



SMART TRANSMITTER FOR POSITION MEASUREMENT **TP300** SERIES

- Available for 4 to 20 mA, HART®, FOUNDATION™ fieldbus and PROFIBUS PA communication protocols
- Position measurement without mechanical contact
- Position measurement carried out through a Hall Effect magnetic sensor
- Available for remote mounting of the position sensor
- Applications in high vibrations, high temperatures and hard-access locations
- Easy installation
- Local adjustment without need to open the transmitter housing
- For linear and rotary applications
- Rotary display facilitates reading in any position
- Supports DD and EDDL formats for FDT/DTM applications
- Protection against reverse polarity
- Explosion-proof and intrinsically safe
- Designed to comply with European regulations



To measure linear or rotary displacement or movement

TP300 Series

The TP300 Series produces an output signal proportional to the displacement length of mechanical equipment. It can be used to measure linear or rotary displacements.



The **TP300** is a member of the renowned family of Smar equipment available in HART® 4 to 20 mA, FOUNDATION™ fieldbus and PROFIBUS PA technologies.

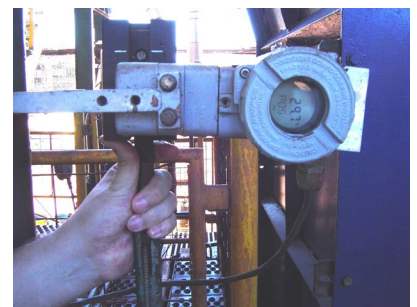
This product line presents the TP290 version, also with digital technology and a 4 - 20 mA output signal.

The **TP300** is a smart transmitter for position measurement, suitable for linear or rotary displacement or movement. Its digital technology and communication provides a friendly interface between the field and the control room, presenting features that considerably reduce installation, operation and maintenance costs.

The **TP300** uses a magnetic coupler without physical contact for position measurement. For this reason it is immune to vibration effects and provides longer operational durability. The magnetic coupler replaces the mechanical connection a significant dead band reduction and preventing inaccurate results from wearing out by use. The **TP300** may be installed in any equipment with linear or rotary motion and a variety of other devices such as dampers, rollers spacing, crushers, etc.

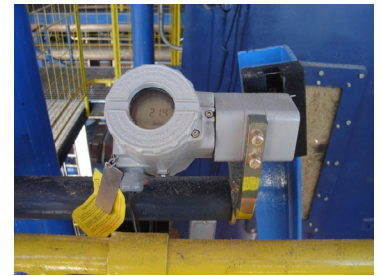
The **TP300** also offers other advantageous functions in comparison to other position transmitters as:

- Linear movement range from 3 mm through 100 mm: for longer courses, consult our BFY-CL Series catalog;
- Rotary movement range from 30° to 120°;
- Local or remote configuration through HART® 4 to 20 mA, FOUNDATION™ fieldbus and PROFIBUS PA protocols;
- Multifunctional, easy to use, local rotary display;
- Easy to install, fast commissioning and adjustment;
- Configuration protection by password;
- Protection against reverse polarity;
- Hall-Effect contactless position sensor that measures the device movement;
- Remote sensor version available with extension cable for applications with difficult access or involving high vibration and high temperature.



HART® - 4 to 20 mA

- Connectivity through:
 - DEVCOMDROID Software (Android DDL Interpreter), which can be used together with the HI331 (Bluetooth Interface) to configure the TP301;
 - Remote parameterization;
 - Local adjustment without need to open the equipment housing;
 - FDT/DTM standard applicatives (Field Device Tool/Device Type Manager);
 - Asset Management applicatives (AssetView).
- Supports DTM and DD;
- Multidrop operation mode.



FOUNDATION™ fieldbus

- Fieldbus communication from PC or via local switch;
- Local configuration with magnetic tool, without need to open the housing or portable configurator;
- 12 mA consumption current;
- Dynamic block instantiation;
- 11 function blocks.

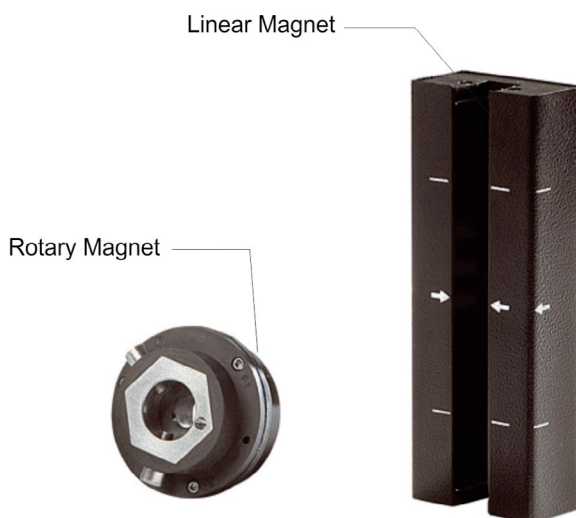


PROFIBUS PA

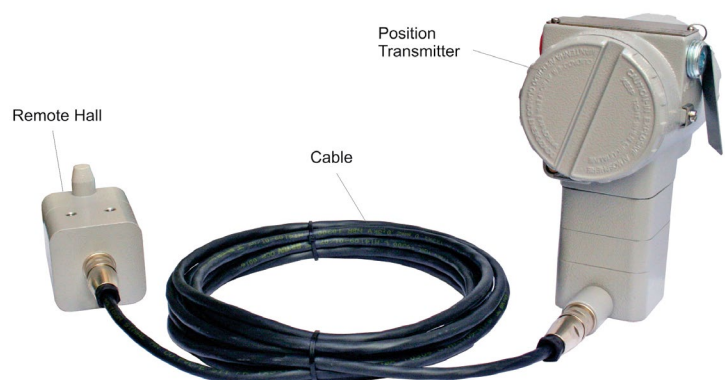
- Connectivity through:
 - Basic configuration with magnetic tool;
 - Complete configuration carried out with a remote configurator (Ex: Smar ProfibusView).
- Function blocks for analog output and valve diagnostics;
- 12 mA current consumption;
- Supports DTM and DD.



Product Highlights



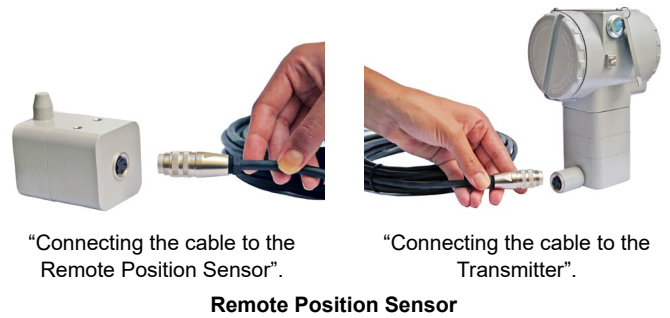
Rotary magnet for 30° to 120° movement and linear magnet for 3 to 100 mm stroke.



Position transmitter: local contactless Position Sensor, or remote contactless Position Sensor.

The Remote Sensor Position is a recommended accessory for high temperatures applications (up to 105 °C), for excessive vibration or even difficult local access. It avoids equipment excessive wear and, consequently, increases the equipment lifetime.

The cable supplied by Smar is shielded and provides excellent protection against electromagnetic interferences.



Services and Support

SMAR offers customers first-class technical support and services with a highly specialized, experienced team. We guarantee the maintenance of your system by supplying quality spare parts and services rapidly, in all stages of the project and plant maintenance.

Online Support

Information about certifications, manuals, catalogues, and applications are available at www.smar.com

Functional Description

Hall Effect Position Sensor

The magnet measures according to the motion of the device. The Hall sensor circuit detects the voltage variation and generates a small voltage proportional to the variation of the magnetic field.

The Hall sensor circuit processes the voltage variation and generates a signal to the A/D converter. The converter sends a set of signals to the transmitter CPU.

HART Modem

Modulates and demodulates the line communication signal. The "1" represents 1200 Hz and the "0" represents 2200 Hz, as specified by the standard. The frequency signal is symmetrical and does not affect the 4-20 mA output DC current level.

Fieldbus Modem

Monitors the activity on line, modulates and demodulates the communication signals; inserts and deletes, limits the beginning and the end and verifies the integrity of the received frame.

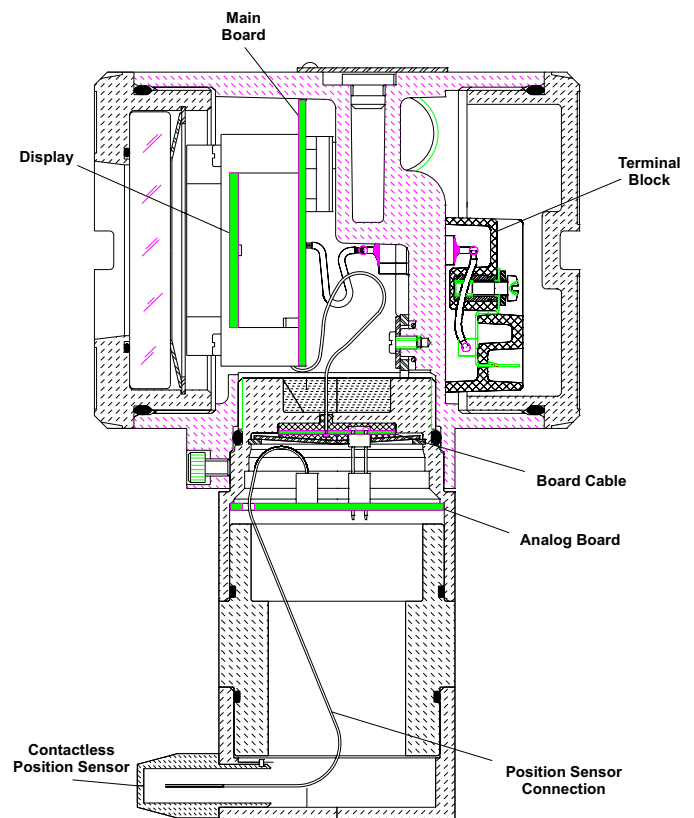
CPU, RAM, PROM and EEPROM

The CPU is the intelligent part of the position transmitter, one that is responsible for the management, operation, control and self-diagnostics. The program is stored in the PROM. For temporary storage of data the CPU has an internal RAM. The CPU has a non-volatile internal memory (EEPROM) where configuration data are stored, such as TP301 calibration and configuration.

Display Controller

Receives data from the CPU and controls the LCD display.

Schematic Section of the TP300



Local Adjustment

Through two switches activated by the magnetic tool without opening the equipment.

The **TP300** may be mounted on any linear or rotary valve, actuator or a variety of other equipment, such as skylights, dampers, rollers spacing, crushers, etc.

The Position Transmitter mounting depends on the type of movement it is applied, be it linear or rotary.

By using the mounting bracket supplied by Smar, it is easy to install the position transmitter in a wide variety of devices.

Mounting brackets for linear or rotary strokes or remote sensor applications have an "L" shaped profile for fixing on a 2" pipe.

To increase linear stroke measurement from 100mm to 1000mm use BFY-CL (<http://www.smar.com>)



TP300 Packing

Transmitter Models

Linear

Local or remote configuration, from 3 mm to 100 mm of linear stroke.

To increase the measurement up to 1000 mm linear stroke, use the **BFY-CL** (<http://www.smar.com>).

Rotary

Configuration (local or remote) through software, 30° to 120° rotation, used with rotating magnet and suitable mounting bracket.

Contactless Local Position Sensor

Standard Position Sensor.

Contactless Remote Position Sensor

Best suited for applications involving high temperature and high vibration. It is also suitable for places of difficult access. Available for cable length from 5m to 20m.

Output

Reverse Output or Direct Action.



TP300 - Remote Sensor



TP300 - Integrated Sensor

Diagnostics and Parameterization

The **TP300** series is available in the **HART®**, **FOUNDATION™ fieldbus** and **PROFIBUS PA** Technologies. These devices can be configured with the Smar software configuration tools, and those from other manufacturers. Local adjustment is available on the **TP300** series. The magnetic tool is used to locally configure the control parameters and several functions.

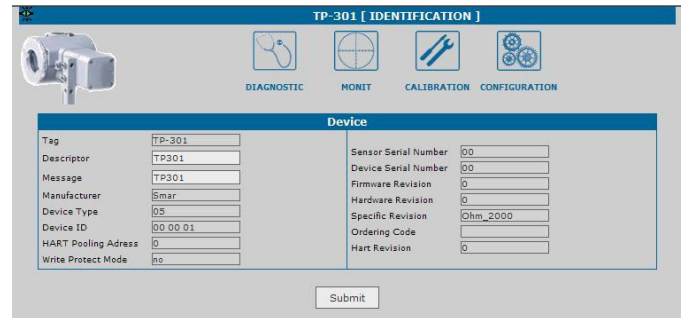
Additionally, Smar developed the AssetView application, a web tool with friendly interface that may be accessed at any time and place with an Internet navigator.

HART® TP301

TP301 (HART® protocol) can be configured by:

- DEVCOMDROID Smar software, used with HI331 (Bluetooth Interface);

Other manufacturers' configuration tools based on DD (Device Description) or FDT/DTM (Device Type Manager), such as AMS™, Simatic PDM, FieldCare™, PACTware™, HHT275 and HHT375, PRM Device Viewer.



FOUNDATION™ fieldbus TP302

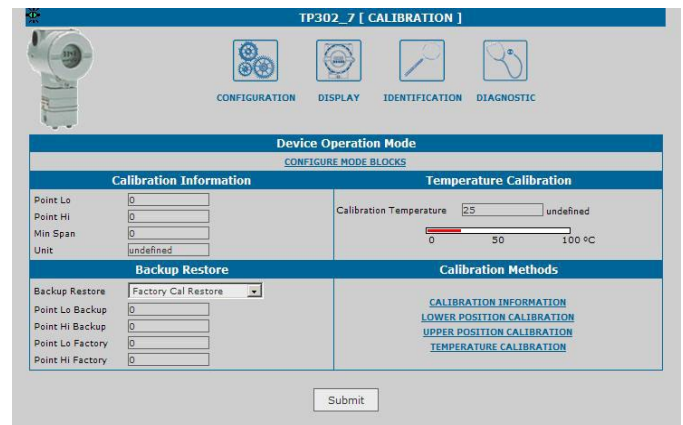
The TP302 uses the H1 communication protocol, the open technology that makes possible for any enabled H1 tool to configure this equipment.

The System Configurator Tool is a software used to configure, operate and provide maintenance for the field equipment. The Syscon offers efficient and friendly interaction with the users that operate the Windows.

Configuration tools like AMS™, FieldCare™, HHT375 e HHT475 can configure the TP302. DD (Device Description) and CF (Capability File) files may be downloaded from the Smar site or FieldComm Group site.

The TP302 supports complex configuration strategies due to its high capacity and variety of the instantiable function blocks.

Eleven function blocks types are available. The fieldbus technology enables the AssetView application to access status and diagnostics information. Therefore, the maintenance procedures become more efficient, providing more safety and plant availability.



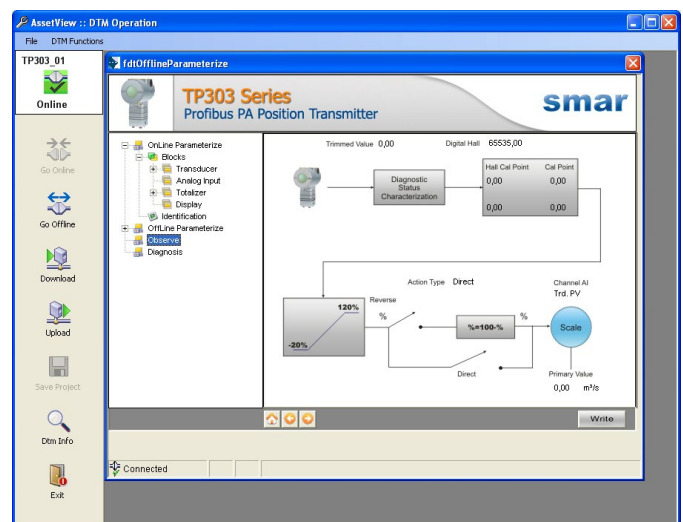
PROFIBUS PA TP303

These instruments can be configured locally with the magnetic tool, without the need to open the cover, or remotely through the ProfibusView from Smar or Simatic PDM from Siemens.

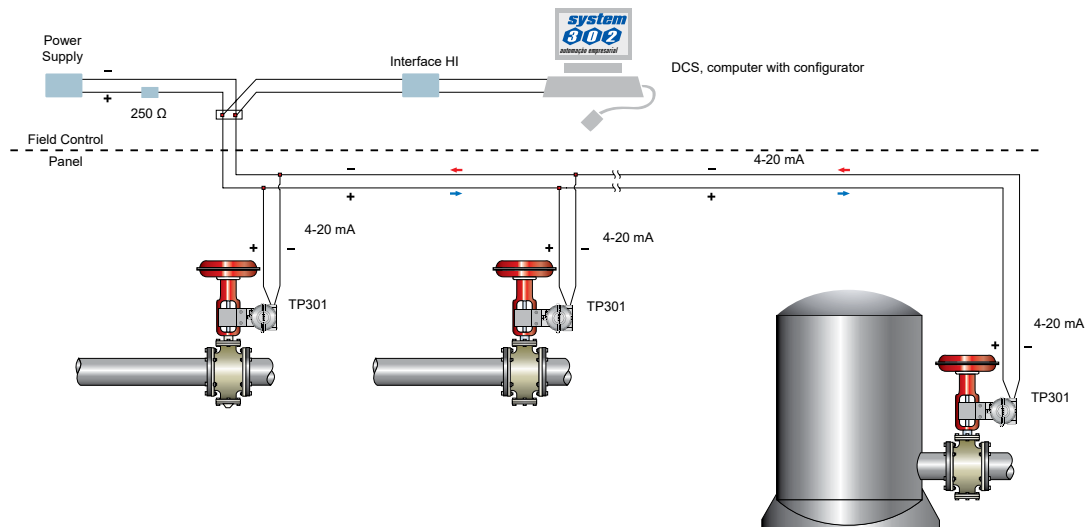
The TP303 was designed to use the PROFIBUS PA protocol and it is configured using the ProfibusView, Simatic PDM or the FDT (Field Device Tool) and DTM (Device Type Manager) tools concept, such as FieldCare™ e PACTware™. It can also be configured by any PROFIBUS system that uses de GSD files.

The PROFIBUS PA also provides information on quality and diagnostics to improve the plant management and maintenance.

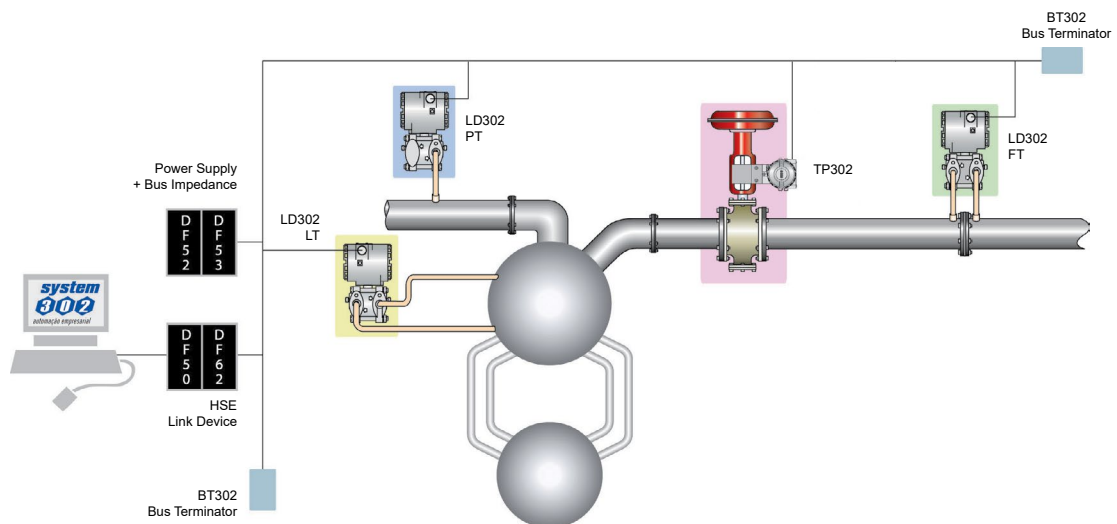
The EDDL (Electronica Device Description Language) and DTM files are available on the Smar website.



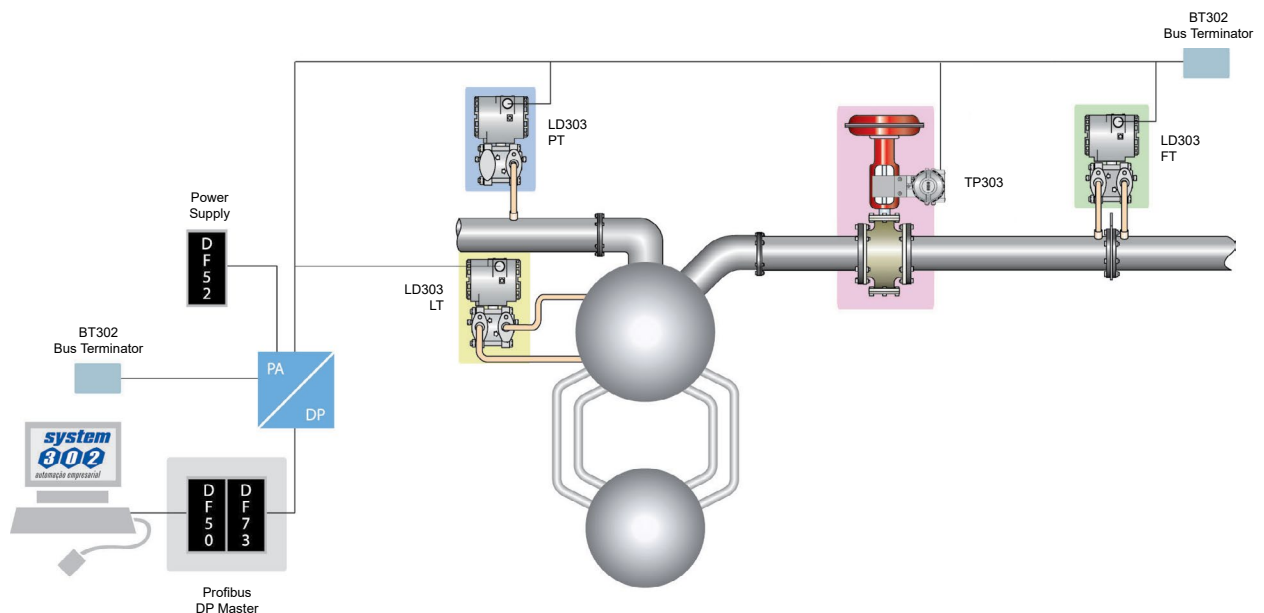
HART® - TP301



FOUNDATION™ fieldbus - TP302



PROFIBUS PA - TP303



Functional Specifications

Travel	Linear Motion: 3 - 100 mm. (For measurement beyond 100 mm consult the BFY-CL catalog at www.smar.com). Rotary Motion: 30° - 120° Rotation Angle.
Output and Communication Protocol	HART® Two-wire 4-20 mA (TP290) with digital overlaid communication (HART® Protocol) compliant with NAMUR NE-43 (TP301). FOUNDATION™ fieldbus and PROFIBUS PA Only digital, compliant with IEC 61158-2 (H1) 31,25 Kbit/s with power supply through the bus.
Zero and Span Adjustment	Non-interactive adjustment, via digital communication or local adjustment.
Indicator	Rotary CLD with 4½ - numerical digits and 5 alphanumeric characters. Function and Status Indication (optional).
Hazardous Area Certifications	INMETRO (CEPEL), FM, ATEX and IECEx (Nemko-Presafe and Dekra-Exam) certification for Intrinsic Safety and Explosion Proof. Designed to comply with European regulations ATEX 2014/34/EU Directive, LVD 2014/35/EU Directive, ROHS 2011/65/EU Directive, EMC 2014/30/EU Directive
Temperature Limits	Ambient: -40 to 85 °C (-40 to 185 °F). Storage: -40 to 90 °C (-40 to 194 °F). Digital Display: -10 to 75 °C (14 to 167 °F) in operation; -40 to 85 °C (-40 to 185 °F) without damages. Remote Sensor: -40 to 105 °C (-40 to 221 °F).
Configuration	4 to 20 mA Local adjustment and configuration with the use of the magnetic tool and digital display. HART® 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. It can also be configured using DD and FDT/DTM tools, and can be partially configured through local adjustment. FOUNDATION™ fieldbus and PROFIBUS PA Basic configuration may be done using the local adjustment magnetic tool if device is fitted with display. Complete configuration is possible using configuration tools.
Humidity Limits	0 to 100% RH (Non-condensable Relative Humidity).
Failure Alarms	In case of sensor or circuit failures the self-diagnostics drives the output on 3.8 or 21.0 mA, at the user's choice.
Protection Against Reverse Polarity	12 to 45 Vdc.
Update Time	Approximately 150 ms.
Operation Start Time	The performance within specifications is smaller than 5 seconds after power supply is applied to the transmitter.
Output	Direct or reverse.
Position Sensor	Non-contact Hall effect sensor.

Performance Specifications

Accuracy	≤ 0.2% F. S. the effects of linearity, hysteresis and repeatability are included. (NOTE: Valid value only when used with the table of points. Refer to the Configuration Section on the Instructions Manual).
Resolution	≤ 0.1% F. S.
Repeatability	≤ 0.5% F. S.
Hysteresis of Full Scale	≤ 0.2% F. S.
Stability	± 0.1% F. S.
Temperature Effect	± 0.8% / 20°C F. S.
Power Supply Effect	± 0.005% F. S. Calibration.
Electromagnetic Interference Effect	Designed to comply with European Directive EMC 2014/30/EU

Physical Specifications

Electrical Connection See Note (*)	<div> <div> 1/2 - 14 NPT. M20 X 1.5. PG 13.5 DIN. </div> <div> 3/4 - 14 NPT (with 316 SST adapter for 1/2 - 14 NPT). 3/4 - 14 BSP (with 316 SST adapter for 1/2 - 14 NPT). 1/2 - 14 BSP (with 316 SST adapter for 1/2 - 14 NPT). </div> </div>
Material of Construction	Injected low copper aluminum with polyester painting or 316 Stainless Steel housing, with Buna N O-Rings on cover. Identification Plate: 316 SST.
Mounting Brackets	Bichromatized Carbon Steel with polyester paint of Stainless Steel 316.
Approximate Weight	<p>TP</p> <p>1.5 kg in Aluminum (without mounting bracket); 3.3 kg in Stainless Steel (without mounting bracket).</p> <p>Remote sensor:</p> <p>0.58 kg in Aluminum; 1.5 kg in Stainless Steel.</p> <p>Cable and remote sensor connectors:</p> <p>Cable 0.045 kg/m; 0.05 kg for each connector.</p>

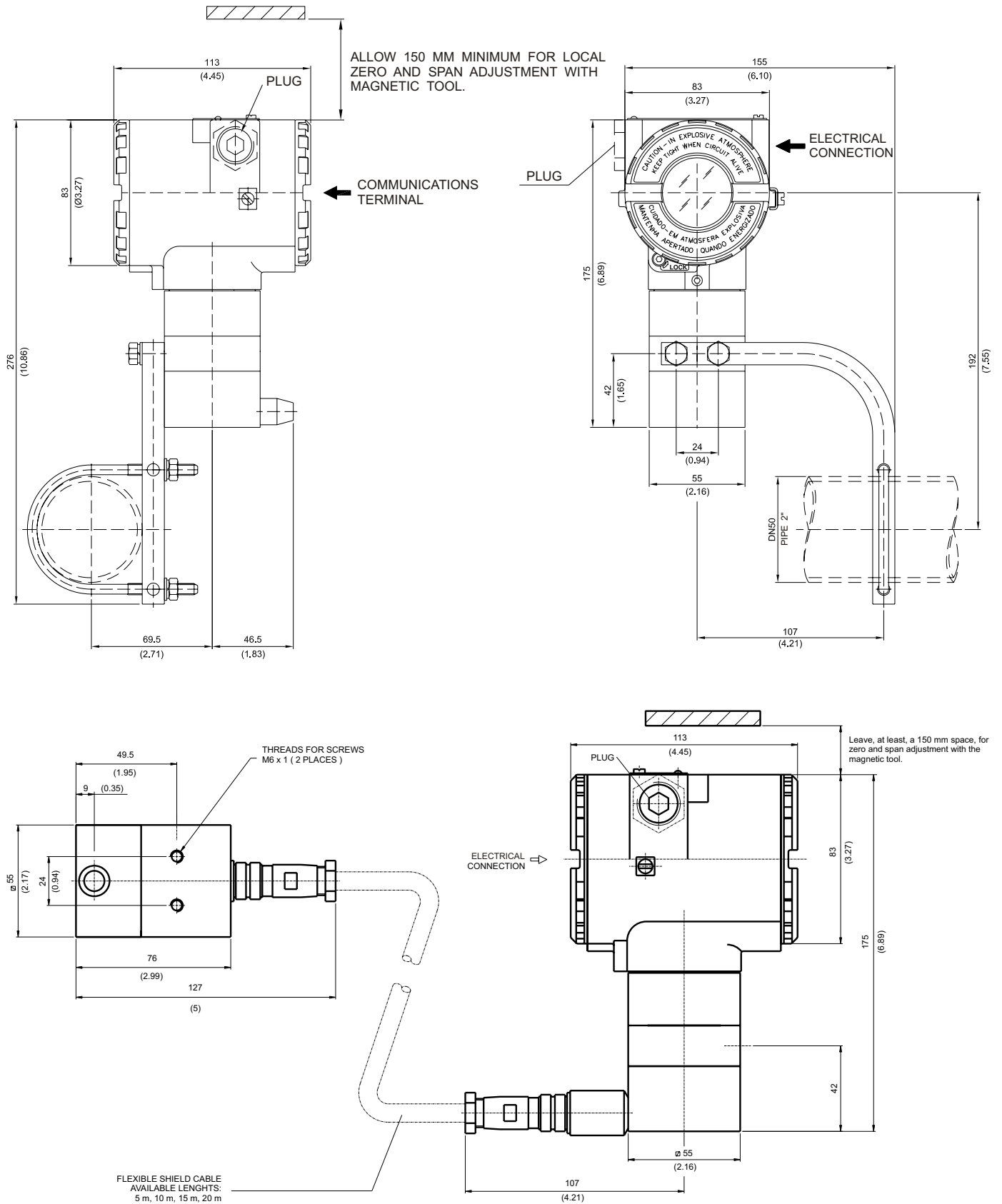
(*) Consult Smar for applications in classified areas.

MODEL	POSITION TRANSMITTER
TP290	4 to 20 mA
TP301	HART® & 4 to 20 mA
TP302	FOUNDATION™ fieldbus
TP303	PROFIBUS PA
COD.	Local Display
0	Without Local Display
1	With Local Display
COD.	Mounting Bracket
0	Without Bracket
1	Carbon Steel, "L" + clamp "U" pipe 2". (3)
2	Stainless Steel, "L" + clamp "U" pipe 2". (3)
3	Carbon Steel, rotary - VDI / VDE NAMUR
4	Stainless Steel, rotary - VDI / VDE NAMUR
5	For BFY-CL (carbon steel)
6	For BFY-CL (stainless steel)
7	Carbon Steel, "L" + clamp "U" pipe 2" - Accessories in 316 SST. (3)
COD.	Electrical Connection
0	1/2" - 14 NPT
1	1/2" - 14 NPT X 3/4 NPT (316 SST) - with adapter
2	1/2" - 14 NPT X 3/4 BSP (316 SST) - with adapter
3	1/2" - 14 NPT X 1/2 BSP (316 SST) - with adapter
A	M20 X 1.5
B	PG 13.5 DIN
COD.	Type of Actuator
0	Without magnet
1	Rotary
5	Linear Stroke up to 50 mm
7	Linear Stroke up to 100 mm
A	Linear Stroke up to 30 mm
SPECIAL OPTIONS (1)	
CODE	Housing
H0	Aluminum (IPW/TYPX)
H1	316 Stainless Steel (IPW/TYPX)
H2	Aluminum for saline atmosphere (IPW/TYPX)
H3	316 Stainless Steel for saline atmosphere (IPW/TYPX)
H4	Copper Free Aluminium (IPW/TYPX)
CODE	Identification Plate
I4	ATEX (EX-I, EX-D) GAS
I5	INMETRO (EX-D, EX-I) GAS
I6	Without certification
I7	ATEX (EX-I) MINING
IE	IECEX
IJ	ATEX (EX-D) GAS
IO	INMETRO (EX-T) DUST
CODE	Painting
P0	Gray Munsell N 6.5 Polyester
P2	Safety Blue Epoxy – Atmospheric Zone - Petrobras N1021
P3	Black Polyester
P8	Without Painting
P9	Blue Safety Epoxy – Electrostatic Painting
CODE	Manufacturing Standard
S0	SMAR
CODE	TAG Plate
J0	With TAG
J1	Blank
J2	According to user's notes
CODE	Special Characteristics
ZZ	See notes
CODE	Sensor Mounting (2)
R0	Full Mounting
R1	Remote sensor - 5 m cable
R2	Remote sensor - 10 m cable
R3	Remote sensor - 15 m cable
R4	Remote sensor - 20 m cable
R9	Remote mounting (For remote sensor - Without cable and extension)
RA	Integral mounting - Hall rotated 90° inside the nozzle

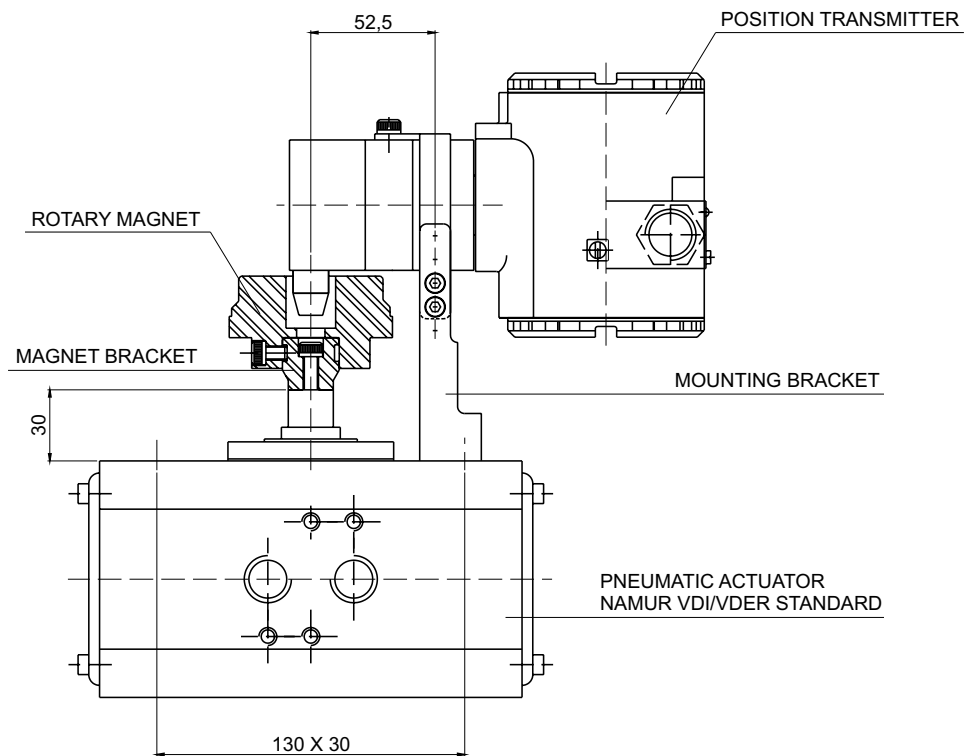
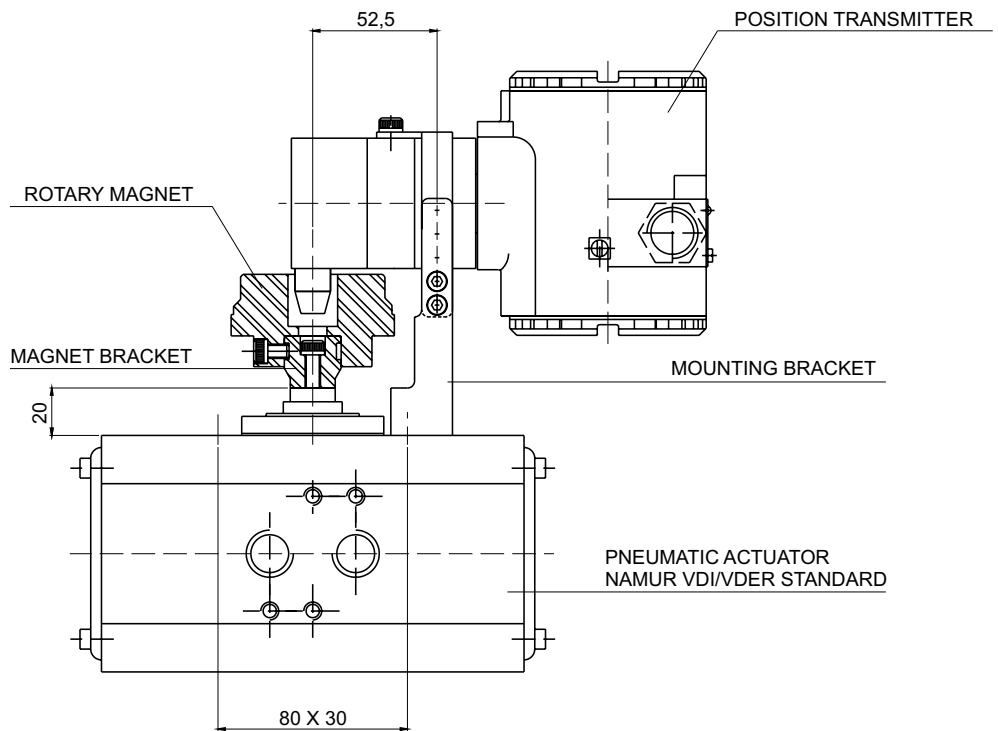
TP290	-	1	0	-	0	1	*	•	*	/	*	/	*	/	*	/	*
TP301	-	1	0	-	0	1	*	•	*	/	*	/	*	/	*	/	*
TP302	-	1	0	-	0	1	*	•	*	/	*	/	*	/	*	/	*
TP303	-	1	0	-	0	1	*	•	*	/	*	/	*	/	*	/	*

← TYPICAL MODEL NUMBER

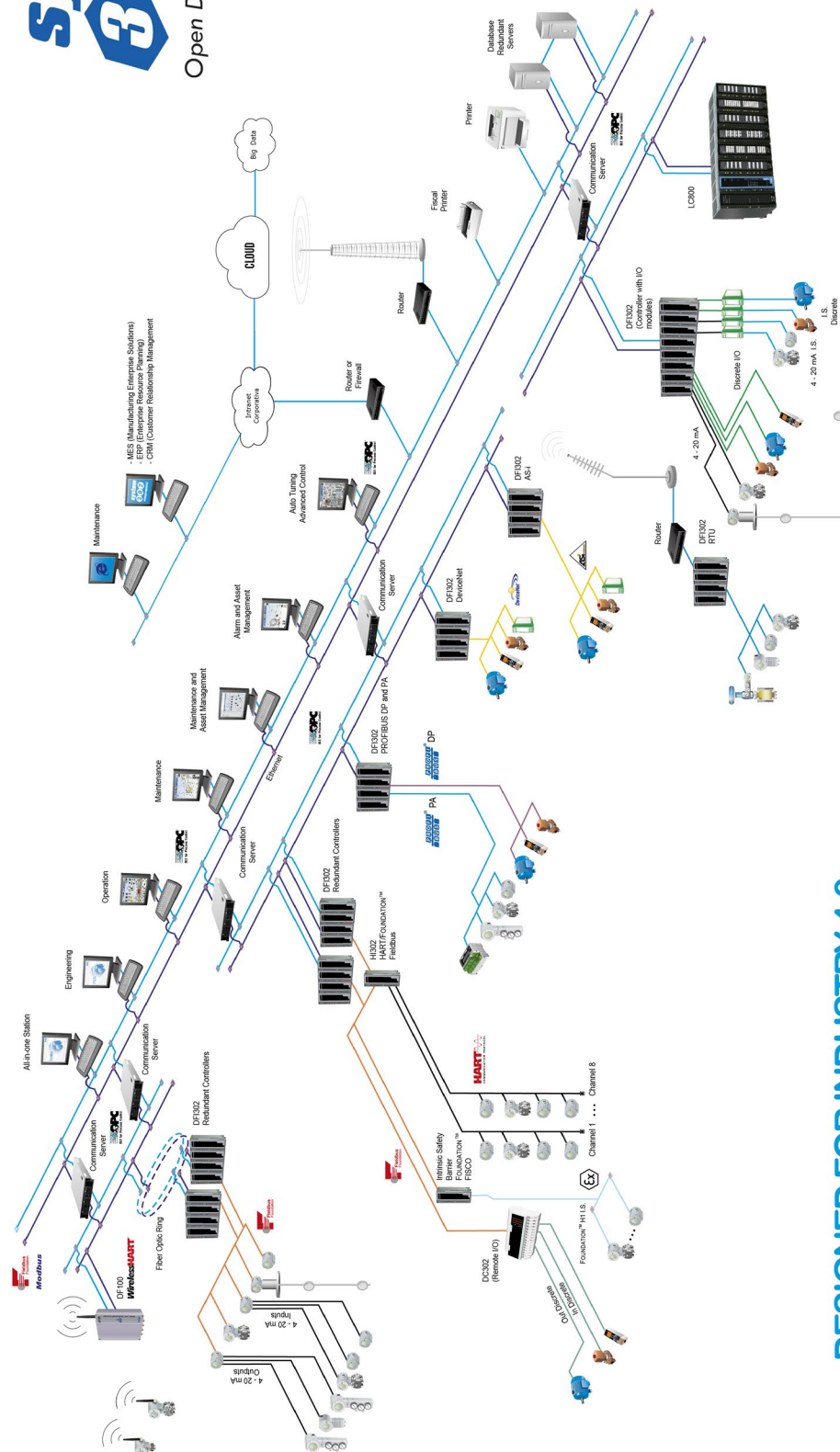
(1) Leave it blank when there are not optional items. TP290 standard model is supplied with local display.
 (2) Consult us for classified areas applications.
 (3) Magnet mounting bracket not supplied with the TP.



Special Mounting Bracket - Rotary VDI / VDE NAMUR



Open Digital Ecosystem



DESIGNED FOR INDUSTRY 4.0

PROVIDING RELIABLE CHOICES



TP300 Series

Smart Transmitter for Position Measurements



Contact us



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