TxRail 4-20 mA Transmitter

TEMPERATURE TRANSMITTER - OPERATING MANUAL – V1.2x D

CONFIGURAÇÃO

If the default configuration or the ordered configuration satisfies the application, then no further configuration is necessary and the transmitter is ready to be used. If a new setting is desired, this can be accomplished by the **TxConfig** and sent to the transmitter through the **TxConfig Interface**.

The TxConfig Interface and Software compose the **Transmitter Configuration Kit**, which can be purchased separately. The latest release of this software can be downloaded from our web site. To install, run the ***Tx_setup.exe*** and follow the instructions.

Serial port configuration errors may occur when other software are sharing the same serial port. Close all serial port applications prior to using the TxConfig software.

The TxConfig interface connects the transmitter to the PC, as shown in **Figures 01** and **02**. There are two types of interface: TxConfig-RS232 and TxConfig-USB.
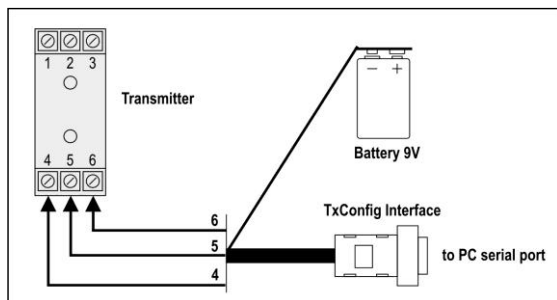

Figure 01 – TxConfig Interface connections model RS232
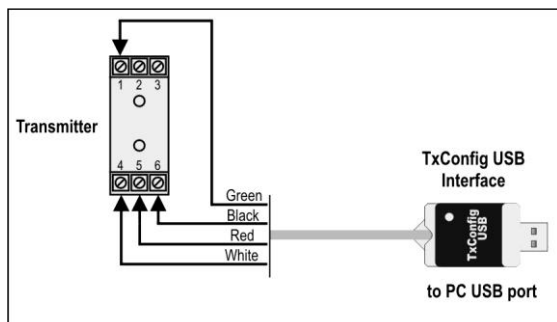

Figure 02 – TxConfig Interface USB connections

Once the connection is accomplished, the software shows the configuration options of the transmitter model attached. Access the *Help* for usage instructions.

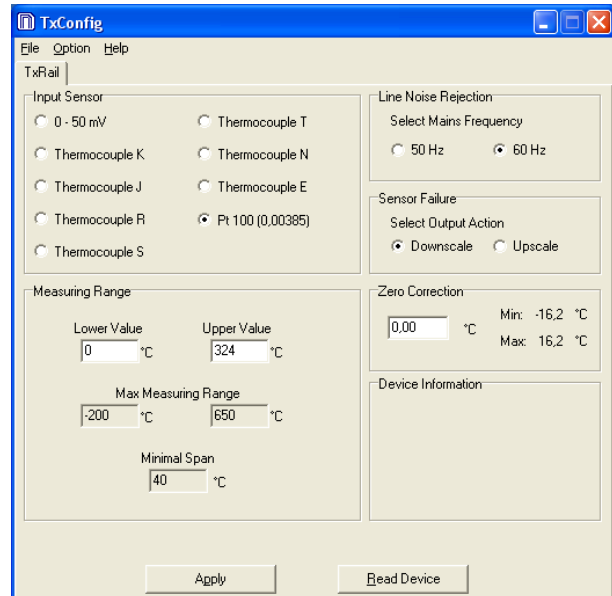**Figure 03** shows the TxConfig software main screen.

Figure 03 – TxConfig main screen

The fields in the screen mean:

1. **Input Sensor**: Choose the desired temperature sensor among the available options. See **Table 01**.

2. **Measuring Range**: Defines the output scale for the input sensor. Program here the measurement **Lower Range Value** and the **Upper Range Value.**

   When the Low Scale Limit is configured with a value higher than the Full Scale Limit, the current output will have a decrescent behavior (20~4 mA).

   The values configured in these fields can not be beyond the sensor measuring range. The minimum span value has to be observed as well. See **Table 01**.

3. **Line Noise Rejection**: The transmitter incorporates a digital filter to cancel the induced noise from the 50 or 60 Hz systems. For better performance, select the line frequency used in your country.

4. **Sensor Failure Detection**: establishes the transmitter output behavior (upscale or down-scale) in the presence of a sensor fail.

5. **Zero Correction**: Allows for small sensor corrections. See item Operating.

6. **Device Information**: The *Device Information* box contains relevant data concerning a particular transmitter. Please pass along this information when contacting the technical assistance department.

7. **Read Device**: Brings to the screen the current transmitter parameters configuration.

8. **Apply**: Sends a new configuration to the transmitter.

Note: The factory default configuration is (unless otherwise specified or ordered):

- Pt100 input, 0 to 100 °C.
- 60 Hz filtering and up scale (20 mA) output for sensor fail.

The transmitter must be powered in order to be configured. The TxConfig-USB interface provides the necessary power. The TxConfig-RS232 interface, however, requires an auxiliary supply to guarantee a reliable communication with the computer.

An external 9 V battery can be used for this purpose (**Figure 01**). An alternative is to configure the transmitter while it is in operation; this way, the needed energy is supplied by the current loop, as in **Figure 04**.
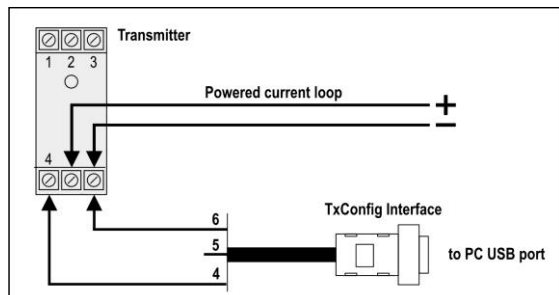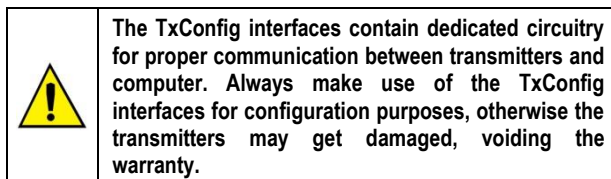

Figure 04 – TxConfig Interface connections – *Loop* powered

⚠ **The TxConfig interfaces contain dedicated circuitry for proper communication between transmitters and computer. Always make use of the TxConfig interfaces for configuration purposes, otherwise the transmitters may get damaged, voiding the warranty.**

OPERATION

All input types and the 4-20 mA output current are factory calibrated and have no need for user adjustment.

However, if desired by the user, a manual offset trim is implemented to provide fine adjustments to the signal in the field. This is accomplished by the front keys ZERO+ and ZERO-, located under the frontal label in order to avoid accidental adjustments. Using a small tool (2 mm diameter), press and hold the desired key for at least 2 seconds to increase or decrease the output current. When the output current is reached, the key must be released.

The offset correction can also be accomplished by the TxConfig software. The serial adaptor can be connected to the transmitter while it is operating in the process (**Figure 04**). See in **Figure 03** the **Zero Correction** field for this purpose.

The user must choose the sensor and configure the sensor span which best suit the application. The sensor span must not exceed the maximum range supported by the transmitter for a particular sensor, neither be lower than the minimum span.

It is important to note that the transmitter accuracy is related to the total sensor span of a sensor, regardless of the output scale (span) configured. Example:

- Pt100; maximum input span of –200 to +650 °C, 0.2 % accuracy.
- Maximum error: 1.7 °C (0.2 % of 850 °C)
- This error is the same no matter if total span is used (-200 to 650 °C) or a narrower user-defined span is used, like 0 to 100 °C.

Note: When using a Pt100 simulator, make sure the transmitter Pt100 excitation current (0.18 mA) s compatible with the simulator specification.

INSTALLATION

The transmitter is intended for DIN rail mounting. Its drawing is presented in **Figure 05**.
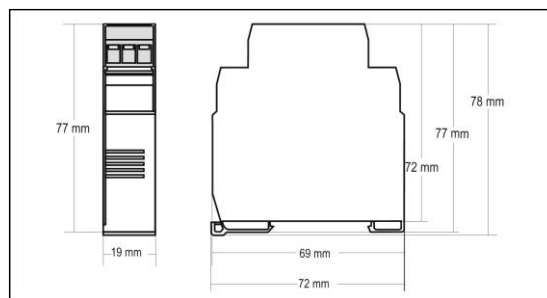

Figure 05 – Transmitter dimensions

ELECTRICAL CONNECTIONS

Figures 06 and **07** below shows the transmitter connections to the sensor and power supply. Terminals 1, 2 and 3 are used for sensor input. For 2-wire Pt100, terminals 2 and 3 shall be connected together.
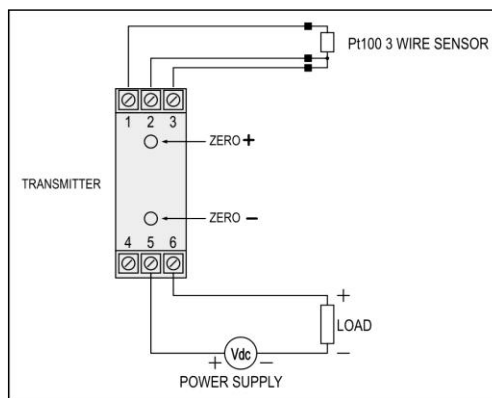

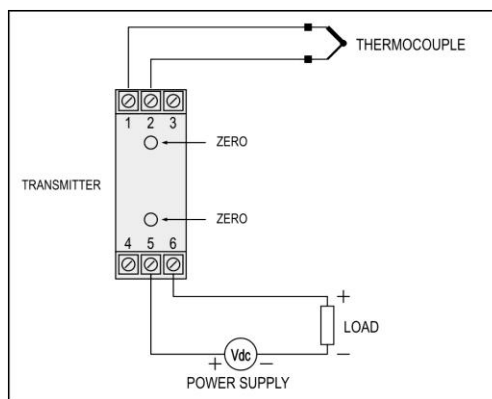**Figure 06** – Transmitter wiring – Pt100

Figure 07 – Transmitter wiring – Thermocouple

The **LOAD** represents the input shunt of an instrument measuring the 4-20 mA current loop.

Installation Recommendations

- Conductors of small electrical signals must be distant from activation ur high-tension/current conductors, preferably passing through grounded conduits.
- A specific electrical power supply network should be provided for instruments use only.
- In controlling and monitoring applications, possible consequences of any system failure must be considered in advance.
- RC filters (47R an 100nF, serial) in inductor charges (contactors, solenoids, etc.) are recommended.

SPECIFICATIONS

Sensor input: User defined. The supported sensors are listed in **Table 01**, along with their maximum ranges.

Thermocouples: Types J, K, R, S, T, N and E, to IEC 60584 (ITS-90).
Impedance >> 1 MΩ

Pt100: Excitation: 0.18 mA, 2 or 3-wire connection (for 2-wire sensors, tie terminals 2 and 3 together).
α = 0.00385, according to IEC 60751 (ITS-90).

Voltage: 0 to 50 mVdc. Impedance >> 1 MΩ

Sensor Type	Range	Minimum measurement span
Thermocouple K	0 to 1370 °C	100 °C
Thermocouple J	0 to 760 °C	100 °C
Thermocoupler R	0 to 1760 °C	400 °C
Thermocouple S	0 to 1760 °C	400 °C
Thermocouple T	0 to 400 °C	100 °C
Thermocouple N	0 to 1300 °C	100 °C
Thermocouple E	0 to 720 °C	100 °C
Pt100	-200 to 650 °C	40 °C
Voltage	0 to 50 mV	5 mV

Table 01 – Transmitter input sensors

Output: 2-wire 4-20 mA, linear with respect to the measured temperature.

Total accuracy: better than 0.3 % of the maximum range for thermocouples and 0.2 % for Pt100 and voltage;

Resolution: 0.004 mA (12 bits)

Resposta time: < 100 ms

Power supply: 18 to 35 Vdc, across the transmitter;

Maximum load (RL): RL (Ohms max.) = (Vcc – 12) / 0.02 [Ω]
Where: Vcc = Power supply voltage

Operating temperature: -40 to 85 °C

Humidity: 0 a 90 % RH

Electromagnetic compatibility: EN 50081-2, EN 50082-2

No isolation between the sensor and the 4-20 mA loop.

Internal protection against polarity inversion.

Cold junction compensation for thermocouples.

Housing: ABS plastic. Dimensions: Refer to Figure 05.

SAFETY INFORMATION

Any control system design should take into account that any part of the system has the potential to fail. This product is not a protection or safety device and its alarms are not intended to protect against product failures. Independent safety devices should be always provided if personnel or property are at risk.

Product performance and specifications may be affected by its environment and installation. It's user's responsibility to assure proper grounding, shielding, cable routing and electrical noise filtering, in accordance with local regulations, EMC standards and good installation practices.

SUPPORT AND MAINTENANCE

This product contains no serviceable parts inside. Contact our local distributor in case you need authorized service. For troubleshooting, visit our FAQ at www.novusautomation.com.

LIMITED WARRANTY AND LIMITATION OF LIABILITY

NOVUS warrants to the original purchaser that this product is free from defects in material and workmanship under normal use and service within one (1) year from the date of shipment from factory or from its official sales channel to the original purchaser.

NOVUS liability under this warranty shall not in any case exceed the cost of correcting defects in the product or of supplying replacement product as herein provided and upon the expiration of the warranty period all such liability shall terminate.

For complete information on warranty and liability limitations, check appropriate section in our web site: www.novusautomation.com.