TRP-20
USER'S MANUAL

TRP-20 are electronic modules developed by Tetraedre to provide analog measurement capabilities over radio. These devices are operating on the ISM 868 MHz band and are compatible with the EN13757-4 norm.

Table of content

I - HARDWARE

I.1 Connections

The TRP-20 has 4 connectors and a main switch

I.1.1 Connectors

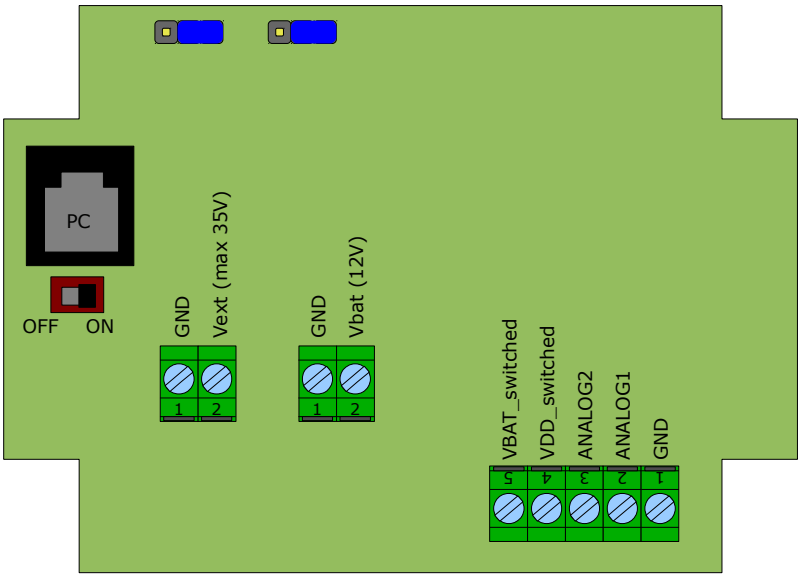


Illustration 1: TRP-20 connectors

I.1.2 TRP-20 power supply

The TRP-20 has two power supply inputs.

1) Vbat input is the main power input. Nominal operating voltage is +12V DC. Maximal operating voltage is +15VDC. **Warning, this input is <u>not</u> protected with a diode**, so please do not invert power supply. Vbat is intended to be used a with a 12V lead battery but other 12V source can be used. When powered through Vbat, the power consumption is very low (typical 50µA, max 50mA).

2) Vext input provides a +12VDC to +35VDC input. This input is protected with a diode. This input can be used with a +24VDC input or a solar panel. Voltage from this input is internally regulated to +13.4VDC

By connecting Vbat to a 12V lead battery and connecting Vext to a solar panel, the system will charge the battery when light is available.

I.1.2.1 Sensors power supply

The TRP-20 can provide supply to analog sensors.

Usually sensors are powered by VBAT_switched. This signal is switched on only during analog measurement. Analog measurement lasts during 4 seconds.

Supplying the sensors with VBAT_switched greatly reduces system power consumption and allow long term battery operations.

Note that it is also possible to keep the sensors by supplying them externally to VBAT.

I.1.2.2 Power consumption

Thanks to its advanced power supply switching techniques, the TRP-20 has a low power consumption and can then operate during several months (depending on the configuration) on the battery.

I.1.3 Power-on

To switch the TRP on, simply slide the red switch to position "ON" like indicated on the drawing. The blue LED will light during 1 second and then switch off. The device is ready

I.1.4 PC connection

It is possible to connect the TRP to a PC to modify settings.

To do so, use the INF-USB-RJ11 cable and the Soft_8383.

I.1.5 4-20mA measure

As explained above, the VBAT_switched output is switched on 4 seconds before analog measurement. Both analog channels are measured.

A factory calibration is performed on the channels before shipping.

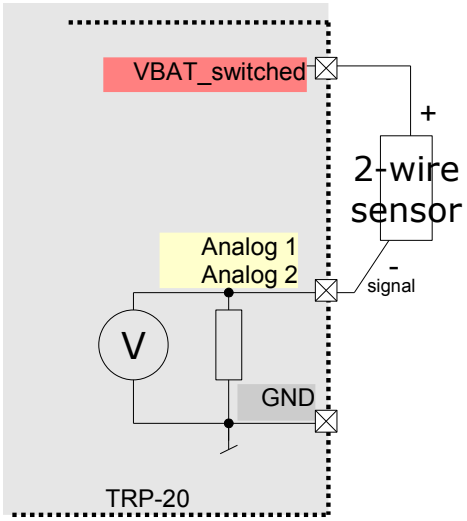


Illustration 2: measurement principle, 2-wire sensor

The TRP-20 has a 250mA fuse on each analog input.

Current measurement is made across a 33Ω resistor between the analog input and GND.

II - SOFTWARE AND RADIO

II.1 Measure

The TRP makes a periodic measurement of the analog inputs. The period is specified with the MEASUREMENT_INTERVAL parameter.

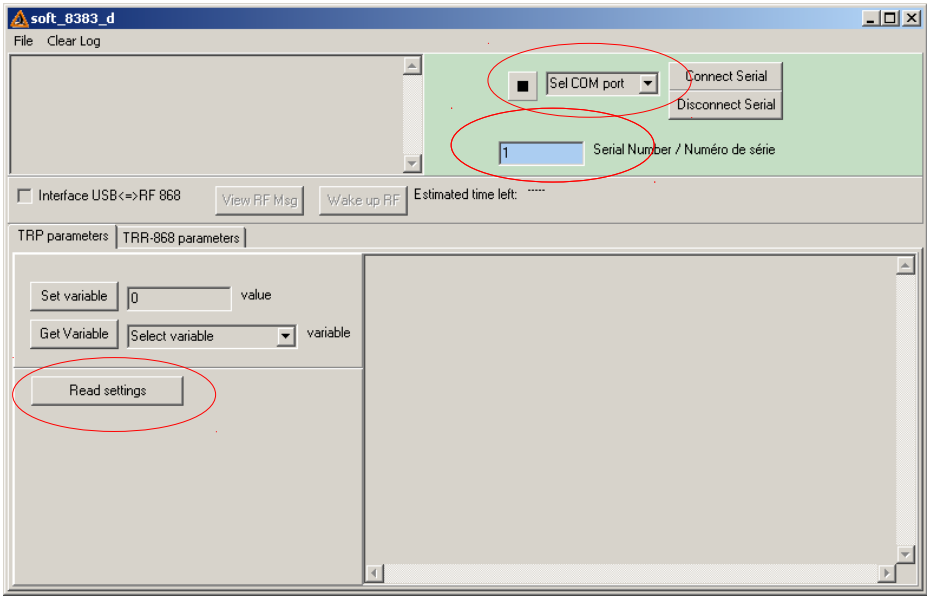
Typical values for MEASUREMENT_INTERVAL are 300 (5 minutes) or 900 (15 minutes), but other values can be used. To change the MEASUREMENT_INTERVAL parameter, use the software 8383 available by Tetraedre.

II.1.0.1 Radio message update

The radio message is updated after each measurement.

II.2 Configuration with PC

The configuration of the TRP can be modified with software 8383 provided by Tetraedre.



Open soft_8383

In the drop-down menu on the upper right corner choose the COM port of your USB converter cable (read documentation about this topic on Tetraedre's web site : at this link).

Then click on "Connect serial"

In the blue area, enter the TRP serial number

Plug the RJ11 connector of the USB cable inside the TRP and switch the device on.

Then press on "Read Settings".

To change measurement period, select "Measure period [s]" from the drop-down menu on the left. Set the value in the "value" field (for example 60 for 1 minute) and click on "Set Value".

Check that data was written correctly by making a "Read Settings".

In case of problem, check error messages in the upper left corner.

II.2.0.1 Frequency

The TRP sends data at regular interval. The frequency range is the ISM 868 MHz. The TRP can be configured to transmit data at two predefined frequencies:

- 868.950 MHz (default value, OMS standard, EN 13757-4 norm)
- 868.330 MHz

II.2.0.2 Transmission interval

The TRP transmits data over radio every 8 seconds. Real delay can vary between 4 to 12 seconds but average is still 8 seconds.

II.2.1 OMS configuration

In order to configure the TRP for OMS communication mode, please set the parameters in the following table.

"*Message_format*" MUST be changed.

RF_KEYs should be changed according to the user's need.

Parameter name	new value	description
Message_format	122	In hexadecimal, this value is 0x7A This parameter changes the format of the message to make it OMS compatible

RF_KEY RF_KEY_4 RF_KEY_8 RF_KEY_12	user configurable	See below
OMS_device_type		We suggest to keep this value to 4
dot_1	4	Value 1 DIF parameter
dot_2	4	Value 2 DIF parameter
media_1	40 note 1	Value 1 VIF parameter note 1
media_2	48 note 1	Value 2 VIF parameter note 1

note 1 : In the current implementation the VIF choice is limited to the primary VIF codes without Extended VIF codes.

II.2.1.1 Encryption key

The OMS message is encrypted with the AES_128 algorithm

The 128-bit key is the concatenation of the 4 32-bits registers as shown in the following example:

```
RF_KEY         : 0xDFD109E8
RF_KEY_4       : 0x4F523A60
RF_KEY_8       : 0xBD4391C8
RF_KEY_12      : 0xF3C19D6A
OMS key        : DF D1 09 E8 4F 52 3A 60 BD 43 91 C8 F3 C1 9D 6A
```

II.2.2 non-OMS radio message configuration

Parameter name	**new value**	**description**
Message_format	163	In hexadecimal, this value is 0xA3 This parameter changes the format of the message to make it proprietary

Setting the "message_format" parameter to 163 modifies the format to Tetraedre's proprietary format. The message is compatible with EN13757-4 norm but is not OMS. Data transmitted can be encrypted or not.

The following data show a communication example of unencrypted data.

Bold hexadecimal text represents each input. Value are 32-bit integers MSB first. 1 LSB represents 1 µA.

The following data represents the content of a message with no encryption (key=0). To decode messages with encryption please contact Tetraedre.

```
194492522133B7E40000FADAA3720000004B0000124C140000006B174564
```

"B7E40000" => 0x0000E4B7 = 58551 : device serial number

"0000124C" => 0x124C = 4684 => 4.684mA : current at ANALOG input 1

"0000006B" => 0x6B = 107 => 0.107mA : current at ANALOG input 2

III - CONTACT INFORMATION

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