# FY303
## PROFIBUS PA VALVE POSITIONER

### *Features*

- Low air consumption.
- Direct non-contact position sensing.
- Configuration and Parameterization all through configuring and programming tools available in the market, e.g., based on PC or PCMCIA Cards or some limited operations by the local adjustment switches (should be used with an LCD display).
- Valve characteristics change with software cams.
- Use of Function Block Analog Output.
- Weather proof, Explosion proof and intrinsically safe.
- Digital LCD Display (optional).
- Self Calibration.
- User table and valve curves (EP25, EP33, EP50, QO25, QO33, QO50).
- Self diagnostics.

  The FY303 allows the following diagnostic functions:

  - Travel;
  - Strokes;
  - Reversals;
  - Maximum Temperature;
  - Minimum Temperature;
  - Time to Close;
  - Time to Open;
  - Sensor Module Failure.
- Configurable Local Adjustment.
- Easy firmware upgrade (via Flash Memory Interface).
- Esay update to Foundation Fieldbus and HART protocol.
- PROFIBUS PA compliant.

### *Description*

The FY303 is a control valve positioner for a pneumatic valve in a PROFIBUS system. The FY303 produces a pressure output as required to position a control valve according to an input received over the PROFIBUS network or internal controller. The PROFIBUS PA technology used in the FY303 enables an easy interface between the field and the control room and also

includes several interesting features that considerably reduce the installation, operation and maintenance costs.

The FY303 is part of Smar's complete 303 series of PROFIBUS PA devices.

### Reliable and flexible

The elimination of many mechanical parts in the FY303 is the biggest advantage over other positioners in the market: Higher reliability as there are fewer parts that wear, safer as there are less moving parts, and more accurate as there is less dead-band from mechanical imprecision.

The position sensing is done without any mechanical contact virtually eliminating wear and tear and subsequent degradation. The FY303 directly senses longitudinal or rotary movement based on the Hall effect. The position signal may also be used in advanced control schemes.

The Hall effect sensor allows a remote mounting, using an up to 20 m length extension cable. Such feature is suitable for high temperatures applications and heavy vibration places.

Valve characteristics, action, absolute and rate-of-change limits, etc are configured in software instead of a mechanical cam and spring. The changing of the Action behavior or changing of the Flow characteristic (linear, equal percentage, hyperbolic (quick opening) or a freely configurable table) may be done remotely by the click of a bottom. These and other software capabilities make the FY303 extremely flexible.

### Self diagnostics

The continuous self-diagnostics of the positioner issues alerts for a range of hardware and software failures and problems with the positioner or valve immediately. This enables maintenance personnel to pinpoint errors instantly or before they can cause any harm. The diagnostic data may also be accessed on demand.

The benefit for the operator to get this information without having to bring the valve or positioner in to a workshop for testing is obvious. The time that can be saved by not having to test only a few units is enormous.

Diagnostics enables you to quickly determine if a process problem is due to the valve/positioner or not, without having to do several field visits. Production can resume operation in minutes. The diagnostic functions are also suitable for preventive maintenance such as detection of increasing valve dead-band and "stick-slip" operation.

There is also a software limit switch for travel, which automatically alerts the operator.

## Function Blocks Table

| BLOCK | |
|---|---|
| PHY | ***PHYSICAL*** **-** This Function Block contains data regarding the device's identification, specific information of the hardware and firmware of the device and diagnosis information. |
| TRD | ***TRANSDUCER*** **-** This block provides the interface with the hardware controlling the final element by generating output pressure, and sensing and reading the position of the final element. Other features like valve characteristics, actions, rate-of-change, etc…are done in this block. The built-in self-diagnostic provides device's operation reliability. |
| DSP | ***DISPLAY*** **-** Transducer Block controls the LCD display and interfaces with the user providing local configuration capability. |
| AO | ***ANALOG OUTPUT*** **-** The AO block provides a value and its status associated to an output transducer block. It also provides mode control, scaling conversion, fault state mechanism and other features. |

## Technical Characteristics

### Functional Specifications

| | |
|---|---|
| **Travel** | Linear Motion: 3 - 100 mm.<br>Rotary Motion: 30 - 120° Rotation Angle. |
| **Input Signal** | Digital only. Fieldbus, 31.25 Kbits/s voltage mode with bus power. |
| **Communication Protocol** | PROFIBUS PA, Digital only, complies with IEC 61158-2 (H1): 31.25 kbit/s voltage mode with bus power. |
| **Power Supply** | Bus powered: 9-32 Vdc.<br>Output impedance (from 7.8 kHz - 39 kHz):<br>Non-intrinsic safety: 3 kΩ.<br>Intrinsic safety: 400 kΩ (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 Area Certifications** | Explosion proof, weather proof and intrinsically safe:<br>NEMKO, DMT, FM, CSA and CEPEL standards. |
| **Temperature Limits** | Operation: -40 to 85ºC (-40 to 185ºF).<br>Storage: -40 to 90ºC (-40 to 194ºF).<br>Display: -10 to 60ºC ( 14 to 140ºF) operation.<br>-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. |
| **Configuration** | Basic configuration may be done using local adjustment magnetic tool if device is fitted with display. Complete configuration is possible using remote configurator (Ex.: Simatic PDM, from Siemens). |

## Performance Specifications

| | |
|---|---|
| **Resolution** | ≤ 0.1% F.S. |
| **Repeatibility** | ≤ 0.1% F.S. |
| **Hysteresis** | ≤ 0.1% F.S. |
| **Consumption** | 0.25 Nm/h (0.15 SCFM) at 1.4 bar (20 psi) supply.<br>0.70 Nm/h (0.40 SCFM) at 5.6 bar (80 psi) supply. |
| **Output Capacity** | 13.6 Nm3/h (8 scfm) at 5.6 bar (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:<br>5-15 Hz at 4 mm constant displacement.<br>15-150 Hz at 2 g.<br>150-2000 HZ at 1 g.<br>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

| | |
|---|---|
| **Hardware** | Physical: according to IEC 61158-2 and conformity with the FISCO model. |
| **Electrical Connection** | ½ - 14 NPT, Pg 13.5 or M20 x 1.5. |

| | |
|---|---|
| **Pneumatic Connections** | Supply and output: 1/4 - 18 NPT.<br>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. (Aluminum)<br>5.8 Kg. (Stainless Steel)<br>Add for digital display: 0.1 kg.<br>For Aluminum FY: Remote Sensor: 550g.<br>Cable: 100g. (Connectors) plus 45g/m |

## Ordering Code

***MODEL FY303*** ***PROFIBUS PA VALVE POSITIONER***

| CODE | Digital Local Indicator |
|---|---|
| 0 | Without Digital Indicator |
| 1 | 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 Magnet Coupling |
|---|---|
| 1 | Rotary – Single Action |
| 2 | Rotary – Double Action |
| 3 | Linear Stroke up to 15 mm - Single Action |
| 4 | Linear Stroke up to 15 mm - 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 |
| Z | Others - Specify |

| CODE | Pressure 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 |
| H1 | 316 SST housing |
| K1 | With pressure sensors for air input and output |
| R1 | Remote sensor: 5 m (****) |
| R2 | Remote sensor: 10 m (****) |
| R3 | Remote sensor: 15 m (****) |
| R4 | Remote sensor: 20 m (****) |

| FY303 | - | 1 | 0 | - | 0 | 1 | 0 | / | H1 |
|---|---|---|---|---|---|---|---|---|---|

◀ TYPICAL MODEL NUMBER

* Leave it blank for no optional items.
** Use separate ordering code.
*** The pressure gauges for supply pressure, output 1 or output 2, when specified in stainless steel, will be supplied with the external housing in SS316 and the wet parts in brass.
**** Consult for hazardous areas applications.

## Ordering Code

**BFY 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 | Optional Items* |
|---|---|
| ZZ | Specify Actuator Model / Company |

| BFY | - | 1 | 0 | 0 | / | * |
|---|---|---|---|---|---|---|

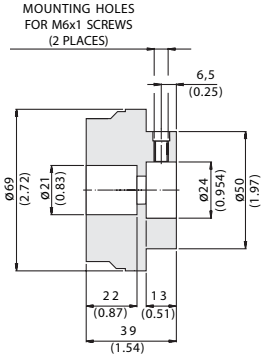
◀ TYPICAL MODEL NUMBER

*Leave it blank for no optional items.

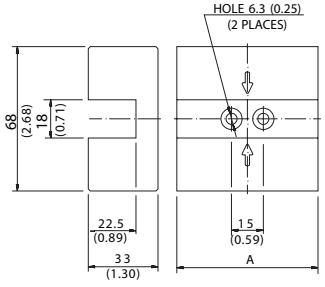
## Dimensions

Dimensions are mm (in)

### Rotary Magnet

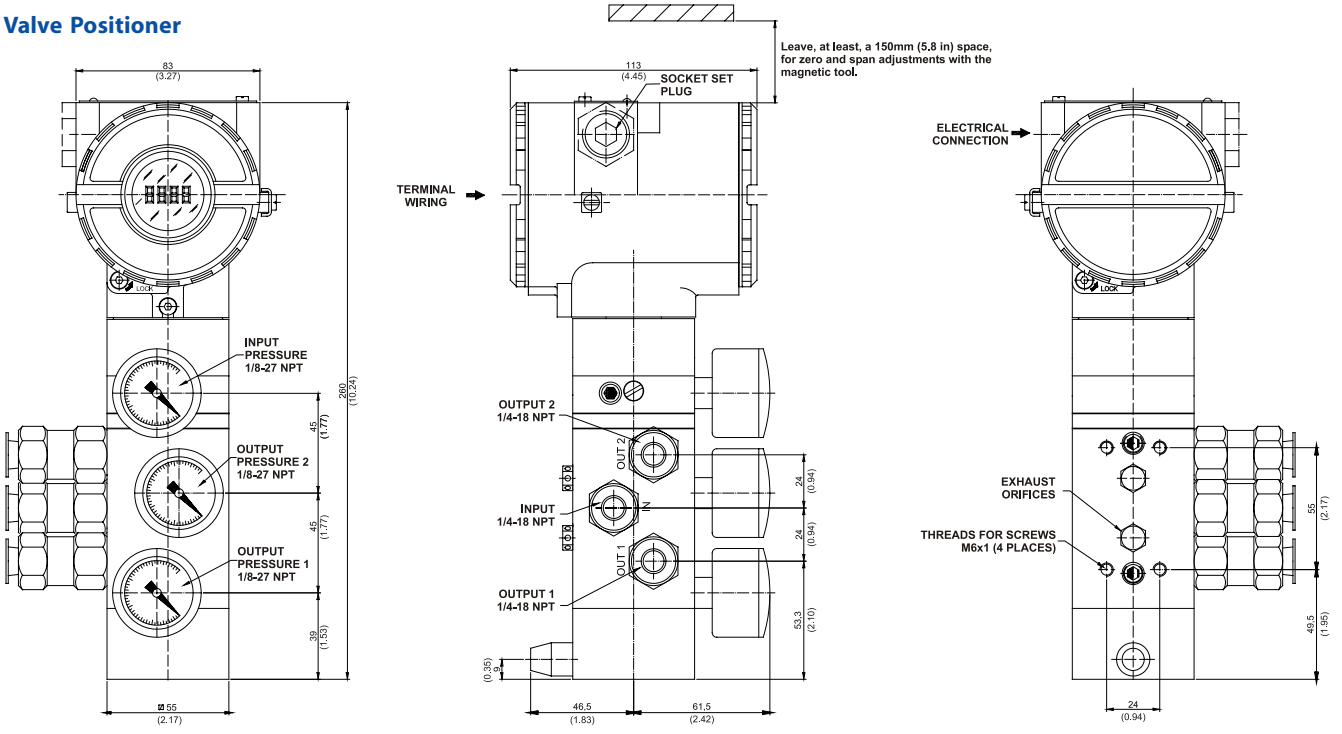



### Linear Magnet




| 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 TO100 mm (3.94) | 181 mm (7.12) |

### Valve Positioner



**USA**
Smar International Corporation
6001 Stonington Street, Suite 100
Houston, TX 77040
Tel.: +1 713 849-2021
Fax: +1 713 849-2022
sales@smar.com

Smar Research Corporation
4250 Veterans Memorial Hwy. Suite 156
Holbrook , NY 11741
Tel.: +1 631 737-3111
Fax: +1 631 737-3892
sales@smarresearch.com

Smar Laboratories Corporation
6001 Stonington Street, Suite 100
Houston, TX 77040
Tel.: +1 713 849-2021
Fax: +1 713 849-2022
sales@smar.com

**SINGAPORE**
Smar Singapore Pte. Ltd.
315 Outram Road
#06-07, Tan Boon Liat Building
Singapore 169074
Tel.: +65 6324-0182
Fax: +65 6324-0183
info@smar.com.sg

**BRAZIL**
Smar Equipamentos Ind. Ltda.
Rua Dr. Antonio Furlan Jr., 1028
Sertãozinho SP 14170-480
Tel.: +55 16 3946-3510
Fax: +55 16 3946-3554
insales@smar.com.br

**GERMANY**
Smar GmbH
Rheingaustrasse 9
55545 Bad Kreuznach
Tel: + 49 671-794680
Fax: + 49 671-7946829
infoservice@smar.de

**MEXICO**
Smar Mexico
Cerro de las Campanas #3 desp 119
Col. San Andrés Atenco
Tlalnepantla Edo. Del Méx - C.P. 54040
Tel.: +53 78-4600 al 02
Fax: +53 78-4603
ventas@smar.com

**NETHERLANDS**
Smar Nederland
De Oude Wereld 116
2408TM Alphen aan den Rijn
Tel: +31 172 494 922
Fax: +31 172 479 888
info@smarnederland.nl

**FRANCE**
Smar France S. A. R. L.
42, rue du Pavé des Gardes
F-92370 Chaville
Tel.: +33 1 41 15-0220
Fax: +33 1 41 15-0219
smar.adm@wanadoo.fr

**CHINA**
Smar China Corp.
3 Baishiqiao Road, Suite 30233
Beijing 100873, P.R.C.
Tel.: +86 10 6849-8643
Fax: +86 10 6894-0898
info@smar.com.cn

**UNITED KINGDOM**
Smar UK Ltd
3, Overhill Road
Cirencester
Gloucestershire
GL7 2LG
Phone: +44 (0)797 0094138
Fax: +44 (0)797 4747502
info@smarUK.co.uk

Plus a network of
representatives in 58 countries.
For your nearest representative
please contact:
insales@smar.com.br

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www.smar.com

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