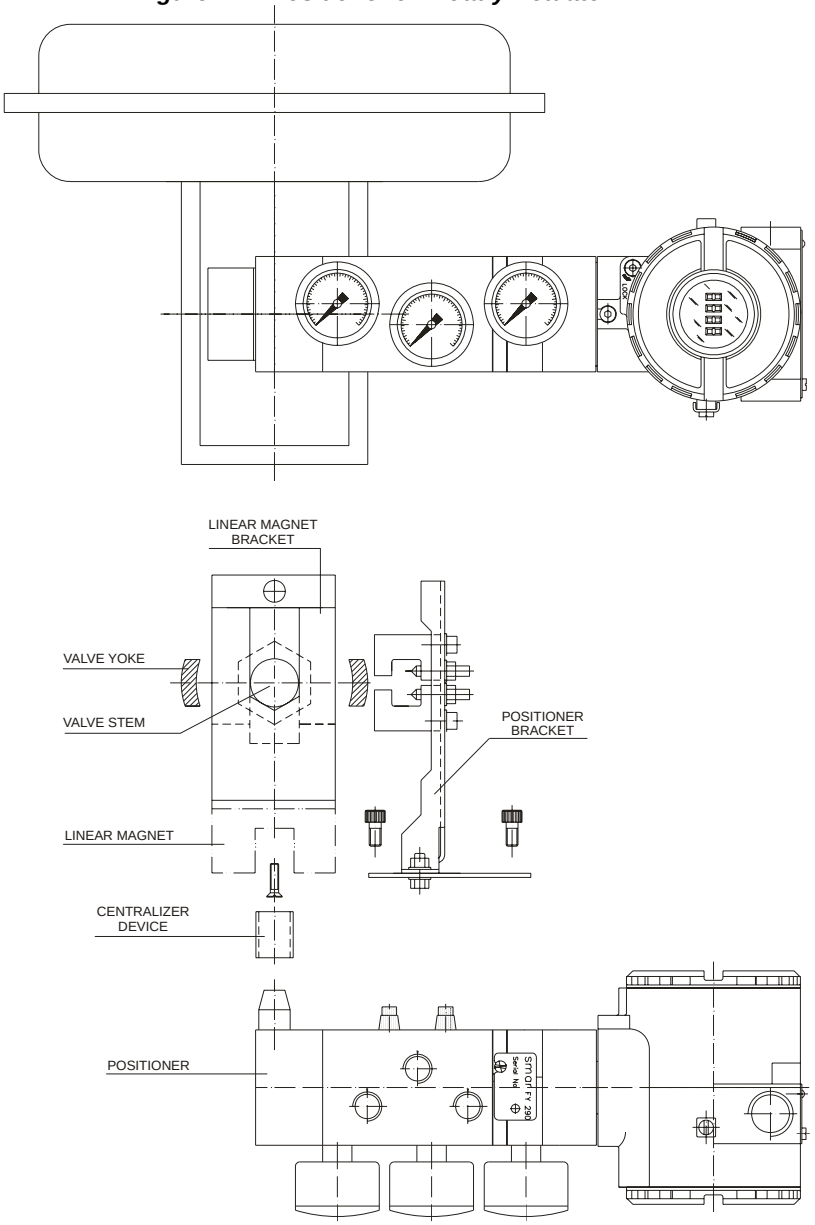


Figure 1.3 - Positioner on Linear Actuator

Electronic Housing Rotating

The electronic housing can be rotated in order to have a better position of the digital display. To rotate it, use the Housing Rotation Set Screw. (See Figure 1.4 – Cover Locking and Housing Rotation Set Screw).

The local indicator itself can also be rotated. (See Figure 2.4 – Rotating the position of the LCD Display).

Electric Wiring

Reach the wiring block by removing the Electrical Connection Cover. This cover can be locked by the cover locking screw. To release the cover, rotate the locking screw clockwise.
The wiring block has screws on which fork or ring-type terminals can be fastened.
(See Figure 1.5 – Wiring Block).

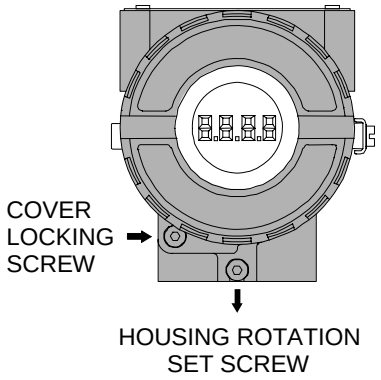


Figure 1.4 - Cover Locking and Housing Rotation Set Screw

For convenience there are two ground terminals: one inside the cover and one external, located close to the conduit entries. (See Figure 1.5 – Wiring Block).

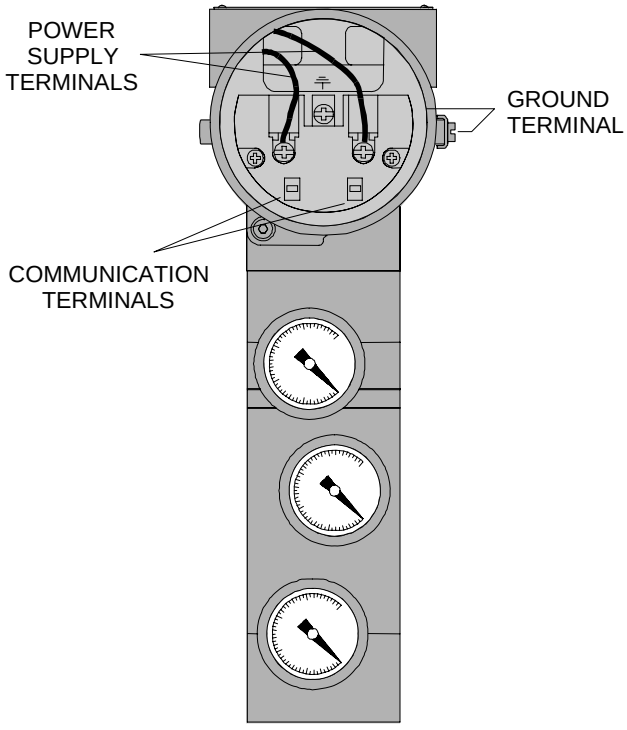


Figure 1.5 - Wiring Block

WARNING
In hazardous areas with explosion proof requirements, the covers must be tightened with at least 8 turns. In order to avoid the penetration moisture or corrosive gases, tighten the O'ring until feeling the O'ring touching the housing. Then, tighten more 1/3 turn (120°) to guarantee the sealing. Lock the covers using the locking screw. In hazardous zones with intrinsically safe or non incendive requirements, the circuit entity parameters and applicable installation procedures must be observed. Cable access to wiring connections is obtained by the two conduit outlets. Conduit threads should be sealed by means of code-approved sealing methods. The unused outlet connection should be plugged and sealed accordingly. Should other certifications be necessary, refer to the certification or specific standard for installation limitations.

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

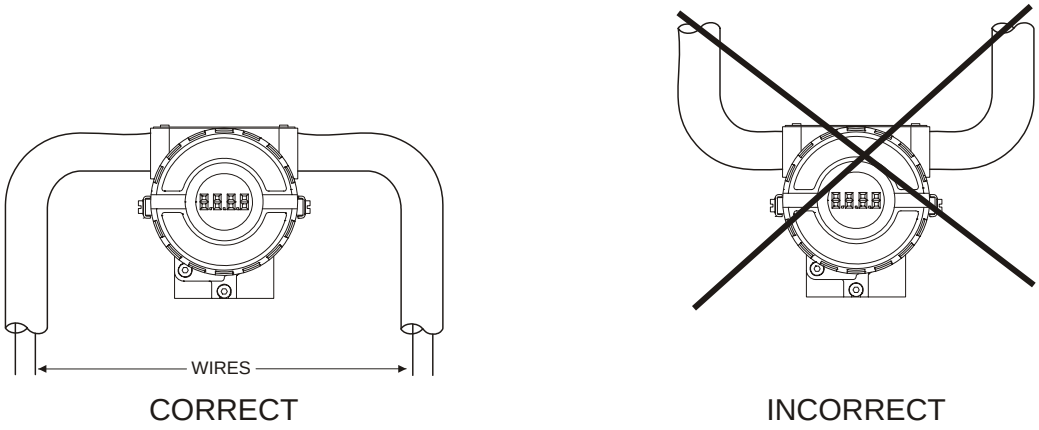


Figure 1.6 - Conduit Installation Diagram

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

Topology and Network Configuration

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

Active repeaters may be used to extend the trunk length.

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

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

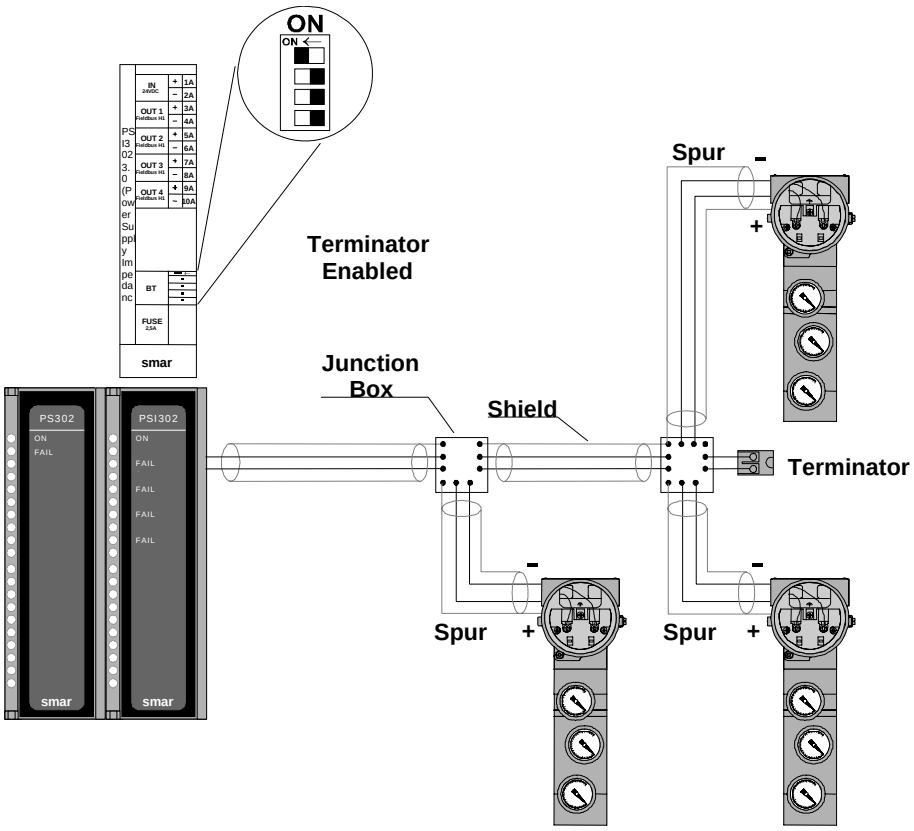


Figure 1.7 - Bus Topology

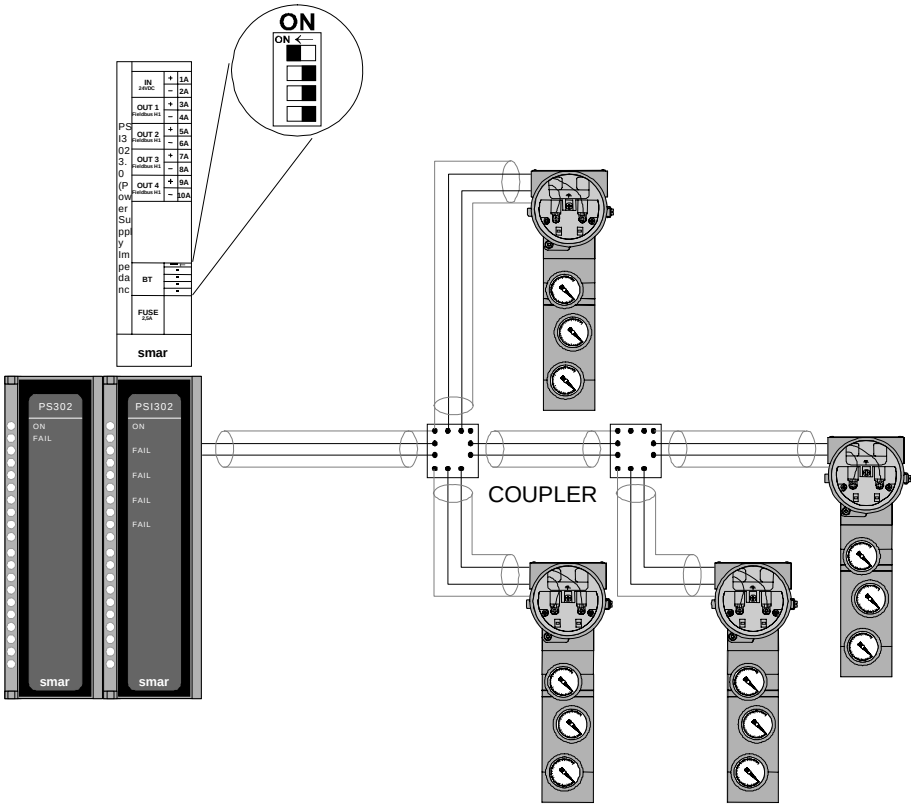


Figure 1.8 - Tree Topology

Intrinsic Safety Barrier

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

Use of **SB302** is recommended.

Jumper Configuration

In order to work properly, the jumpers J1 and W1 located in the **FY302** main board must be correctly configured (See Table 1.1 - Description of the Jumpers).

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

Table 1.1 - Description of the Jumpers

Power Supply

The **FY302** receives power from the bus via the signal wiring. The power supply may come from a separate unit or from another device such as a controller or DCS.

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

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

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

Recommendations for an Instrument Air System

Instrument air quality shall be superior to that of industrial compressed air. Humidity, airborne particles and oil may impair the instrument operation, either temporarily or permanently in case of internal parts wearing.

As per standard *ANSI/ISA S7.0.01 - 1996 - Quality Standard for Instrument Air*, instrument air shall the following characteristics:

Dew point	10°C below minimum plant temperature
Size of particles (airborne)	3 m (maximum)
Oil content	1 ppm w/w (maximum)
Contaminants	free from toxic flammable gases

Table 1.2 - Quality Standard for Instrument Air

This standard recommends that the compressor intake be located in an area free from process spills and fitted with and adequate filter. It also recommends the use of non-lubricated type compressors, in order to prevent air contamination by lubricating oil. Where lubricated type compressors are adopted, there shall be used means to make the air oil free.

The Figure 1.9 - Air Supply System and Figure 1.10 - Air Quality Conditioning System show a typical system for Air Supply and Air Quality Conditioning.

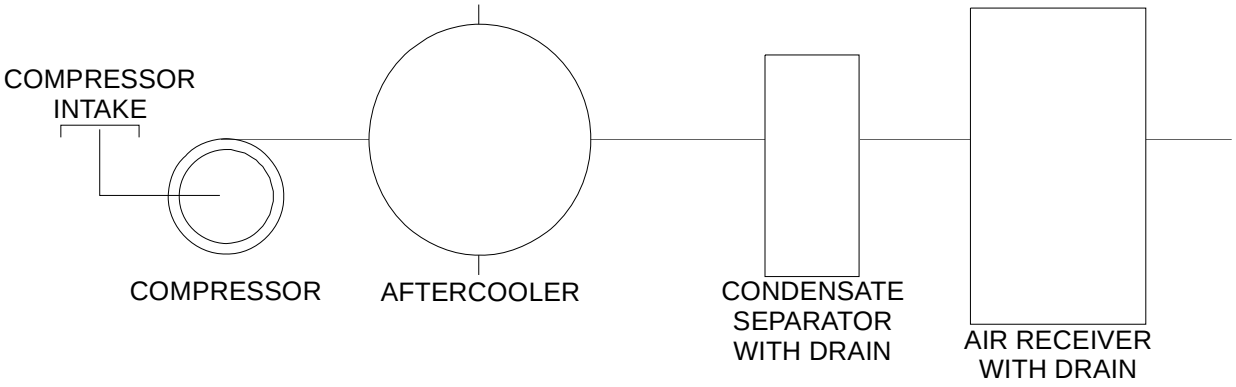


Figure 1.9 - Air Supply System

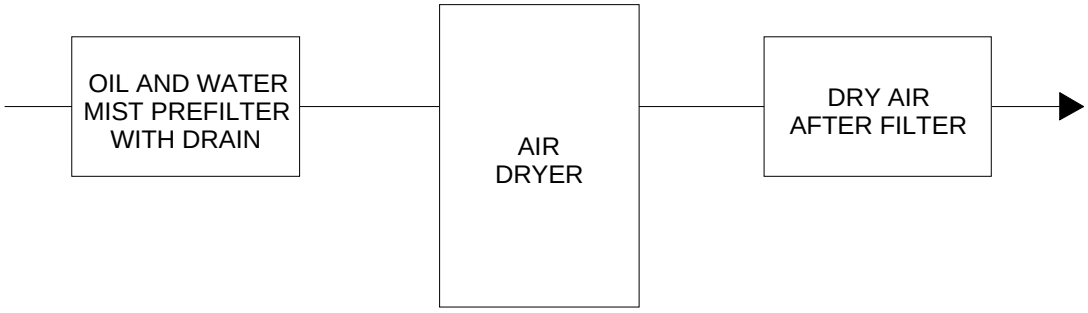


Figure 1.10 - Air Quality Conditioning System

Remote Hall Sensor

The remote Hall magnetic sensor is recommended for applications where there are high temperatures and extreme vibrations applications. It prevents excessive wear of the equipment and, consequently, the reduction of its useful lifetime.

The electric signals on the remote sensor's connection cable are of low intensity. Therefore, it is recommended to install the cable inside a conduit (maximum length 20 meters) away from possible sources of induction and/or electromagnetic interferences. The cable supplied by Smar is shielded in order to protect it against electromagnetic interferences. Despite this protection, it is not recommended for the cable to share the same conduit with other cables.
The parts for the sensor's connection cable are:

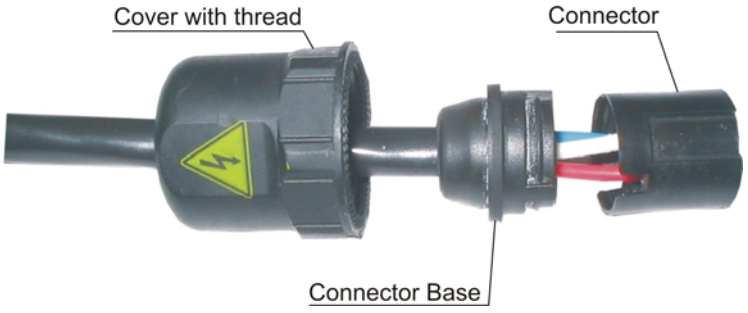


Fig. 1.13 –Hall Sensor cable and its accessories

Disassembly Procedure

Figures 1.11 to 1.14 show the correct disassembling order for the Hall sensor. The steps for disassembling are:
Unscrew the cover, by turning it on counter-clockwise direction (direction of the arrow) for the remote Hall side according to figure 1.11.
Pull the cable following the arrow as in figure 1.12,
Pull the cable connector base, to release it from the block connector, according to figures 1.13 and 1.14.

Fig. 1.14 – Disconnecting the cover of the Hall sensor cable

Fig. 1.15 – Disconnecting the Hall sensor cable

Fig. 1.16 –Unfastened connector

Fig. 1.17 – Connector with the cable's wires maintained in their orifices

Fig. 1.18 – Wires position in the connector

Fig. 1.19 – Release the cables' connector

Assembly Procedure

Mount the components following the sequence:

Pass the cable through the cover orifice (**Figure 1.17**);
Pass the cable through the base connector orifice (**Figure 1.18**);
The red, white, and black wires should be inserted in the base connector orifice marked by numbers beside them, look at **Figure 1.19** e **1.20.**

Fig. 1.20 – Assembling the cover

Fig. 1.21 – Assembling the wire bracket

Fig. 1.22 – Inserting the wires in the connector.

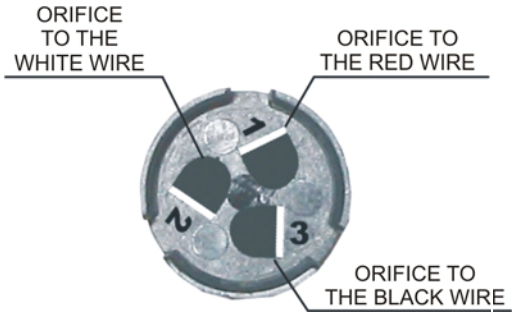


Fig. 1.23 – Orifice Cable's Connector with Numbers beside them.

Insert the cable connector in the remote Hall's block connector as figure 1.21. The block connector has internal saliencies that perfectly fit the groove, in order to prevent errors in the assembly. The cutting pins inside of the block connector will cut the wire insulators and press against them, thus establishing the electric contact between the cable and the hall sensor's circuit.
To finish, fasten the cover to the Hall sensor's connection (figure 1.22).

Fig. 1.24– Fasten the cover to the remote Hall.

Fig. 1.25 –Assembly finished.

Section 2

OPERATION

Functional Description - Output Module

The main parts of the output module are the pilot, servo, Hall effect sensor and the output control circuit. (See Figure 2.1 - Pneumatic Transducer Schematic).

The control circuit receives a digital setpoint signal from the CPU and a feedback signal from the Hall effect sensor.

The pneumatic circuit is based on a well-known and widely adopted technology, which is described on item Nozzle-and-Vane and Spool.

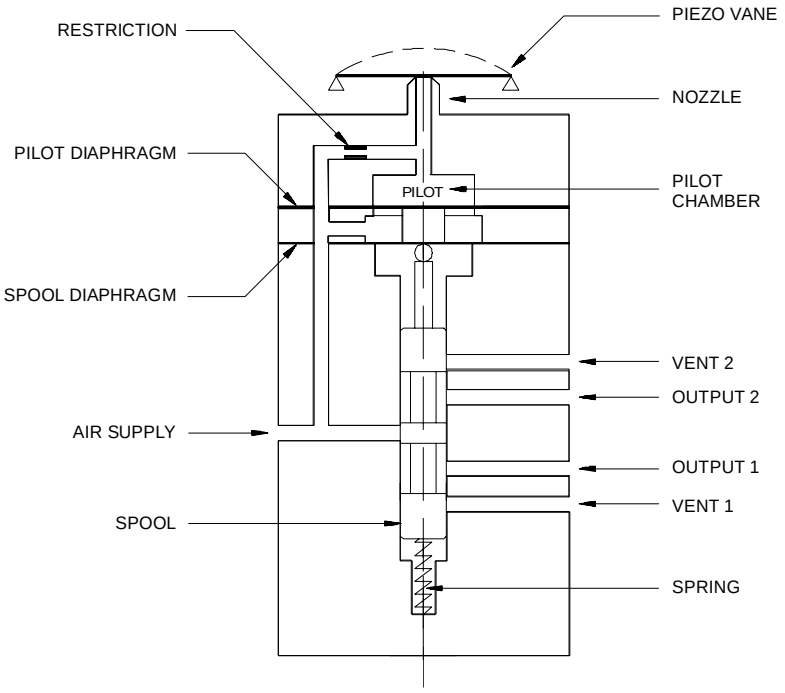


Figure 2.1 - Pneumatic Transducer Schematic

A piezoelectric disk as flapper in the pilot stage. The flapper is deflected when the control circuit applies a voltage. A small stream of air flowing through the nozzle is obstructed causing an increase in pressure in the pilot chamber, this is called the pilot pressure.

The pilot pressure is too low, with flowing capacity, and for this reason it must be amplified in the servo section. The servo section includes a diaphragm in the pilot chamber and a smaller one in the spool chamber. The pilot pressure applies a force at the pilot chamber's diaphragm which, in the equilibrium state, will be equal to the force applied by the spool valve at the smaller diaphragm which is in the spool chamber.

Therefore, upon every position change caused by the positioner, the pilot pressure increases or decreases as explained in the pilot stage section; such change in pilot pressure causes an upward or downward valve travel wich alters the pressure at output 1 and output 2 until a new equilibrium is reached, which results in a new valve position.

Functional Description-Electronics

Refer to the block diagram (See Figure 2.2 - FY302 Block Diagram). The function of each block is described below.

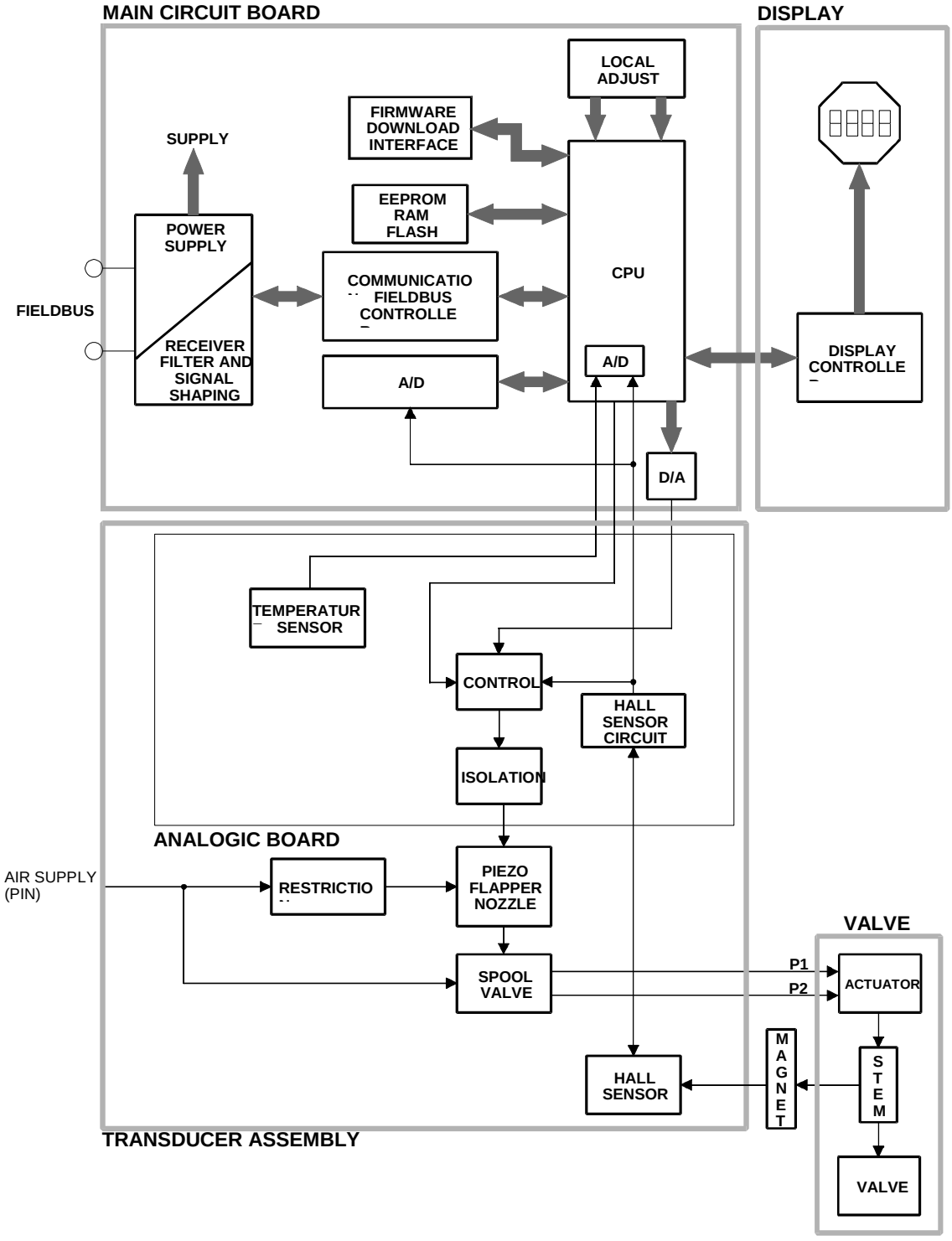


Figure 2.2 - FY302 Block Diagram

D/A
Receives the signal from the CPU and converts it to an analog voltage proportional the desired position, used by the control.

Control
Controls the valve position according to the data received from the CPU and the Hall effect sensor feedback.

A/D
Receives the signal from the Hall Sensor and converts it to a digital value proportional to the actual valve position.

Hall Effect Sensor
Measures the position actual and feedback to the control and CPU.

Temperature Sensor
Measures the temperature of the Transducer Assembly.

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

EEPROM
A non-volatile memory which stores configuration data as a backup.

Central Processing Unit (CPU), RAM, PROM and EEPROM
The CPU is the intelligent portion of the positioner, being responsible for the management and operation of block execution, self-diagnostics and communication. The program is stored in PROM. For temporary storage of data there is a RAM. The data in the RAM is lost if the power is switched off, however the device also has a nonvolatile EEPROM where data that must be retained is stored. Examples of such data are: calibration and valve configuration.

Communication Controller
A monitor line activity, modulates and demodulates communication signals and inserts and deletes start and end delimiters.

Power Supply
The positioner circuit receives supply from a 9 to 32 Vdc power supply. Use of **PS302** and **PSI302** is recommended.

Display Controller
Receives data from the CPU and drives the (LCD) Liquid Crystal Display.

Local Adjustment
Local adjustment is provided by means of two magnetic naturally actuated switches with no external electric or mechanical contact, by using a magnetic screwdriver.

Piezo Flapper Nozzle
The unit flapper nozzle converts the movement of piezoelectric into a pneumatic signal to control pressure in the pilot chamber.

Restriction
The restriction and the nozzle form a pressure-divided circuit. Air is supplied to the nozzle through a restriction.

Spool
The spool ensures a quick valve positioning by providing a greater air flow than one provided by the restriction.

Introduction to Fieldbus Application

From a Fieldbus point of view, the **FY302** is not an assembly of electronics, housing and sensor forming a positioner, but a network node containing function blocks.

Basically, it contains one output transducer block, one resource block and one display transducer block and various function blocks.

These blocks are models of the functionality that the **FY302** provides for a control system. They can loosely be said to make up part of the application that is performed in the **FY302**. Generally these blocks can be said to use an algorithm and contained parameters to process input parameters producing output parameters.

Function Blocks

Models the basic user configurable functionality of the device. Typically these functionality were previously available in individual devices, but now several are included in a single device. As example of function blocks available on each device are:

PID control block
This is block, which makes the PID controller operational, this enabling the **FY302** to function as a PID servo.

Analog output block
Provides the functionality of what is known as a positioner. It makes the Fieldbus signal available to the **FY302** output hardware. It also optionally performs output reversing.

Splitter/Output Selector block
Split range, sequencing and output selection applications are provided with this block.

Arithmetic block
Implements the most useful calculations used in an application.

Input Selector block
Selects one of three inputs according to an algorithm chosen by the user.

All information regarding to them and others are available on the "Function Blocks Manual".

Transducer Blocks

These are responsible for the interface between the function blocks and the **FY302** output channel hardware.

Output transducer block
It is responsible for the processing of the output signal, such as output characterization and trim.

Display transducer block
It is responsible for the display and local adjustment.

Resource Block

It is responsible for monitoring the operation of the device. It also contains device information such as serial equipment number.

The Local Indicator

The local indicator is required for signaling and operation in local adjustment. The parameters desired by the user to be viewed on the LCD display should be configured in the display block.

Normal Indicator
During normal operation, the **FY302** remains in the monitoring mode and the display will always indicate the variable of monitoring configured in the display block. It is recommend to configure the position of the valve in % (percentage). The local programming mode is activated by the Magnetic tool, by inserting it in orifice Z.

The possible configuration and monitoring operation are shown on.

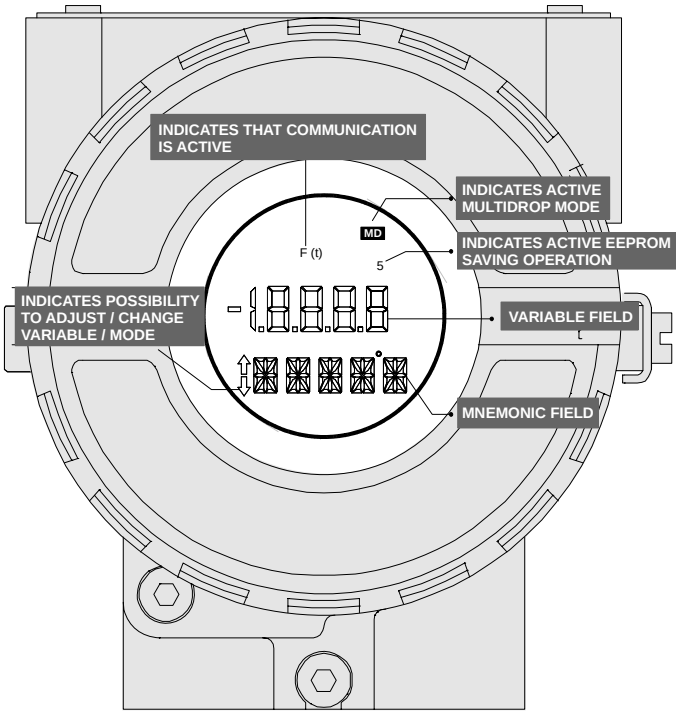


Figure 2.3 - Local Indicator

Upon receiving power, the **FY302** initializes the position indication on the display, by showing model **FY302** and its software version (X.XX). The indication should be higher than ±19999 it will be displayed as two digits and an exponent.

Monitoring
During normal operation, **FY302** remains in the monitoring mode.

The display simultaneously shows readout and some other information.

Normal displaying is interrupted when the magnetic tool is placed in orifice marked as **Zero** (See **Error! Reference source not found.**) and the indicator **MD** is showed on the display. After this, withdraw the magnetic tool off the orifice **Z** and put it in the orifice marked with the **S** letter. With the tool in the orifice, wait for 3 seconds. Withdraw again the magnet tool and wait for 3 seconds. Put it now in the orifice **S** and it will appear the message of " LOC ADJ" (Local Adjust). Withdraw the tool and put it in the orifice **Z**. After this, you can browse to all the parameters configured in the display block.

Four Different Positions to the LCD Display

As you can see below, there are four different positions for attaching the LCD display on the device in order to adequate it for a better view of its information.

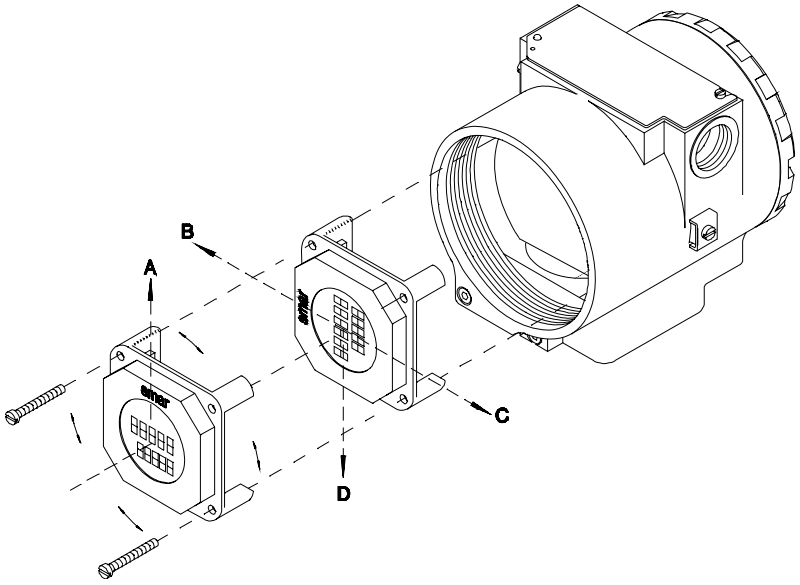


Figure 2.4 - Rotating the position of the LCD Display

CONFIGURATION

One of the many advantages of Fieldbus is that device configuration is independent of the configurator. A third party terminal or operator console may configure the FY302. Any particular configurator is therefore not addressed here.

The **FY302** contains one output transducer block, one resource block, one display transducer block and function blocks.

Transducer Block

Transducer block insulates function block from the specific I/O hardware, such as sensors, actuators. Transducer block controls access to I/O through manufacturer specific implementation. This permits the transducer block to execute as frequently as necessary to obtain good data from sensors without burdening the function blocks that use the data. It also insulates the function block from the manufacturer specific characteristics of certain hardware. By accessing the hardware, the transducer block can get data from I/O or passing control data to it. The connection between Transducer block and Function block is called channel. These blocks can exchange data from its interface.

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

Transducer Block Diagram

See transducer block diagram below.

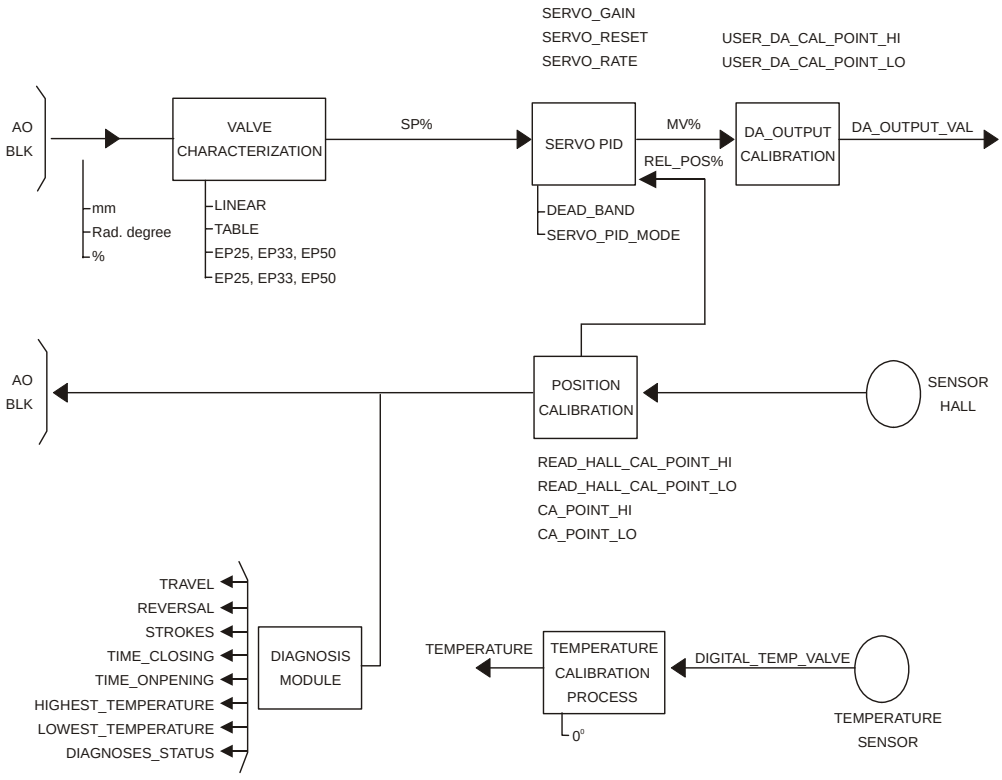


Table 3.1 – Transducer Block Diagram

Fieldbus Positioner Transducer

Description
The fieldbus positioner transducer receives the demanded valve position FINAL_VALUE from the AO block and uses it as a setpoint for a PID servo-positioning algorithm with adjustable gains SERVO_GAIN and SERVO_RESET. The transducer block also makes the corrected actual position sensor reading RETURN available to the AO block. The engineering unit and the final value range are selected from the XD_SCALE in the AO block. The units allowed are: for linear valve % and mm, for rotary valve %,°, rad.

After setting GAIN and RESET an automatic calibration should be done using SETUP to start the valve operation. The supported mode is OOS and AUTO. As the transducer block runs together with AO block, the transducer block goes to AUTO only if the AO mode block is different from OOS. The sensor module temperature may be read from the SECONDARY_VALUE parameter.

Warning messages may appear in Return status or in the Block Error in certain condition as explain below.

Supported Modes
OOS and AUTO.

BLOCK_ERR
The BLOCK_ERR of the transducer block will reflect the following causes:
- Block Configuration – When the XD_SCALE has an improper range or unit.
- Output Failure – When mechanic module is disconnected from main electronic board or no air supply (if FINAL_VALUE is different from 0 or 100%).
- Out of Service – When the block is in OOS mode.

Return Status
The RETURN status of the transducer block will reflect the following causes:
- Bad::NonSpecific:NotLimited – When mechanic module is disconnected from main electronic board or no air supply (if FINAL_VALUE is different from 0 or 100%).

Parameters

Idx	Parameter	Data Type	Valid Range	Initial/ Default Value	Units	Store	Description
1	ST_REV	Unsigned16	Positive	0	None	S	Indicates the level of static data.
2	TAG_DESC	VisibleString		Null	Na	S	Description of Transducer Block.
3	STRATEGY	Unsigned16		0	None	S	This parameter is not checked and processed by Transducer Block.
4	ALERT_KEY	Unsigned8	1-255	0	None	S	Number of identification in the plant.
5	**MODE_BLK**	**DS-69**		**OOS**	**Na**	**S**	**Indicates the operation mode of Transducer Block.**
6	**BLOCK_ERR**	**Bit String**		**Out of Service**	**E**	**D**	**Indicates the status associated with hardware or software in the Transducer.**
7	UPDATE_EVT	DS-73		*	Na	D	It is the alert for any static data.
8	BLOCK_ALM	DS-72		*	Na	D	It is used for configuration, hardware and others fail.
9	TRANSDUCER_DIRECTORY	Array of Unsigned16		0	None	N	It is used to select several Transducer Blocks.
10	TRANSDUCER_TYPE	Unsigned16		Positioner Valve	E	N	Indicates the type of Transducer according to its class.
11	XD_ERROR	Unsigned8		Default value set	None	D	It is used to indicate calibration status.
12	COLLECTION_DIRECTORY	Array of Unsigned 32		0	None	S	Specifies the number of transducer index into Transducer Block.
13	**FINAL_VALUE**	**DS-65**		*	**FVR**	**D**	**It is the value and status used by channel 1.**

Idx	Parameter	Data Type	Valid Range	Initial/ Default Value	Units	Store	Description
14	**FINAL_VALUE_RANGE**	**DS-68**		**100/0/%**	**FVR**	**S**	**The High and Low range limit values, the engineering unit code and the number of digits to the right of the decimal point to be used for Final Value.**
15	FINAL_VALUE_CUTTOF_HI	Float		100.0	FVR	S	If the FINAL_VALUE is more positive than this value is forced to its maximum high value (fully opened).
16	FINAL VALUE_CUTTOF_LO	Float		0.0	FVR	S	If the FINAL_VALUE is more negative than this value is forced to its maximum low value (fully closed).
17	FINAL_POSITION_VALUE	DS-65		*	FVR	D	The actual valve position and status could be used at the READBACK_VALUE in an AO block.
18	**SERVO_GAIN**	**Float**		**20**	**None**	**S**	**The servo PID gain valve.**
19	**SERVO_RESET**	**Float**		**2**	**FVR/Se**	**S**	**The servo PID reset valve.**
20	SERVO_RATE	Float		0	FVR/Sec	S	The servo PID rate valve.
21	ACT_FAIL_ACTION	Unsigned8		Undefined	None	S	Specifies the action the actuator takes in case of failure.
22	ACT_MAN_ID	Unsigned32		*	None	N	The actuator manufacturer identification number.
23	ACT_MODEL_NUM	VisibleString		NULL	None	N	The actuator model number.
24	ACT_SN	VisibleString		*	None	N	The actuator serial number.
25	VALVE_MAN_ID	Unsigned32		0	None	N	The valve manufacturer identification number.
26	VALVE_MODEL_NUM	VisibleString		NULL	None	N	The valve model number.
27	VALVE_SN	VisibleString		0	None	N	The valve serial number.
28	**VALVE_TYPE**	**Unsigned8**	**Lin/Rot**	**Liner**	**None**	**N**	**The type of the valve.**
29	XD_CAL_LOC	VisibleString		NULL	None	S	The location of the last positioned calibration. This describes
30	XD_CAL_DATE	Time of Day		Unspecified	None	S	The date of last positioner calibration.
31	XD_CAL_WHO	VisibleString		NULL	None	S	The name of the person responsible for the last positioner calibration.
32	CAL_POINT_HI	Float	-10.0-110.0%	100	%	S	The highest calibrated point.
33	CAL_POINT_LO	Float	-10.0-100.0%	0	%	S	The lowest calibrated point.
34	CAL_MIN_SPAN	Float		1	%	S	The minimum calibration span value allowed. This minimum span information is necessary to ensure that when calibration is done, the two calibrated points (high and low) are not too close together.
35	CAL_UNIT	Unsigned16		%	E	S	Engineering units code for the calibration values.
35	CAL_METHOD	Unsigned8		Factory	None	S	The method of last sensor calibration.
37	**SECONDARY_VALUE**	**DS-65**		*****	**SUV**	**D**	**The secondary value related to the sensor.**
38	**SECONDARY_VALUE_UNIT**	**Unsigned16**		**°C**	**E**	**S**	**The engineering units to be used with the secondary value**
39	BACKUP_RESTORE	Unsigned8		None		S	This parameter is used to backup or to restore configuration data.
40	POS_PER	DS-65		*		D	The percent position.
41	SERVO_PID_BYPASS	Unsigned8	True/False	Not bypass		S	Enable and disable the servo PID.
42	SERVO_PID_DEAD_BAND	Float		0	%	S	The dead band error for servo PID.
43	SERVO_PID_ERROR_PER	DS-65		*	%	D	The percent error value for the servo PID.
44	SERVO_PID_INTEGRAL_PER	DS-65		*	%	D	The percent integral value for the servo PID.

Idx	Parameter	Data Type	Valid Range	Initial/ Default Value	Units	Store	Description
45	SERVO_PID_MV_PER	DS-65		*	%	D	The percent measured value for the servo PID.
46	MODULE_SN	Unsigned32		*		N	The module manufacturer identification number.
47	SENSOR_PRESS _POL0	Float	± INF	31811.5	None	S	The pressure sensor polynomial coefficient 0.
48	SENSOR_PRESS _POL1	Float	± INF	27251.5	None	S	The pressure sensor polynomial coefficient 1.
49	SENSOR_PRESS _POL2	Float	± INF	0	None	S	The pressure sensor polynomial coefficient 2.
50	SENSOR_PRESS _POL3	Float	± INF	0	None	S	The pressure sensor polynomial coefficient 3.
51	SENSOR_PRESS _POL4	Float	± INF	0	None	S	The pressure sensor polynomial coefficient 4.
52	SENSOR_PRESS _POL5	Float	± INF	0	None	S	The pressure sensor polynomial coefficient 5.
53	SENSOR_PRESS _POL6	Float	± INF	0	None	S	The pressure sensor polynomial coefficient 6.
54	SENSOR_PRESS _POL7	Float	± INF	0	None	S	The pressure sensor polynomial coefficient 7.
55	SENSOR_PRESS _POL8	Float	± INF	0	None	S	The pressure sensor polynomial coefficient 8.
56	SENSOR_PRESS _POL9	Float	± INF	0	None	S	The pressure sensor polynomial coefficient 9.
57	SENSOR_PRESS _POL10	Float	± INF	0	None	S	The pressure sensor polynomial coefficient 10.
58	POLYNOMIAL_SENS_VERSION	Unsigned8		0	None	S	The pressure sensor polynomial version.
59	USER_HALL_CAL_POINT_HI	Float		*	%	S	The highest calibrated point.
60	USER_HALL_CAL_POINT_LO	Float		*	%	S	The lowest calibrated point.
61	READ_HALL_CAL_POINT_HI	Float	0.0-65535.0	*	None	S	The highest calibrated point for Hall sensor.
62	READ_HALL_CAL_POINT_LO	Float	0.0-65535.0	*	None	S	The lowest calibrated point for Hall sensor.
63	COEFF_SENS_TEMP_POL0	Float	± INF	*	None	S	The polynomial temperature coefficient 0.
64	COEFF_SENS_TEMP_POL1	Float	± INF	*	None	S	The polynomial temperature coefficient 1.
65	COEFF_SENS_TEMP_POL2	Float	± INF	*	None	S	The polynomial temperature coefficient 2.
66	COEFF_SENS_TEMP_POL3	Float	± INF	*	None	S	The polynomial temperature coefficient 3.
67	COEFF_SENS_TEMP_POL4	Float	± INF	*	None	S	The polynomial temperature coefficient 4.
68	POLYNOMIAL_SENS_TEMP_VERSION	Unsigned8		*	None	S	The polynomial temperature version.
69	CAL_TEMPERATURE	Float		*	°C(1001)	S	The temperature value used to calibrate the temperature.
70	CAL_DIGITAL_TEMPERATURE	Float		*	None	S	The cal digital temperature value.
71	CHARACTERIZATION_TYPE	Unsigned8		Linear	None	S	Select the characterization type.
72	CHARACTERIZATION _BYPASS	Unsigned8	True/False	True	None	S	Enable and disable the curve type.
73	CURVE _LENGTH	Unsigned8	2 to 8	10	None	S	The curve length of table characterization.
74	CURVE _X	Array of Float		*	%	S	Input points of characterization curve.
75	CURVE _Y	Array of Float		*	%	S	Output points of characterization curve.
76	CAL_POINT_HI_ BACKUP	Float		100.0	%	S	Indicates the backup for highest calibration point.
77	CAL_POINT_LO_ BACKUP	Float		0.0	%	S	Indicates the backup lowest calibration point.
78	CAL_POINT_HI_FACTORY	Float		100.0	%	S	Indicates the factory for highest calibration point.

Idx	Parameter	Data Type	Valid Range	Initial/ Default Value	Units	Store	Description
79	CAL_POINT_LO_FACTORY	Float		0.0	%	S	Indicates the factory for lowest calibration point.
80	**SETUP**	**Unsigned8**	**En/Dis**	**Disable**	**None**	**N**	**Enable self-calibration.**
81	FEEDBACK _CAL	Float		0	%	S	The position value used to correct a calibration.
82	CAL_CONTROL	Unsigned8	En/Dis	Disable	None	S	Enable and disable a calibration method.
83	**RETURN**	**DS-65**		*****	**FVR**	**D**	**The actual valve position and status, could be used at the READBACK_VALUE in an AO block.**
84	POT_KP	Unsigned8		*	None	S	The servo gain value by hardware.
85	POT_DC	Unsigned8		*	None	S	The DC constant value for the piezo sensor.
86	MAGNET_SIZE	Unsigned8		*	None	S	Features of Magnet.
87	ANALOG_LATCH	Unsigned8		*	None	S	Analog Switch used by hardware.
88	MAIN_LATCH	Unsigned8		*	None	S	Air to Open/Close.
89	DIGITAL_TEMPERATUR	DS-65		*	None	D	The digital temperature value.
90	PIEZO_ANALOG_VOLTA	DS-65		*	VOLTS	D	The piezo analog voltage value.
91	PIEZO_DIGITAL_VOLTA	DS-65		*	None	D	The piezo digital voltage value.
92	DA_OUTPUT_VALUE	DS-65		*	None	D	Digital analog output value.
93	USER_DA_CAL_POINT_HI	Float		*	None	S	Digital analog value for output in a highest calibration point.
94	USER_DA_CAL_POINT_LO	Float		*	None	S	Digital analog value for output in a lowest calibration point.
95	DIGITAL_HALL_VALUE	Unsigned16		*	None	D	Digital Hall value.
96	**SETUP_PROGRESS**	**Unsigned8**	**0/100**	*****	**None**	**D**	**Shows the setup progress status.**
97	HALL_OFFSET	float		*	None	D	The value after done self offset Hall calibration for Hall sensor value.
98	ORDERING_CODE	Array of Unsigned8		NULL	None	S	Indicates information about the sensor and control from factory production.
99	TRAVEL_ENABLE	Unsigned8	True/False	False	None	S	Enables the travel action
100	TRAVEL_DEADBAND	Float	± INF	2	None	S	It's the magnitude value of the valve movement, in percent of ranged travel (full stroke), necessary to increment the Travel
101	TRAVEL_LIMIT	Float	± INF	0	None	S	It is the value of the Travel.
102	TRAVEL	Float	± INF	*	None	D	It is the number of equivalent ranged travel (full stroke). The Travel value is incremented when the magnitude of the changing exceeds the Travel Deadband.
103	REVERSAL_ENABLE	Unsigned8	True/False	False	None	S	Enables the reversal action
104	REVERSAL_DEADBAND	Float	± INF	2	None	S	It is the magnitude value of the valve movement, in percent of ranged travel, necessary to increment the Reversal
105	REVERSAL_LIMIT	Float	± INF	0	None	S	It is the value of the Reversal, which, when exceeded, an Alert is generated. The alert is cleared by entering a new Reversal value lower than the Reversal Limit.

Idx	Parameter	Data Type	Valid Range	Initial/ Default Value	Units	Store	Description
106	REVERSAL	Float	± INF	*	None	D	It is the number of times the valve changes direction. The Reversal is incremented when there is a changing in the direction and the movement exceeds the Reversal Deadband.
107	DEVIATION_ENABLE	Unsigned8	True/False	False	None	S	Enables the deviation action
108	DEVIATION_DEADBAND	Float	± INF	2	None	S	It's the magnitude value of the valve deviation, in percent of ranged travel.
109	DEVIATION_TIME	Float	± INF	5	None	S	It's the time, in seconds, that the valve must exceed the Deviation Deadband before the alert is generated.
110	STROKES	Float	± INF	*	None	D	It is number of the times that the valve reached its maximum and minimum position.
111	**TIME_CLOSING**	**Float**	**± INF**	*****	**None**	**S**	**The time in seconds it took to stroke the valve from fully open to fully close.**
112	**TIME_OPENING**	**Float**	**± INF**	*****	**None**	**S**	**The time in seconds it took to stroke the valve from fully closed to fully open.**
113	HIGHEST_TEMPERATURE	Float	± INF	*	None	S	Indicates the highest environment temperature.
114	LOWEST_TEMPERATURE	Float	± INF	*	None	S	Indicates the lowest environment temperature.
115	DIAGNOSES_STATUS	Unsigned8		*	None	D	Show the device status (fails and warnings)
116	SENSOR_PRESS_UNIT	Unsigned16		psi	E	S	Pressure unit
117	SENSOR_CAL_SELECTED	Unsigned8	In,out1, out2	In	None	S	Selects between the three sensor pressure
118	SENSOR_CAL_POINT_HI	Float	0 - 100 psi	100	PRESS_UNIT	S	The highest calibrated point for the sensor pressure.
119	SENSOR_CAL_POINT_LO	Float	0 - 100 psi	0	PRESS_UNIT	S	The lowest calibrated point for the sensor pressure.
120	SENSOR_PRESS_IN	DS-65	0 - 100 psi	0	PRESS_UNIT	D	The reading of input sensor pressure.
121	SENSOR_PRESS_OUT1	DS-65	0 - 100 psi	0	PRESS_UNIT	D	The reading of out1 sensor pressure.
122	SENSOR_PRESS_OUT2	DS-65	0 - 100 psi	0	PRESS_UNIT	D	The reading of out2 sensor pressure.
123	SENSOR_PRESS_LO_LIM	Float	0 - 100 psi	0	PRESS_UNIT	S	The maximum limit value for the input pressure.
124	SENSOR_PRESS_HI_LIM	Float	0 - 100 psi	100	PRESS_UNIT	S	The minimum limit value for the input pressure.
125	SENSOR_PRESS_INSTALLED	Unsigned8	Not Installed/ Installed	*	*	N	Says if there are sensor pressure installed
126	SENSOR_PRESS_STATUS	Unsigned8		*	None	D	Show the sensor pressure status

Legend: E – Enumerated parameter; Na – Admensional parameter; RO – Read only; D – dynamic; N – non-volatile; S – Static
CU: CAL_UNIT; FVR: FINAL_VALUE_RANGE; SR: SENSOR_RANGE; SVU: SECONDARY_VALUE_RANGE

Gray Background Line: Default Parameters of Syscon

Transducer Block Parameter Description

Parameter	Description
ST_REV	Indicates the level of static data.
TAG_DESC	Description of Transducer Block.
STRATEGY	This parameter is not checked and processed by Transducer Block.
ALERT_KEY	Number of identification in the plant.
MODE_BLK	Indicates the operation mode of Transducer Block.
BLOCK_ERR	Indicates the status associated with hardware or software in the Transducer.
UPDATE_EVT	It is the alert for any static data.
BLOCK_ALM	It is used for configuration, hardware and other fails.
TRANSDUCER_DIRECTORY	It is used to select several Transducer Blocks.
TRANSDUCER_TYPE	Indicates the type of Transducer according to its class.
XD_ERROR	It is used to indicate calibration status.
COLLECTION_DIRECTORY	Specifies the number of transducer index into Transducer Block.
FINAL_VALUE	It is the value and status used by channel 1.
FINAL_VALUE_RANGE	The High and Low range limit values, the engineering unit code and the number of digits to the right of the decimal point to be used for Final Value.
FINAL_VALUE_CUTTOF_HI	If the FINAL_VALUE is more positive than this value is forced to its maximum high value (fully opened).
FINAL VALUE_CUTTOF_LO	If the FINAL_VALUE is more negative than this value is forced to its maximum low value (fully closed).
FINAL_POSITION_VALUE	The actual valve position and status could be used at the READBACK_VALUE in an AO block.
SERVO_GAIN	The servo PID gain valve.
SERVO_RESET	The servo PID reset valve.
SERVO_RATE	The servo PID rate valve.
ACT_FAIL_ACTION	Specifies the action the actuator takes in case of failure.
ACT_MAN_ID	The actuator manufacturer identification number.
ACT_MODEL_NUM	The actuator model number.
ACT_SN	The actuator serial number.
VALVE_MAN_ID	The valve manufacturer identification number.
VALVE_MODEL_NUM	The valve model number.
VALVE_SN	The valve serial number.
VALVE_TYPE	The type of the valve.
XD_CAL_LOC	The location of the last positioned calibration. This describes the physical location at which the calibration was performed.
XD_CAL_DATE	The date of last positioner calibration.
XD_CAL_WHO	The name of the person responsible for the last positioner calibration.
CAL_POINT_HI	The highest calibrated point.
CAL_POINT_LO	The lowest calibrated point.
CAL_MIN_SPAN	The minimum calibration span value allowed. This minimum span information is necessary to ensure that when calibration is done, the two calibrated points (high and low) are not too close together.
CAL_UNIT	Engineering units code for the calibration values.
CAL_METHOD	The method of last sensor calibration.
SECONDARY_VALUE	The secondary value related to the sensor.
SECONDARY_VALUE_UNIT	The engineering units to be used with the secondary value related to the sensor
BACKUP_RESTORE	This parameter is used to do backup or to restore configuration data.
POS_PER	The percent position.
SERVO_PID_BYPASS	Enable and disable the servo PID.
SERVO_PID_DEAD_BAND	The dead band error for servo PID.
SERVO_PID_ERROR_PER	The percent error value for the servo PID.
SERVO_PID_INTEGRAL_PER	The percent integral value for the servo PID.
SERVO_PID_MV_PER	The percent measured value for the servo PID.
MODULE_SN	The module manufacturer identification number.
COEFF_HALL_POL0	The polynomial Hall coefficient 0.
COEFF_HALL_POL1	The polynomial Hall coefficient 1.
COEFF_HALL_POL2	The polynomial Hall coefficient 2.
COEFF_HALL_POL3	The polynomial Hall coefficient 3.
COEFF_HALL_POL4	The polynomial Hall coefficient 4.
COEFF_HALL_POL5	The polynomial Hall coefficient 5.
COEFF_HALL_POL6	The polynomial Hall coefficient 6.
COEFF_HALL_POL7	The polynomial Hall coefficient 7.
COEFF_HALL_POL8	The polynomial Hall coefficient 8.
COEFF_HALL_POL9	The polynomial Hall coefficient 9.
COEFF_HALL_POL10	The polynomial Hall coefficient 10.

Parameter	Description
POLYNOMIAL_HALL_VERSION	The polynomial Hall version.
USER_HALL_CAL_POINT_HI	The highest calibrated point.
USER_HALL_CAL_POINT_LO	The lowest calibrated point.
READ_HALL_CAL_POINT_HI	The highest calibrated point for Hall sensor.
READ_HALL_CAL_POINT_LO	The lowest calibrated point for Hall sensor.
COEFF_SENS_TEMP_POL0	The polynomial temperature coefficient 0.
COEFF_SENS_TEMP_POL1	The polynomial temperature coefficient 1.
COEFF_SENS_TEMP_POL2	The polynomial temperature coefficient 2.
COEFF_SENS_TEMP_POL3	The polynomial temperature coefficient 3.
COEFF_SENS_TEMP_POL4	The polynomial temperature coefficient 4.
POLYNOMIAL_SENS_TEMP_VERSION	The polynomial temperature version.
CAL_TEMPERATURE	The temperature value used to calibrate the temperature.
CAL_DIGITAL_TEMPERATURE	The cal digital temperature value.
CHARACTERIZATION_TYPE	Select the characterization type.
CHARACTERIZATION _BYPASS	Enable and disable the curve type.
CURVE _LENGTH	The curve length of table characterization.
CURVE _X	Input points of characterization curve.
CURVE _Y	Output points of characterization curve.
CAL_POINT_HI_ BACKUP	Indicates the backup for highest calibration point.
CAL_POINT_LO_ BACKUP	Indicates the backup lowest calibration point.
CAL_POINT_HI_FACTORY	Indicates the factory for highest calibration point.
CAL_POINT_LO_FACTORY	Indicates the factory for lowest calibration point.
SETUP	Enable self-calibration.
FEEDBACK _CAL	The position value used to correct a calibration.
CAL_CONTROL	Enable and disable a calibration method.
RETURN	The actual valve position and status could be used at the READBACK_VALUE in an AO block.
POT_KP	The servo gain value by hardware.
POT_DC	The DC constant value for the piezo sensor.
MAGNET_SIZE	Features of Magnet.
ANALOG_LATCH	Analog Switch used by hardware.
MAIN_LATCH	Air to Open/Close.
DIGITAL_TEMPERATURE	The digital temperature value.
PIEZO_ANALOG_VOLTAGE	The piezo analog voltage value.
PIEZO_DIGITAL_VOLTAGE	The piezo digital voltage value.
DA_OUTPUT_VALUE	Digital analog output value.
USER_DA_CAL_POINT_HI	Digital analog value for output in a highest calibration point.
USER_DA_CAL_POINT_LO	Digital analog value for output in a lowest calibration point.
DIGITAL_HALL_VALUE	Digital Hall value.
HALL_OFFSET_CONTROL	Enable self-Offset Hall (Hall) calibration.
HALL_OFFSET	The value after done self offset Hall calibration for Hall sensor value.
ORDERING_CODE	Indicates information about the sensor and control from factory production.
TRAVEL_ENABLE	Enables the travel action
TRAVEL_DEADBAND	It's the magnitude value of the valve movement, in percent of ranged travel (full stroke), necessary to increment the Travel
TRAVEL_LIMIT	It's the value of the Travel
TRAVEL	It is the number of equivalent ranged travel (full stroke). The Travel value is incremented when the magnitude of the changing exceeds the Travel Dead band
REVERSAL_ENABLE	Enables the reversal action
REVERSAL_DEADBAND	It is the magnitude value of the valve movement, in percent of ranged travel, necessary to increment the Reversal
REVERSAL_LIMIT	It is the value of the Reversal, which, when exceeded, an Alert is generated. The alert is cleared by entering a new Reversal value lower than the Reversal Limit.
REVERSAL	It is the number of times the valve changes direction. The Reversal is incremented when there is a changing in the direction and the movement exceeds the Reversal Dead band.
DEVIATION_ENABLE	Enables the deviation action
DEVIATION_DEADBAND	It's the magnitude value of the valve deviation, in percent of ranged travel.
DEVIATION_TIME	It's the time in seconds, that the valve must exceed the Deviation Dead band before the alert is generated.
STROKES	It is number of the times that the valve reached its maximum and minimum position.
TIME_CLOSING	The time in seconds it took to stroke the valve from fully open to fully closed
TIME_OPENING	The time in seconds it took to stroke the valve from fully closed to fully open
HIGHEST_TEMPERATURE	Indicates the highest environment temperature
LOWEST_TEMPERATURE	Indicates the lowest environment temperature
DIAGNOSES_STATUS	Show the device status (fails and warnings)
SENSOR_PRESS_UNIT	Pressure unit
SENSOR_CAL_SELECTED	Selects between the three sensor pressure

Parameter	Description
SENSOR_CAL_POINT_HI	The highest calibrated point for the sensor pressure.
SENSOR_CAL_POINT_LO	The lowest calibrated point for the sensor pressure.
SENSOR_PRESS_IN	The reading of input sensor pressure
SENSOR_PRESS_OUT1	The reading of out1 sensor pressure
SENSOR_PRESS_OUT2	The reading of out2 sensor pressure
SENSOR_PRESS_LO_LIM	The maximum limit value for the input pressure
SENSOR_PRESS_HI_LIM	The minimum limit value for the input pressure
SENSOR_PRESS_INSTALLED	Says if there are sensor pressure installed
SENSOR_PRESS_STATUS	Show the sensor pressure status

Table 3.2 - Transducer Block Parameter Description

Transducer Block Parameter Attributes

Relative Index	Parameter Mnemonic	Object Type	Data Type	Store	Size	Access	Default Value	View
1	ST_REV	Simple	Unsigned16	S	2	R/W	0	1,2,3,4
2	TAG_DESC	Simple	VisibleString	S	32	R/W	TRD BLOCK	
3	STRATEGY	Simple	Unsigned16	S	2	R/W	0	4
4	ALERT_KEY	Simple	Unsigned8	S	1	R/W	0	4
5	MODE_BLK	Record	DS-69	S	4	R/W	O/S,AUTO	1,3
6	BLOCK_ERR	Simple	Bit String	D	2	R/W		1,3
7	UPDATE_EVT	Record	DS-73	D	5	R/W		
8	BLOCK_ALM	Record	DS-72	D	13	R/W		
9	TRANSDUCER_DIRECTORY	Simple	Array of Unsigned16	N	Variable	R/W		
10	TRANSDUCER_TYPE	Simple	Unsigned16	N	2	R/W	65535	
11	XD_ERROR	Simple	Unsigned8	D	1	R	16	1,2,3,4
12	COLLECTION_DIRECTORY	Simple	Array of Unsigned 32	S	Variable	R		1,3
13	FINAL_VALUE	Record	DS-65	D	5	R		1,3
14	FINAL_VALUE_RANGE	Record	DS-68	S	11	R	0.0-100.0%	2
15	FINAL_VALUE_CUTTOF_HI	Simple	Float	S	4	R/W	100.0%	4
16	FINAL VALUE_CUTTOF_LO	Simple	Float	S	4	R/W	0.0%	4
17	FINAL_POSITION_VALUE	Record	DS-65	D	5	XD_SCALE	0.0%	1,3
18	SERVO_GAIN	Simple	Float	S	4	None	43.0	4
19	SERVO_RESET	Simple	Float	S	4	FVRU/Sec	2.0	4
20	SERVO_RATE	Simple	Float	S	4	FVRU/sSec	0.0	4
21	ACT_FAIL_ACTION	Simple	Unsigned8	S	1	None	0	
22	ACT_MAN_ID	Simple	Unsigned32	N	4	None	0	
23	ACT_MODEL_NUM	Simple	VisibleString	N	32	None	NULL	
24	ACT_SN	Simple	VisibleString	N	32	None	0	
25	VALVE_MAN_ID	Simple	Unsigned32	N	4	None	0	
26	VALVE_MODEL_NUM	Simple	VisibleString	N	32	None	NULL	
27	VALVE_SN	Simple	VisibleString	N	32	None	0	
28	VALVE_TYPE	Simple	Unsigned8	N	1	None	Linear	4
29	XD_CAL_LOC	Simple	VisibleString	S	32	none	NULL	
30	XD_CAL_DATE	Simple	Time of Day	S	7	none		
31	XD_CAL_WHO	Simple	VisibleString	S	32	none	NULL	
32	CAL_POINT_HI	Simple	Float	S	4	R/W	100.0	2,4
33	CAL_POINT_LO	Simple	Float	S	4	R/W	0.0	2,4
34	CAL_MIN_SPAN	Simple	Float	S	4	R	1.0	
35	CAL_UNIT	Simple	Unsigned16	S	2	R	1342	
36	CAL_METHOD	Simple	Unsigned8	S	1	R	103	
37	SECONDARY_VALUE	Record	DS-65	D	5	R	0	1,3
38	SECONDARY_VALUE_UNIT	Simple	Unsigned16	S	2	R	°C(1001)	2
39	BACKUP_RESTORE	Simple	Unsigned8	S	1	R/W	0	4
40	POS_PER	Record	DS-65	D	5	R	0	3
41	SERVO_PID_BYPASS	Simple	Unsigned8	S	1	R/W	False	1,3
42	SERVO_PID_DEAD_BAND	Simple	Float	S	4	R/W	10.0	4
43	SERVO_PID_ERROR_PER	Record	DS-65	D	5	R	0	3,4
44	SERVO_PID_INTEGRAL_PER	Record	DS-65	D	5	R	0	3
45	SERVO_PID_MV_PER	Record	DS-65	D	5	R	0	3
46	MODULE_SN	Simple	Unsigned32	N	4	R/W	0	4

Relative Index	Parameter Mnemonic	Object Type	Data Type	Store	Size	Access	Default Value	View
47	COEFF_HALL_POL0	Simple	Float	S	4	R/W	35331.0	4
48	COEFF_HALL_POL1	Simple	Float	S	4	R/W	24999.0	4
49	COEFF_HALL_POL2	Simple	Float	S	4	R/W	0	
50	COEFF_HALL_POL3	Simple	Float	S	4	R/W	0	
51	COEFF_HALL_POL4	Simple	Float	S	4	R/W	0	
52	COEFF_HALL_POL5	Simple	Float	S	4	R/W	0	
53	COEFF_HALL_POL6	Simple	Float	S	4	R/W	0	
54	COEFF_HALL_POL7	Simple	Float	S	4	R/W	0	
55	COEFF_HALL_POL8	Simple	Float	S	4	R/W	0	
56	COEFF_HALL_POL9	Simple	Float	S	4	R/W	0	
57	COEFF_HALL_POL10	Simple	Float	S	4	R/W	0	
58	POLYNOMIAL_HALL_VERSION	Simple	Unsigned8	S	1	R/W	0	
59	USER_HALL_CAL_POINT_HI	Simple	Float	S	4	R	100.0	
60	USER_HALL_CAL_POINT_LO	Simple	Float	S	4	R	0.0	
61	READ_HALL_CAL_POINT_HI	Simple	Float	S	4	R	50810.0	4
62	READ_HALL_CAL_POINT_LO	Simple	Float	S	4	R	2400.0	4
63	COEFF_SENS_TEMP_POL0	Simple	Float	S	4	R/W	-70.5	
64	COEFF_SENS_TEMP_POL1	Simple	Float	S	4	R/W	0.7774	
65	COEFF_SENS_TEMP_POL2	Simple	Float	S	4	R/W	-0.0001072	
66	COEFF_SENS_TEMP_POL3	Simple	Float	S	4	R/W	0	
67	COEFF_SENS_TEMP_POL4	Simple	Float	S	4	R/W	0	
68	POLYN_SENS_TEMP_VERSION	Simple	Unsigned8	S	1	R/W	10H	
69	CAL_TEMPERATURE	Simple	Float	S	4	R/W	25.0	
70	CAL_DIGITAL_TEMPERATURE	Simple	Float	S	4	R	125.606	3
71	CHARACTERIZATION_TYPE	Simple	Unsigned8	S	1	R/W	255	2
72	CHARACTERIZATION _BYPASS	Simple	Unsigned8	S	1	R/W	False	2
73	CURVE _LENGTH	Simple	Unsigned8	S	1	R/W	8	2
74	CURVE _X	Simple	Array of Float	S	21	R/W		
75	CURVE _Y	Simple	Array of Float	S	21	R/W		
76	CAL_POINT_HI_ BACKUP	Simple	Float	S	4	R	100.0	2
77	CAL_POINT_LO_ BACKUP	Simple	Float	S	4	R	0.0	2
78	CAL_POINT_HI_FACTORY	Simple	Float	S	4	R	100.0	
79	CAL_POINT_LO_FACTORY	Simple	Float	S	4	R	0.0	
80	SETUP	Simple	Unsigned8	N	1	R/W	Disable	
81	FEEDBACK _CAL	Simple	Float	S	4	R/W	0	4
82	CAL_CONTROL	Simple	Unsigned8	S	1	R/W	Disable	4
83	RETURN	Record	DS-65	D	5	R	0	3
84	POT_KP	Simple	Unsigned8	S	1	R		3
85	POT_DC	Simple	Unsigned8	S	1	R/W	128	3
86	MAGNET_SIZE	Simple	Unsigned8	S	1	R/W		
87	ANALOG_LATCH	Simple	Unsigned8	S	1	R/W	12	4
88	MAIN_LATCH	Simple	Unsigned8	S	1	R/W		
89	DIGITAL_TEMPERATURE	Record	DS-65	D	5	R	0	3
90	PIEZO_ANALOG_VOLTAGE	Record	DS-65	D	5	R	0	3
91	PIEZO_DIGITAL_VOLTAGE	Record	DS-65	D	5	R	0	3
92	DA_OUTPUT_VALUE	Record	DS-65	D	5	R	0	3
93	USER_DA_CAL_POINT_HI	Record	Float	S	4	R	12000	4
94	USER_DA_CAL_POINT_LO	Record	Float	S	4	R	4000	4
95	DIGITAL_HALL_VALUE	Simple	Unsigned16	D	2	R	0	3
96	HALL_OFFSET_CONTROL	Simple	Unsigned8	D	1	R/W	Disable	4
97	HALL_OFFSET	Simple	float	D	4	R	0	4
98	ORDERING_CODE	Simple	Array of Unsigned8	S	50	R/W	NULL	
99	TRAVEL_ENABLE	Simple	Unsigned8	S	1	R/W	False	
100	TRAVEL_DEADBAND	Simple	Float	S	4	R/W	0	
101	TRAVEL_LIMIT	Simple	Float	S	4	R/W	0	
102	TRAVEL	Simple	Float	D	4	R/w	0	
103	REVERSAL_ENABLE	Simple	Unsigned8	S	1	R/W	False	
104	REVERSAL_DEADBAND	Simple	Float	S	4	R/W	0	
105	REVERSAL_LIMIT	Simple	Float	S	4	R/W	0	
106	REVERSAL	Simple	Float	D	4	R/w	0	
107	DEVIATION_ENABLE	Simple	Unsigned8	S	1	R/W	False	
108	DEVIATION_DEADBAND	Simple	Float	S	4	R/W	0	
109	DEVIATION_TIME	Simple	Float	S	4	R/W	0	
110	STROKES	Simple	Float	D	4	R/W	0	
111	TIME_CLOSING	Simple	Float	S	4	R/W	0	

Relative Index	Parameter Mnemonic	Object Type	Data Type	Store	Size	Access	Default Value	View
112	TIME_OPENING	Simple	Float	S	4	R/W	0	
113	HIGHEST_TEMPERATURE	Simple	Float	S	4	R/W	0	
114	LOWEST_TEMPERATURE	Simple	Float	S	4	R/W	0	
115	DIAGNOSES_STATUS	Simple	Unsigned8	D	1	R/W	0	
116	SENSOR_PRESS_UNIT	Simple	Unsigned16	S	2	R/W	psi	
117	SENSOR_CAL_SELECTED	Simple	Unsigned8	S	1	R/W	input	
118	SENSOR_CAL_POINT_HI	Simple	Float	S	4	R/W	100	
119	SENSOR_CAL_POINT_LO	Simple	Float	S	4	R/W	0	
120	SENSOR_PRESS_IN	Record	DS-65	D	5	R	0	
121	SENSOR_PRESS_OUT1	Record	DS-65	D	5	R	0	
122	SENSOR_PRESS_OUT2	Record	DS-65	D	5	R	0	
123	SENSOR_PRESS_LO_LIM	Simple	Float	S	4	R/W	0	
124	SENSOR_PRESS_HI_LIM	Simple	Float	S	4	R/W	100	
125	SENSOR_PRESS_INSTALLED	Simple	Unsigned8	N	1	R/W	Not Installed	
126	SENSOR_PRESS_STATUS	Simple	Unsigned8	D	1	R/W	0	

Table 3.3 - Transducer Blocks Parameter Attributes

How to Configure a Transducer Block

The transducer block has an algorithm and a set of contained parameters.

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

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

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

Auto-Setup

This process is necessary to find the position values at which the valve is considered fully open or close. This operation can be done using the **SYSCON** or the Local Adjustment. The **FY302** automatically finds the fully open and closed positions of a valve, but the user may also set a narrower range of operation should he like to. Before making the Auto-Setup, select the type of valve through the parameter VALVE_TYPE choosing between "Linear or Rotary" options.

The setup operation can be started writing "Enable" on the parameter SETUP, so the positioner will execute immediately the operation of auto-setup for approximately 2 to 5 minutes depending on the type of valve, other configured parameters and function blocks used in the positioner.

The process will be finished when the SETUP parameter will indicate "Disable" automatically during the operation of reading.

NOTE

This operation should be performed off-line or with the process shut down to be sure that the plant operation is not disturbed, due the valve will be moved between the fully open and close points in order to reach the better adjustment.

After the AUTO-SETUP operation the user should adjust the ZERO and SPAN positions, writing on the parameters CAL_POINT_LO and CAL_POINT_HI.

NOTE

In case of oscillation, decrease the gain of valve, acting on the SERVO_GAIN parameter.

If the valve could be out-of-control after its operation, please, repeat the Auto-Setup operation again.

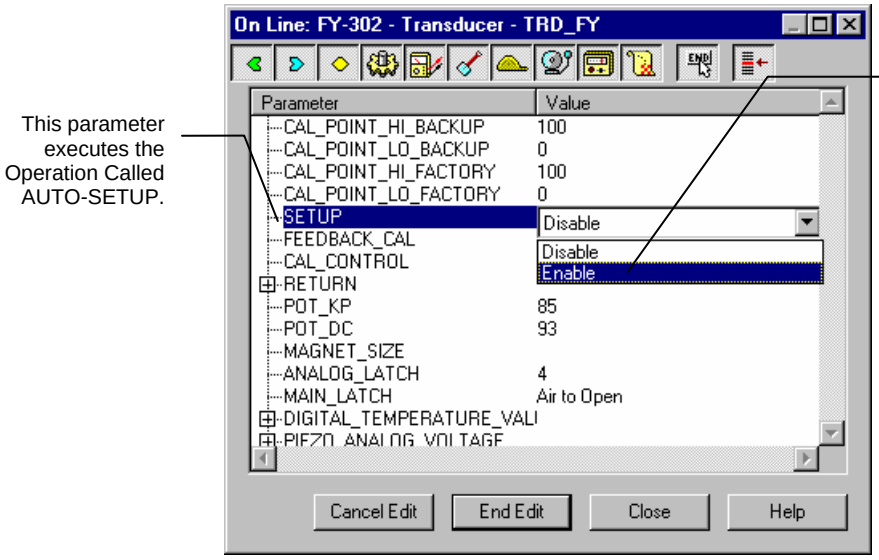


Figure 3.1 - Enabling the Auto-Setup Operation

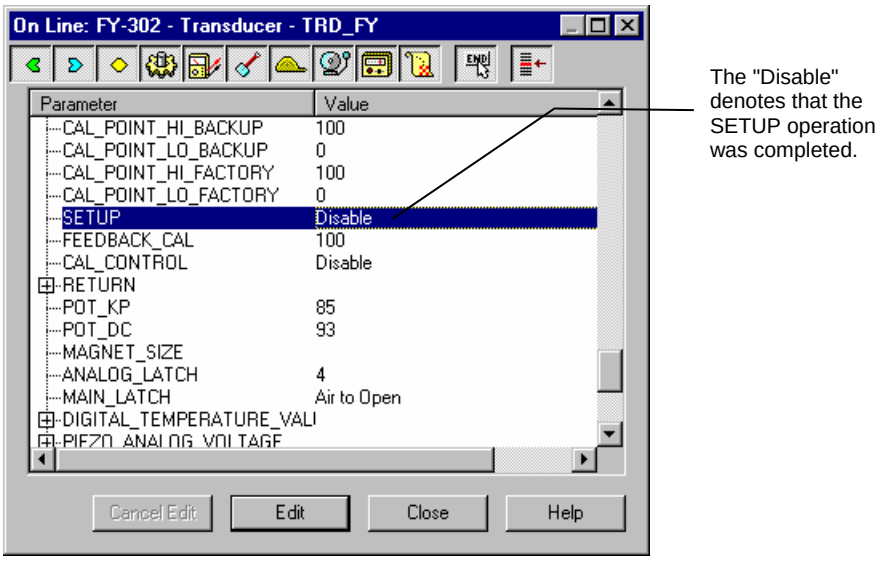


Figure 3.2 - Disabling the Auto-Setup Operation

The setup progress can be followed by watching the parameters SETUP_PROGRESS. It goes from 0 to 100%.

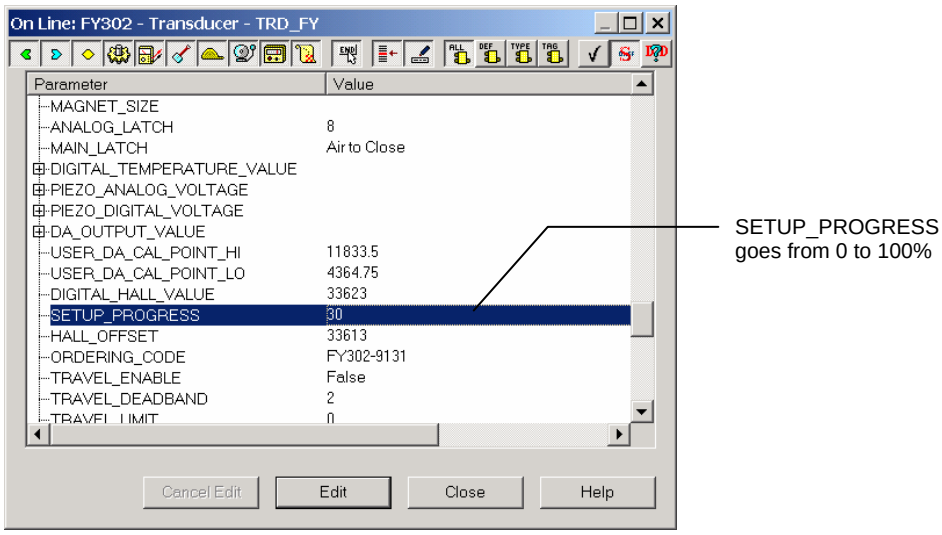


Figure 3.3 - Setup Progress

The setup process stuck sometimes because of wrong parameter configuration or a problem in the positioner assembly. Bellow there is a list of the maintenance procedure according to the SETUP_PROGRESS value.

Setup Progress	Probably Problem Cause
40%	No air supply, spool stuck or lower proportional value
60%	Lower proportional value (SERVO_GAIN)
70%	Higher proportional value (SERVO_GAIN)
80%	Higher proportional value (SERVO_GAIN)

Also the display positioner can show some error messages.

Display Message	Probably Problem Cause
Fail Press	No air supply, spool stuck or lower proportional value
Fail Mgnt	No magnet installed or it was not well assembly
Fail Hall	Problem with Hall sensor or flat cable disconnected

Calibration

It is a specific method to make the calibration operation. It is necessary to match the source of reference applied to or connected to the device with the desired value. At least four parameters should be used to configure this process: CAL_POINT_HI, CAL_POINT_LO, CAL_MIN_SPAN, and CAL_UNIT. Those parameters define the highest and lowest calibrated values for this device, the minimum allowable span value for calibration (if necessary) and the engineering unit selected for calibration purposes.

NOTE
98% of the valves after setup process are well calibrated, therefore the calibration is not necessary.

Position Trim

Via SYSCON

First of all, the user must configure the valve type. Through the parameter “VALVE TYPE” the valve type can be selected.

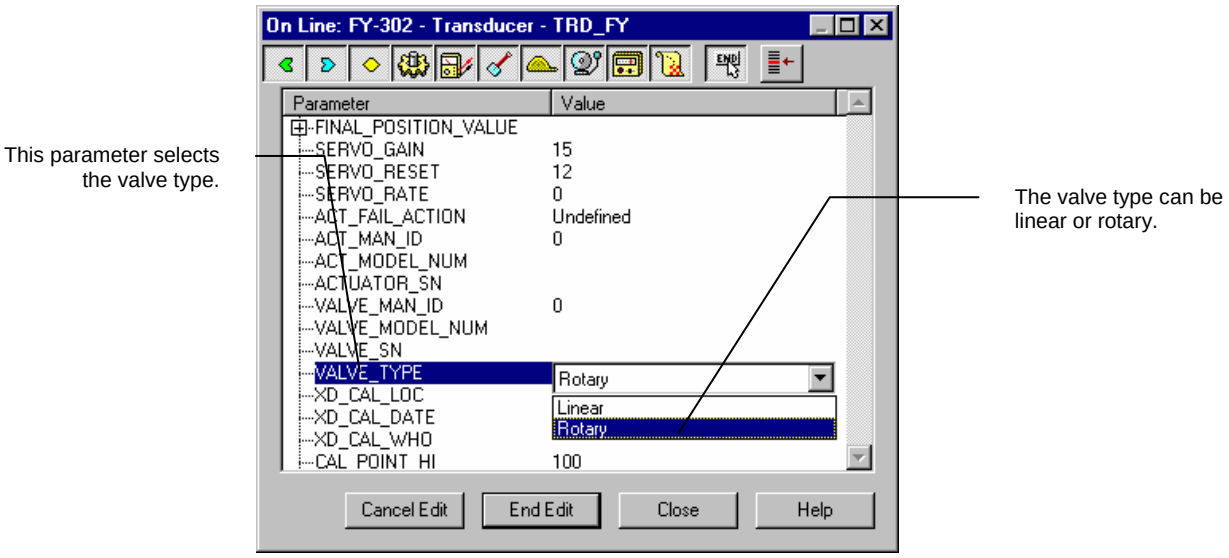


Figure 3.4 – Valve Type Configuration

It is possible to calibrate the positioner by parameters CAL_POINT_LO and CAL_POINT_HI. Let’s take the lower value as an example:
Write 0% in parameter CAL_POINT_LO. For **FY302** it should be always 0%.

Simply by writing in this parameter, the trim procedure is initialized.

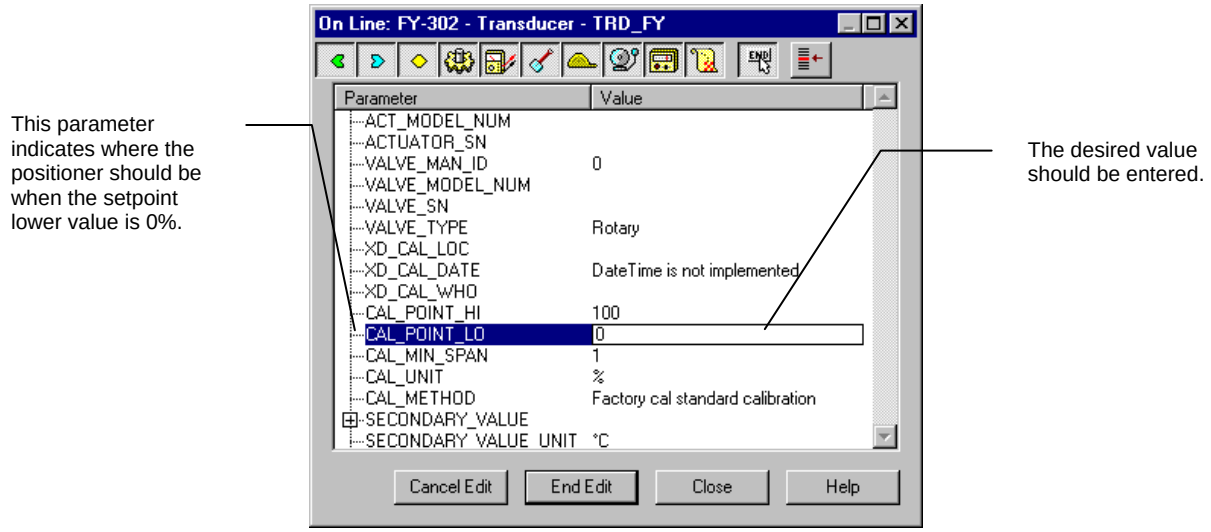


Figure 3.5 - Calibrating Low Range Value Point

Check the position showed in the local indicator and if it is different of 0% write it in the parameter FEEDBACK_CAL. Repeat this operation until it reads 0%.

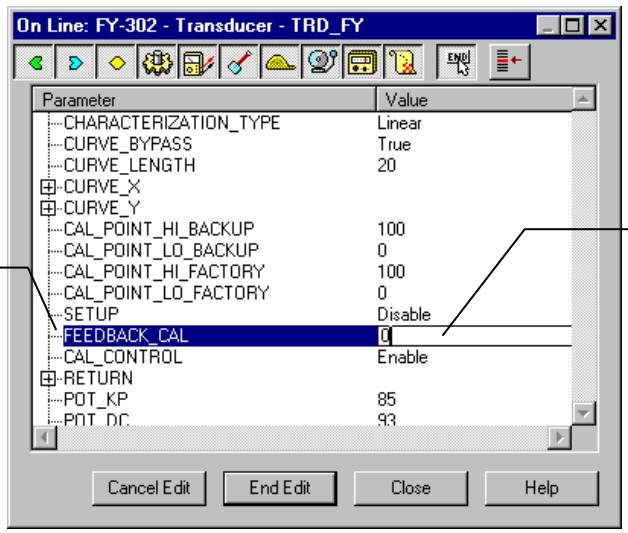


Figure 3.6 - Calibrating of Trim 0%

You should finalize the calibration method writing "Disable" in the parameter CAL_CONTROL.

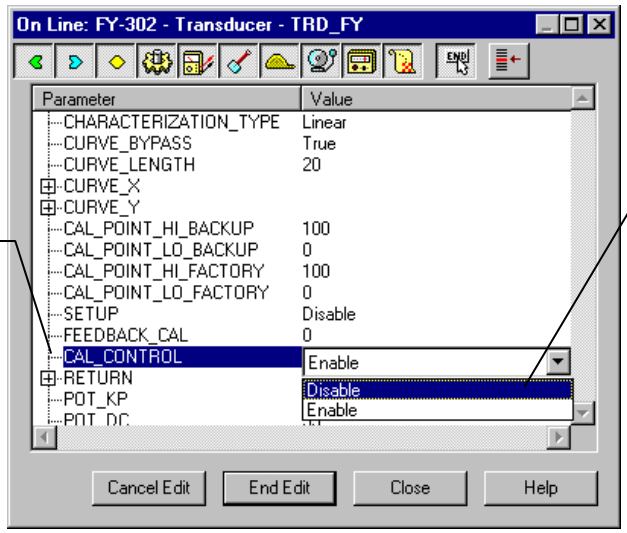


Figure 3.7 – Finishing Calibration Procedure

For the upper value, for example:
Write 100% in parameter CAL_POINT_HI.
For **FY302** it should be always 100%.
Always keep in mind that, simply by writing in this parameter, the trim procedure is initialized.

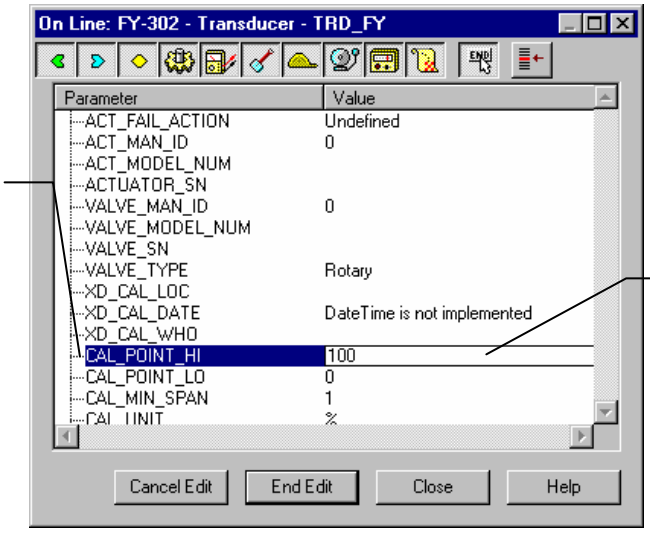


Figure 3.8 - Calibrating High Range Value Point

Check the position showed on the local indicator and if it is different of 100% write it in the parameter FEEDBACK_CAL. Repeat this operation until it reads 100%.

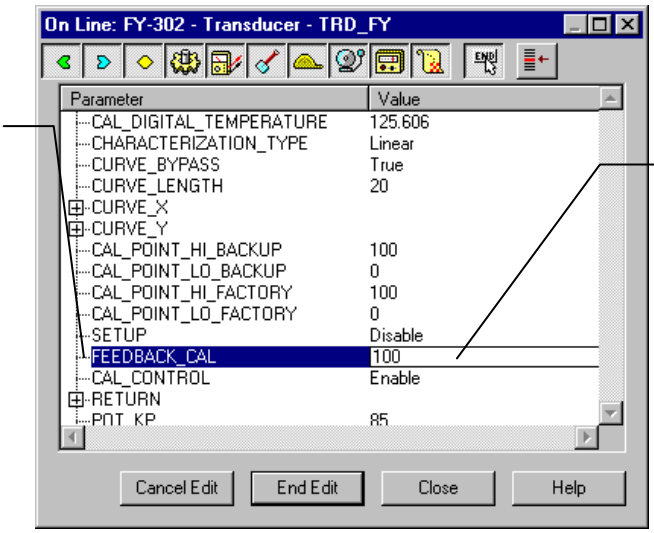


Figure 3.9 - 100% Trim Calibration

In order to end the trim procedure, select ”DISABLE” in CAL_CONTROL parameter.

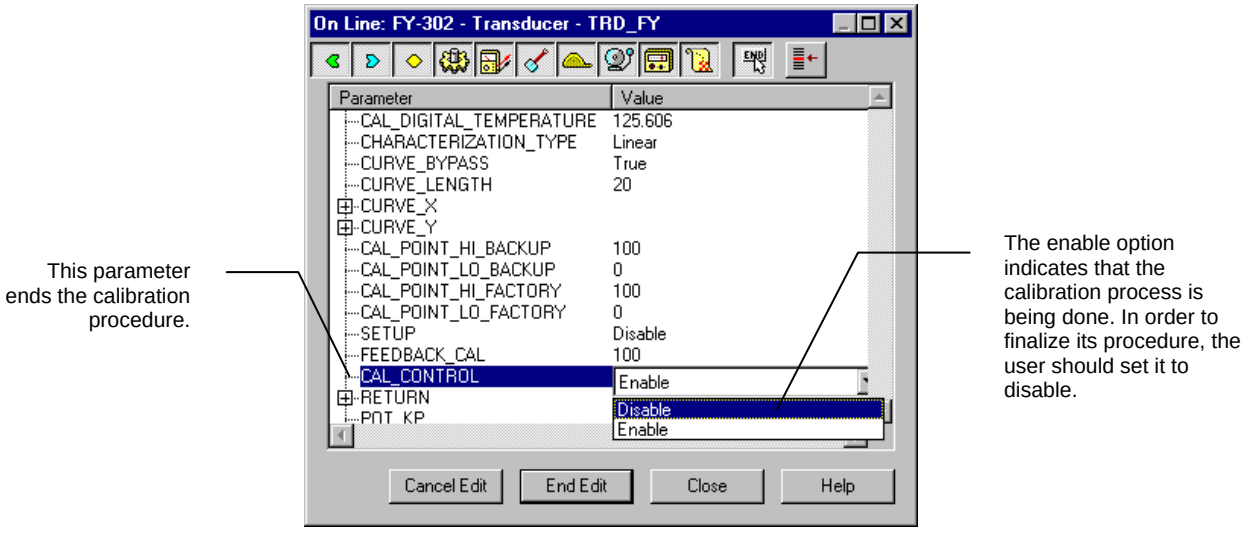


Figure 3.10 – End of Trim Procedure

NOTE

It is convenient to choose the unit to be used in parameter XD_SCALE of the Analog Output Block, considering that positioner limits shall be observed, it means 0% and 100%.

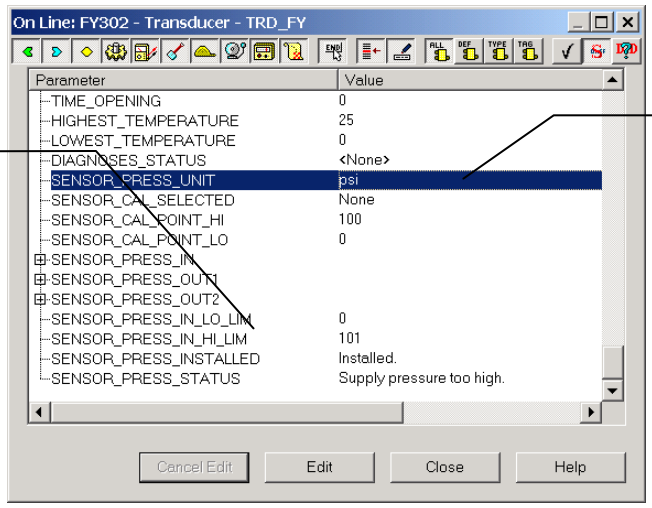
It is also recommendable, for every new calibration, to save the existing trim data in the parameters CAL_POINT_LO_BACKUP and CAL_POINT_HI_BACKUP, by means of parameter BACKUP_RESTORE, using option LAST_CAL_ BACKUP.

Sensor Pressure

Some positioner FY302 has three sensors that work individually to monitor input and output pressures. Those pressure values can be used by a maintenance supervisory system, such as Asset View, for diagnosis procedure.

.

If the input pressure is outside this range an alarm will appears in the SENSOR_PRESS_STATUS



Sensor Pressure unit can be: atm, bar, ftH20(68°F),g/cm2, inH20(4°C), in H20(68°F), in Hg(0°C), Kg/cm2, kPa, mbar, mmH20(4°C), mm 20(68°F), mmHg(0°C), psi, Mpa, Pa, torr

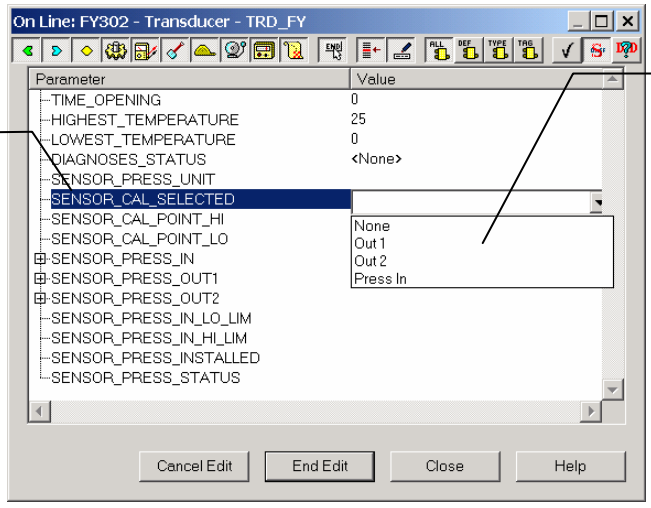
Figure 3.11 - Sensor Pressure Parameters

The sensor pressure trim is done through SENSOR_CAL_SELECTED, SENSOR_CAL_POINT_HI and SENSOR_CAL_POINT_LO parameters.

The SENSOR_CAL_SELECTED allow to choose among the three pressure sensor (input, out1 and out2). After the sensor selection the calibration is done using two points, one can be without pressure (CAL_POINT_LO) and the other using the system pressure.

In order to make a good calibration, the valve should be opened totally (out1 with maximum pressure for the sensor out1 trim) and the valve should be closed totally (out2 with maximum pressure for sensor out2 trim).

Enter here the measured pressure



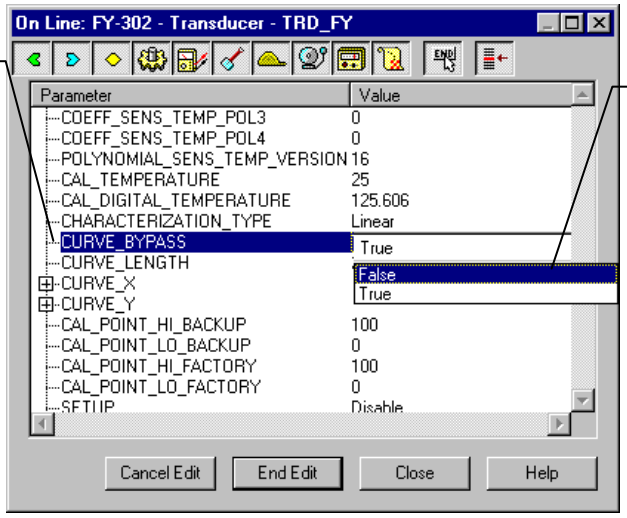
Select here the sensor for trim.

Figure 3.12 - Sensor Pressure Trim

Flow Characterization

The desired flow characteristics may be changed using this function. The options for applied flow characterization are: **LINEAR, TABLE , EP25, EP33, EP50, QO25, QO33, QO50**

The user can select the best flow characterization curve for each type of valve.



The value of “False” indicates that the Flow Characterization curve is enabled.

Figure 3.13 - Choosing the Flow Characterization Curve

In case of flow characterization selected to be TABLE, the user can configure up to 20 points in percentage. The number of points should be configured writing the parameter CURVE_LENGTH and its curve can be enabled by writing on the parameter CURVE_BYPASS.

The equation resulting from its curve is:

Y[%] = (100*(X[%]/100))/(L+(1-L)*(X[%]/100)),

Where:

Y[%] = Value after the flow characterization curve calculation
X[%] = Position value before entering in the curve calculation

L = Characterization Factor

TIPO	L
LINEAR	1.0
EP25	3.5
EP33	4.1
EP50	5.1
QO25	0.27
QO33	0.24
QO50	0.19

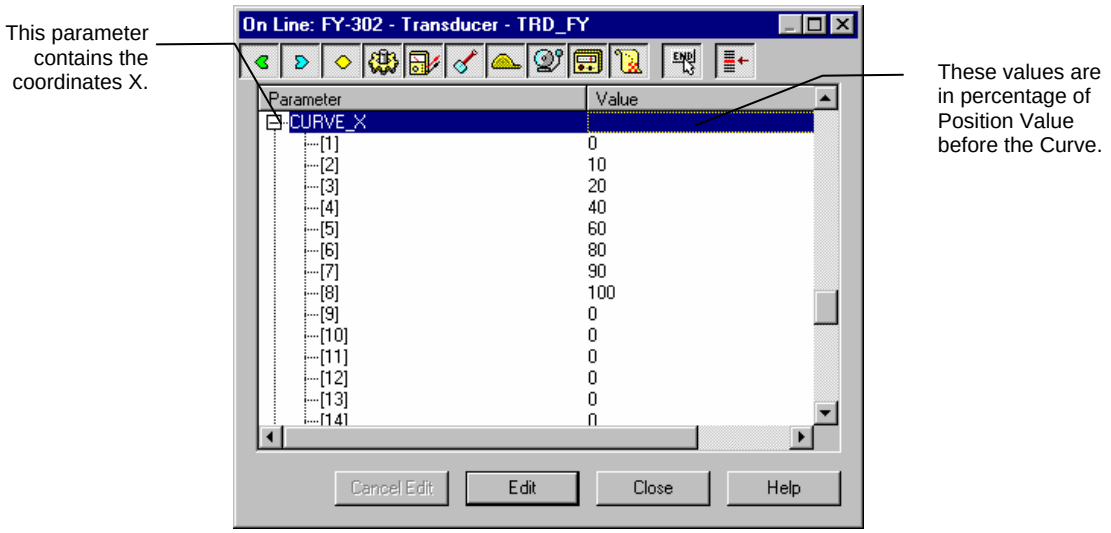


Figure 3.14 - Configuring the Table for Flow Characterization - X points

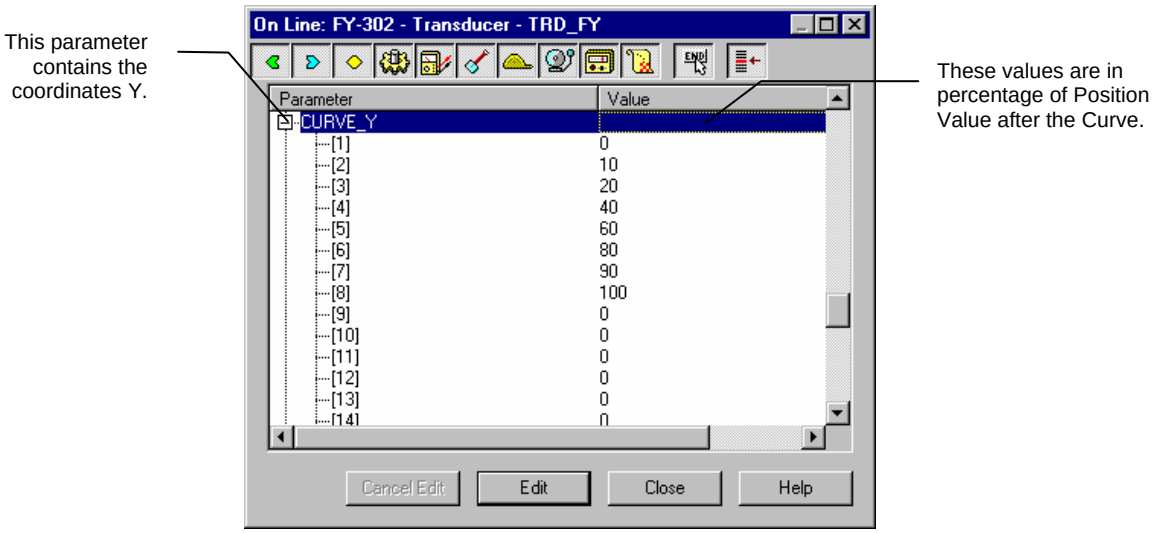


Figure 3.15 - Configuring the Table for Flow Characterization - Y points

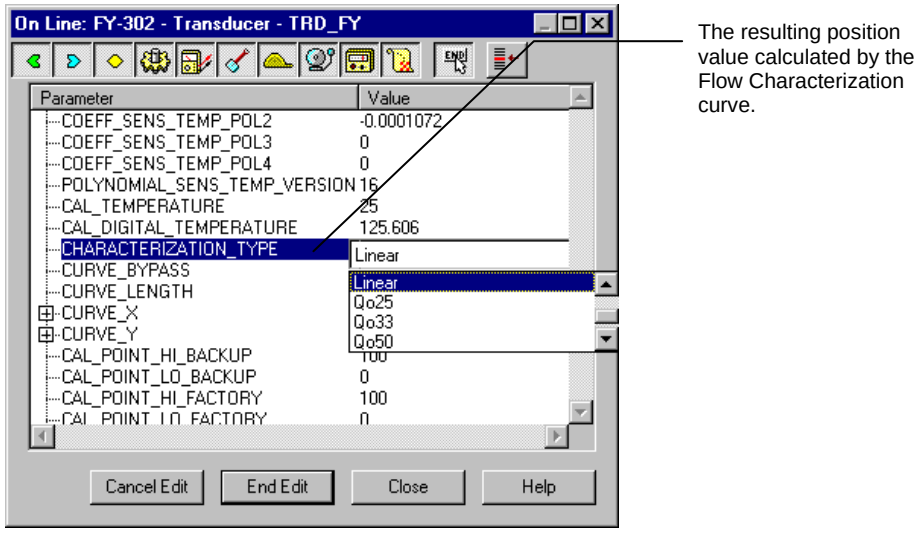


Figure 3.16 - Flow Characterization Type

Temperature Calibration

The parameter CAL_TEMPERATURE can be used to trim the temperature sensor located at the body of positioner in order to improve the accuracy of temperature measurement done by its sensor. The range accepts from -40°C to +85 °C. The parameter SECONDARY_VALUE indicates the value of such measurement.

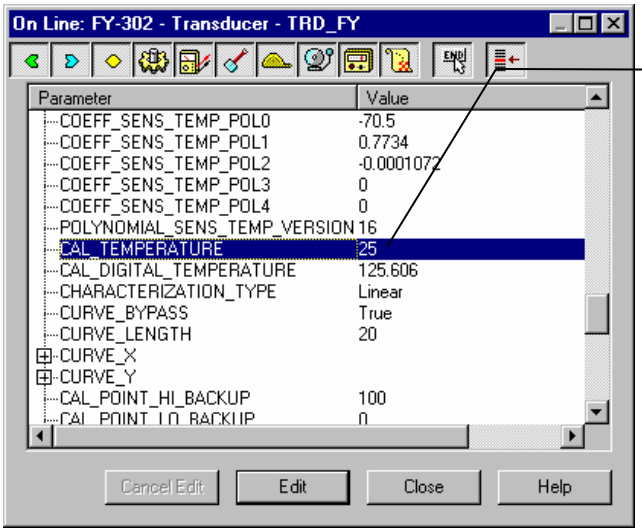


Figure 3.17 - Calibrating the Temperature Sensor

Display Transducer Block

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

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

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

In order to enable the local adjustment using the magnetic tool, it is necessary to previously prepare the parameters related with this operation via **SYSCON** (System Configuration).

The Figure 3.18 - Parameters for Local Adjustment Configuration and the Figure 3.19 - Parameters for Local Adjustment Configuration show all parameters and their respective values, which shall be configured in accordance with then necessity of being locally adjusted by means of the magnetic tool. All values shown on the display are default values.

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

Definition of Parameters and Values

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

Index_Relative
This is the index related to the parameter to be actuated or viewed (0, 1, 2…). Refer to the Function Blocks Manual to know the desired indexes, or visualize them on the **SYSCON** opening the desired block.

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

Mnemonic
This is the mnemonic for the parameter identification (it accepts a maximum of 16 characters in the alphanumeric field of the display). Choose the mnemonic, preferably with no more than 5 characters because, this way, it will not be necessary to rotate it on the display.

Inc_Dec
It is the increment and decrement in decimal units when the parameter is Float or Float Status type, or integer, when the parameter is an integer type.

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

Access
The access allows the user to read, in the case of the “Monitoring” option, and to write when "Action" option is selected, then the display will show the increment and decrement arrows.

Alpha_Num
These parameters include two options: value and mnemonic. In option value, it is possible to display data both in the alphanumeric and in the numeric fields; this way, in the case of a data higher than 10000, it will be shown in the alphanumeric field.
In option mnemonic, the display may show the data in the numeric field and the mnemonic in the alphanumeric field.

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

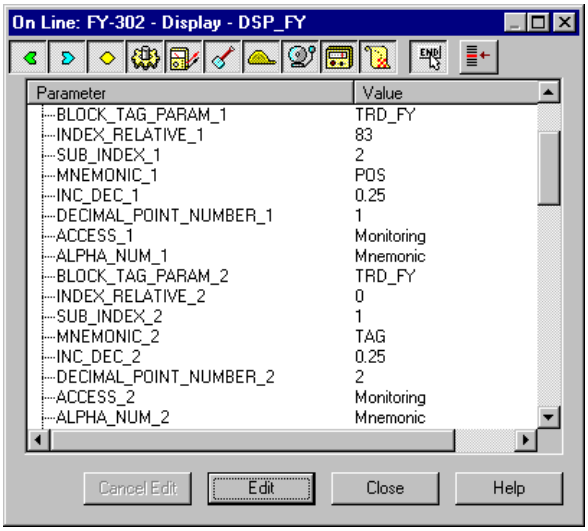


Figure 3.18 - Parameters for Local Adjustment Configuration

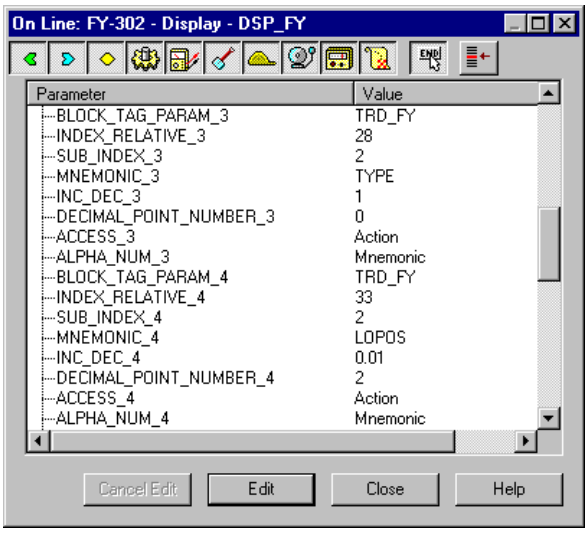


Figure 3.19 - Parameters for Local Adjustment Configuration

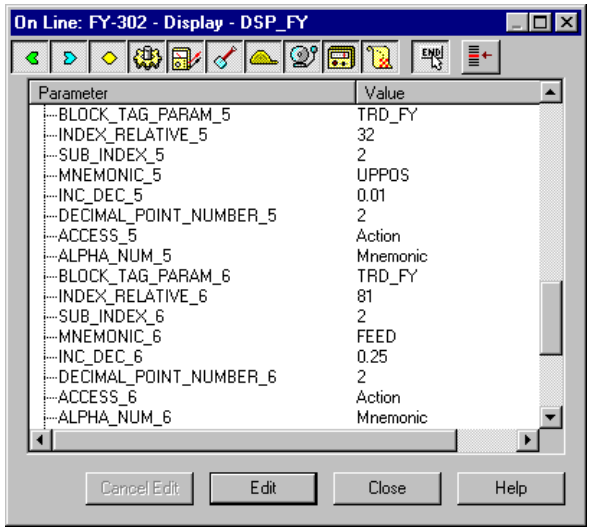
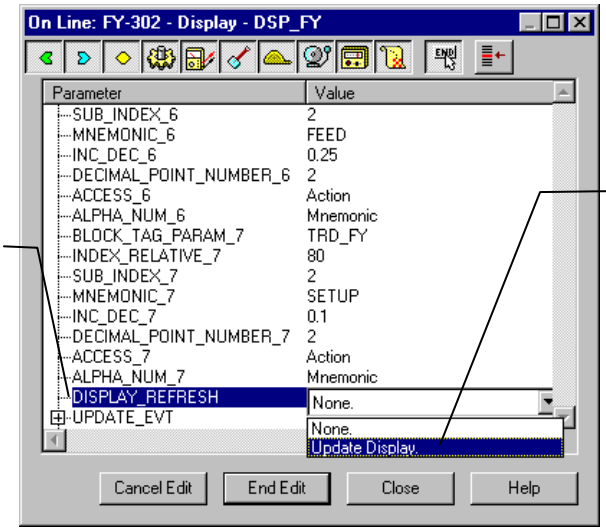


Figure 3.20 - Parameters for Local Adjustment Configuration

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



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

Figure 3.21 - Parameters for Local Adjustment Configuration

Calibrating Via Local Adjustment

The positioner has two holes for magnetic switches, located under the identification plate (See the section "*Programming Using Local Adjustment*"). These magnetic switches are activated by one magnetic tool.

This magnetic tool enables adjustment of the most important parameters of the blocks. The jumper W1 on top of the main circuit board must be in place and the positioner must be fitted with the digital display for access to the local adjustment. Without the display the local adjustment is not possible.

To enter the local adjustment mode, place the magnetic tool in orifice “Z” until flag “MD” lights up in the display. Removes magnetic tool from “Z” and place it in orifice “S”.

Remove and reinsert the magnetic tool in “S” until the message “LOC ADJ” is displayed.

The message will be displayed during approximately 5 seconds after the user removes the magnetic tool from “S”. By placing the magnetic tool in “Z” the user will be able to access the local adjustment/monitoring tree.

Browse to parameter “LOPOS”. After that in order to start the calibration, the user shall activate parameter “LOPOS” with the help of the magnetic tool placed in “S”. For example, it is possible to enter 0%. When the magnetic tool is removed from “S”, the output will be set to a value close to the desired value. The user shall then browse the tree up to parameter FEED (FEEDBACK_CAL), and actuate this parameter by placing the magnetic tool in “S” until reaching the value obtained from the position reference.

The user shall write in this parameter until it reads 100% or the desired upper position value.

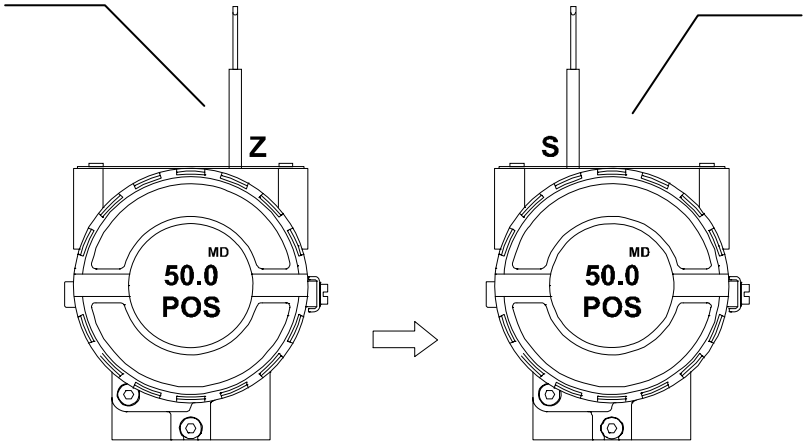
The LOWER and UPPER should be different.

LIMIT CONDITIONS OF CALIBRATION	
LOPOS (Lower Position)	Always equal 0%
UPPOS (Upper Position)	Always equal 100%
FEED	- 10% =< FEED =< 110%, otherwise XD_ERROR = 22

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

Programming Using Local Adjustment

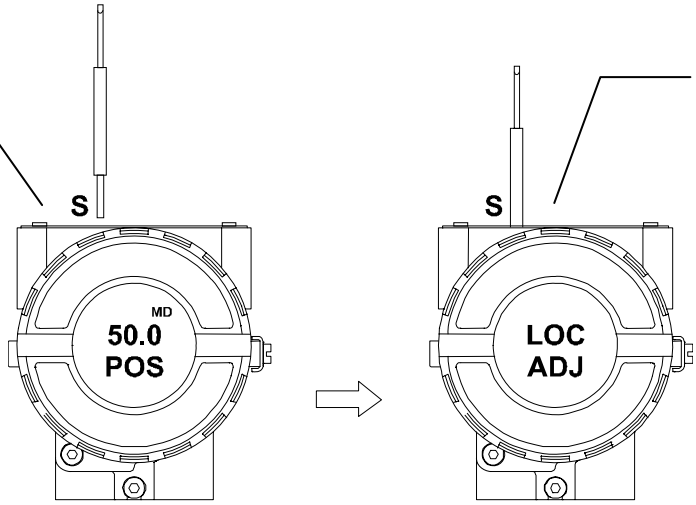
In order to start the local adjustment, place the magnetic tool in orifice **Z** and wait until letters MD are displayed.



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

Figure 3.22 - Step 1 - FY302

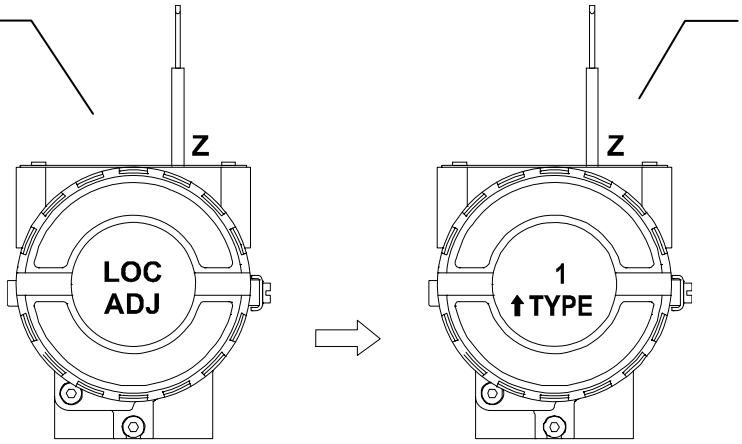
Remove the magnetic tool from orifice **S**.



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

Figure 3.23 - Step 2 - FY302

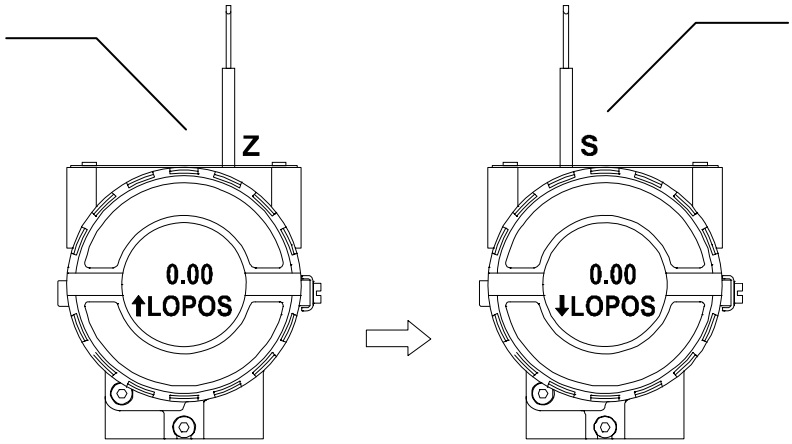
Place the magnetic tool in orifice **Z**. In case this is the first configuration, the option shown on the display is the TAG with its corresponding mnemonic configured by the SYSCOM. Otherwise, the option shown on the display will be the one configured in the prior operation. By keeping the tool inserted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



In this option TYPE, is indicated by the numbers 1 or 2, which respectively represent Linear or Rotary valves.

Figure 3.24 - Step 3 - FY302

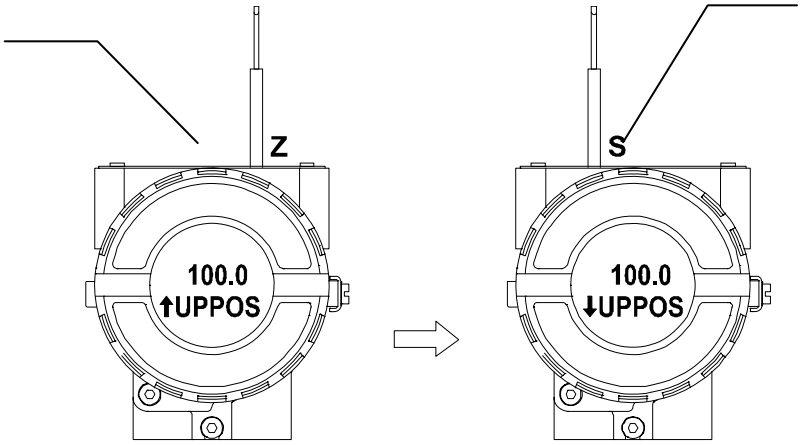
In order to start the LOPOS, simply insert the magnetic tool in orifice **S** as soon as LOPOS is shown on the display. An arrow pointing upward (↑) increments the valve and an arrow pointing downward (↓) decrements the valve. In order to increment the lower position valve, keep the tool inserted in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



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

Figure 3.25 - Step 4 - FY302

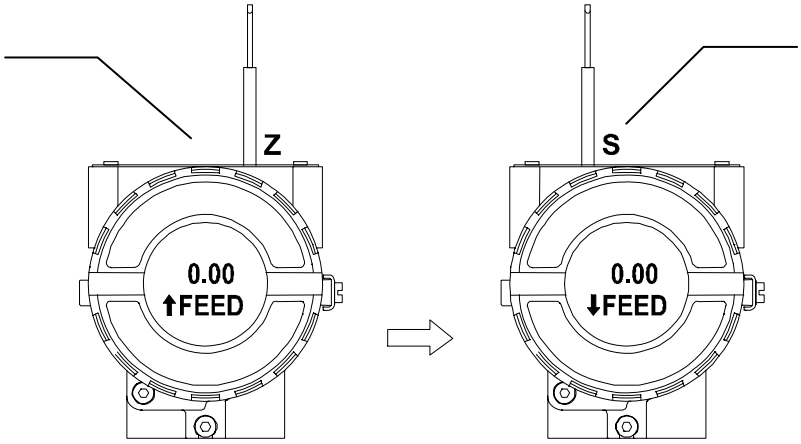
In order to start the UPPOS, simply insert the magnetic tool in orifice **S** as soon as UPPOS is shown on the display. An arrow pointing upward (↑) increments the valve and an arrow pointing downward (↓) decrements the valve. In order to increment the upper position valve, keep the tool inserted in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



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

Figure 3.26 - Step 5 - FY302

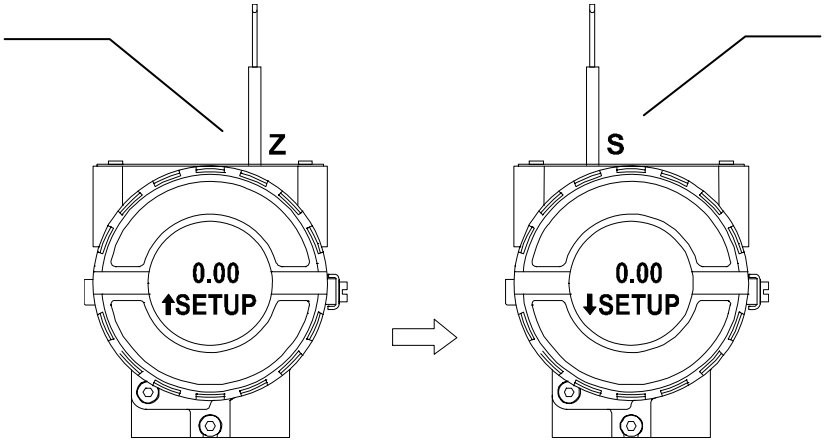
Option FEED allows the user to correct the valve calibration. In order to implement the correction, read the valve indicated by the valve and enter it in this option. This option makes it possible to correct LOPOS as well as UPPOS. An arrow pointing upward increments the position valve.



Place the magnetic tool in orifice **S** to shift the arrow to the downward position and decrement the calibration valve in accordance with the valve readout valve. An arrow pointing downward decrements the position valve.

Figure 3.27 - Step 6 - FY302

This option implements the auto setup of the valve, that is, the lower and upper position points of the valve. When setup displays 0 (zero), it indicates that the setup is disabled.



Insert the magnetic tool in orifice **S** and enter the value 1. After this, the auto setup will be started and a flashing message with the word SETUP will show in the display of the positioner. After this process finishes, the local adjustment returns to normal operation.

Figure 3.28 - Step 7 - FY302

NOTE
Every time the AUTO SETUP is used it is necessary to save it via SYSCON, and to write in the Backup-Restore parameter of the transducer block the sensor Data Backup option. This Local adjustment configuration is a suggestion only. The user may choose his preferred configuration via SYSCON, simply configuring the display block. (refer to paragraph Display Transducer Block)

Section 4

MAINTENANCE PROCEDURES

General

SMAR **FY302** Fieldbus to Valve Positioners are extensively tested and inspected before delivery to the end user. Nevertheless, during their design and development, consideration was given to the possibility of repairs by the end user, if necessary.

In general, it is recommended that the end user do not try to repair printed circuit boards. Instead, he should have spare circuit boards, which may be ordered from **SMAR** whenever necessary.

DIAGNOSTICS	
SYMPTOM	**PROBABLE ERROR SOURCE**
POSITION SHOWN ON DISPLAY	*Positioner Connections* Check wiring polarity and continuity. *Power Supply* Check the minimum voltage signal equal 9 Volts. *Electronics Failure* Check circuit boards for bad connections and replace them for spare boards.
NO COMMUNICATION	*Network Connection* Check network connections: equipment, power supply, terminators. *Network Impedance* Check network impedance (power supply and terminators impedance). *Positioner Configuration* Check the configuration of the positioner communication parameters. *Network Configuration* Check the network communication configuration. *Electronics Failure* Try spare parts in the positioner circuits.
NO RESPONSE TO INPUT SIGNAL	*Pressure Output Connections* Check up on air leaks. *Air Supply Pressure* Check the air supply pressure. The input pressure to **FY302** shall be between 20 psi and 100 psi. *Calibration* Check the positioner calibration points. *Obstructed Restriction and/or Blocked Output* Observe the following procedures described in this Manual: OUTPUT CONNECTIONS and RESTRICTION CLEANING.
OSCILLATING ACTUATOR	*Calibration* Adjust parameter Kp. Adjust parameter Tr.
SLOW ACTUATOR RESPONSE	*Adjustment Parameters are Too Low* Adjust parameter Kp.
TOO FAST ACTUATOR RESPONSE	*Adjustment Parameters are Too High* Adjust parameter Kp.

Table 4.1 - FY302 Diagnostics

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

NOTE

The Factory Init should be tried as a last option to recover the equipment control when the equipment presents some problem related to the function blocks or the communication. **This operation must only be carried out by authorized technical personnel and with the process offline, since the equipment will be configured with standard and factory data.**

This procedure resets all the configurations run on the equipment, after which a partial download should be performed.

Two magnetic tools should be used to this efect,. On the equipment, withdraw the nut that fixes the identification tag on the top of the housing, so that access is gained to the "S" and "Z" holes.

The operations to follow are:

1) Switch off the equipment, insert the magnetic tools and keep them in the holes (the magnetic end in the holes);
2) Feed the equipment;
3) As soon as Factory Init is shown on the display, take off the tools and wait for the "5" symbol on the right upper corner of the display to unlit, thus indicating the end of the operation.

This procedure makes effective all the factory configuration and will eliminate eventual problems with the function blocks or with the equipment communication.

Disassembly Procedure

Refer to *Figure 4.3 – Exploded View*. Make sure to disconnect power supply and supply pressure before disassembling the transmitter.

TRANSDUCER

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

Loosen the hex screw (6) and carefully unscrew the electronic housing from the transducer, observing that the flat cable is not excessively twisted.

NOTE

The positioners have a stopper that can be released to allow the transducer to rotate more than one turn. See *Figure 4.1 - Transducer Rotation Stopper*.

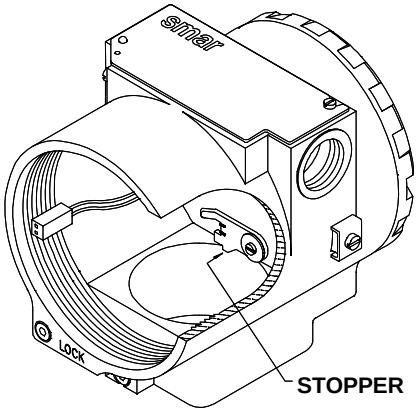


Figure 4.1 - Transducer Rotation Stopper

WARNING

Do not rotate the electronic housing more than 180º without disconnecting the electronic circuit from the power supply.

ELECTRONIC CIRCUIT

To remove the circuit board (5) and indicator (4), first loose the cover locking (13) on the side not marked “Field Terminals”, then unscrew the cover (1).

WARNING

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

Loosen the two screws (3) that anchors the indicator and the main circuit board. Gently pull out the indicator, and then the main board (5).

Reassembly Procedure

TRANSDUCER
Mount the transducer to the housing turning clockwise until it stops. Then turn it counterclockwise until it faces the square of electronic housing to the square of transducer. Tighten the hex screw (6) to lock the housing to the transducer.

Restriction Cleaning Procedure

The air flows to the nozzle through a restriction. Verify from time to time the restriction cleaning to assure a positioner good performance.

1. Be sure that the air supply of the equipment is blocked.

2. With an appropriate tool, remove the transducer serial number plate. (New models have the plate placed on the opposite side of the transducer).

3. Remove the restriction screw using an adequate tool;

4. Remove the o-ring's with an appropriate tool;
5. Dive the part in petroleum base solvent and dry it with compressed air (apply the compressed air directly in the smaller orifice for the air to get out through the bigger orifice).
6. Introduce the appropriate tool (PN 400-0726) into the restriction orifice to prevent any possible obstruction;

7. Mount the o'rings again and screw the restriction in the positioner.
8. The equipment can be supplied with air again.

CHANGE OF THE FILTER ELEMENTS
Change the positioner filter elements (See Figure 5.3 – Exploded View – Position 28) with a minimum stated period of 1 (one) year.

The instrumentation air supply must be clean, dry and non-corrosive, following standards indicated for the American National Standard "Quality Standard for Instrument Air" – ANSI/ISA S7.0.01 - 1996.

If the instrumentation air does not comply with the above mentioned standards, the user has to consider changing the positioner filter elements more frequently.

EXHAUST PORT
Air is vented to the atmosphere through the two exhausts ports located behind the transducer nameplate. A foreign object interfering or blocked exhaust port provides a way to increase the output. Cleaning by spraying it with a solvent.

NOTE
Never use oil or grease in the spool, otherwise the positioner performance will be impaired.

ELECTRONIC CIRCUIT
Plug transducer connector and power supply connector to main board.

Attach the display to the main board. Observe the four possible mounting positions (See *Figure 4.2 - Four Possible Position of the Local Indicator*). The ↑ mark indicates up position.

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

After tightening the protective cover (1), mounting procedure is complete. The positioner is ready to be energized and tested.

ELECTRICAL CONNECTIONS
The plug must obligatorily be installed in the electric connection that will not be used, preventing the humidity accumulation.

NOTE
The plug with sealant from factory is not certified for use in explosion proof installations.

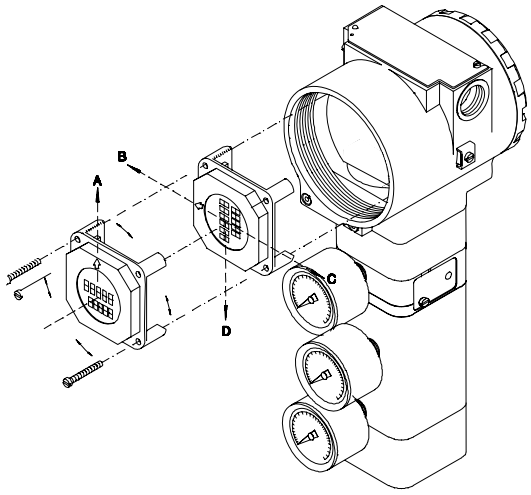


Figure 4.2 - Four Possible Position of the Local Indicator

INTERCHANGEABILITY
Main board can be changed and operate with the transducer. There is an EEPROM in the transducer part that keeps the trim.

PACKAGE CONTENT
When receiving the equipment, verify the package content. The number for items marked with (*) must be in accordance with the number of positioners.

- Positioner
- Adequate Mounting Brackets
  - For the positioner
  - For the magnet
- Magnetic Tool for Local Adjustment (*)
- Centralizer Transmitter Device (*)
- Cleaning Device for the Restriction (*)
- Operation, Maintenance and Instructions Manual (*)

RETURNING MATERIALS
Should it become necessary to return the positioner to SMAR, simply contact your local agent or SMAR office, informing the defective instrument's serial number, written in identification plate, and return it to our factory in Sertãozinho/SP.

You can contact the Revisions Deparment by:
Telephone: +55 (16) 3946-3550, Fax: +55 (16) 3946-3549, E-mail: revisoes@smar.com.br

In order to expedite analysis and solution of the problem, the defective item should be returned with a description of the failure observed, with as many details as possible. Other information concerning to the instrument operation, such as service and process conditions, is also helpful. To return or to repair the devices/equipment not covered by the guarantee clauses, please make a purchase request order or budget request.

In case of maintenance, cleaning, diagnostics, repair or other service necessary to the equipment, is indicated to send the equipment to the SMAR´s Revisions Department with the SRF – Service Request Form copy presented in the last page of this manual. To fill out this form is important to speed up the service to be done in the equipment.

ACCESSORIES	
ORDERING CODE	**DESCRIPTION**
SD1	Magnetic Tool for Local Adjustment
SYSCON	System Configurator
PS302_1	Power Supply
PSI302_2 or PSI302_4	Power Supply Impedance
BT302	Terminator
PCI	Process Control Interface
400-0726	Needle cleaning Device for the restriction

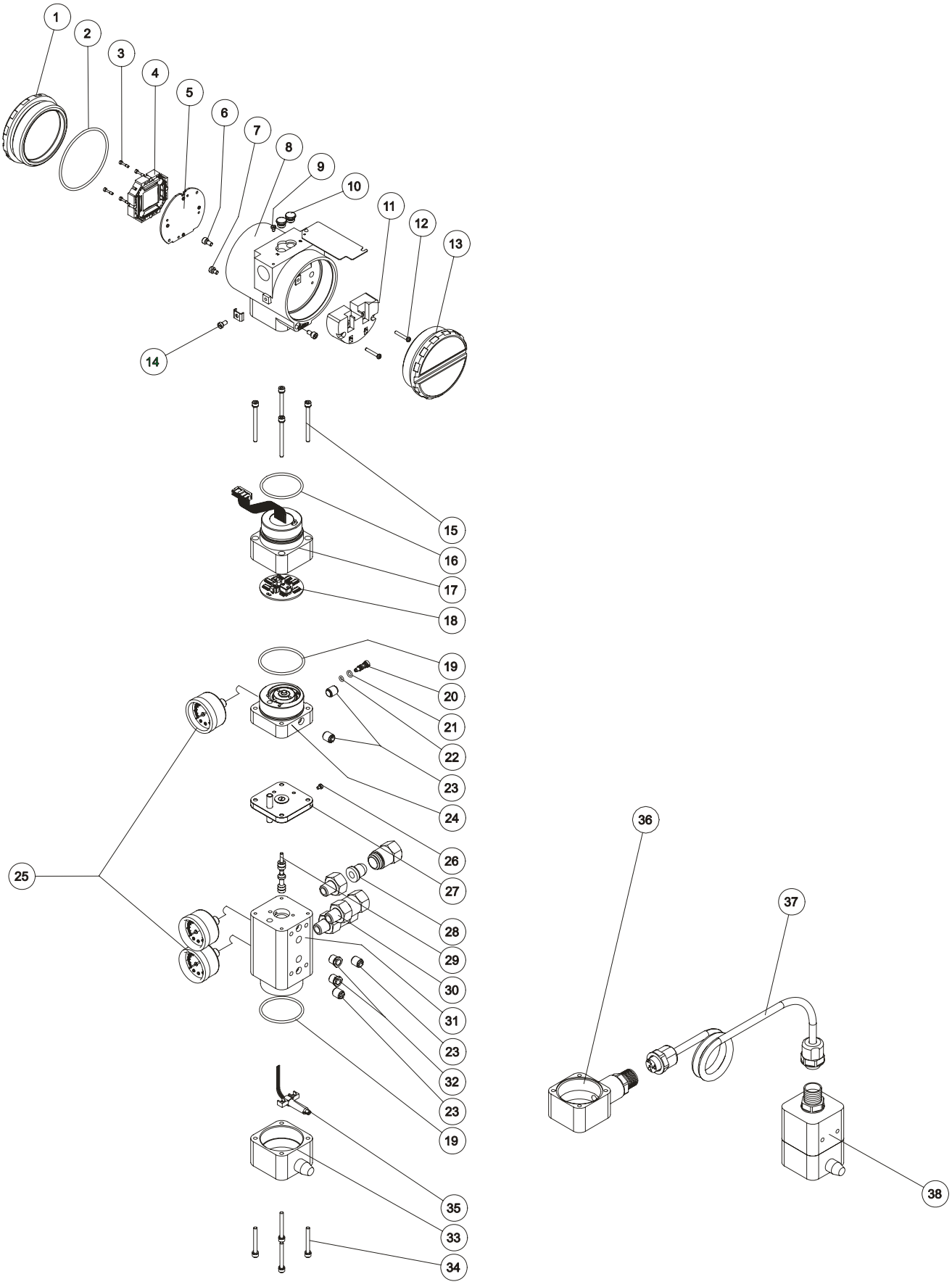


Figure 4.3 - Exploded View

SPARE PARTS LIST			
PARTS DESCRIPTION	**POSITION**	**CÓDE**	**CATEGORY (NOTE 4)**
HOUSING, Aluminum (**NOTE 1**)			
. 1/2 - 14 NPT	8	301-0340	-
. M20 x 1.5	8	301-0341	-
. PG 13.5 DIN	8	301-0342	-
HOUSING, 316 SS (**NOTE 1**)			
. 1/2 - 14 NPT	8	301-0343	-
. M20 x 1.5	8	301-0344	-
. PG 13.5 DIN	8	301-0345	-
COVER (INCLUDES O'RING)			
. Aluminum	1 e 13	204-0102	-
. 316 SS	1 e 13	204-0105	-
COVER WITH WINDOW FOR INDICATION (INCLUDES O' RING)			
. Aluminum	1	204-0103	-
. 316 SS	1	204-0106	-
COVER LOCKING BOLT	7	204-0120	-
SENSOR LOCKING BOLT	6	204-0121	-
EXTERNAL GROUND BOLT	14	204-0124	-
IDENTIFICATION PLATE FIXING BOLT	9	204-0116	-
DIGITAL INDICATOR	4	214-0108	A
TERMINAL INSULATOR	11	400-0058	A
MAIN ELECTRONIC CIRCUIT BOARD	5	304-0650	A
0-RINGS COVER (**NOTE 2**)			
. Buna-N	2	204-0122	B
TERMINAL HOLDING BOLT HOUSING IN ALUMINUM			
Housing in 316 Stainless Steel	2	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
ALUMINUM CONNECTION COVER	15,16,17 and 18	400-0643	A
316 STAINLESS STEEL CONNECTION COVER	15,16,17 and 18	400-0644	A
. Connection Cover Bolt	15	400-0073	-
. Buna N Neck O-ring	16	204-0113	B
. Assembled Connection Cover - Aluminum	17	400-0074	-
. Assembled Connection Cover - 316 Stainless Steel	17	400-0391	-
. Analog PC Board GLL 1012	18	400-0060	-
PIEZO BASE SET – ALUMINUM	19,20,21,22, 23,24 and 25	400-0645	A
PIEZO BASE SET – 316 STAINLESS STEEL	19,20,21,22, 23,24 and 25	400-0646	A
. Base and Block O'ring	19	400-0085	B
. Restriction	20	344-0165	B
. Restriction External O-ring	21	344-0155	B
. Restriction Internal O-ring	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 (Pressure gauge) – Carbon Steel	25	209-0400	B
. Analog indicator (Pressure gauge) – 316 Stainless Steel	25	400-0395	B
ALUMINUM INTERMEDIATE SET	26 and 27	400-0647	A
316 STAINLESS STEEL INTERMEDIATE SET	26 and 27	400-0648	A
. Identification tag bolt	26	344-0160	-
. Assembled diaphragm – Aluminum	27	400-0649	B
. Assembled diaphragm – 316 Stainless Steel	27	400-0650	B

SPARE PARTS LIST			
PARTS DESCRIPTION	**POSITION**	**CÓDE**	**CATEGORY (NOTE 4)**
ALUMINUM BLOCK SET	19,23,25,28,29,30,31 and 32	400-0651	A
316 STAINLESS STEEL BLOCK SET	19,23,25,28,29,30,31 and 32	400-0652	A
. Base & Block O-ring	19	400-0085	-
. Syntherized Bushing	23	400-0033	-
. Analog indicator (Pressure gauge) – Carbon Steel	25	209-0400	-
. Analog indicator (Pressure gauge) – 316 Stainless Steel	25	400-0395	-
. Filtering Element	28	400-0655	A
. Spool valve	29	400-0653	-
. Spool valve Spring		400-0787	
. 304 Stainless steel Filter- 1/4" NPT	30	101B3403	B
. Assembled Block– Aluminum	31	400-0082	-
. Assembled Block – 316 Stainless Steel	31	400-0394	-
. Vent Plug – Bronze	32	400-0077	-
. Vent Plug - 316 Stainless Steel	32	400-0654	-
ALUMINUM HALL COVER SET	33,34 and 35	400-0656	A
316 STAINLESS STEEL HALL COVER SET	33,34 and 35	400-0657	A
. Aluminum Hall Cover Set	33	400-0089	-
. 316 Stainless Steel Hall Cover Set	33	400-0396	-
. Hall Cover Bolt	34	400-0092	-
. Hall Support + Hall Sensor + Flat cable	35	400-0090	B
ALUMINUM REMOTE HALL COVER SET (NOTE 5)	36	400-0706	-
316 STAINLESS STEEL REMOTE HALL COVER SET (NOTE 5)	36	400-0707	-
ALUMINUM REMOTE EXTENSION SET	38	400-0708	-
316 STAINLESS STEEL REMOTE EXTENSION SET	38	400-0709	-
CABLE SET + CONNECTOR, 5M	37	400-0710	-
CABLE SET + CONNECTOR, 10M	37	400-0711	-
CABLE SET + CONNECTOR, 15M	37	400-0712	-
CABLE SET + CONNECTOR, 20M	37	400-0713	-
ALUMINUM TRANSDUCER SET	NOTE 3	209-0180	A
316 STAINLESS STEEL TRANSDUCER SET		400-0399	A
LOCAL ADJUSTMENT PROTECTION COVER.	10	204-0114	
MAGNETS			
. Linear magnet 15mm.	-	400-0034	-
. Linear magnet 30mm.	-	400-0748	-
. Linear magnet 50mm.	-	400-0035	-
. Linear magnet 100mm.	-	400-0036	-
. Rotative magnet.	-	400-0037	-

Table 4.2 - Spare Part List

Note: 1) Includes terminal isolator, bolts (cover locking, ground and terminal isolator) and identification plate without certification.
2) O' rings are packaged with 12 units.
3) Includes all transducer's spare parts.
4) For category **A**, it is recommended to keep, in stock, 25 parts installed for each set, and for category **B**, 50.
5) This code includes the cover, the cable and the connector for the extension cable.

Section 5

TECHNICAL CHARACTERISTICS

Functional Specifications

Travel
Linear Motion: 3 - 100 mm.
Rotary Motion: 30 - 120° Rotation Angle.

Input Signal
Digital only. Fieldbus, 31.25 Kbits/s voltage mode with bus power.

Output
Output to actuator 0 -100% supply air pressure. Single or double-action.

Power Supply
Bus powered: 9-32 Vdc.
Output impedance (from 7.8 kHz - 39 kHz):
Non-intrinsic safety: ≥ 3 kΩ.
Intrinsic safety: ≥ 400 Ω (assuming an IS barrier in the power supply).

Pressure Supply
1.4 - 7 bar (20-100 psi) free of oil, dust and water.

Indication
Optional 4 ½ - digit numerical and 5-character alphanumerical LCD indicator.

Hazardous Location Certification
Explosion proof, weather proof and intrinsically safe CEPEL, FM, CSA, NEMKO and DMT standards (pending).

Temperature Limits

Operation:	-40	to	85ºC	(-40	to	185ºF).
Storage:	-40	to	90ºC	(-40	to	194ºF).
Display:	-10	to	60ºC	(14	to	140ºF) operation.
	-40	to	85ºC	(-40	to	185ºF) without damage.
Remote Hall							
Operation:	-40	to	150ºC	(-40	to	302ºF).

Humidity Limits
0 to 100% RH.

Turn-on Time
Approximately 10 seconds.

Update Time
Approximately 0.5 second.

Flow Characterization
Linear, equal percentage, quick opening and customer configuration through fieldbus communication from e.g., a PC or by the local adjustment switches.

Gain
Through software. Locally adjustable.

Travel Time
Through software. Locally adjustable.

Actual Position Sensing
Magnet (Non-contact) via Hall Effect.

Performance Specifications

Resolution
≤ 0.1% F.S.

Repeatibility
≤ 0.1% F.S.

Hysteresis
≤ 0.2% F.S.

Consumption
0.25 Nm/h (0.15 SCFM) at 1.4 bar (20 psi) supply.
0.70 Nm/h (0.40 SCFM) at 5.6 bar (80 psi) supply.

Output Capacity
13.6 Nm^3/h (8 SCFM) at 5.6 (80 psi) supply.

Ambient Temperature Effect
0.8%/20 ºC do span.

Supply Pressure Effect
Negligible.

Vibration Effect
±0.3%/g of span during the following conditions:
5-15 Hz at 4 mm constant displacement.
15-150 Hz at 2g.
150-2000 HZ at 1g.
Reference SAMA PMC 31.1 - 1980, Sec. 5.3, Condition 3, Steady State.

Electro-Magnetic Interference Effect
Designed to comply with IEC 801 and European Standards EN50081 and EN50082.

Physical Specifications

Electrical Connection
1/2 -14 NPT, Pg 13.5 or M20 × 1.5.

Pneumatic Connections
Supply and output: 1/4 - 18 NPT
Gage: 1/8 - 27 NPT

Material of Construction
Injected low copper aluminum with polyester painting or 316 Stainless Steel housing, with Buna-N O-rings on cover (NEMA 4X, IP67).

Weight
Without display and mounting bracket: 2.7 kg.
Add for digital display: 0.1 kg.

MODEL FY302	FIELDBUS VALVE POSITIONER

CODE	Local Indicator
1	Without Indicator
0	With Digital Indicator

CODE	Mounting Bracket**
0	Without Bracket
1	With Bracket

CODE	Electrical Connections
0	½ - 14 NPT
A	M20 x 1.,5
B	Pg 13.5 DIN

CODE	Type of Actuator (Not Included)
1	Rotary – Single Action
2	Rotary – Double Action
3	Linear Stroke Up to 15mm - Single Action
4	Linear Stroke Up to 15mm - Double Action
5	Linear Stroke Up to 50mm - Single Action
6	Linear Stroke Up to 50mm - Double Action
7	Linear Stroke Up to 100mm – Single Action
8	Linear Stroke Up to 100mm – Double Action
A	Linear Stroke Up to 30mm – Single Action
B	Linear Stroke Up to 30mm – Double Action
Z	Others Specify

CODE	Indication Gage
0	Without Gage
1	With Gage – Input
2	With Gage – Output 1
3	With 2 Gages - Input and Output 1
4	With 2 Gages - Output 1 and 2
5	With 3 Gages
Z	Others Specify

CODE	Optional Items *
ZZ	With Special Features

FY302	1	0	0	1	0	*

* Leave it blank no optional items.
** Use separated ordering code.

Table 5.1 - Fieldbus Valve Positioner Ordering Code

	BRACKET			
	CODE	**Positioner Mounting Bracket**		
	0	Without Positioner Bracket		
	1	Universal Rotary		
	2	Universal Linear (Yoke and Pillar)		
	3	Linear – Yoke Type		
	4	Linear – Pillar Type		
	Z	Others Specify		
		CODE	**Magnet Mounting Bracket**	
		0	Without Magnet Mounting Bracket	
		1	Rotary	
		2	Linear Up to 15mm	
		3	Linear Up to 50mm	
		4	Linear Up to 100mm	
		5	Linear Up to 30mm	
		Z	Others Specify	
			CODE	**Mounting Bracket Material**
			C	Carbon Steel Bracket
			I	316 sst Bracket
			7	Carbon Steel Bracket and Accessories in SST
			Z	Others – Specify
				CODE	**Type of Actuator (Not Included)**
				H1	316 SST Housing
				K1	With pressure sensors for air Input and Output
				R1	Remote sensor - 5 m. Cable (**).
				R2	Remote sensor -10 m. Cable (**).
				R3	Remote sensor -15 m. Cable (**).
				R4	Remote sensor -20 m. Cable (**).
				ZZ	With Special Features - Specify
BFY	**1**	**0**	**0**	*****

* Leave it blank for no optional items.
** Consult SMAR for applications in classified areas.

Table 5.2 - Bracket Ordering Code

SMAR - General Terms of Warranty

Smar manufactures its products with new parts and pieces, according to the industry good practices.

Smar guarantees the products against defects of material, labor or performance during a period of 18 (eighteen) months, from the purchase date, as well as for spare parts used for repair.

This warranty DOES NOT apply to defects resulting from installation problems, inappropriate use or maintenance, and for equipments installed or used in disagreement to the instruction and operation manual.

During the warranty period, Smar will proceed with the necessary repair or even replace the equipment, free of charge to the costumer, according to the following policy:

Smar Factories or Authorized Repair Shop: Only the transportation costs will be costumer's responsibility. Parts, labor and eventual replacement by a new equipment will be Smar's responsibility.

Costumer's Installations: The transportation and dayly (accomodation and meals) costs of Smar's specialist will be costumer's responsibility. Parts, labor and eventual replacement for a new equipment will be Smar's responsibility.

Smar provides to the customers, through the products maintenance, instruction and operation manual, all the necessary information related to safety, attention warnings and instructions related to installation, operation, maintenance, including preventive maintenance of its products.

It is convenient and necessary that the customer follows the manual instructions and ensure its employees, agents and subcontracted being informed about such instructions.

Positioners

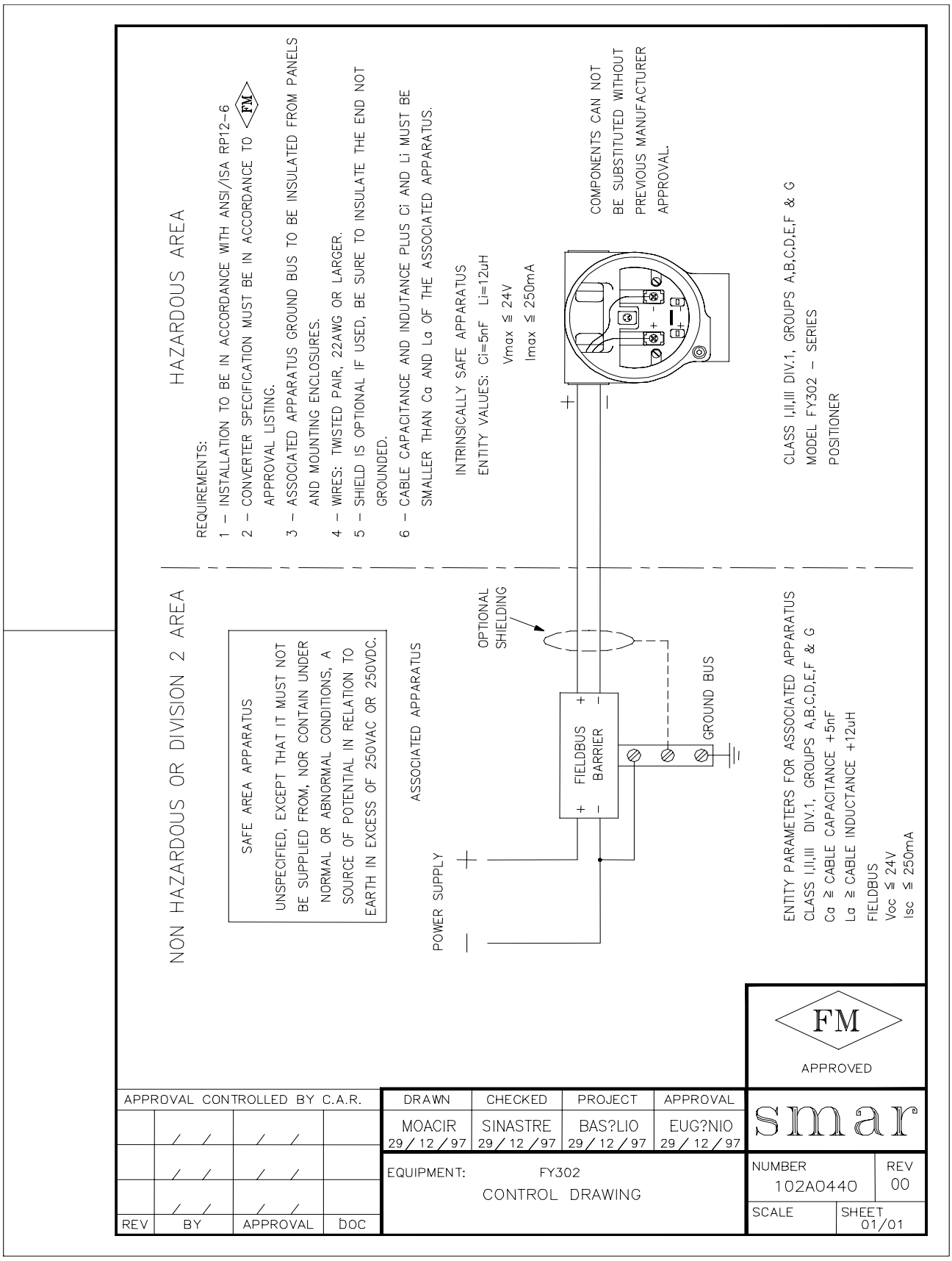
Precautions should be taking into consideration in using Smar positioner. The positioner is a product with high mechanical content, and its good performance is directly related to an adequate mechanical installation and an air supply according to the standards.

All these precautions should be considered as described in the instruction and operation manual, as well as in this General Terms of Warranty, since the improper equipment use compromises the product warranty.

- **Installation:** The correct mechanical installation is mandatory. Correctly tight the bracket screws, correct location of position sensor and the correct device alignment should be considered.

- **Air Supply:** The air supply should comply with the standard for instrument air described in manual. Water, oil and other material decrease the equipment timelife. The Warranty does not apply to equipments operating with inadequate air supply.

Water in electrical connections: Installations that allows the water entry, damaging the equipment terminals, should be analyzed at field. The warranty does not apply to equipments with terminals and circuits damaged because of water or fluids entry, due to wrong installation.


HAZARDOUS AREA
REQUIREMENTS:
1 – INSTALLATION TO BE IN ACCORDANCE WITH ANSI/ISA RP12-6
2 – CONVERTER SPECIFICATION MUST BE IN ACCORDANCE TO FM APPROVAL LISTING.
3 – ASSOCIATED APPARATUS GROUND BUS TO BE INSULATED FROM PANELS AND MOUNTING ENCLOSURES.
4 – WIRES: TWISTED PAIR, 22AWG OR LARGER.
5 – SHIELD IS OPTIONAL IF USED, BE SURE TO INSULATE THE END NOT GROUNDED.
6 – CABLE CAPACITANCE AND INDUTANCE PLUS Ci AND Li MUST BE SMALLER THAN Ca AND La OF THE ASSOCIATED APPARATUS.
INTRINSICALLY SAFE APPARATUS
ENTITY VALUES: Ci=5nF Li=12uH
Vmax ≦ 24V
Imax ≦ 250mA
COMPONENTS CAN NOT BE SUBSTITUTED WITHOUT PREVIOUS MANUFACTURER APPROVAL.
CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
MODEL FY302 – SERIES
POSITIONER
NON HAZARDOUS OR DIVISION 2 AREA
SAFE AREA APPARATUS
UNSPECIFIED, EXCEPT THAT IT MUST NOT BE SUPPLIED FROM, NOR CONTAIN UNDER NORMAL OR ABNORMAL CONDITIONS, A SOURCE OF POTENTIAL IN RELATION TO EARTH IN EXCESS OF 250VAC OR 250VDC.
ASSOCIATED APPARATUS
OPTIONAL SHIELDING
POWER SUPPLY
FIELDBUS BARRIER
GROUND BUS
ENTITY PARAMETERS FOR ASSOCIATED APPARATUS
CLASS I,II,III DIV.1, GROUPS A,B,C,D,E,F & G
Ca ≧ CABLE CAPACITANCE +5nF
La ≧ CABLE INDUCTANCE +12uH
FIELDBUS
Voc ≦ 24V
Isc ≦ 250mA
FM
APPROVED
APPROVAL CONTROLLED BY C.A.R.
REV BY APPROVAL DOC
DRAWN MOACIR 29/12/97
CHECKED SINASTRE 29/12/97
PROJECT BAS?LIO 29/12/97
APPROVAL EUG?NIO 29/12/97
smar
EQUIPMENT: FY302
CONTROL DRAWING
NUMBER 102A0440
REV 00
SCALE
SHEET 01/01

smar	**SRF - Service Request Form** **FY Positioner**

General Data

Model:	( ) FY290	( ) FY301	( ) FY302	( ) FY303
Hall Remote Sensor ? ( ) No	( ) Yes	Pressure Sensor ? ( ) No	( ) Yes	
Action: ( ) Rotary	( ) Linear	Travel: ( ) 30mm ( ) 50mm ( ) 100mm ( ) Other:		mm
Serial Number:	Sensor Number:	TAG:		
Configuration: ( ) Magnetic Tool	( ) Palm	( ) Psion	( ) PC - Software:	Version:
Use Supervisory? ( ) No	( ) Yes - Software:		Version:	

Final Control Element Data

Type	Size	Travel	Manufacturer	Model
( ) Valve + Actuator				
( ) Pneumatic Cylinder (ACP)				
( ) Other:				

Air Supply

Conditions	Work Pressure
( ) Dry and Clean	( ) 20 PSI
( ) Oil	( ) 60 PSI
( ) Water	( ) 100 PSI
( ) Other:	( ) Other: PSI

Process Data

Hazardous Area Classification	Interference Types
( ) Non-Classified	( ) Vibration
( ) Chemical	( ) Temperature
( ) Explosive	( ) Electromagnetic
( ) Other:	( ) Other:

Occurrence Description

Service Suggestion

( ) Adjustment	( ) Cleaning	( ) Preventive Maintenance	( ) Update / Up-grade
( ) Outro:			

User Information

Company:			
Contact:		Title:	Section:
Phone:	Extension:	e-mail:	
Date:		Signature:	

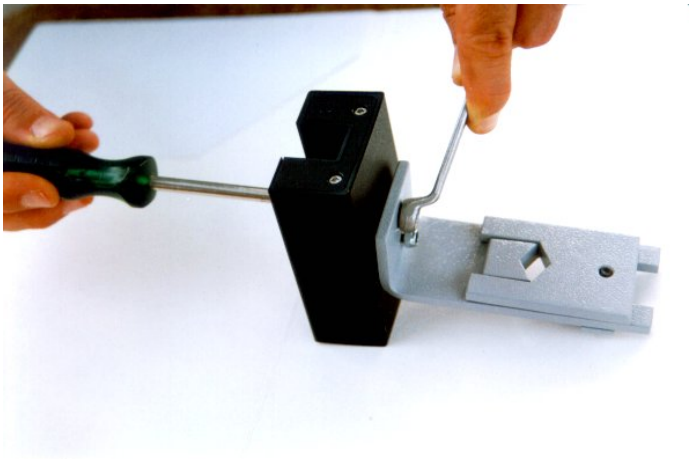
revisoes@smar.com.br
CNPJ: 46.761.730/0003-78

Tel: +55 (16) 3946-3550
Fax:+55 (16) 3946-3549

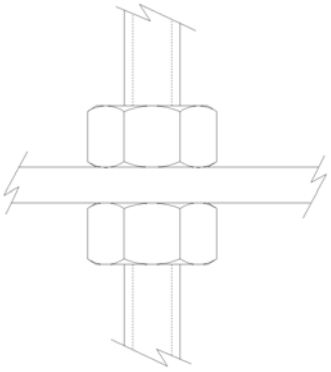
APPENDIX

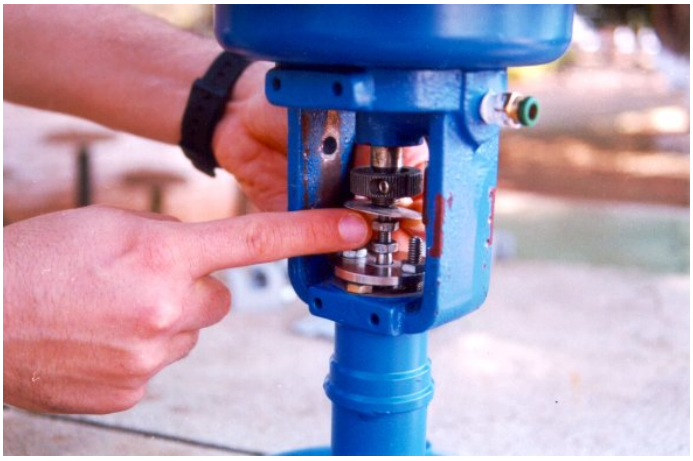
MOUNTING BRACKET FOR POSITIONER – LINEAR STROKE VALVE MOUNTING INSTRUCTIONS

1 –Attach the magnet to the magnet bracket support before connect them to the valve stem.



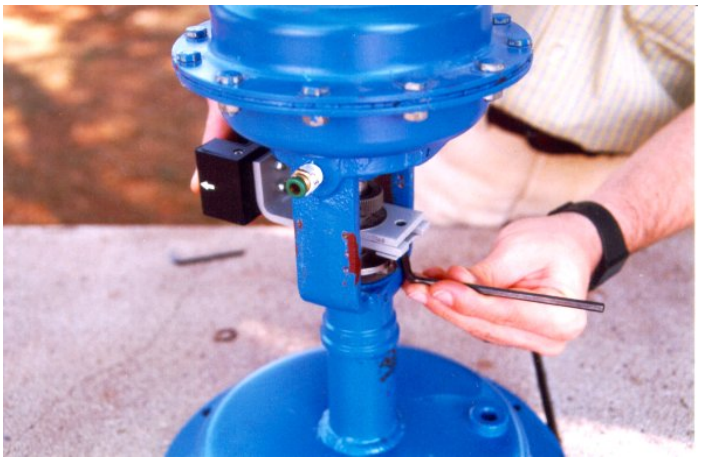
2 - The stem nuts should be used to fasten the magnet bracket.





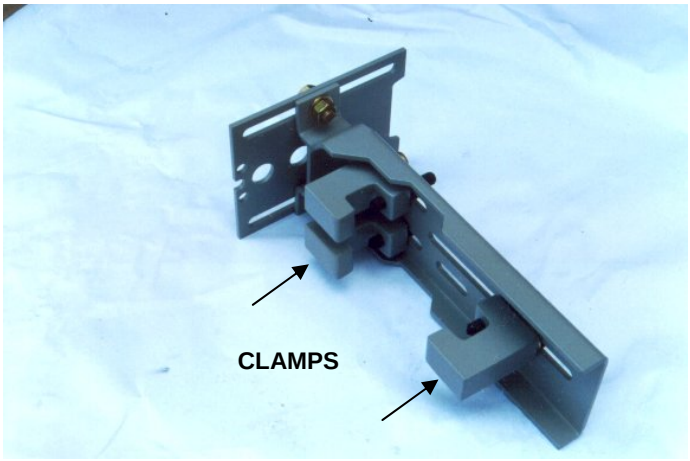
3 – Mount the magnet assembly using the nuts of the valve stem. The mounting bracket has two parts that should be mounted to the stem.

4 – Tighten the hex screw that join the two parts of the magnet bracket. It will avoid sliding of the two parts of the bracket during the fastening of the stem nuts.



5 – Tighten the stem nuts.

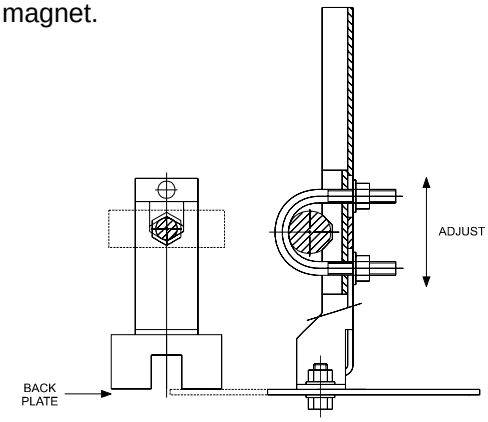
6 – Attach the “clamps” to the positioner bracket.
If your actuator is pillar type, go to step 15 to see the instructions.

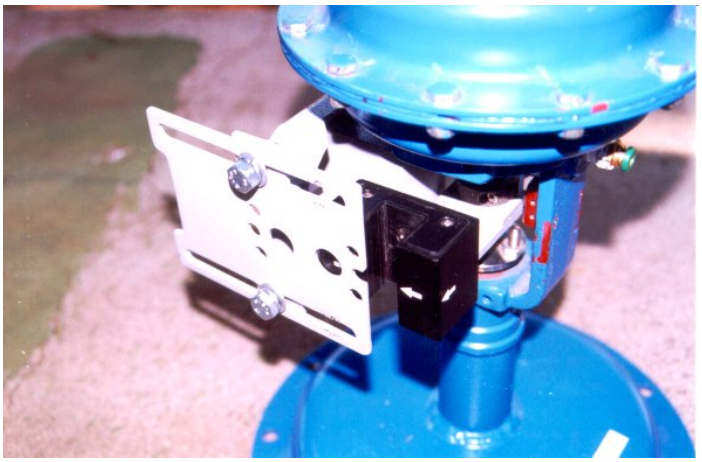


7 – Adjust the clamps according to the width of the yoke and tighten the bolts finger tight.

8 – Mount the positioner back plate. Tighten the nuts finger tight.

9 – Use the plate as a guidance to adjust the position of the positioner so that the back plate is about 1 mm apart from the magnet.

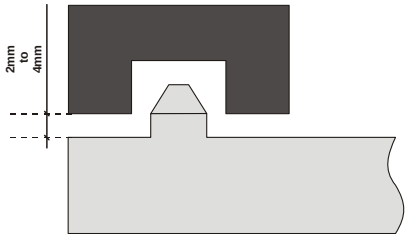


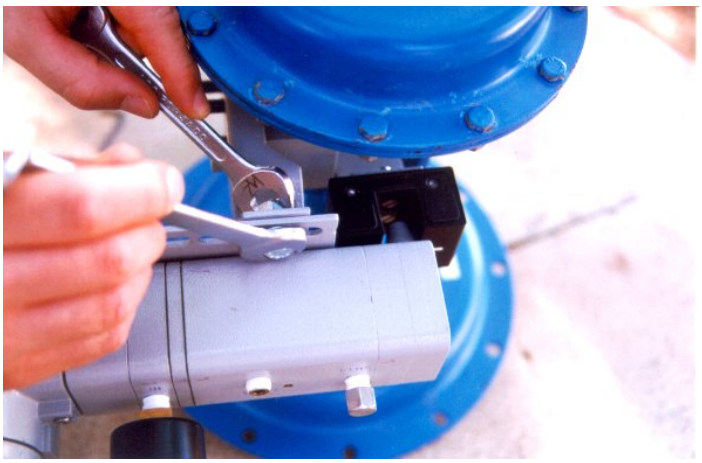


10 – Fasten the nuts to fix the positioner bracket to the yoke.
If the actuator is pillar type, fasten the U-clamp nuts.

11 – Mount the positioner to the plate and tighten the hex screws. You can take the back plate apart to facilitate the assembling.

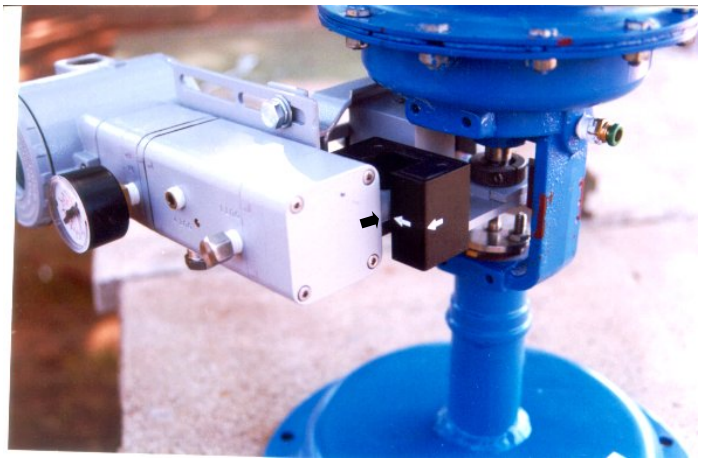
12 – Move the positioner as to adjust the Hall sensor tip in the center of the magnet. Tighten the nuts after the adjustment.





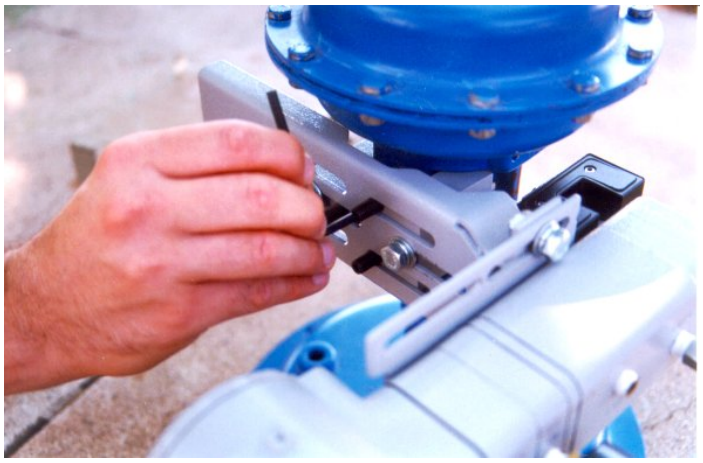
ATTENTION:
A minimum distance of 2mm and a maximum distance of 4mm is recommended between the magnet external face and the positioner face. For that, a centralizer device (linear or rotary) must be used. The centralizer device is in the positioner packing.

13 – Put the pressure equivalent to the half of the stem travel and adjust the height of the bracket assembly to have the arrows matching.



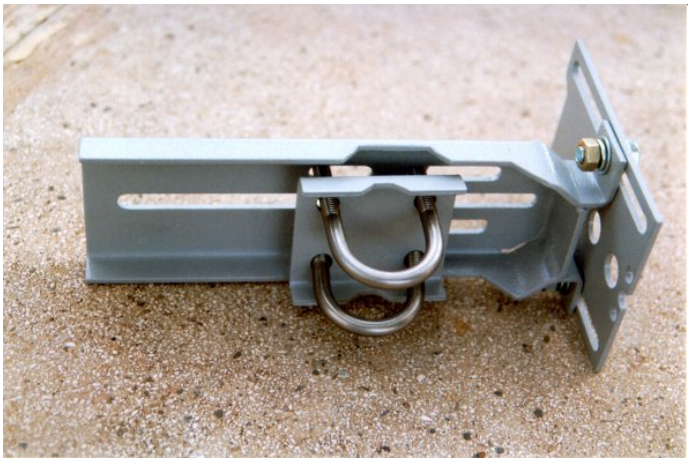
14 - Tighten the bolts to fasten the clamps to the yoke.

If the actuator is pillar type, fasten the U-clamp nuts.



MOUNTING DETAILS FOR THE PILLAR TYPE ACTUATOR

15 - This is the mounting bracket using U-clamps to be mounted on pillar type actuators.

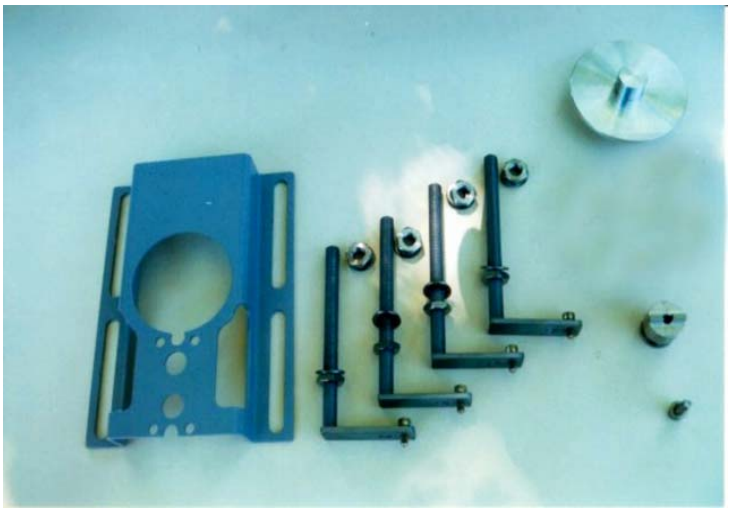


16 – After assembling the U-clamps, follow the steps 8 to 13.

ROTARY VALVE POSITIONER BRACKET

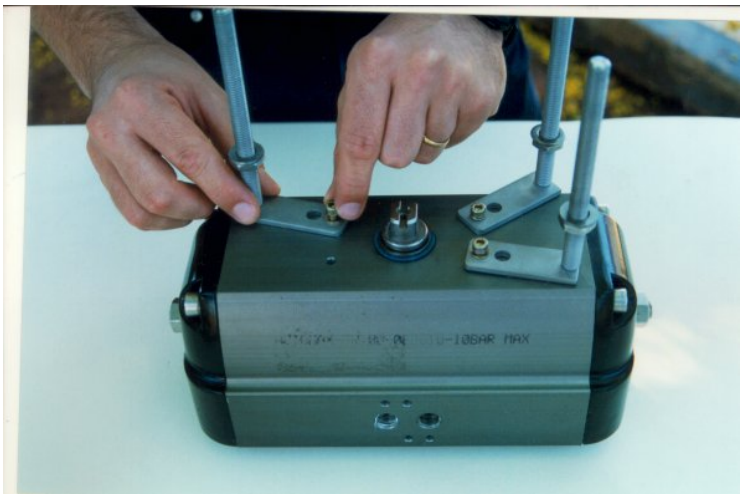
MOUNTING INSTRUCTIONS

Rotary Valve Positioner Bracket Parts.



1- Attach the clamps to the threaded orifices existent on the actuator.
Do not tight them completely.

The bolts are not supplied with the mounting bracket and they must be in accordance with size and thread of the actuator holes.



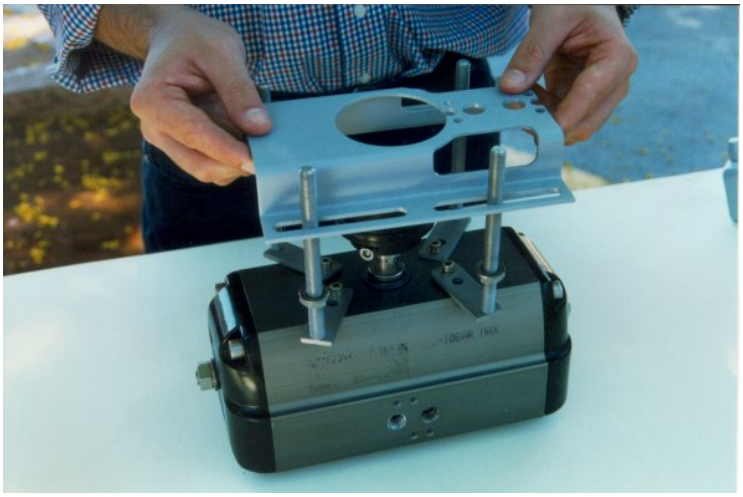
2- Attach the magnet bracket to the Actuator extremity (NAMUR).

The end the valve shaft must comply with Namur Standard.

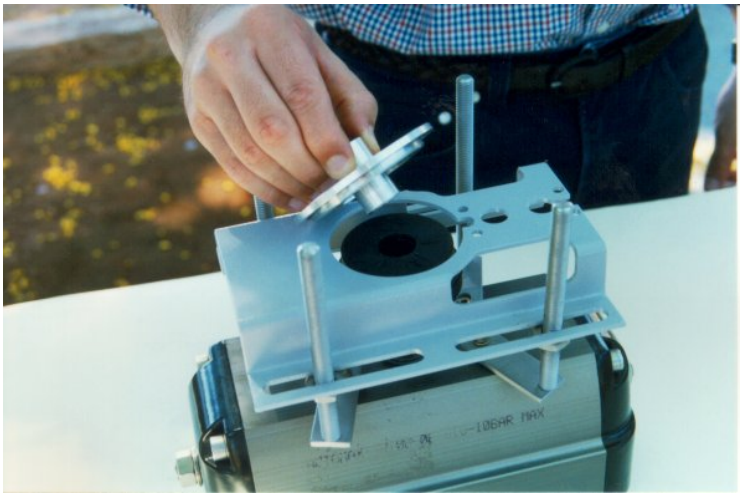
3 – Fasten the hex screw.

4 – Attach the magnet to the NAMUR adapter.
Do not fasten the bolts completely, allowing the magnet rotation.

5 – Mounting the positioner bracket through the threaded rods.



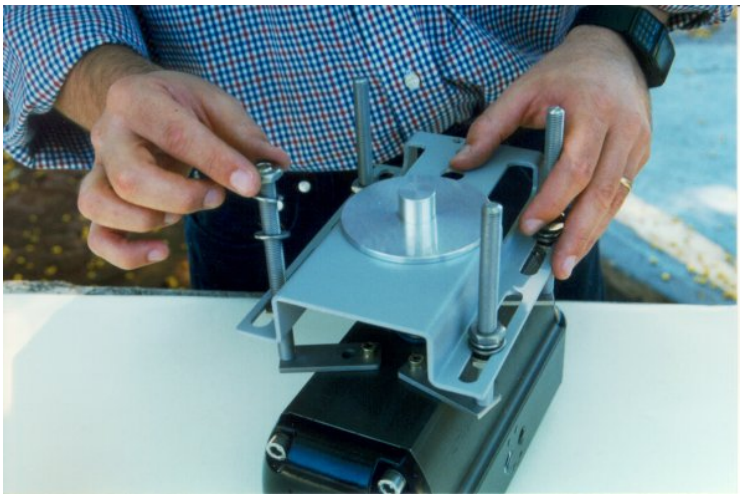
6 – Use the centralizer gadget to get the bracket centralized with the magnet.



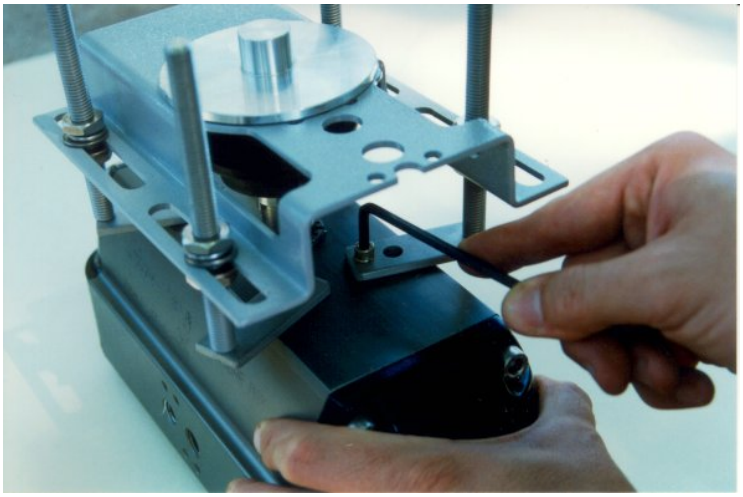
7 – Adjust the positioner bracket using the centralizer gadget and the nuts to get the height.

8 – Place the nut and washers.

Do not fasten the nuts completely.

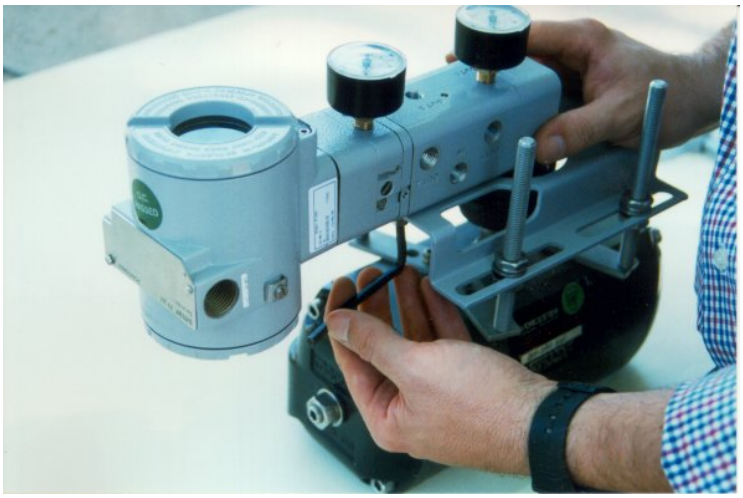


9 – Tighten the clamp bolts to fasten them to the actuator.

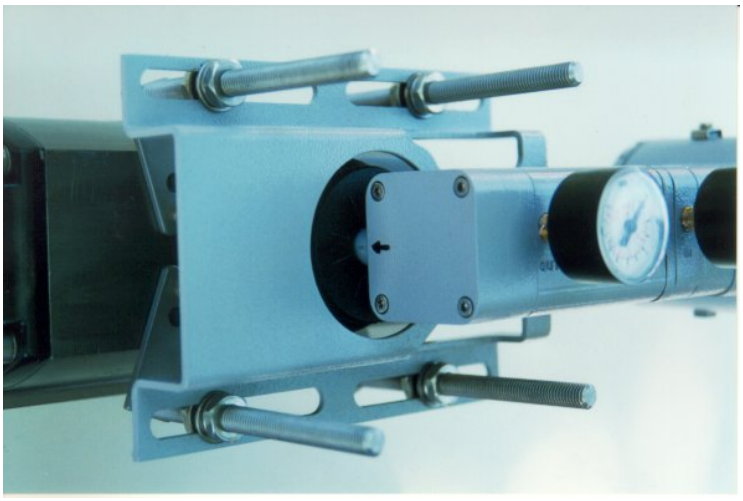


10 – Fasten the positioner bracket bolts to the clamps fastening.

11 – Remove the centralizer gadget and fasten the positioner to the positioner bracket.



12 – Put the pressure equivalent to the half of the stem and adjust the magnet position to have the arrows matching.



13 – Tighten the bolts to fasten the magnet to the magnet bracket.