

# Section 1

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## INSTALLATION

### General

The overall accuracy of temperature and other measurements depends on several variables. Although the transmitter has an outstanding performance, proper installation is essential in order to maximize its performance.

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

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

In warm environments, the transmitter should be installed in such a way as 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. For temperature measurements, sensors with cooling-neck can be used or the sensor can be mounted separately from the transmitter housing.

Use of sunshades or heat shields to protect the transmitter from external heat sources should be considered.

Humidity is fatal for electronic circuits. In areas subjected to high relative humidity, the O-rings for the electronic housing covers must be correctly placed and the covers must be completely closed by tightening them by hand until you feel the O-rings being compressed. Do not use tools to close the covers. 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 exposure to humidity may affect the protection provided. It is also important to keep the covers tightened in place. Every time they are removed, the threads are exposed to corrosion, as painting cannot protect these parts. Code-approved sealing methods should be employed on conduit entering the transmitter.

Connecting the sensor as close to the transmitter as possible and using proper wires (See Section 2 - Operation), can decrease measurement error.

### Mounting

The transmitter may be mounted in two basic ways:

- Separated from the sensor, using optional mounting brackets.
- Mounted on the sensor assembly.

It can be mounted in several different positions using the bracket, as shown in Figure 1.3. As shown in Figure 1.3 one of the conduit inlets for electrical connection is used to mount the sensor integral to the temperature transmitter.

For better visibility, the digital display may be rotated in steps of 90° (see Figure 4.1).

### Network Wiring

Access the terminal block by removing the Electrical Connection Cover. This cover can be locked closed by the cover locking screw (See Figure 1.1). To release the cover, rotate the locking screw clockwise.

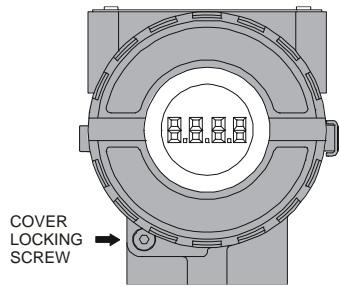


Figure 1.1 - Cover Locking

Cable access to wiring connections are obtained by one of the two conduit outlets. Conduit threads should be sealed by means of code-approved sealing methods. **The unused outlet connection should be plugged accordingly.**

The wiring block has screws on which fork or ring type terminals can be fastened (see Figure 1.2).

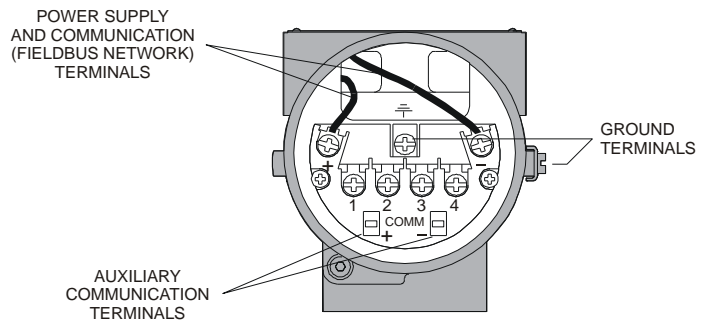


Figure 1.2 - Ground Terminals

For convenience, there are three ground terminals: one inside the cover and two externally, located close to the conduit entries.

**WARNING**

Do not connect the Fieldbus network wires to the sensor terminals. (Terminals 1, 2, 3 and 4).

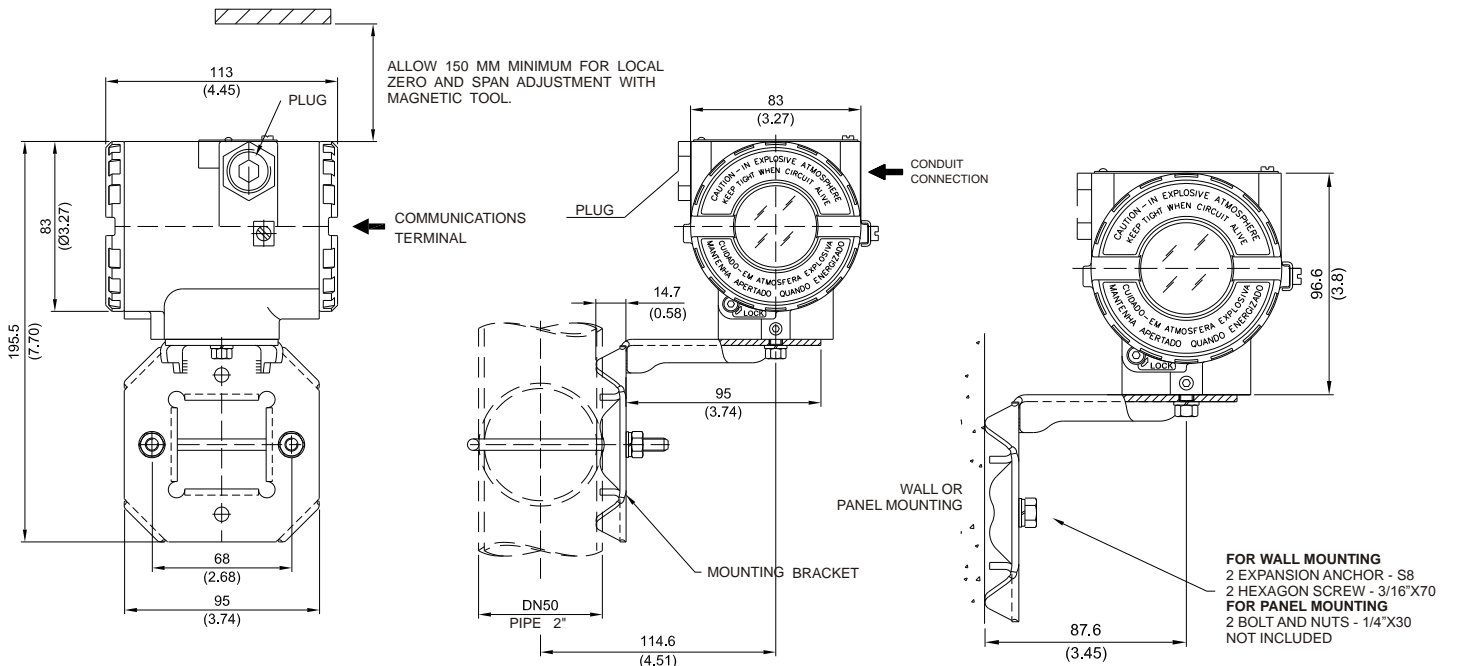


Figure 1.3 - Dimensional Drawing and Mounting Positions

The **TT303** uses the 31.25-kbit/s, voltage mode option for the physical signaling. All other devices on the same bus must use the same signaling. All devices are connected in parallel along the same pair of wires.

Various types of Fieldbus devices may be connected on the same bus. The **TT303** is powered via the bus. The limit for such devices is according to the DP/PA coupler limitations for one bus for non-intrinsically safe requirement.

In hazardous areas, the number of devices may be limited intrinsically safe restrictions, according to the DP/PA coupler and barriers limitations.

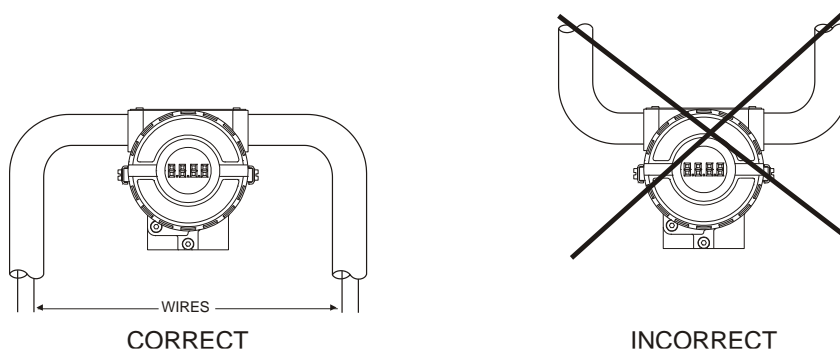
The **TT303** is protected against reverse polarity, and can withstand  $\pm 35$  VDC without damage, but it will not operate when in reverse polarity.

Use of twisted pair cables is recommended. It is also recommended to ground shield of shielded cables at one end only. The non-grounded end must be carefully isolated.

**NOTE**

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

The Figure 1.4 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 1.4 - Conduit Installation Diagram**

## **Sensor Wiring**

The **TT303** accepts up to two sensors and may operate in one of three modes:

- Single channel single sensor measurement;
- Dual channel dual sensor measurement;
- Single channel dual sensor differential measurement;
- Single channel dual sensor backup measurement;

**NOTE**

Avoid routing sensor wiring close to power cables or switching equipment.

In accordance with connection and sensor types, the terminal blocks shall be wired as shown on the figure 1.5.

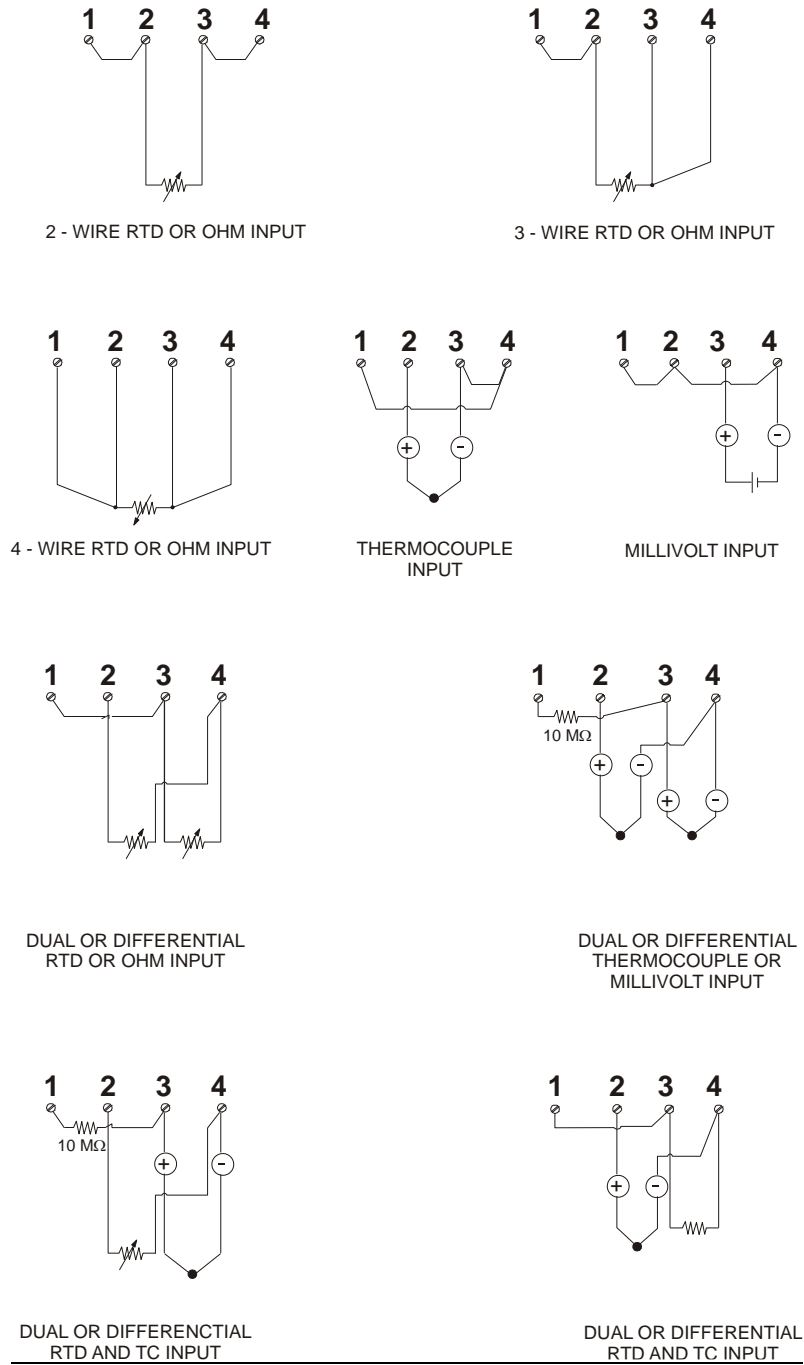


Figure 1.5 - Sensor Wiring

## Topology and Network Configuration

Bus topology (see Figures 1.6 and 1.7) 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 1900 m.

The connection of couplers should be kept less than 15 per 250 m. In following figures the DP/PA link depends on the application needs.

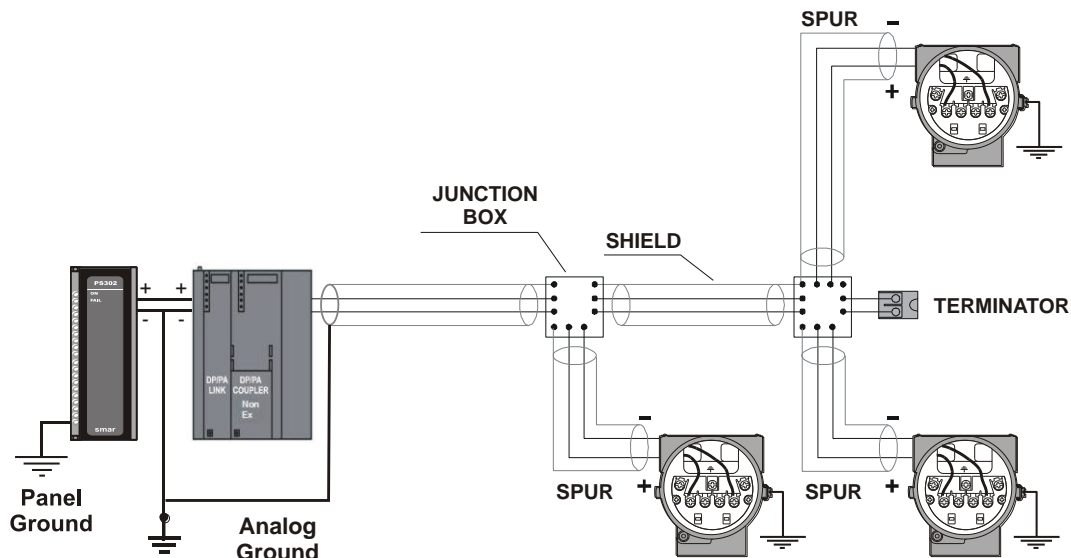


Figure 1.6 - Bus Topology

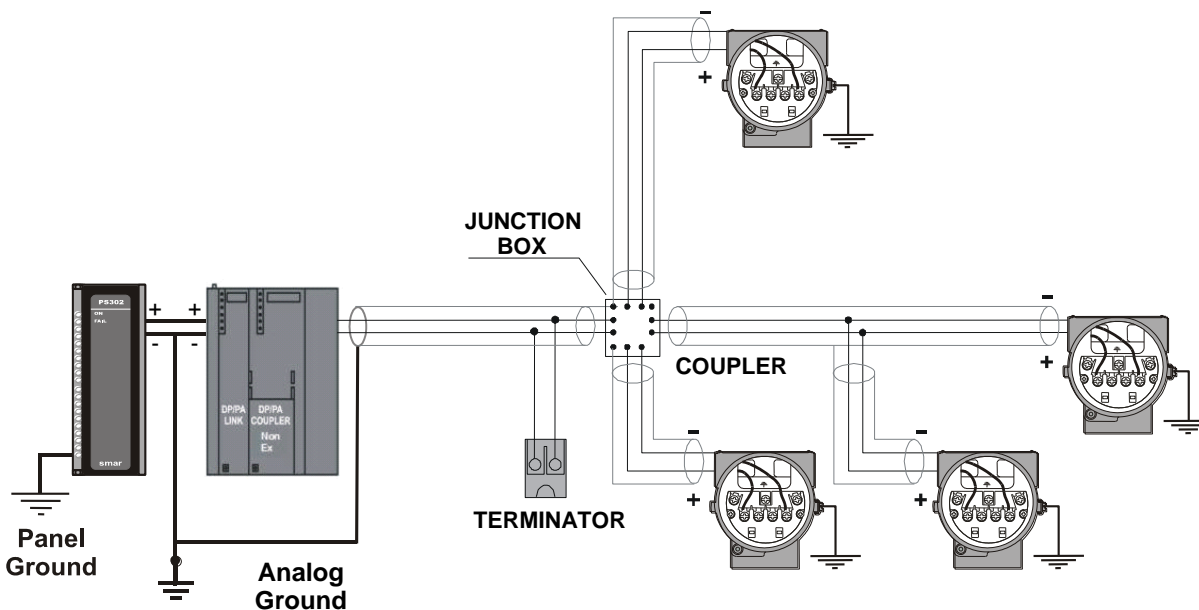


Figure 1.7 - Tree Topology

## ***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 DP/PA coupler, when it is Non-Ex type.

Use of **DF47** is recommended.

## ***Jumper Configuration***

In order to work properly, the jumpers J1 and W1 located in the **TT303** main board must be correctly configured (See Table 1.1).

<b>J1</b>	This jumper enables the simulation mode parameter in the AI block.
<b>W1</b>	This jumper enables the local adjustment programming tree.

***Table 1.1 - Description of the Jumpers***

## ***Power Supply***

The **TT303** 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.

## Installation in Hazardous Areas

### WARNING

Explosions could result in death or serious injury, besides financial damage. Installation of this transmitter in explosive areas must be carried out in accordance with the local standards and the protection type adopted. Before continuing the installation make sure the certificate parameters are in accordance with the classified area where the equipment will be installed.

The instrument modification or parts replacement supplied by other than authorized representative of Smar is prohibited and will void the certification.

The transmitters are marked with options of the protection type. The certification is valid only when the protection type is indicated by the user. Once a particular type of protection is selected, any other type of protection can not be used.

## Explosion/Flame Proof

### WARNING

Only use Explosion Proof/Flameproof certified Plugs, Adapters and Cable glands.

In Explosion-Proof installations the cable entries must be connected or closed using metal cable gland and metal blanking plug, both with at least IP66 and Ex-d certification.

The standard plugs provided by Smar are certified according to CEPEL certificate. If the plug needs to be replaced, a certified plug must be used.

The electrical connection with NPT thread must use waterproofing sealant. A non-hardening silicone sealant is recommended.

For NEMKO ATEX certificate please to follow the installation guidelines in hazardous locations below: Group II Category 2G, Ex d, Group IIC, Temperature Class T6, EPL Gb U = 28VDC

Ambient Temperature: -20 to 60°C for T6

Environmental Protection: IP66/687 or IP66W/687W

The electrical connection available are ½ - 14NPT and M20x1,5.

Cable entries must be connected or closed using metal cable gland and metal blanking plug, both with at least IP66 and Ex-d certification or any appropriate ATEX approved metal cable gland and metal blanking plug. Do not remove the transmitter covers when power is ON.

## Intrinsically Safe

### WARNING

In hazardous zones with intrinsically safe or non-incendive requirements, the circuit entity parameters and applicable installation procedures must be observed.

To protect the application the transmitter **must be connected to a barrier**. Match the parameters between barrier and the equipment (Consider the cable parameters). Associated apparatus ground bus shall be insulated from panels and mounting enclosures. Shield is optional. If used, be sure to insulate the end not grounded. Cable capacitance and inductance plus  $C_i$  and  $L_i$  must be smaller than  $C_o$  and  $L_o$  of the associated Apparatus.

It is not recommended to remove the transmitter cover when the power is ON.

