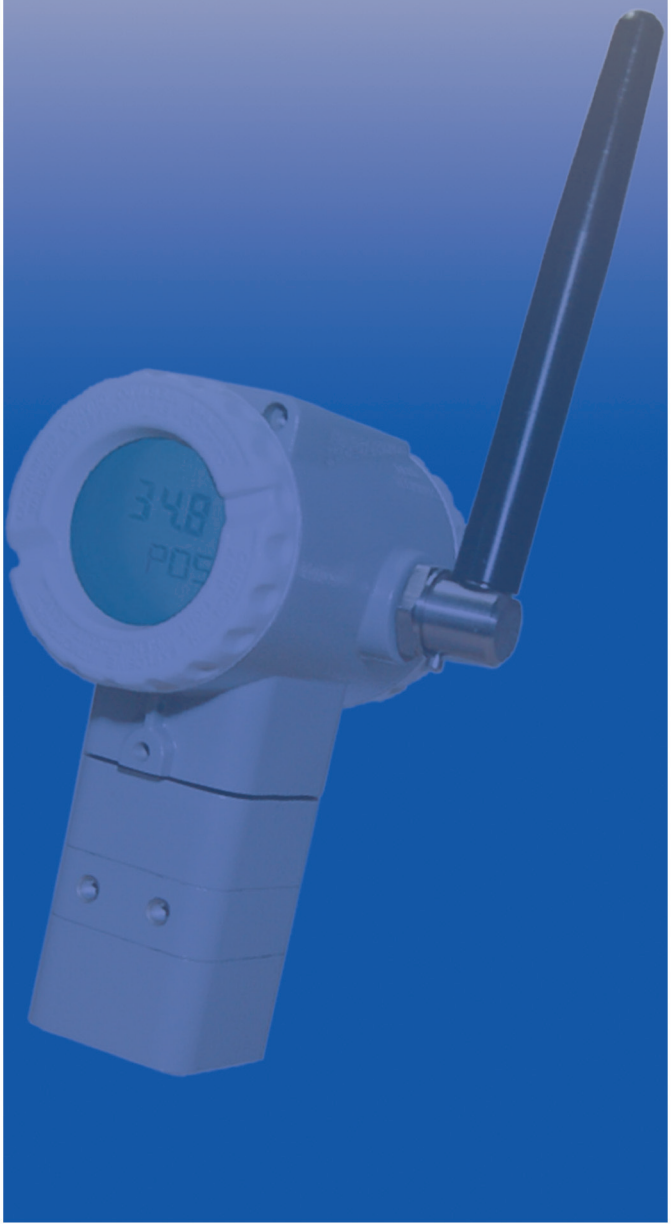
# TP400 Series

## WirelessHART™

**SMART TRANSMITTER FOR POSITION MEASUREMENT**

**TO MEASURE LINEAR OR ROTARY DISPLACEMENT OR MOVEMENT**



- *Wireless*HART™ Technology
- Device can be either configured previously, bench, as at the time of installation
- Position measurement without mechanical contact
- Position measurement carried out through a Hall Effect magnetic sensor
- Available for remote mounting position sensor
- Applications in high vibrations, high temperatures and hard-access locations
- Easy to assembly
- Local adjustment without need to open the transmitter housing
- For linear and Rotary applications
- Rotary display facilitates reading in any position
- Reading of the direct or reverse position

WirelessHART

smar

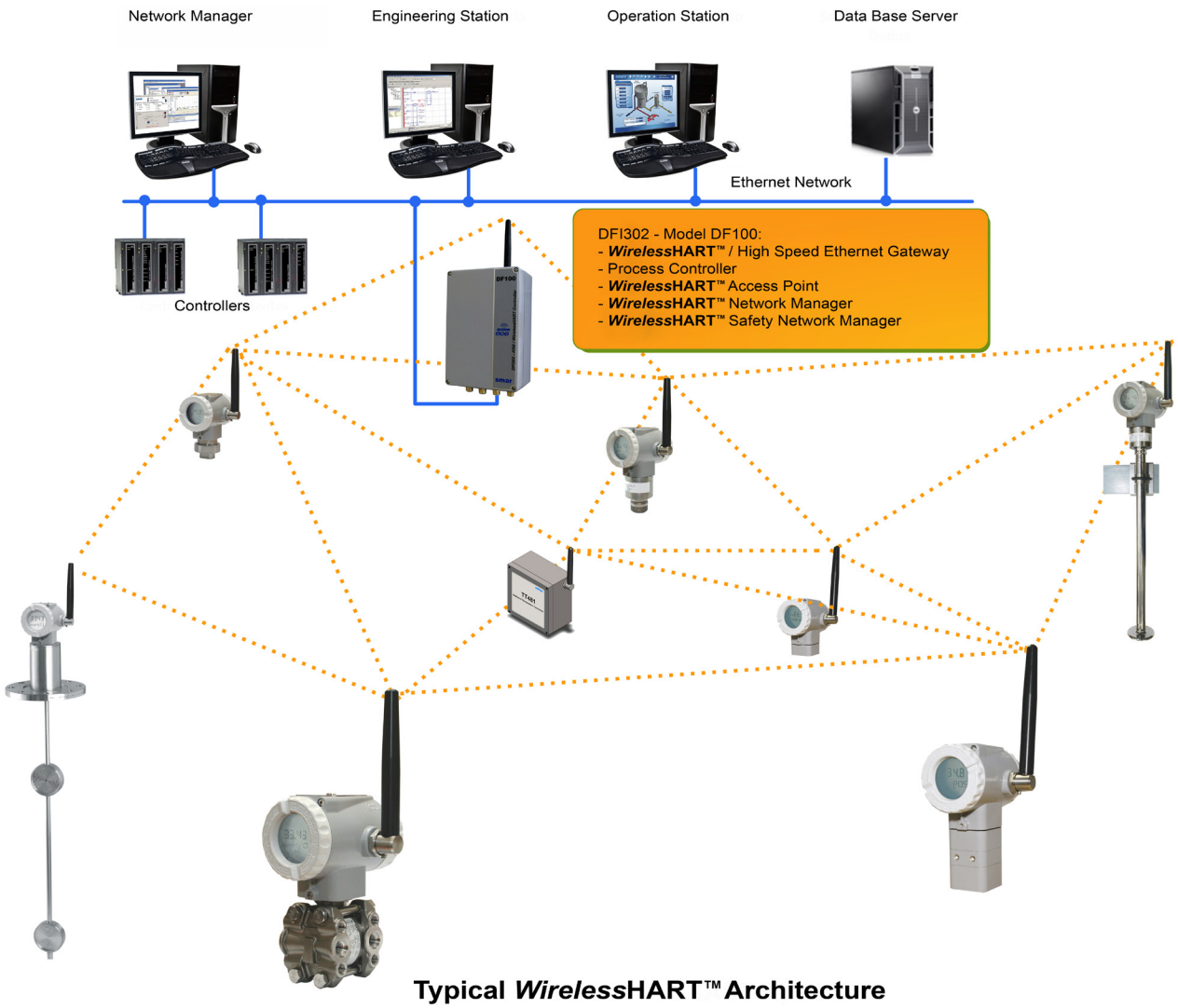
## *Wireless*HART™ Technology

The world dedicated HART technology now offers a robust protocol designed for numerous applications, with the advantage of the wireless feature. Economy installation and efficient management of energy, quick access to information from the field, strength in communication and information integrity, network security: and so many other advantages that make ***Wireless*HART™** technology (more on www.hartcomm.org) , who came to the world of automation to innovate and revolutionize.

Based on a communication protocol for wireless mesh network, the ***Wireless*HART™** protocol ensures compatibility between instruments, controls and existing HART tools. Basically, a network ***Wireless*HART™** is composed of elements as the one shown below.

The picture elements in the network, constitute the so-called mesh network. They are:

- **Host –** The host, usually connected to the control network, is a workstation in which, e.g., can be installed an Human Machine Interface application, which allows an operator to interact with the process. Use a communication protocol, for example, HSE, H1, Profibus or Modbus.
- ***Wireless*HART™ Gateway –** It converts data from the host to the ***Wireless*HART™** protocol, used by the devices connected to the ***Wireless*HART™** network. Use Gateway DF100.




**Typical *Wireless*HART™ Architecture**

- **Network Manager –** The Network Manager is an application that can be embedded in the ***Wireless*HART™** Gateway. Among its responsibilities, the Network Manager distributes network identity (advertisement) publishing its existence, manages and authenticates the addition (joining) of devices to the network.

- **Access Point –** in a simple way, can be understood as a radio installed in the wireless gateway.

- ***Wireless*HART™ Device –** The ***Wireless*HART™** field device is the device that connects to the process, being able to receive and/or transmit data on the ***Wireless*HART™** network. It is a ***Wireless*HART™** router (repeater) by nature, i.e., it is able to retransmit messages to/from other devices on the ***Wireless*HART™** network.

- ***Wireless*HART™ Adapter –** It is a bridge-type device, because it is able to provide data of HART + 4 to 20mA field device, legacy, to the host via ***Wireless*HART™**. The adapter uses HART FSK standard communication, wired, to access data from HART field devices. And the adapter also uses the ***Wireless*HART™** communication to provide data of the field device to the host. The adapter thus enables a HART field device to work on ***Wireless*HART™** network.

The ***Wireless*HART™** devices should be installed in field and configured the same way as conventional HART devices. This is possible with files of DD type (Device Description) updated and uploaded to your configurator. This, in turn, can also be used normally.

It is noteworthy also that these tools can be either configured previously, bench, as at the time of installation.

## TP400 - *Wireless*HART™ Position Transmitter

The TP400 is a ***Wireless*HART™** transmitter for position measurement and it is part of the family of Smar devices.

It can measure displacement or movement of rotary or linear type based on Hall effect non-contact sensor. The digital technology and wireless communication provide an easy interface between the field and control room and several interesting features that considerably reduce the installation, operation and maintenance cost.

The **TP400 *Wireless*HART™** may be installed to monitor valves and actuators position or in any equipment with linear or rotary motion such as skylights, dampers, rollers spacing, crushers, etc. There is an option for remote sensor with cable length up to 20 m.

The **Remote Sensor Position** is a recommended accessory for high temperatures applications (up to 105 ºC), 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.

TP400 - Remote Sensor

TP400 - Integrated Sensor

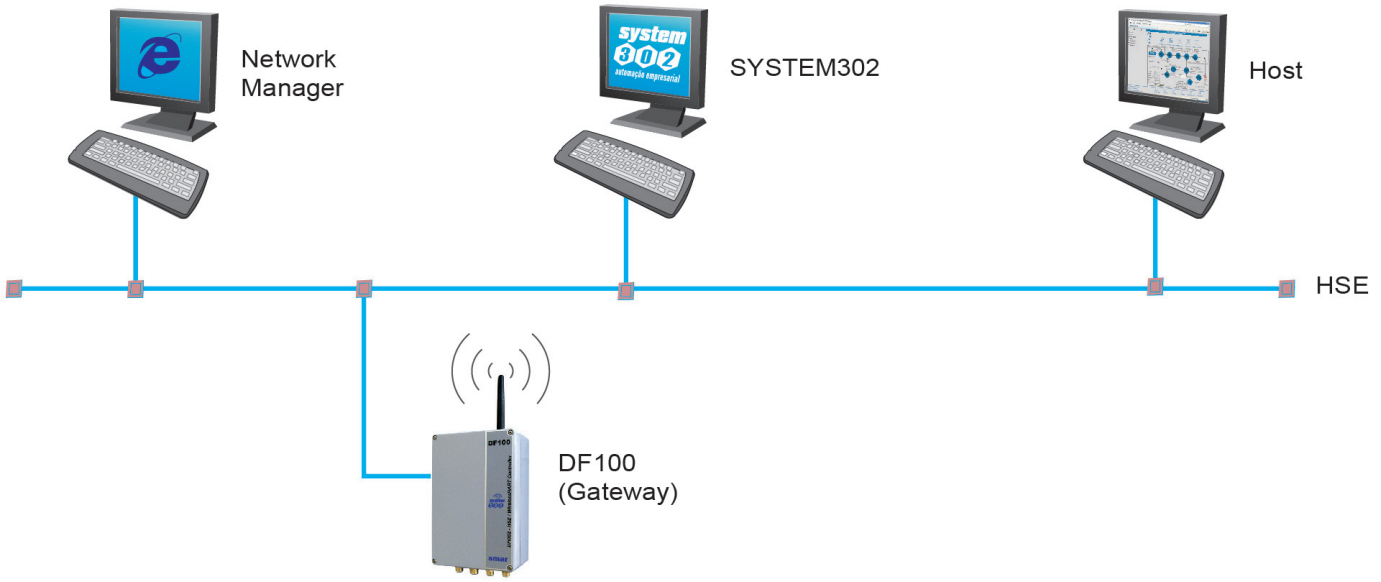
**DF100** - HSE/***Wireless*HART™** Controller with 2 Ethernet Ports 100 MBPS, 1 RS-485 Port and 1 ***Wireless*HART™** Channel

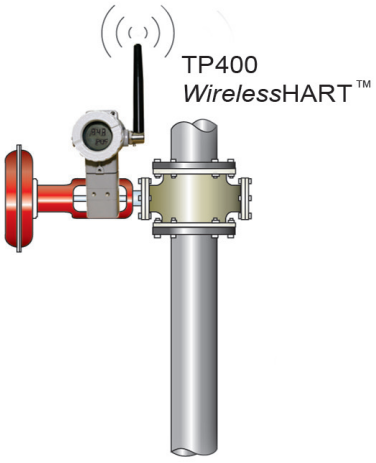
The DF100 controller is a key element in the distributed architecture of field control systems. Gathers powerful communication features with access to field equipment via ***Wireless*HART™** protocol.

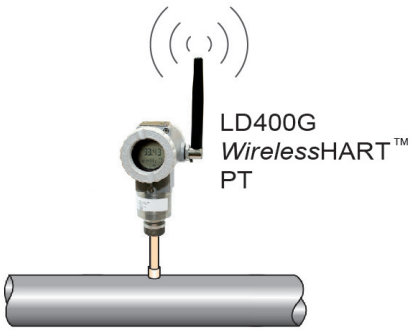
This controller has totally innovative aspects with respect to the line of modular DFI302. The DF100 can be used outdoors, open, since it has degree of protection IP66. Furthermore, it allows to work with the new specification HSE RIO of the Fieldbus FOUNDATION™ and Modbus communication via RS-485 port.

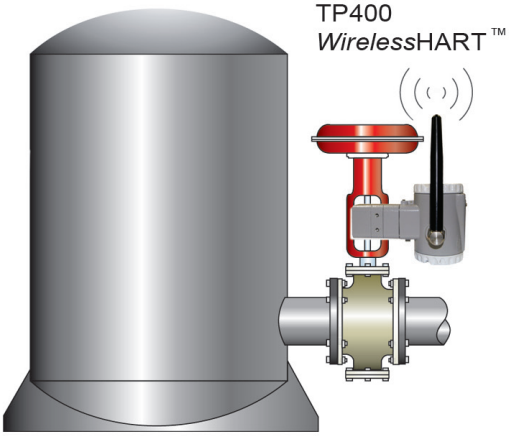

## Applications

### *Wireless*HART™



## Functional Specifications

| | |
|---|---|
| **Travel** | Linear Motion: 3 - 100 mm. (For measurement beyond 100 mm consult the BFY-CL catalog at www.smar.com).<br>Rotary Motion: 30° - 120° Rotation Angle. |
| **Battery Module** | The module consists of 2 primary lithium batteries (Li - SOCl2 ) of 3.6 V, totaling 7.2 V.<br>**Duration**<br>Burst Mode at 8 seconds, @25°C, network with at least 3 neighbors devices: 3 years.<br>Note: The Battery Module used in the repeaters must be provided exclusively by Smar (Battery Module - Code 400-1209). |
| **Communication Protocol** | HART® Version 7 protocol, with **TP400 *Wireless*HART™** command set.<br>A HART® transmitter specific review must be managed according to the **TP400 *Wireless*HART™** transmitter.<br>HART® is a trademark of HART Communication Foundation. |
| **Output Signal** | Digital output via 2.4 GHz radio frequency, according to HCF_SPEC-65 Rev. 1.0. |
| **Measurement Type** | Position for linear and rotary displacement. |
| **Zero and Span Adjustment** | Jumper of local adjustment with two positions: Able and Disable. |
| **Indicador** | Rotary CLD with 4½ - numerical digits and 5 alphanumerical characters.<br>Function and Status Indication. |
| **Temperature Limits** | Ambient: -40 to 85 °C (-40 to 185 °F).<br>Storage: -40 to 90 °C (-40 to 194 °F).<br>Digital Display: -10 to 75 °C ( 14 to 167 °F) in operation;<br>-40 to 85 °C (-40 to 185 °F) without demagens.<br>Remote Sensor: -40 to 105 °C (-40 to 221 °F). |
| **Configuration** | Remotely with external programmer via ***Wireless*HART™** network.<br>Locally via programmer with wired maintenance port. |
| **Humidity Limits** | 0 to 100% RH (Non-condensable Relative Humidity). |
| **Failure Alarms (Diagnostics)** | Detailed diagnostics via HART® communicator and display LCD. |
| **Wireless Certification (pending)** | ANATEL (National Telecommunications Agency). |

| | |
|---|---|
| **Update Time** | 2 seconds. |
| **Turn-on Time** | Performs within specifications in less than 7 seconds after power is applied to the transmitter. |
| **Reading of the Position** | Direct or reverse. |
| **Position Sensor** | Non-contact Hall effect sensor.<br>Available in the remote mounting version (optional; consult the Smar on applicable harzardous certifications). |

## Performance Specifications

| | |
|---|---|
| **Accuracy (*)** | ≤ 0,2% F. S. the effects of linearity, hysteresis and repeatability are included. |
| **Resolution** | ≤ 0,1% F. S. |
| **Repeatability** | ≤ 0,5% F. S. |
| **Hysteresis** | ≤ 0,2% F. S. |
| **Temperature Effect** | ± 0,8% / 20°C F. S. |
| **Electromagnetic Interference Effect** | Designed to comply with European Directive EMC 2004/108/EC. |

(*) For more precise linear measurements use the linearization process. Refer to the Linearization chapter on the Instructions Manual.

## Physical Specifications

| | |
|---|---|
| **Electrical Connection** | M20 X 1,5 (default to antenna wireless equipment). |
| **Material of Construction** | Injected low copper Aluminum with polyester painting or Stainless Steel housing, with Buna N O-Rings on cover (NEMA 4X, IP66). |
| **Mounting Brackets** | In SAE 1020 Carbon Steel with electrostatic polyester paint or Stainless Steel.<br>Including accessories (bolts, nuts, washers and U-clamp) in Carbon Steel or Stainless Steel. |
| **Identification Plate** | Stainless Steel plate with label in special plastic. |
| **Approximate Weight** | **TP400**<br>1.8 kg in Aluminum;<br>3.6 kg in Stainless Steel.<br>**Remote Position Sensor**<br>0.58 kg in Aluminum;<br>1.5 kg in Stainless Steel.<br>**Cable and Connector**<br>Add 0.05 kg for the Remote Sensor connector and 0.045 kg/m for each meter of the Remote Sensor extension cable. |
| **Electronic Circuit** | Antenna omnidirectional 2.4 GHz.<br>Coaxial cable to connect the antenna with the radio board.<br>Battery pack with 2 units Type 'C'. |

## Operation Protection Specifications

| | |
|---|---|
| **Counter Operation** | Historical of configuration change. |
| **Protection Configuration** | Write protection via hardware and software. |
| **Certificação** | Segurança intrínseca (pendente) e à prova de tempo. |

## Human Machine Interface (HMI) Specifications

| | ITEM | ICON | DEFINITION |
|---|---|---|---|
| **Display LCD Status** | **1** | PV | Indication of the primary variable |
| | **2** | ⇧ | Blinking when the transmitter is seeking wireless network |
| | **3** | ⇧<br>⇩ | Flashing when connecting to the wireless network |
| | **4** | MD | Transmitter operating on a wireless network |
| | **5** | ⇩ | Failed to connect to the wireless network |
| | **6** | ACK | Transmitter in burst mode |
| | **7** | F(t) | Lights when sending command in burst mode |
| | **8** | SP | Lights when an event is sent by the device |
| | **9** | F(x) | When the points table for linearization is enabled |

# Ordering Code

**MODEL TP400 — POSITION TRANSMITTER**

**COD. Communication Protocol**

| COD. | |
|---|---|
| W | *Wireless*HART™ |

**COD. Security Option**

| COD. | |
|---|---|
| 0 | Standard (for use in measurement and control) |

**COD. Local Indicator**

| COD. | |
|---|---|
| 1 | With digital indicator |

**COD. Electrical Connection**

| COD. | |
|---|---|
| A | M20 X 1.5 (also standard antenna for wireless device) |

**COD. Mounting Bracket**

| COD. | |
|---|---|
| 0 | Without Bracket |
| 1 | Carbon Steel Brackets |
| 2 | Stainless Steel Brackets |

**COD. Housing**

| COD. | |
|---|---|
| A | Aluminum (IP/TYPE) |
| I | 316 Stainless Steel - CF8M (ASTM - A351) (IP/TYPE) |

**COD. Painting**

| COD. | |
|---|---|
| 0 | Gray Munsell N 6.5 Polyester |
| 8 | Without Painting |
| Z | User specification |

**COD. Certification Type**

| COD. | |
|---|---|
| N | Without Certification |

**COD. Certifying Body**

| COD. | |
|---|---|
| 0 | Without |

**COD. TAG Plate**

| COD. | |
|---|---|
| 0 | With TAG, when specified |
| 1 | Blank |
| 2 | User specification |

**COD. Type of Actuator**

| COD. | |
|---|---|
| 0 | Without magnet |
| 1 | Rotary |
| 5 | Linear Curso até 50 mm |
| 7 | Linear Curso até 100 mm |
| A | Linear Curso até 30 mm |

**SPECIAL OPTIONS (1)**

**COD. Sensor Mounting**

| COD. | | COD. | |
|---|---|---|---|
| R0 | Full Mounting | R3 | Remote sensor - 15 m cable |
| R1 | Remote sensor - 5 m cable | R4 | Remote sensor - 20 me cable |
| R2 | Remote sensor - 10 m cable | | |

**COD. Special Features**

| COD. | |
|---|---|
| ZZ | User specification |

**COD. Certification for Telecommunications**

| COD. | |
|---|---|
| W1 | ANATEL |

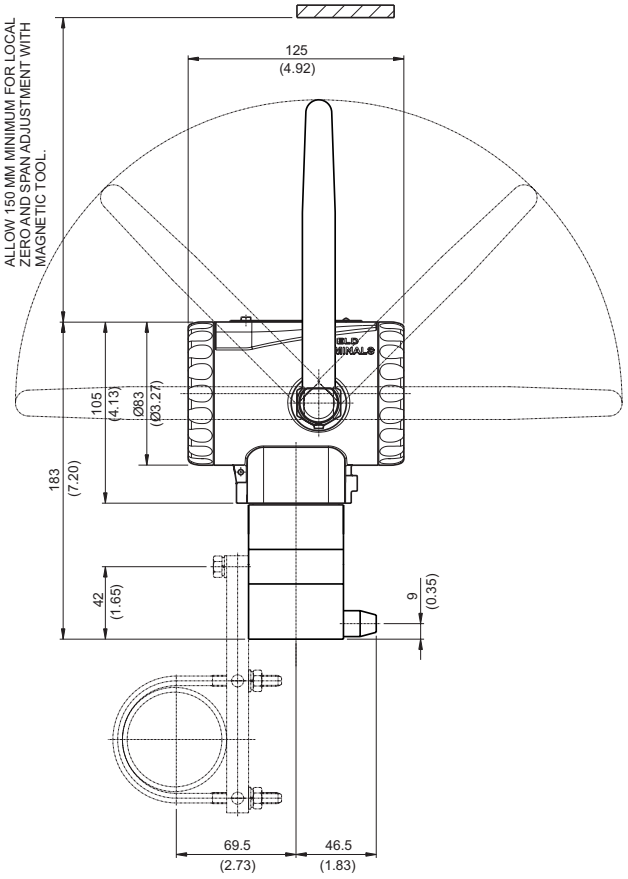
**COD. Manufacture Standard**

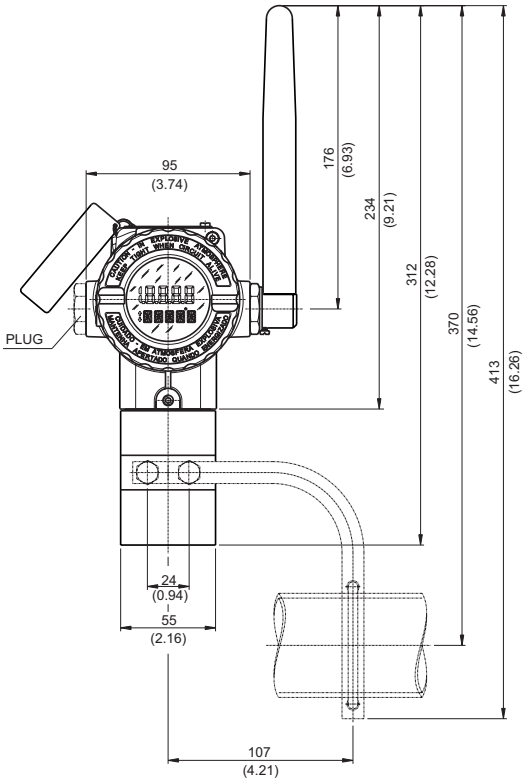
| COD. | |
|---|---|
| S0 | SMAR |

| TP400 | - | W | 0 | 1 | - | A | 1 | A | 0 | - | N | 0 | 0 | - | 1 | • | * | * | * | * |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

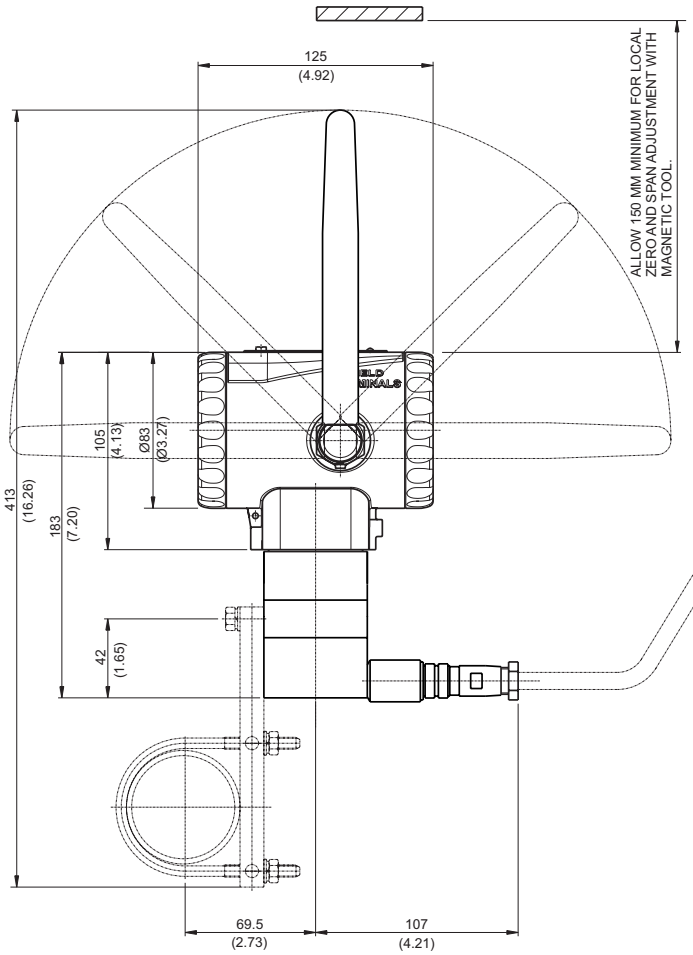
TYPICAL MODEL NUMBER

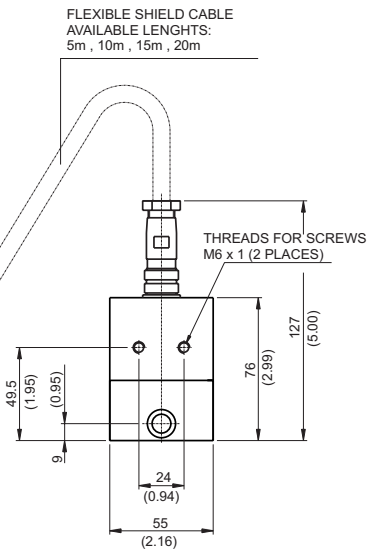
(1) Leave it blank for no optional item.




NOTE: DIMENSIONS mm (in)



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Specifications and information are subject to change without notice.
Up-to-date address information is available on our website.

web: www.smar.com/contactus.asp

TP400CE