TRANSMITTER
TXMINI-M12-485-MP

USER GUIDE – V1.0x

We Measure, We Control, We Record

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1. SAFETY ALERTS

The symbols below are used throughout this manual to draw the user's attention to valuable information related to device safety and use.

		
CAUTION Read the manual fully before installing and operating the device.	**CAUTION OR HAZARD** Risk of electric shock.	**ATTENTION** Electrostatic-sensitive device. Make sure you take the necessary precautions before handling it.

Safety recommendations must be followed to ensure personal safety and prevent damage to the device or system. If the device is used in a manner other than that specified in this manual, the device's safety protections may not be effective.

2. INTRODUCTION

TxMini-M12-485 is a compact temperature transmitter for internal assembly on the output of Pt100 resistance temperature sensors. It is composed of an encapsulated electronic circuit and a M12 connection for power supply.

When using Modbus RTU commands, their configuration can be performed via RS485 interface.

The **SigNow** software and app allows you to configure all features of the transmitter, as well as perform diagnostics. It is also possible to use another supervisory software to configure and read the information provided by the transmitter.

3. SPECIFICATIONS

FEATURES	TXMINI-M12-485-MP
Sensor input	**Pt100:** 3-wire type, 0.8 mA excitation, α = 0.00384, according to NBR 13773. IEC 60751 (ITS-90).
Time between energizing and stabilizing the measurement	< 2.5 s. Accuracy is only guaranteed after 15 minutes.
Reference conditions	• Environment: 25 °C (77 °F) • Power supply: 24 V • Load: 250 Ω • Stabilization time: 15 minutes
Temperature influence	± 0.2 % / 25 °C (77 °F)
Response time	Typically 1.6 s
Maximum permissible voltage at the sensor's input terminals	3 V
RTD current	800 μA
Effect of RTD cable resistance	0.005 °C (32,009 °F) / Ω
Maximum admissible resistance of RTD cable	25 Ω
Power supply influence	0.006 % / V typically (maximum range percentage)
Output resolution	2 μA
Power supply	8 to 35 Vdc
Maximum load (RL)	RL (max.) = (Vdc – 8) / 0.02 [Ω] Where: Vdc = Power supply in Volts (from 8 to 35 Vdc)
Operating temperature	-40 to 85 °C (-40 to 185 °F) (Electronics)
Environment humidity	0 to 90 % RH
Wire size	0.14 to 1.5 mm²
Process thread type	1/2" BSP and 1/4" BSP
Recommended torque	0.8 Nm
No electrical isolation between input and output.	
Internal protection against reversal polarity of voltage supply.	

Table 1

3.1 ACCURACY

SENSOR TYPE	MEASUREMENT RANGE	MINIMUM MEASUREMENT RANGE
Pt100	-200 to 650 °C (-328 to 1202 °F)	40 °C (104 °F)

Table 2

Order codes:

P/N: **8816001039**: **USB-i485 Converter**.

4. MECHANICAL INSTALLATION

TxMini-M12-485-MP Transmitter is suitable for installation in pipes and in places with limited space.

Vibrations, excessive humidity and temperature, electromagnetic interference, high voltage, and other interference can permanently damage the transmitter and cause errors in the measured value.

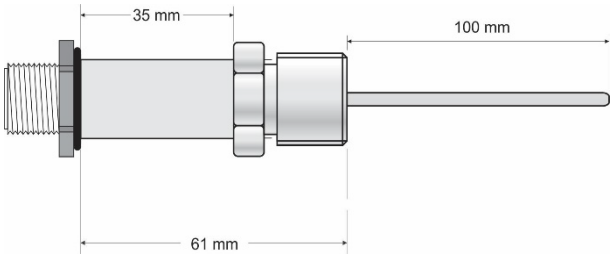


Figure 1

5. ELECTRICAL INSTALLATION

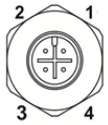
- The terminal housing is made of polyamide.
- Wire size used: 0.14 to 1.5 mm².

5.1 INSTALLATION RECOMMENDATIONS

- Input signal conductors should run through the plant separate from output and supply conductors. If possible, in grounded conduits.
- The power supply for electronic instruments must come from a network specific to the instrumentation.
- In control applications, it is essential to consider what can happen when any part of the system fails.
- It is recommended to use RC FILTERS (noise suppressors) in contactor coils, solenoids, etc.

5.2 POWER SUPPLY AND COMMUNICATION CONNECTION

Terminals 2 and 4 are for serial communication and terminals 1 and 3 are for power, as shown in the table below:



1	Vdc
2	D+
3	GND
4	D-

Table 3

D1	**D**	**D+**	**B**	Bidirectional data line.	Terminal 2
C				Optional connection that improves communication performance.	Terminal 3
GND					
D0	**$\overline{D}$**	**D-**	**A**	Inverted bidirectional data line.	Terminal 4

Table 4

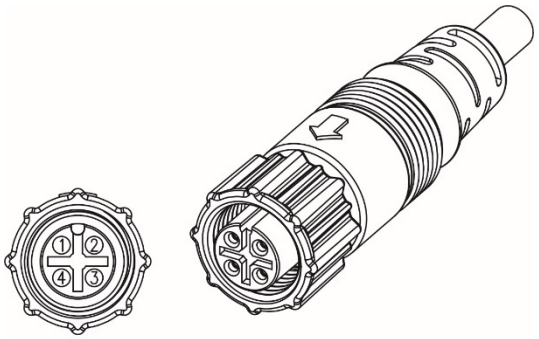
5.3 SENSOR CONNECTION

Terminals 1, 2, and 3 are used to connect the sensor. Terminals 1 and 2 must be connected, as shown in the figure below:

Figure 2

5.4 M12 CABLE CONNECTION

Below are the guidelines for making or purchasing the M12 cable:



Front view of the connection pins

PIN		
PIN	**WIRE COLOR**	**FUNCTION**
1	Brown	Vdc
2	Black	D+
3	White	GND
4	Blue	D-

Table 5

Figure 3

For correct compensation of the RTD cable resistances, they must be equal at all terminals and must not exceed 25 Ω per cable. To guarantee these conditions, it is recommended to use 3 or 4-wire cable of the same length and gauge (the cable is not supplied).

6. CONFIGURATION

6.1 FACTORY SETTINGS

TxMini-M12-485-MP has the following factory settings:

PARAMETERS	CONFIGURATION
Error indicator	0
Zero correction	0 °C (32 °F)
Unit	°C
Digital filter	0
Configuration Timer	60 s
Baud Rate	1200
Data Bits	8
Parity	Even
Stop Bits	1
Address	247

Table 6

6.2 USING A USB-I485 CONVERTER

To change the configuration of your **TxMini-M12-485-MP**, you must use the **SigNow** software or app.

To configure the device via software, you must connect your **TxMini-M12-485-MP** to a 24 V supply (see POWER CONNECTION AND COMMUNICATION section), and then connect the **TxMini-M12-485-MP** to an **USB-i485 Converter**, as shown in the figure below:

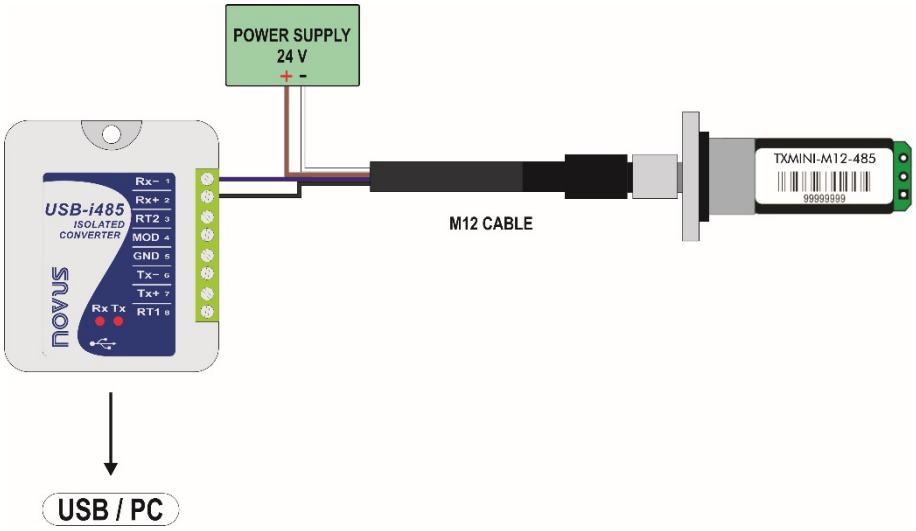


Figure 4

To configure the device via app, in addition to making the connection explained above (i.e. ensuring that the device is powered and that the connection to the converter has been made), you also need to use an OTG cable with the **USB-i485 Converter**. Connected to the USB of the **USB-i485 Converter**, the OTG cable (the other end must be inserted into the USB of the smartphone) will allow you to connect to the smartphone.

After this, you must run **SigNow** on your smartphone and proceed with the recognition process (see CONNECTING THE DEVICE TO YOUR SMARTPHONE section).

⚠	**The transmitter has no electrical insulation between input and output.**

6.3 SIGNOW SOFTWARE

SigNow software is the main tool for configuring and analyzing data from **TxMini-M12-485-MP**. To install it, simply run the ***SigNowSetup.exe*** file and proceed with the configuration.

The software and its respective manual can be downloaded for free in the Download Area of our website www.novusautomation.com.

This manual describes the generic functionalities of **SigNow**. For more specific instructions on how to operate certain tools, check the specific operations manual.

6.3.1 CONNECTING THE DEVICE TO YOUR COMPUTER

Once the communication connection between the **USB-i485 Converter** and the **TxMini-M12-485-MP** has been established and the device is powered, connect the transmitter to the computer's USB port and run **SigNow**, which will display the following screen:

Figure 5

To establish a communication, click on **Configuration** → **RS485** and, under **List of connections**, select the **New connection** option:

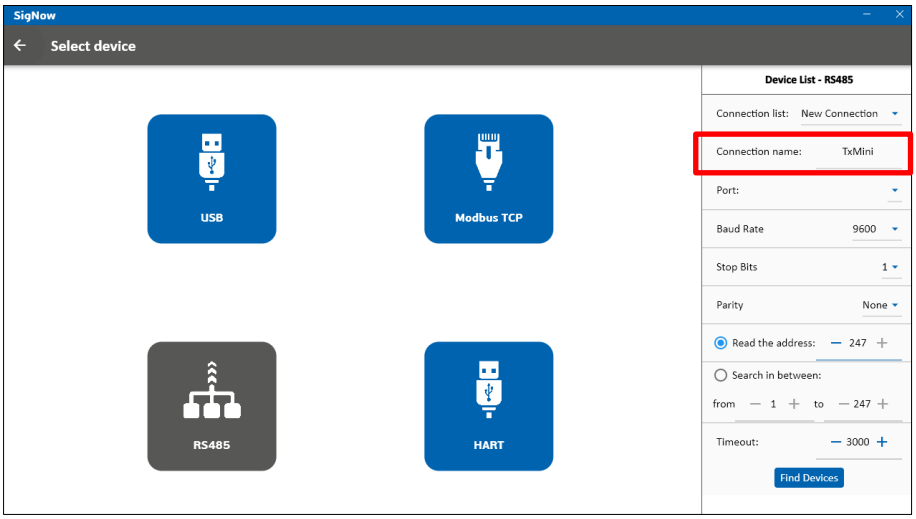


Figure 6

To find the device for the first time, set the **Baud Rate**, **Parity**, and **Read Address** parameters to the factory values (see FACTORY SETTINGS) and click on **Find Devices**. This will allow you to find the desired transmitter and establish the connection:

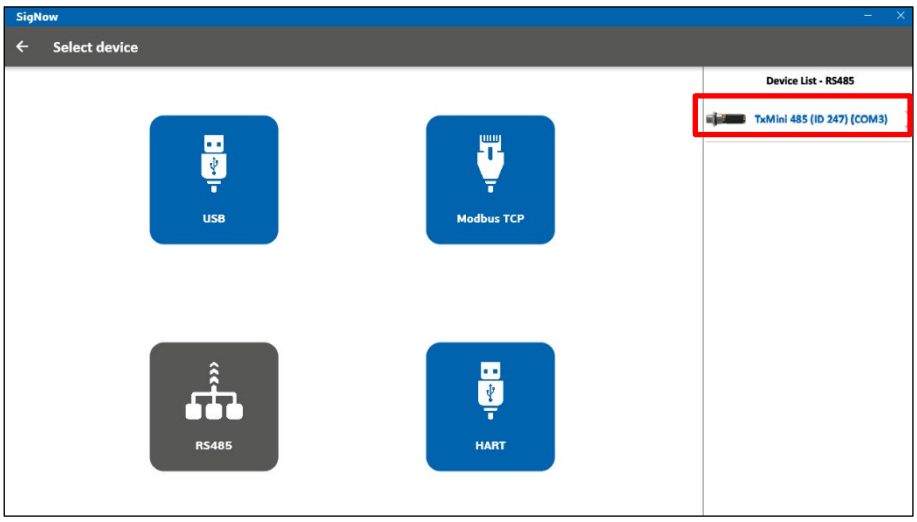


Figure 7

For the next connections, simply select the **Temporary TxMini** option in the **Connection List** parameter and click **Find devices**, ensuring that the connection attempt is within the configured timeout period (otherwise the software will be unable to find the device). If the **Temporary configuration window** parameter is set to 60 seconds (see the COMMUNICATION tab of the CONFIGURATION SECTION), the **TxMini-M12-485-MP** will respond to address 247 during this period. If no connection attempt is made via the **Temporary TxMini** option in the interim, it will adopt the address with which it was configured.

6.3.2 CONFIGURATION SECTION

After connecting the software to the transmitter, the following screen will be displayed:

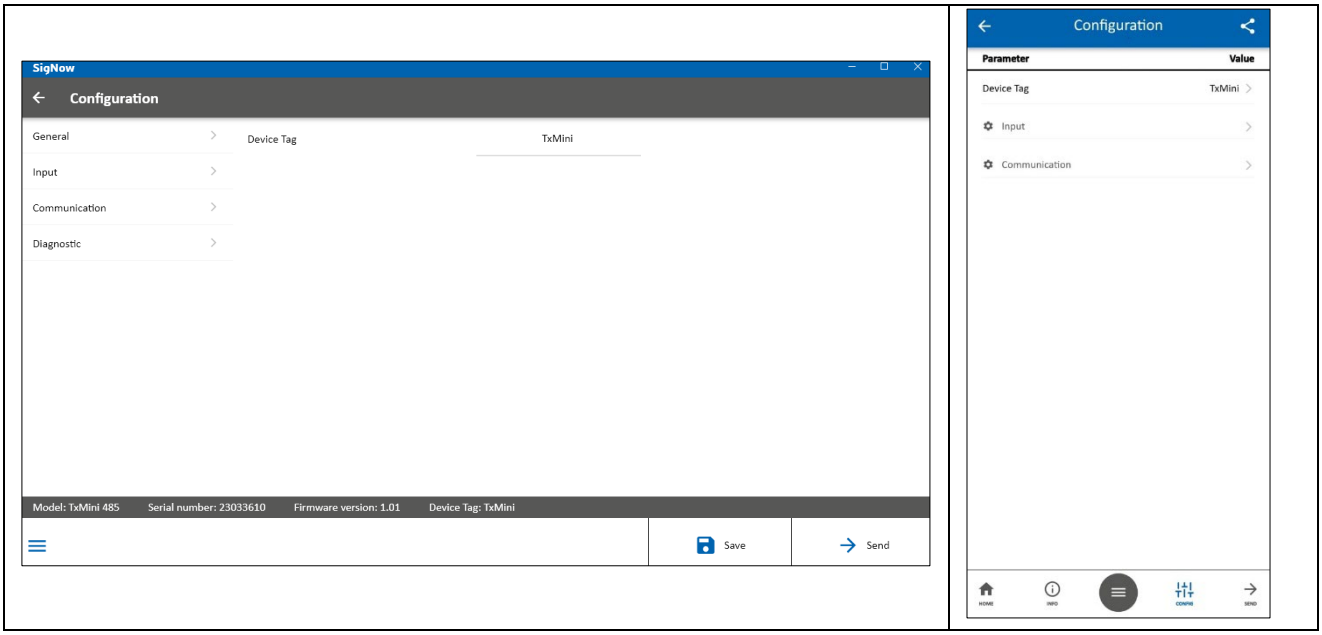


Figure 8

This screen will display information about the device's model, serial number, firmware version, and tag. You can define a new tag with up to 10 characters.

INPUT

By clicking on the **Input** tab, you can configure the device's input:

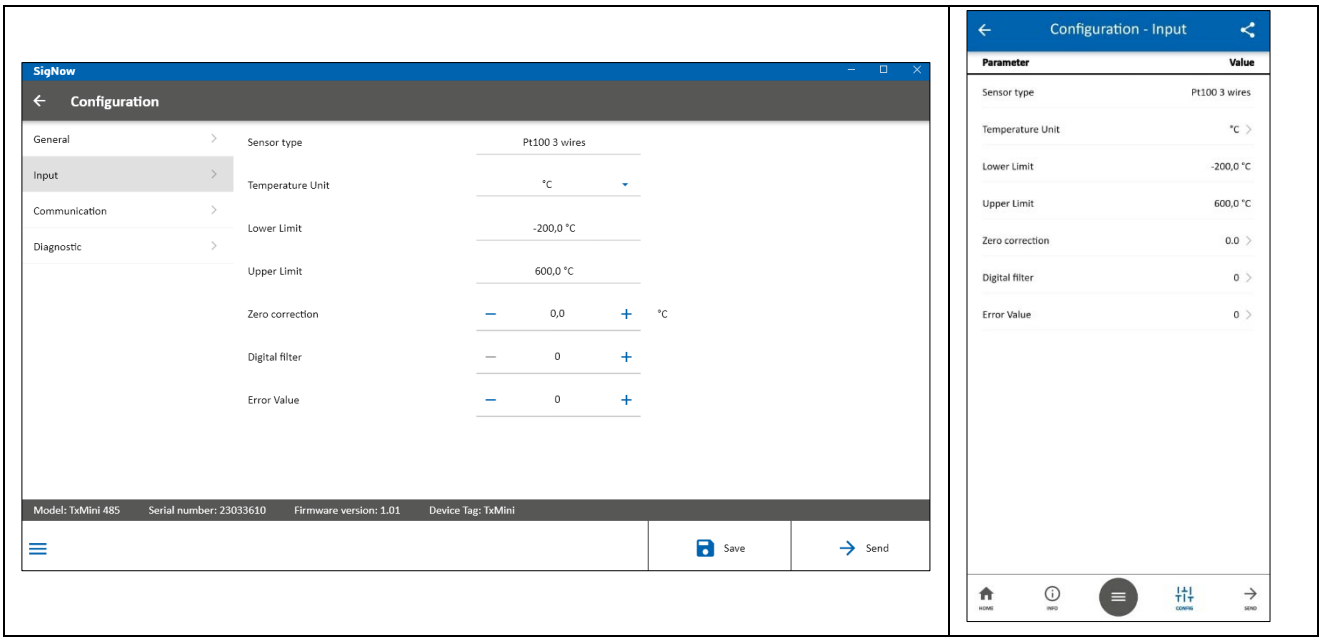


Figure 9

- **Sensor type:** Displays information about the type of sensor in the device.
- **Temperature unit:** Allows you to set the temperature unit to be used.
- **Lower limit:** Displays information about the lower limit of the device. Indicates the permissible measuring range for the temperature reading of the Pt100 sensor.
- **Upper limit:** Displays information about the upper limit of the device. Indicates the permissible measuring range for the temperature reading of the Pt100 sensor.
- **Zero correction:** Allows you to change the temperature value read by the sensor in the range between -10 and 10 degrees.
- **Digital filter:** Allows you to set a digital filter between 0 and 20 to stabilize the temperature read in the **Diagnostic** section. This allows the read value to fluctuate less.
- **Error value:** Allows you to configure a value to be assumed when there is an error in the sensor reading. This parameter leaves the factory with an error indication of 0 but can assume values between -9999 and 9999.

COMMUNICATION

By clicking on the **Communication** tab, you can configure the communication of the device:

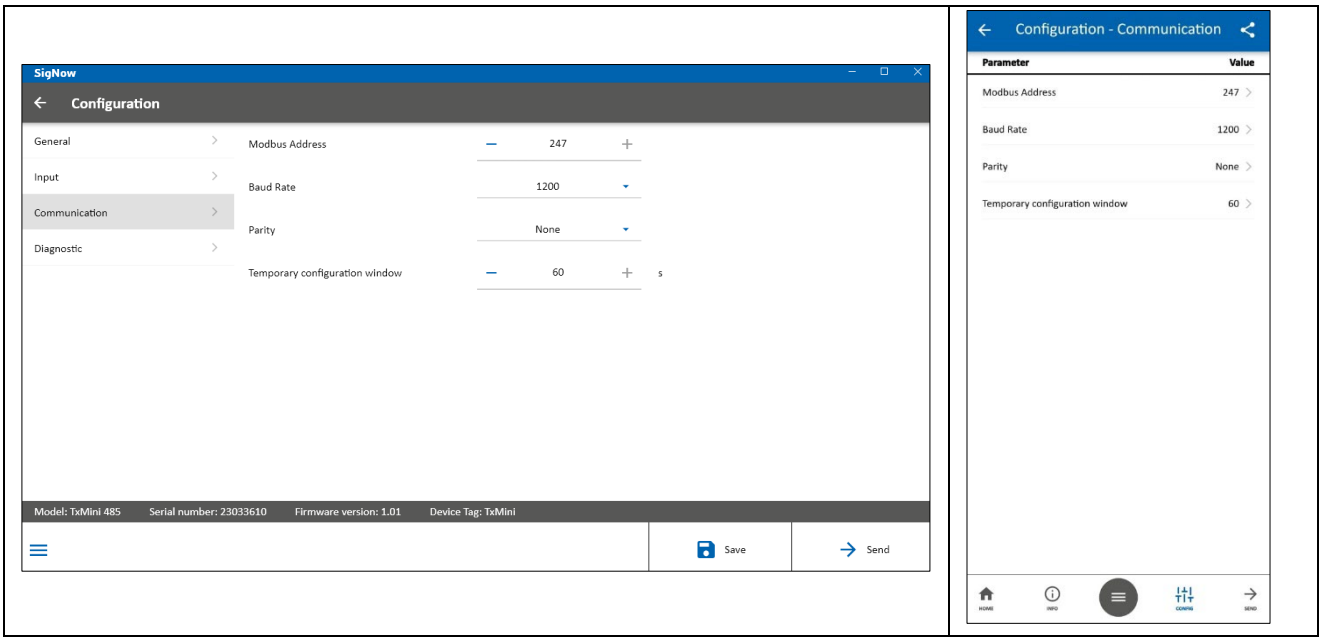


Figure 10

- **Modbus address:** Allows you to configure the Modbus address of the device. A value between 1 and 247 is accepted.
- **Baud Rate:** Allows you to set the Baud Rate of the device.

- **Parity:** Allows you to configure the parity to be used. By configuring this parameter, you can define the number of stop Bits, according to the Modbus standard.
- **Temporary configuration window:** Allows you to define the period to be used for temporary configuration. This parameter ensures that the transmitter remains with the configured parameters within this period (minimum 10 seconds, maximum 60 seconds) before returning to the settings saved in memory. In seconds.

6.3.3 DIAGNOSTIC SECTION

When you click on the **Diagnostic** button, select the **RS485** option, and perform the connection process with the **TxMini-M12-485-MP** (see CONNECTING THE DEVICE TO YOUR COMPUTER or CONNECTING THE DEVICE TO YOUR SMARTPHONE). The software and the app will display the following screens:

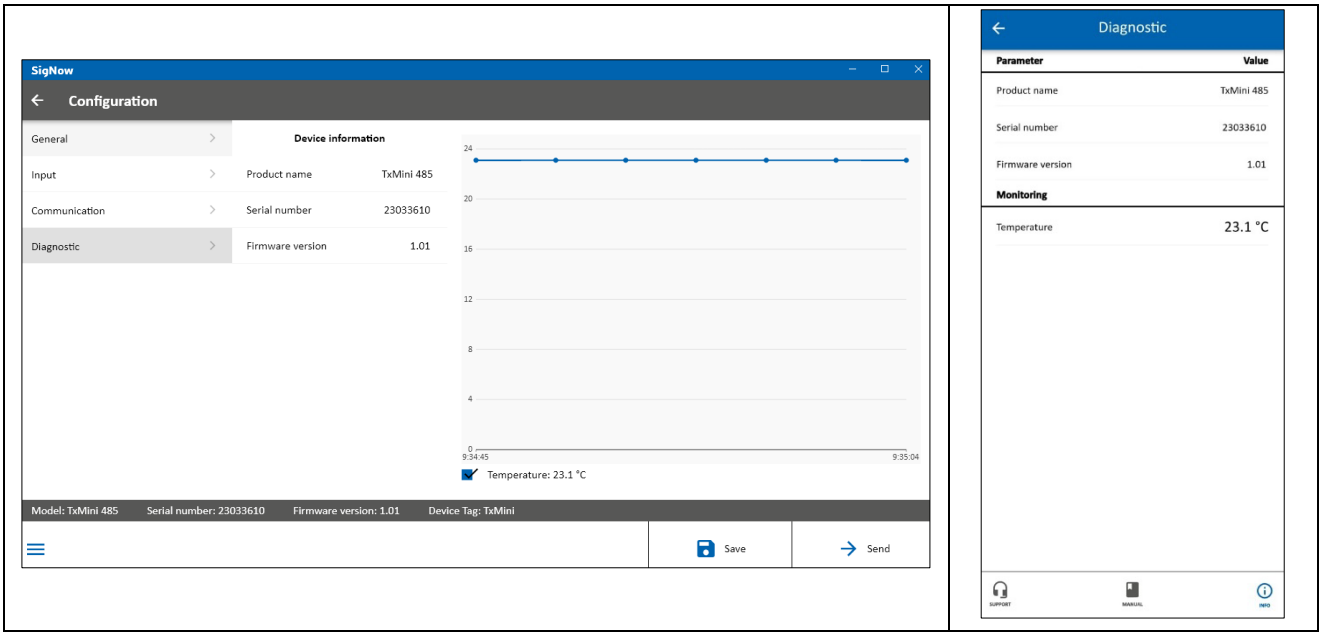


Figure 11

You can also access the Diagnostic section by clicking on the **Diagnostic** tab, located on the left of the configuration screen.

6.4 SIGNOW APP

The **SigNow** app is the ideal tool for using the **TxMini-M12-485-MP** on a daily basis. Available for Android smartphones, it is always easily accessible for monitoring or configuring your device.

SigNow can be downloaded for free from Google Play Store.

6.4.1 CONNECTING THE DEVICE TO YOUR SMARTPHONE

Android smartphones with On the Go (OTG) technology can be directly connected to the device via the USB port. Using the **USB-i485 Converter** and an OTG cable, it is possible to recognize and configure your **TxMini-M12-485-MP** when running the app.

To use the device connected to your smartphone, the **TxMini-M12-485-MP** must be properly powered (see POWER SUPPLY AND COMMUNICATION CONNECTION section).

	**1. If you position the cable end incorrectly, it is possible that the device will not be recognized by the app.** **2. iOS smartphones are not compatible with the OTG cable.**

6.4.2 RUNNING THE APP

When using an OTG cable and the **USB-i485 Converter** to connect the device to the smartphone and run the app (see CONNECTING THE DEVICE TO YOUR SMARTPHONE section), you must first approve the use of the **USB-i485 Converter**, which will act as an intermediary for the connection:

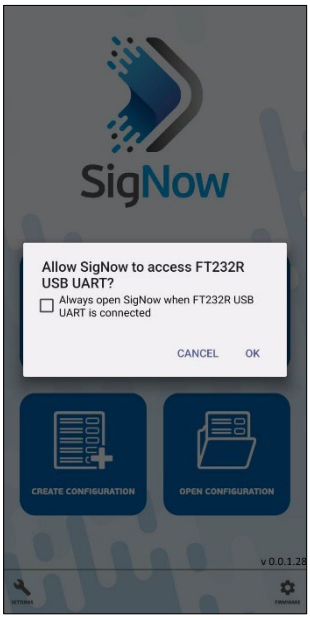


Figure 12

After that, the app will recognize the device and show the main screen:

Figure 13

To configure the device, simply click on **Configuration → RS485** and proceed with the connection, filling in the parameters with the information of your transmitter (if this is your first connection, see parameters in FACTORY SETTINGS):

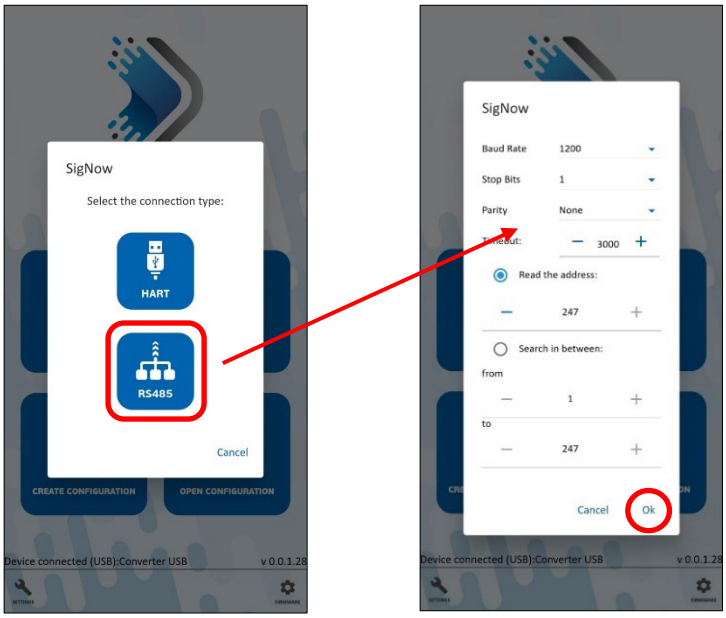


Figure 14

Once the connection has been established, it will be possible to view information about the device, such as its name, serial number and firmware version, as well as configure the parameters displayed in the **Input** and **Communication** subsections, according to the CONFIGURATION SECTION.

By clicking on **Diagnostic** and establishing the connection, you will be able to view information about the transmitter, according to the DIAGNOSTIC SECTION.

Apart from the particularities of the connection mode, the parameters and division of information are the same as in the **SigNow** software. More specific information about the application's buttons can be found in the **SigNow** manual, available on **NOVUS** website.

7. MODBUS COMMANDS

The Modbus RTU commands (functions) listed below are implemented.
For more information on each of these commands and the Modbus protocol in general, see www.modbus.org.

***READ HOLDING REGISTERS* – 0 x 03**

This command can be used to read the value of one or more consecutive registers, as shown in the **Table of Retentive Registers**.

***WRITE HOLDING REGISTERS* – 0 x 06**

This command can be used to write to a retentive register, as shown in the **Table of Retentive Registers**.

7.1 RETENTIVE REGISTER'S TABLE

The addresses specified correspond to low-level physical addresses, where 0 corresponds to PLC address 40001.
The **Minimum** and **Maximum** columns contain the range of valid values for each parameter.
The **R/W** column indicates if the parameter is read and write (R/W) or read only (R).

ADDRESS	DESCRIPTION	MINIMUM	MAXIMUM	R/W
0	Serial number (word high)	0	65535	R
1	Serial number (word low)	0	65535	R
2	Firmware version	100	199	R
3	Model	0	255	R
4	Input Reading - AD	-	-	R
5	Temperature value (°C or °F)*	-200	600	R
6	Error status, overflow, underflow	0	65535	R
7	Baud Rate	0	7	R/W
8	Parity	0	2	R/W
9	Modbus address	1	247	R/W
10	Temperature unit	0	1	R/W
11	Error value	-9999	9999	R/W
12	Sensor	0	0	R
15	User Offset for temperature*	-100	100	R/W
16	Title	-	-	R/W
17	Title	-	-	R/W
18	Title	-	-	R/W
19	Title	-	-	R/W
20	Title	-	-	R/W
21	Timer - Temporary	10	90	R/W
22	Digital Filter	0	20	R/W

Table 7

* For the ranges in the table indicated above, consider to one decimal place. Example: -100 means -10.0.

7.2 DESCRIBING SOME REGISTERS

7.2.1 REGISTER 7 – BAUD RATE

Allows you to set the speed of Modbus communication. The transmitter leaves the factory configured with a Baud Rate of 1200.

CODE	BAUD RATE
0	1200
1	2400
2	4800
3	9600
4	19200
5	38400
6	57600
7	115200

Table 8

7.2.2 REGISTER 8 – PARITY

Allows you to set the parity code used in Modbus communication. The transmitter leaves the factory configured with even parity.

CODE	PARITY
0	No Parity
1	Odd
2	Even

Table 9

7.2.3 REGISTER 9 – MODBUS ADDRESS

Allows you to set the transmitter's address on the Modbus network. Values between 1 and 247.
The transmitter leaves the factory configured with address 247.

7.2.4 REGISTER 10 – TEMPERATURE UNIT

Allows you to set the temperature unit code used in Modbus communication.
The transmitter leaves the factory configured with the unit in degrees Celsius (°C).

CODE	UNIT
0	°C
1	°F

Table 10

7.2.5 REGISTER 11 – ERROR VALUE

It has the error value that is transmitted when the sensor has a problem.
The transmitter leaves the factory configured with a value of 0.

7.2.6 REGISTER 15 – TEMPERATURE USER OFFSET

Allows you to set the user's Offset value in engineering units for the temperature.
The transmitter leaves the factory confiured with an Offset value of 0.

7.2.7 REGISTER 16 TO 20 – TITLE

Allows you to set a name to identify the **TxMini-M12-485-MP** transmitter (the title will be used in **SigNow**).

7.2.8 REGISTER 21 – TEMPORARY TIMER

Allows you to set the value of the time the transmitter will be in default communication mode (**Baud Rate**, **Address**, and **Parity**) for cases where the user does not remember the previous recording parameters.
Note: TEMPORARY: 1200 baud, 247, Even.

7.2.9 REGISTER 22 – DIGITAL FILTER

Allows you to set the user's Digital Filter code for stabilization, treatment of the temperature reading.
The transmitter leaves the factory configured with filter 0.

8. WARRANTY

Warranty conditions are available on our website www.novusautomation.com/warranty.