



VALVE POSITIONER FY400 SERIES

- Automatic setup
- Auto-tuning
- Non-contact position measurement
- Diagnosis for control valves including partial stroke test
- Easier preventive maintenance
- Available for remote mounting position sensor
- For linear and rotary applications
- Fully digital PID control capability
- Advanced diagnostics
- Easy assembled on most control valve in the market
- Supports DD, EDDL, and FDT/DTM formats
- Non-polarity power input
- Built-in transient suppression



Actuation and Control

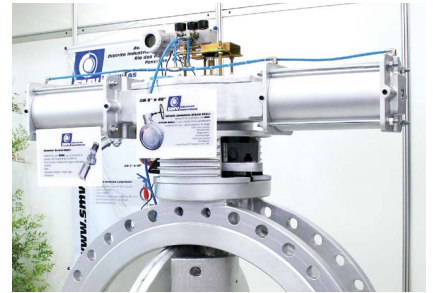
FY400 Series

The FY400 is an intelligent positioner for linear or rotary control valves, capable of using single-acting (spring return) or double-acting pneumatic actuators.

It is based on the nozzle-flapper principle, proven in the field, and a non-contact Hall effect position sensor, which provides high performance and safe operation.



- Suitable for most valve models and brands;
- Linear stroke from 3 mm up to 100 mm;
- Rotary movement from 30° to 120°;
- HART® configurable;
- User-friendly rotative display;
- Auto-tuning capability;
- Easy installation, quick commissioning and setup;
- Online continuous diagnostics to reduce troubleshooting time, and eliminate unnecessary maintenance;
- Partial stroke test available;
- Built-in transient protection;
- Modularity for all mounting brackets;
- Histogram on valve position available in FRAM memory (Ferroelectric crystal memory) for valve performance enhancement;
- Trend and load factor also available for diagnosis and process improvement;
- Configurable valve characteristic with the most used shapes;
- Customized 16 points characteristic curve;
- Configurable user display;
- Non-contact position sensing;
- Remote mounting available for high vibration and high temperature applications;
- Optional 4 to 20 mA Input for position measurement;
- Up to 100 psi air supply pressure;
- FDT/DTM capability and connectivity;
- Suitable for use in hazardous areas such as intrinsic safety, explosion-proof, and EC directives.



Product Highlight

Typical
mounting bracket



Positioner with three
gauges for pressure
supply and output
pressure monitoring



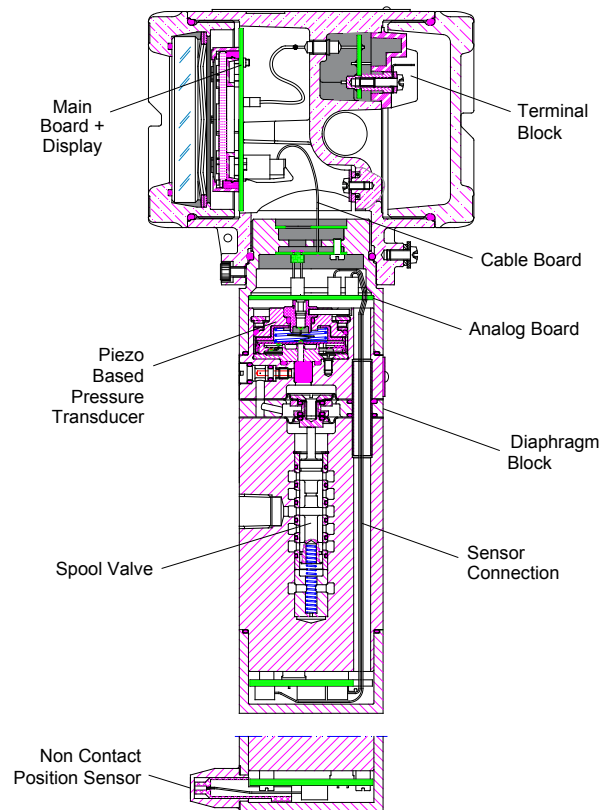
Rotary magnet
for 30° to 120°
movement



Linear magnet for
3 mm up to
100 mm stroke



FY400 schematic cut view



The **FY400** digital positioner uses the most advanced microprocessor to perform an accurate and quick valve positioning. It is a controller which receives a setpoint from the process main controller and move the valve exactly to the ideal position for better process performance.

The **FY400** HART® senses the actual stem valve position and it takes the corrective action according to a fully user configurable strategy. The “non-contact” position sensor (Hall effect based) prevents the inadequacy of links and levers.

The 4 to 20 mA signal (from the controller) is processed at the main digital circuit board. The analog board gets the information from the main circuit board and generates a low power voltage signal to a piezo electric disc in the pressure transducer. It results in a inflection in such disc, moving it nearer or further away from a nozzle in the pressure transducer. This inflection provides a (pilot) pressure variation proportional to the loop controller.

The diaphragm block amplifies the force related to the pilot pressure and pushes down the spool valve, allowing the supply pressure into the valve actuator. On the other hand, the spool valve movement may relieve the pressure from the valve actuator to the atmosphere.

The valve stem will move in response to spool valve movement up to the correct position. The actual valve position is read by the magnet sensor (Hall effect) and feedback to the main circuit board. With the position information (readback signal), the microprocessor will drive a signal to the analog circuit, correcting the valve position.

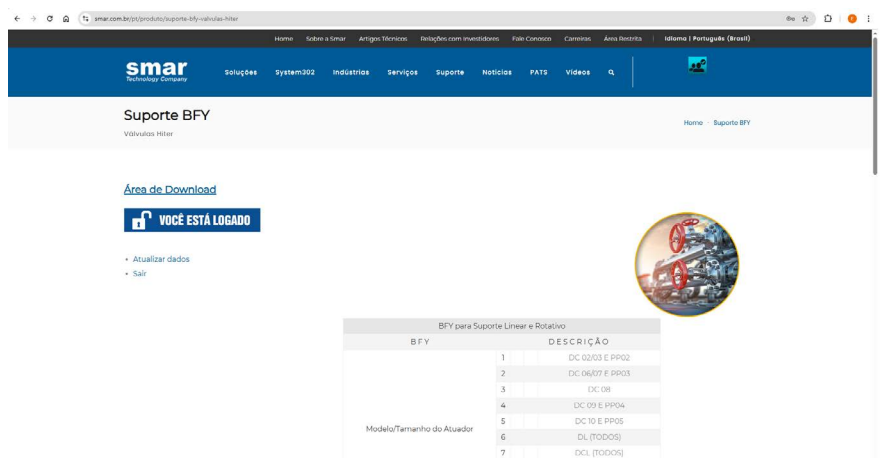
The microprocessor uses the PID algorithm to eliminate the valve position error. The PID parameters are easily tuned automatically through a single command given locally via magnetic tool or a hand held programmer. It is also possible to configure the FY400 via any FDT/DTM software application.

Mounting Brackets

Smar **FY400** HART® is designed for easily assembling in the field or inside the workshop. There are universal mounting brackets (in carbon and stainless steel) for both rotary and linear actuators.

Additionally, several types of dedicated mounting brackets are available, covering various valve models and manufacturers.

Check availability and select the bracket that meets your process needs on the Smar website.



Smar's internet page for customized mounting brackets selection

FY400 Linear

Configurable via software, from 3 mm up to 100 mm stroke, selected from the linear magnet and mounting bracket choices according to the required stroke.

FY400 Rotary

Configurable via software from 30° to 120° used with rotary magnet and proper mounting bracket.

FY400 Local Non-contact Position Sensor

Regular positioner with integrated position sensor.

FY400 Remote Non-contact Position Sensor

Most appropriate on applications involving high temperature and vibration. Also suitable for places with difficult access. Available from 5 m to 20 m cable length.

FY400 with Pressure Sensors

In addition to the regular information on the valve and positioner status, the pressure sensors are also useful for advanced diagnosis.



Parameterization and Diagnostics

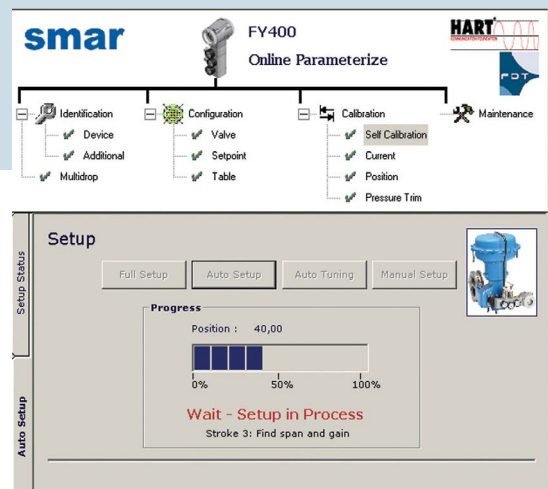
FY400 is available in HART® technology.

These instruments can be configured with Smar software and other manufacturer configuration tools.

Local adjustment is available in all **FY400**. It is possible to configure the valve type and characteristics, manual or automatic setup, local or remote setpoint, tight-shut-off and other control functions using the magnetic tool.

Smar has developed the AssetView, a management application software, which is a user-friendly Web Tool,

accessed from anywhere and at anytime using an internet browser. It is designed for management and diagnostics of field devices, to ensure reactive, preventive, predictive and proactive maintenance.

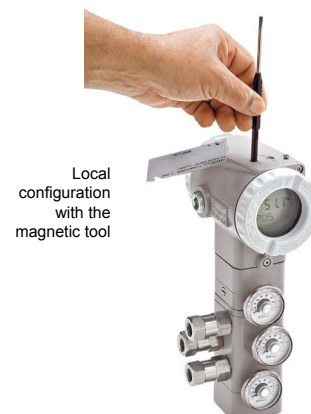


Typical FDT/DTM connected to the FY400 for remote configuration

FY400 with HART® protocol can be configured by:

- DEVCOMDROID Smar software, used with the HI331 (Bluetooth Interface);
- Other manufacturers' configuration tools based on DD (Device Description), AMS™, Simatic PDM, and FDT/DTM, such as, FieldCare™, PACTware™, HHT275 and HHT375, PRM Device Viewer.

For FY400 management and diagnostics, AssetView ensures continuous information monitoring.



Local configuration with the magnetic tool

Smar **FY400** provides diagnostics on several levels allowing quick maintenance and in a safe way:

- Final Element Level
- Electronics Level
- Alarms Management Level

The **FY400** performs advanced diagnostics even during the auto-setup and auto-tuning procedures. It verifies the integrity of important data for the control valve to work properly such as the characterization data, including valve signature, the customer entered data, the calibration data, among other relevant information about the set valve-actuator.

During the operation, the valve position is continuously checked. Using advanced algorithms, the positioner informs the plant operators of the current valve usage, which may indicate a need of preventive maintenance.

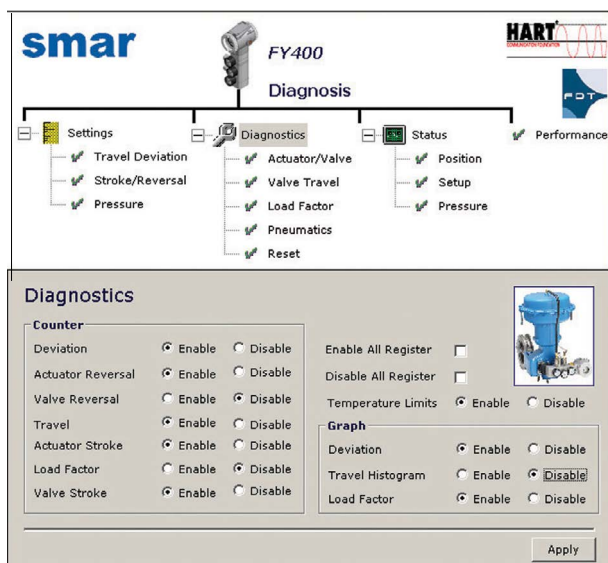
Additional Diagnostics

The **FY400** is a powerful tool for valve preventive diagnosis, supplying on-line information for most of asset management applications in the market. The main target is a significant maintenance costs reduction for control valves and control final elements.

The majority information is recorded on the FY400 memory capabilities, being uploaded to the application software of the customer choice for further analysis and strategic maintenance decision.

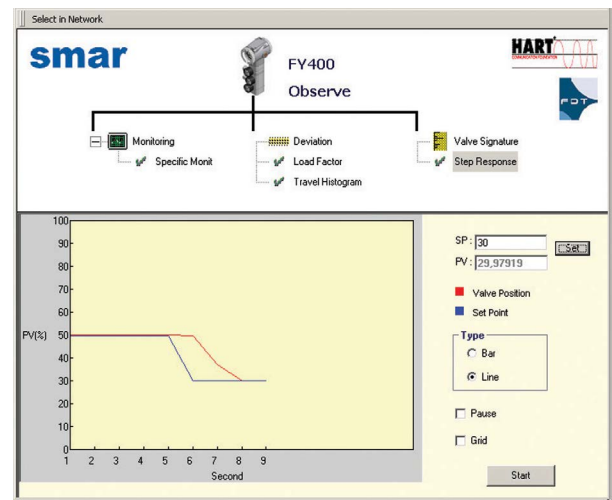
Some of the diagnostic information available are listed below:

- Number of strokes
 - It gives the level of valve wearing.
- Reversals
 - Indicate the possibility of a early change of the gaskets.



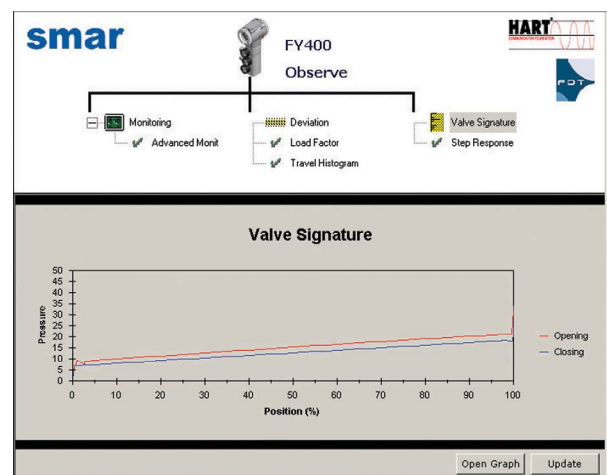
Overview on FY400 Diagnostics

- Travel Mileage
 - Give overall information about the use of the control final element.
- Actuator Load Factor
 - Show the mechanical efforts and pressure requirements for the valve to reach the ideal position.
- Step Response
 - Useful information for the control loop dynamic evaluation and valuable tool for the loop tuning.



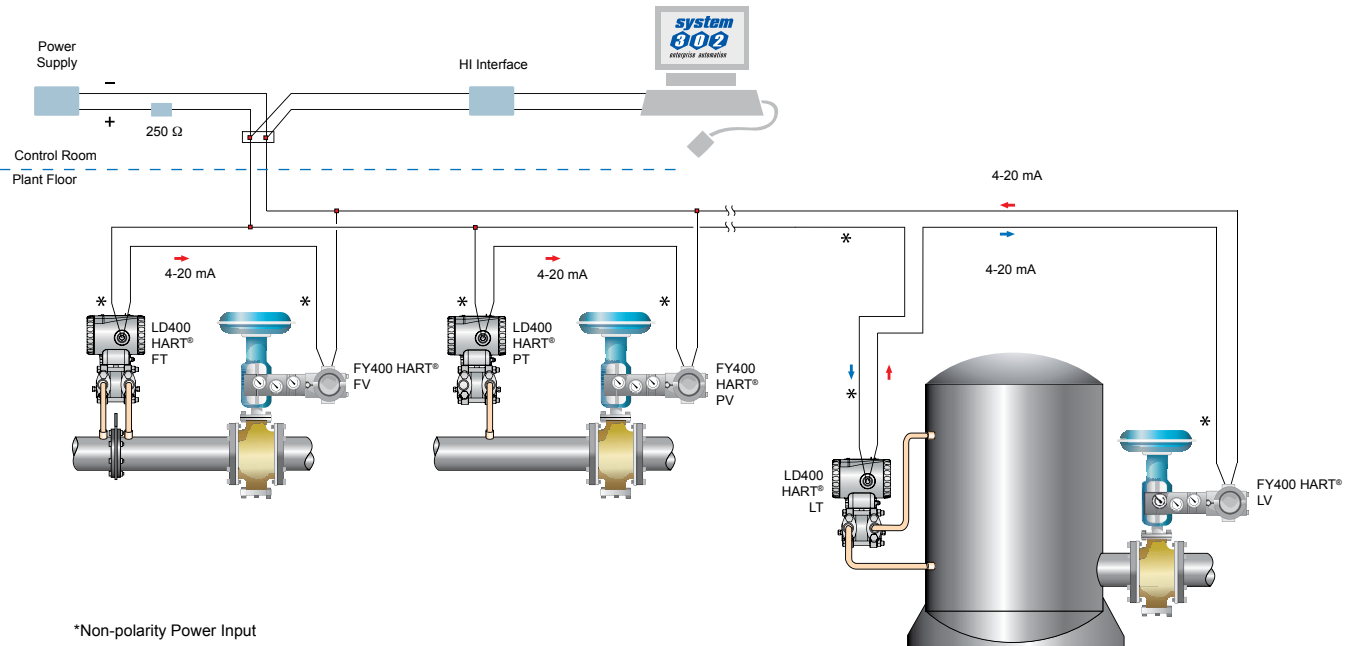
Step Response Graphic

- Valve Signature
 - This is the basic information for the user to predict the need for valve maintenance.



Valve Signature

- Alarms
 - Temperature
 - Low air supply
 - No movement
 - Magnet position
 - Piezo voltage
 - Low current supply



Technical Characteristics - FY400 HART

Functional Specifications

Travel	Linear Motion: 3 to 100 mm. Rotary Motion: 30° to 120° Rotation Angle.
Input and Communication Protocol	Two-wire, 4-20 mA controlled according to NAMUR NE43 specification, with super-imposed digital HART® Protocol.
Indicator	Rotative LCD, with 4½-numerical digit and 5-character alphanumeric. Function and status icons.
Hazardous Area Certifications	INMETRO (NCC) Certification for Intrinsic Safety and Explosion-Proof.
European Directive Information	<p>This product complies with applicable directives. It was designed and manufactured in accordance with sound engineering practices using standards from ANSI, ASTM, DIN and JIS. Monitoring of the Quality Management System by BVQI (Bureau Veritas Quality International) for the certification of Management Systems.</p> <p>PED Directive 2014/68/EU - "Pressure Equipment" This product is in compliance with Article 4 paragraph 3 of the Pressure Equipment Directive and was designed and manufactured in accordance with the sound engineering practice.</p> <p>EMC Directive (2014/30/EU) - Electromagnetic Compatibility The EMC test was performed according to standard: IEC61326:2002.</p> <p>ATEX Directive 2014/34/EU - "Equipment for explosive atmospheres" The EC-Type Examination Certificate is released by DNV Product Assurance AS (NB 2460) and DEKRA Testing and Certification GmbH (NB 0158). Designated certification body that monitors manufacturing and released QAN (Quality Assurance Notification) is UL International Demko AS (NB 0539).</p> <p>ROHS Directive 2011/65/EU - "Restriction of the use of certain hazardous substances in electrical and electronic equipment" For the evaluation of the products the following standards were consulted: EN IEC 63000.</p> <p>LVD Directive 2014/35/EU - "Low Voltage" According the LVD directive Annex II, electrical equipment for use in an explosive atmosphere is outside the scope of this directive. According to IEC standard: IEC 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements.</p>

Flow Characterization	Linear, Equal Percentage, Quick Opening, 16-point freely configurable table. Configurable via local adjustment and digital communication.
Temperature Limits	<p>Operation: -40° to 85 °C (-40° to 185 °F).</p> <p>Storage: -40° to 90 °C (-40° to 194 °F).</p> <p>Display: -10° to 75 °C (14° to 167 °F) operation.</p> <p>-40° to 85 °C (-40° to 185 °F) without damage.</p> <p>Remote Sensor Operation: -40° to 105 °C (-40° to 221 °F).</p>
Voltage drop	11 Vdc max / 20 mA (equivalent to 550Ω).
Configuration	Through digital communication, using DevComDroid configuration software (Android DDL Interpreter), used with HART interfaces, such as HI331 bluetooth interface. However, the old Palm with HPC301 or CONF401, which are obsolete, are still operable with the latest versions of HART transmitters. The FY400 can also be configured using third-party configuration tools, and can be partially configured through local adjustment using the Smar magnetic tool.
Humidity Limits	0 to 100% RH (Relative Humidity non-condensable).
Minimum current	3.8 mA.
Actual Position Sensing	Non-contact Hall effect sensor. Integral or Remote. Optional 4 to 20 mA input for position measurement.
Air Supply	<p>1.4 - 7 bar (20-100 psi).</p> <p>Free of oil, dust and water, as per ANSI/ISA S7.0.01-1996.</p>

Performance Specifications

Resolution	< 0.1% F.S.
Air Supply Effect	Negligible.
Repeatability	< 0.1% F.S.
Consumption	<p>0.35 Nm³/h (0.20 SCFM) at 1.4 bar (20 psi) supply.</p> <p>1.10 Nm³/h (0.65 SCFM) at 5.6 bar (80 psi) supply.</p>
Ambient Temperature Effect	0.8%/20 °C of span.
Output Capacity	13.6 Nm³/h (8 SCFM) at 5.6 bar (80 psi) supply.
Vibration Effect	<p>± 0.3 % /g of span during the following conditions:</p> <p>5-15 Hz at 4 mm constant displacement.</p> <p>15-150 Hz at 2 g.</p> <p>150-2000 Hz at 1 g.</p> <p>Complies with IEC60770-1.</p>
Electromagnetic Interference Effect	According to IEC 61326:2002.

Physical Specifications

Electrical Connection (1)	$\frac{1}{2}$ - 14 NPT M20 X 1.5 PG 13.5 DIN	$\frac{3}{4}$ - 14 NPT (with 316 SST adapter for $\frac{1}{2}$ - 14 NPT). $\frac{3}{4}$ - 14 BSP (with 316 SST adapter for $\frac{1}{2}$ - 14 NPT). $\frac{1}{2}$ - 14 BSP (with 316 SST adapter for $\frac{1}{2}$ - 14 NPT).
Pneumatic Connections	Supply and output: $\frac{1}{4}$ -18 NPT. Gage: $\frac{1}{8}$ - 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, IP 66). Identification Plate: 316 SST.	
Mounting	Universal brackets for rotary motion and linear strokes (See BFY ordering code). Optional customized brackets for most of the market valves and final elements (Consult www.smar.com.br/en for availability and brackets selection). Additional "L" shape bracket, in carbon and Stainless Steel for 2" pipe mounting (remote sensor version).	
Approximate Weights	<ul style="list-style-type: none"> • FY 2.7 kg in aluminum, without mounting bracket; 6.0 kg in SST, without mounting bracket. • Remote Sensor 0.58 kg in aluminum; 1.5 kg in SST. • Cable and connectors of remote sensor 0.045 kg/m of cable; 0.05 kg for each connector. 	
Pressure Sensors	For air supply, output 1 and output 2 measurement. (Optional)	

(*) The pressure gages for input, output 1 or output 2 pressures, will be supplied with the external housing in SS316 and the wet parts in brass.

HART® is a trademark of HART® Communication Foundation.

All other trademarks are the property of their respective owners.

MODEL													
FY400 Intelligent Valve Positioner													
COD. Communication Protocol													
H HART® & 4 to 20 mA													
COD. Safety Options													
0 Standard – For use in measurement and control													
COD. Local Indicator													
1 With local digital indicator													
COD. Mounting Bracket													
0 Without mounting bracket 1 With mounting bracket (Specify BFY)													
COD. Electrical Connection													
0 1/2" - 14 NPT A M20 X 1.5 B PG 13.5 DIN 1 1/2" - 14 NPT X 3/4 NPT (SST) - with adapter 2 1/2" - 14 NPT X 3/4 BSP (SST) - with adapter 3 1/2" - 14 NPT X 1/2 BSP (SST) - with adapter													
COD. Type of Actuator													
1 Rotary - Single Action 2 Rotary - Double Action 5 Linear Stroke Up to 50 mm - Single Action 6 Linear Stroke Up to 50 mm - Double Action 7 Linear Stroke Up to 100 mm - Single Action 8 Linear Stroke Up to 100 mm - Double Action A Linear Stroke Up to 30 mm - Single Action B Linear Stroke Up to 30 mm - Double Action C No Magnet - Simple Action D No Magnet - Double Action													
COD. Indication Gage													
0 Without Gage 1 With 1 Gage - Input 2 With 1 Gage - Output 3 With 2 Gage - Input and Output 1 4 With 2 Gage - Outputs 1 and 2 5 With 3 Gage Z Others Specify													
COD. Certification Type													
D Explosion Proof I Intrinsic Safety G Explosion Proof + Increased Safety N Without Certification H Intrinsic Safety + Explosion Proof + Increased Safety O Protection by Enclosure (Explosive Dust)													
COD. Certifying Body													
0 Without 5 INMETRO (NCC)													
SPECIAL OPTIONS (Leave it blank for no optional items)													
COD. Housing													
H0 Aluminum Housing (IP/Type) H2 Aluminum Housing for saline atmosphere (IP/Type X) (1) H1 316 SST Housing (IP/Type) H3 316 SST Housing for saline atmosphere (IP/Type X) (1)													
COD. Painting													
P0 Gray Munsell N 6.5 Polyester PD Safety Blue Polyesters - Electrostatic Painting P8 Without Painting P9 Safety Blue Epoxy - Electrostatic Painting													
COD. Mounting Sensor (3)													
R0 Integral Mounting R5 Feedback 4 to 20 mA - 5 m Cable (2) R1 Remote sensor - 5 m Cable R6 Feedback 4 to 20 mA - 10 m Cable (2) R2 Remote sensor - 10 m Cable R7 Feedback 4 to 20 mA - 15 m Cable (2) R3 Remote sensor - 15 m Cable R8 Feedback 4 to 20 mA - 20 m Cable (2) R4 Remote sensor - 20 m Cable													
COD. Special Sensor													
K0 Without Pressure Sensors K1 With pressure sensors for diagnostics													
COD. Optional Items													
ZZ Leave blank if there are no optional items.													

FY400 - H 0 - 1 1 - 0 6 5 N 0 • * / * / * / * / *

← TYPICAL MODEL NUMBER

(1) IPW/TYPEx tested for 200 hours according to NBR 8094 / ASTM B 117 standard.

(2) Consult Smar for applications in hazardous areas. See note for mounting bracket on BFY ordering code.

(3) When choosing the Remote Sensor version, an additional "L"-shaped bracket for a 2" tube will be included to attach the Remote FY. To attach the Remote Sensor to the actuator, it is necessary to specify the BFY according to the order code in this catalogue.

MODEL	
BFY	BRACKET (1)
	COD. Positioner Mounting Bracket (2)
	0 Without Positioner Bracket
	1 Universal Rotary
	2 Universal Linear (Yoke and Pillar)
	3 Linear - Yoke Type
	4 Linear - Pillar Type
	Z Others (Specify)
	COD. Magnet Mounting Bracket
	0 Without Magnet Mounting Bracket
	1 Rotary
	2 Linear up to 30 mm
	3 Linear up to 50 mm
	4 Linear up to 100 mm
	Z Others (Specify)
	COD. Positioner Mounting Bracket Material
	7 Carbon Steel Bracket and Accessories in SST
	C Carbon Steel Bracket
	I Stainless Steel Bracket
	N Not applicable
	Z Others - Specify
	COD. Magnet Bracket Material
	C Carbon Steel Bracket
	I Stainless Steel Bracket
	N Not applicable
	Z Others - Specify
	COD. Optional Items
	ZZ Leave it blank for no optional items

BFY

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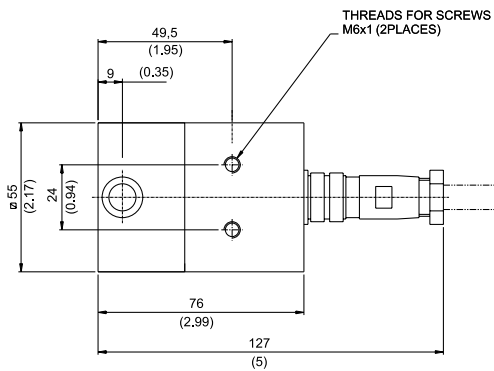
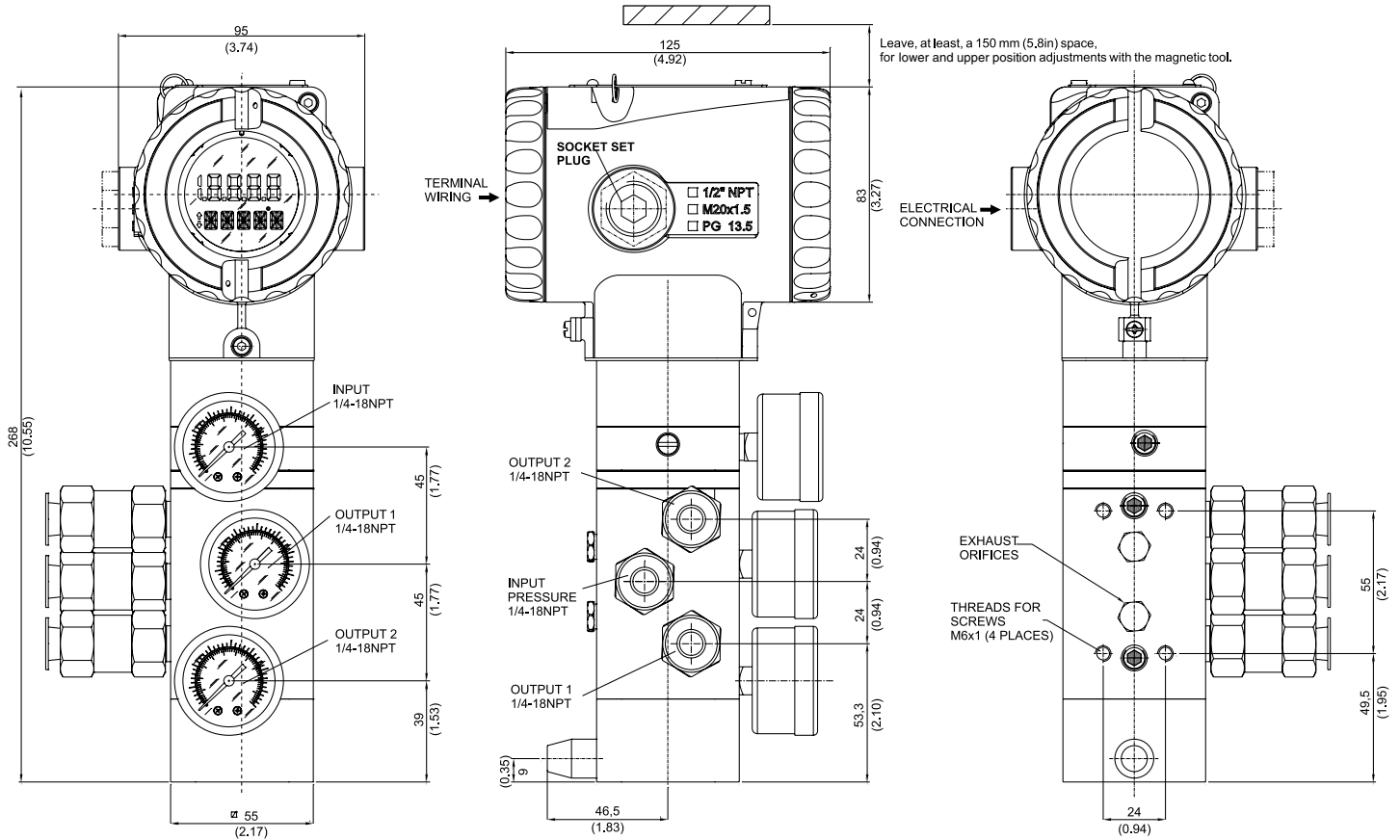
C

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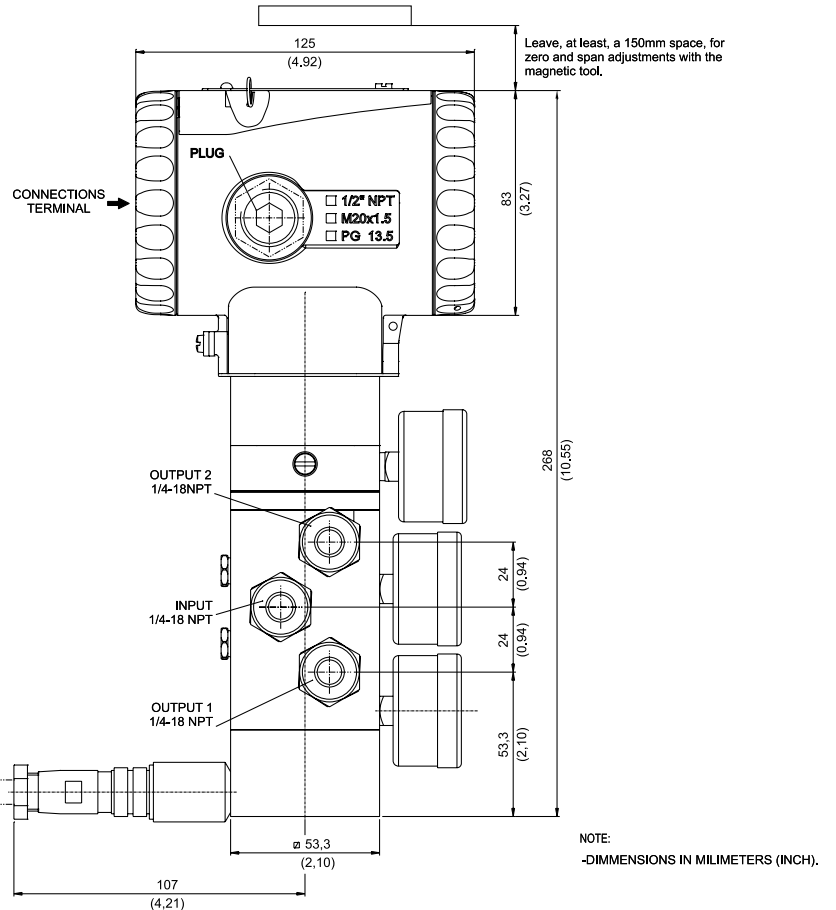
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 TYPICAL MODEL NUMBER

(1) Consult www.smar.com for customized mounting bracket.
(2) When choosing the remote sensor version, an additional "L" shape bracket is included, for 2" tube mounting.



FLEXIBLE SHIELDED CABLE
AVAILABLE LENGTHS:
5 m, 10 m, 15 m, 20 m



NOTE:
-DIMENSIONS IN MILIMETERS (INCH).

FY400 Series

Valve Positioner for Actuation and Control



Positioner with pressure gauges for monitoring pressures.



Remote Position Sensor
(contactless)



Universal mounting bracket
(Linear or Rotary)



Rotary magnet for 30° to 120°
movement and linear magnet
for 3 to 100mm movement

Consult our
representatives



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