

# RF TRANSCEIVER RRF



## INSTALLATION AND OPERATING MANUAL

***SOFTWARE CODE: PRRF04***

***VERSION: Rev.0.0***

# CONTENTS

SYMBOLS	Page 3
WARNINGS	Page 3
IDENTIFICATION DATA PLATE	Page 3
PRODUCT DESCRIPTION	Page 4
MAIN TECHNICAL FEATURES	Page 6
INSTRUMENT INSTALLATION	Page 7
POWER SUPPLY	Page 8
RS232 SERIAL CONNECTION	Page 8
RS422/RS485 SERIAL CONNECTION	Page 9
USB CONNECTION	Page 9
RF CHANNEL SELECTION	Page 10
SELECTING THE NUMBER OF TRF IN THE NETWORK (MULTI)	Page 10
INSTRUMENT CONFIGURATION	Page 11
STATUS LED	Page 12
FIRMWARE BOOT-LOADER	Page 12
COMMUNICATION PROTOCOL IN MODE SINGLE AND MULTI	Page 13
TROUBLESHOOTING	Page 14

## SYMBOLS

Here are the symbols used in the manual to draw the reader's attention:



Warning! Risk of electric shock.



Warning! This must be done by qualified personnel.



Pay particular attention to the following information.

## WARNINGS

The purpose of this guide is to inform the operator with text and illustrations of the installation methods and of the correct use of the instrument.

- The equipment must be installed only by qualified personnel who must have read and understand this manual. The "qualified personnel" is the personnel selected and authorized by the responsible of the security to perform the installation.
- Power the instrument with voltage whose characteristics fall within the limits specified.
- Is your responsibility to ensure that the installation complies with the provisions.
- For each anomaly contact your nearest Service Centre. Any attempt to disassemble the instrument or any modification of the instrument not expressly approved will void the warranty and will relieve the Manufacturer from all liability.

## IDENTIFICATION DATA PLATE



It is important to communicate these data in case of request for information or indications concerning the instrument, also communicate the program number and the version number that are shown on the cover of the manual.



## PRODUCT DESCRIPTION

The transceiver RRF is an interface converter from Rs232-Rs422/485-USB to Radio Frequency 868 MHz, with 3 modes of operation: DIRECT, SINGLE and MULTI, selectable via software through a special configurator. The data format is fixed for all modes: 38400, N, 8, 1.

### DIRECT MODE

Used in pairs, simulates a serial connection using a wireless connection. (Application 1).

### SINGLE MODE

It is used to interface with the weight transmitter for load cell, model TRF, in the manners explained below. In particular it can be used to gain the weight from a single transmitter through the communication port Rs232, Rs485 or USB. (Applications 2 e 3).

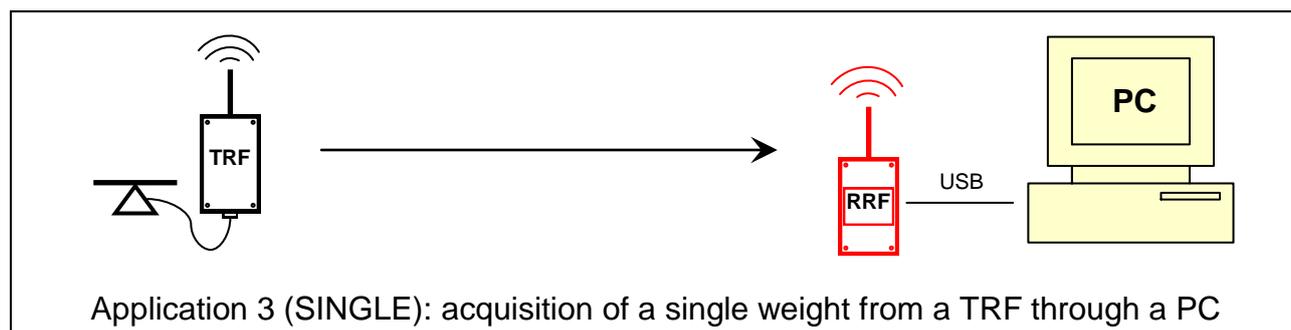
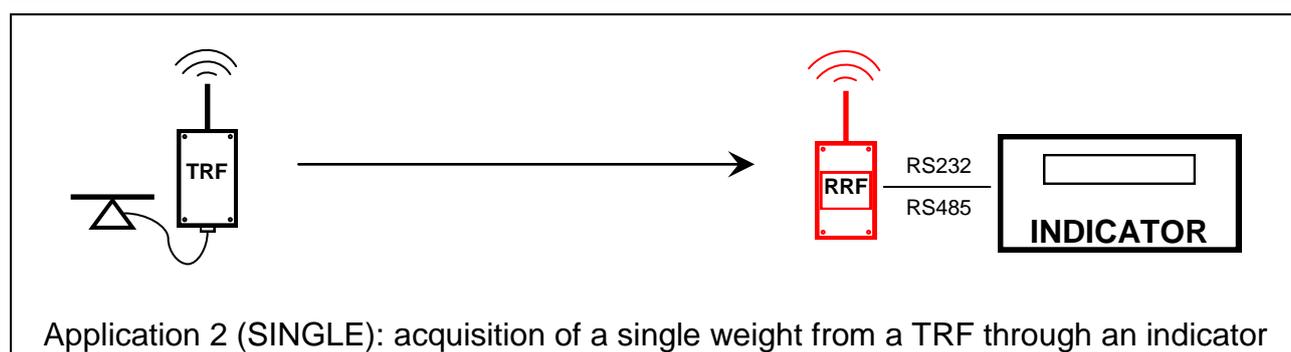
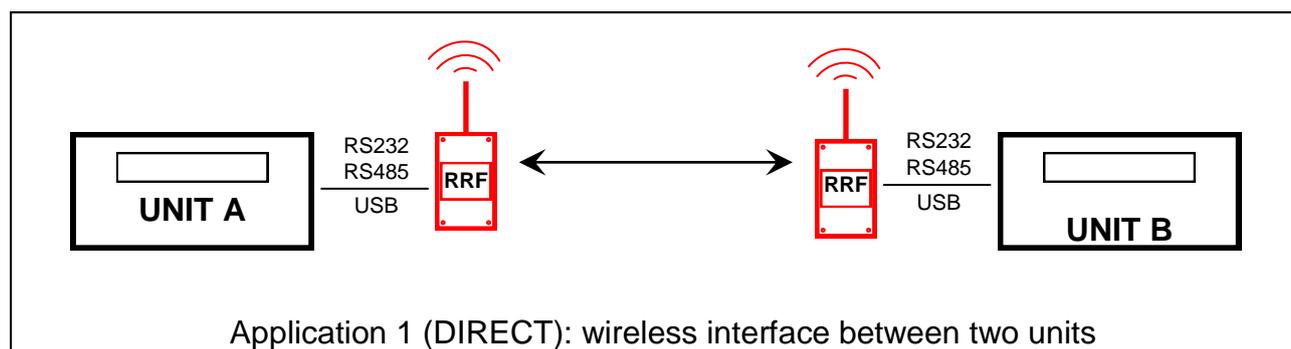
### MULTI MODE

This mode is used to capture the weight from multiple weight transmitters, model TRF (up to 15): in this case the RRF transceiver communicates with the TRF and made available on the serial port (or USB) a string with all the weight obtained. (Applications 4, 5 and 6).

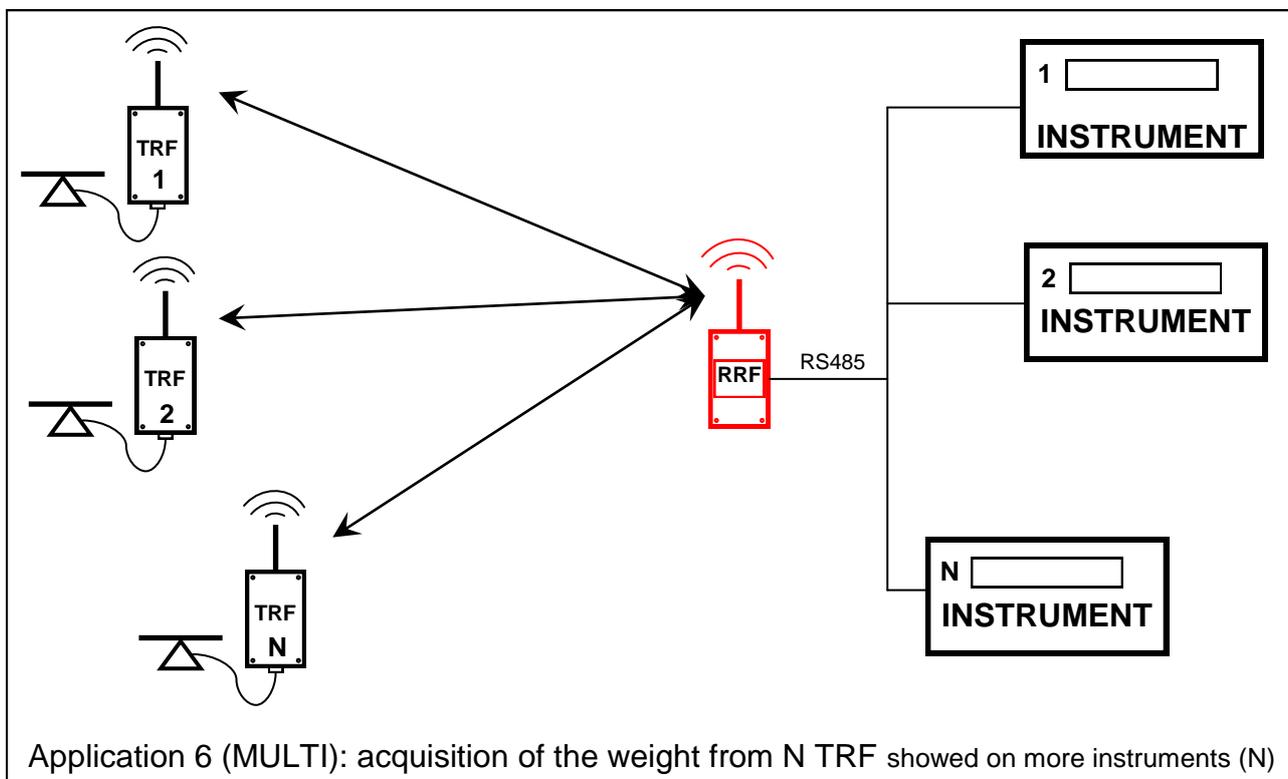
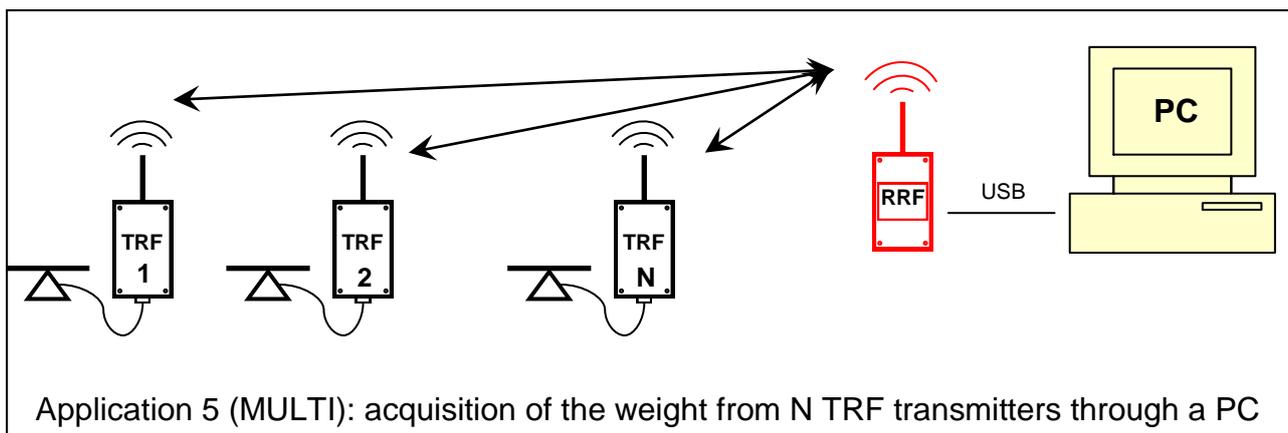
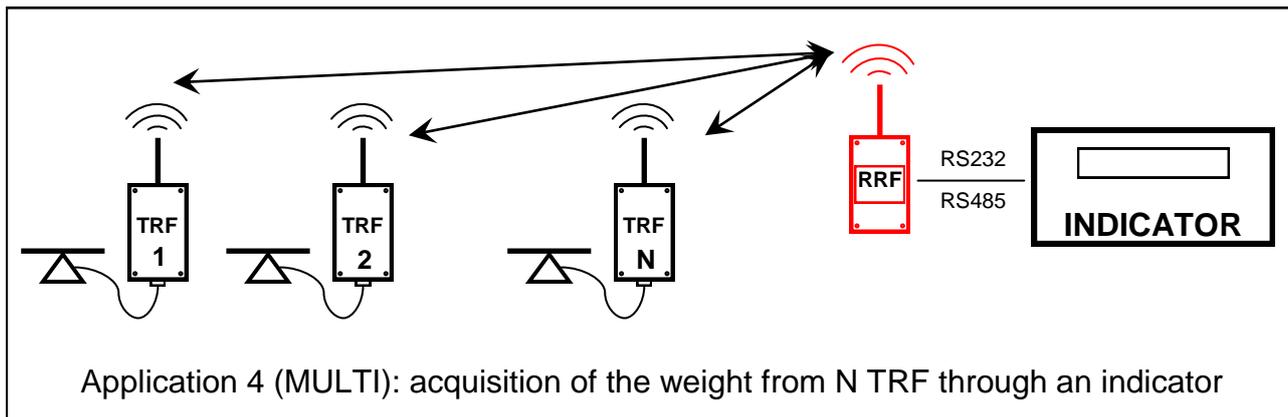
The RF communication frequency is 868MHz, with power up to 10mW, with 7 operation channels selectable from dip-switch for installations where are present multiple RF devices.

The power is at 5Vdc and can be supplied via the USB port when the transceiver is connected to a PC, otherwise can be provided by the weight indicator we produce.

The RRF has programmable operating parameters, such as RF Power and the Communication Protocol. The programming of the operating parameters is made through a PC application that allows you to easily configure and just in few steps the system used (TRF and RRF).



## PRODUCT DESCRIPTION



## MAIN TECHNICAL FEATURES

POWER REQUIREMENTS	
Power supply	4.5 , 15 Vdc ( 50 mA) <ul style="list-style-type: none"> <li>• Connection to PC: automatic power via USB port.</li> <li>• Connection to instrument: normally used to power the load cells.</li> </ul>
Power supply connection	Screw terminal pitch 5,08 mm cable gland
ENVIRONMENTAL	
Operating temperature	-10°C , +50°C (max humidity 85% non condensing)
Storage temperature	-20°C , +60°C
PHYSICAL CHARACTERISTICS	
Overall dimensions	126 mm x 79 mm x 41 mm (l x h x p) excluding antenna and connector
Enclosure	Cast aluminium
Protection degree	IP65
Connection	Screw terminals pitch 5,08 mm cable gland
SERIAL INTERFACE	
Rs232	Communication parameters: 9600/19200/38400,N,8,1. Managed signals: Txd, Rxd, Sgnd.
Rs422 / Rs485	Communication parameters: 38400,N,8,1.
USB	Device, Full speed. Virtual Com Port driver for PC provided with the application.
RF	
Frequency	866-868 MHz
RF channels	7 selectable via DIP SWITCH
Network addresses	15 selectable via DIP SWITCH
Signal coverage	50 mt.
CE	
Conformity to standards	EN 300 220 - EN 301 489 - EN60950 EN61000-6-2, EN61000-6-3, EN61010-1

## INSTRUMENT INSTALLATION

The instrument is secured by 2 screws inserted into holes (diameter 6 mm) indicated by the arrows in the figure. Distance between holes 108 x 45 mm. The overall dimensions are (122 x 75 x 42 mm) excluding antenna and connector / cable gland.



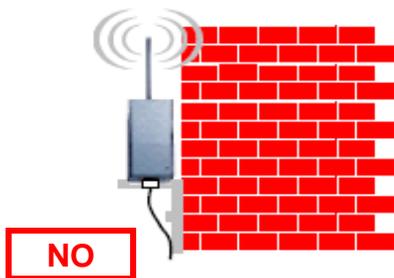
- The following procedures must be performed by qualified personnel.
- All connection must be performed with instrument turned off.



- Do not install the instrument near power equipment (motors, inverters, contactors, etc.) or near equipment that do not comply with CE standards for electromagnetic compatibility.

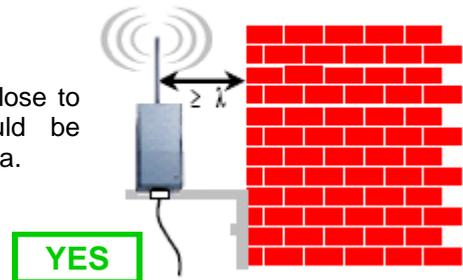
- **The antenna placement is crucial for maximum performance, both for the transmitter and for the receiver. Here are some things in this regard:**

- Avoid installing the unit transmitters and receivers at a distance exceeding 50 meters.
- If it is possible do not place the antenna in close proximity to people or things moving.

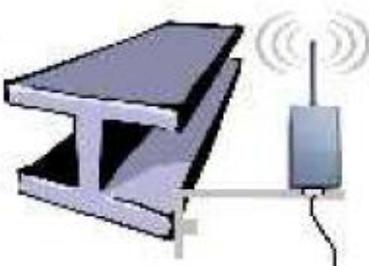
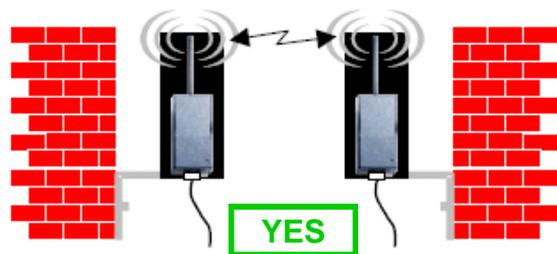
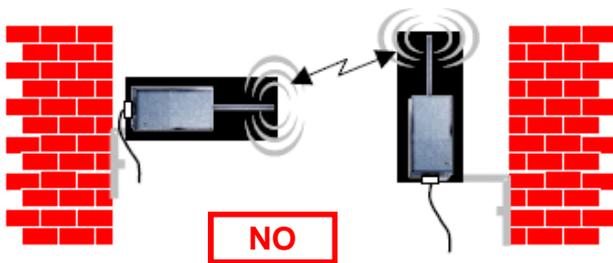


- In addition:

Do not install the instrument too close to walls. The ideal distance should be greater than 35 cm from the antenna.



Keep as much as possible the same antenna orientation, possibly oriented in vertical.

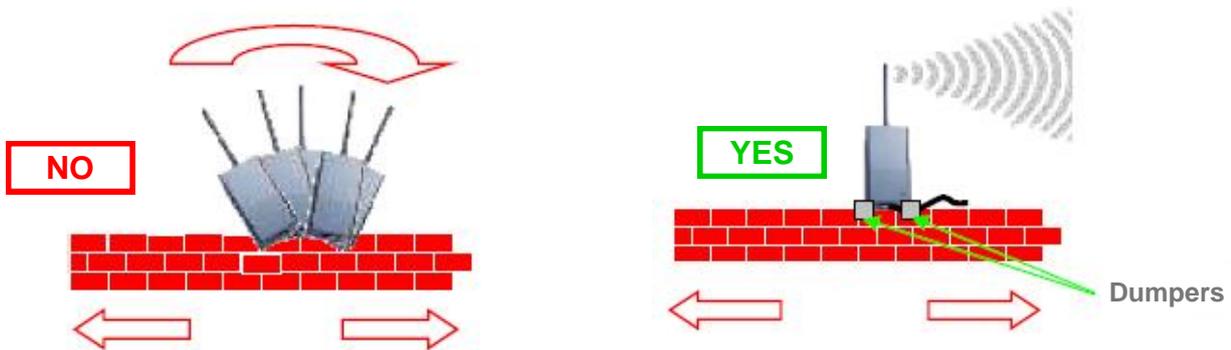


Install the instrument away from metal parts.

NO

## INSTRUMENT INSTALLATION

The transmission efficiency is sensitive to vibration. Fasten the instrument and use the dumpers.



## POWER SUPPLY

### PC CONNECTION

In this case the instrument can be powered directly through the USB port, with the standard USB communication cable (**5Vdc, 50mA**). The transceiver can be provided with the cable already installed for direct connection.

### CONNECTION TO OTHER EQUIPMENT

In case of serial connection (Rs232 / Rs485) power the transceiver with a voltage of **5Vdc / 50mA**, through the terminal shown in the figure.

<b>Mors. 1</b>	<b>+ 5 Vdc (positivo)</b>
<b>Mors. 2</b>	<b>Massa (negativo)</b>



**ATTENTION:**  
Observe power supply polarity.

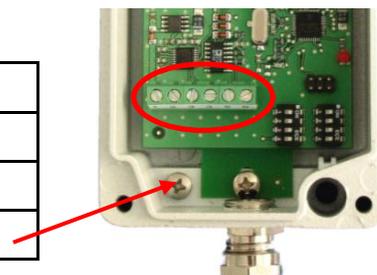
## RS232 SERIAL CONNECTION



- To make the serial connection use a shielded cable, making sure to ground the shield at one of the two ends. In the event that the cable has a number of conductors in excess of those used, connect the unused conductors to the shield.
- The serial connection cable must have a maximum length of 15 meters (regulations EIA RS-232-C), in the event of length exceeding 15 meters must be adopted the Rs422.
- The cable must not be channelled with other cables (for example outputs connected to connectors or power cables), but must follow his own path.

Connect the cable to the terminal block inside the instrument.  
Connect the shield at the point indicated.

<b>2</b>	<b>Signal Ground (SGND)</b>
<b>3</b>	<b>TX Data</b>
<b>4</b>	<b>RX Data</b>
	<b>Shield</b>



## RS422 / RS485 SERIAL CONNECTION



- The serial connection cable must be of the suited type for RS422/RS485 serial communication with one pair twisted for RS485 and the its shield.
- The cable must not be channelled with other cables (for example outputs connected to connectors or power cables), but must follow his own path.

Connect the cable to the terminal block inside the instrument.  
Connect the shield at the point indicated.

5	Data + (positive)
6	Data - (negative)
	Shield



## USB CONNECTION

In the version with USB cable already wired, simply insert it into the port of the PC like a normal device.

The USB cable is connected via the terminal block inside the instrument.

As a result of a change, power cycle the instrument to make the change effective.

1	+ 5 Vdc (VBUS)
2	Data - (negative)
3	Data + (positive)
4	GND



When using serial interface RS232/RS485, you can connect USB interface for PC programming by using the terminal block inside the instrument, taking care to disconnect the serial unit.

## RF CHANNEL SELECTION

The RF channel selection is done by dip-switch, accessed by removing the instrument cover. The dip-switch group concerned is close to the of the container, as shown in the figure.

<i>RF Channel</i>	<i>Dip-switch Position</i>
<b>0 (868,19 MHz)</b>	<b>1=OFF, 2=OFF, 3=OFF</b>
<b>1 (868,34 MHz)</b>	<b>1=ON, 2=OFF, 3=OFF</b>
<b>2 (868,49 MHz)</b>	<b>1=OFF, 2=ON, 3=OFF</b>
<b>4 (868,80 MHz)</b>	<b>1=ON, 2=ON, 3=OFF</b>
<b>5 (868,95 MHz)</b>	<b>1=OFF, 2=OFF, 3=ON</b>
<b>6 (869,11 MHz)</b>	<b>1=ON, 2=OFF, 3=ON</b>
<b>11 (869,87 MHz)</b>	<b>1=OFF, 2=ON, 3=ON</b>



During normal operation keep the dip-switch 4 = OFF.

As a result of a change, power cycle the instrument to make the change effective.

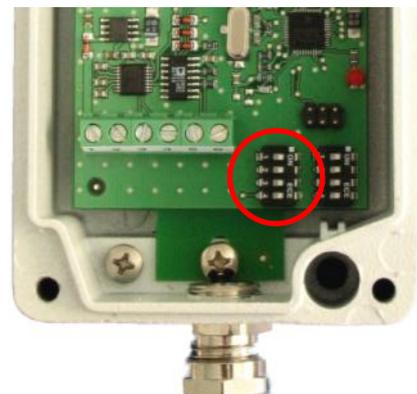
## SELECTING THE NUMBER OF TRF IN THE NETWORK (MULTI)

In MULTI mode, operation mode exemplified by application 4, 5 and 6, must be select the number of TRF transmitters connected via radio.

In mode SINGLE and DIRECT, this selection is not considered.

The selection of the number of TRF is made through the dip-switch, accessed by removing the instrument cover. The dip-switch group concerned is close to the block terminal, as shown in the figure.

<i>Dip switch</i>	<i>Binary bit</i>
<b>1</b>	<b>Bit 0</b>
<b>2</b>	<b>Bit 1</b>
<b>3</b>	<b>Bit 2</b>
<b>4</b>	<b>Bit 3</b>



Example: n. 2 TRF: 1=Off, 2=On, 3=Off, 4=Off

Example: n. 3 TRF: 1=On, 2=On 3=Off, 4=Off



As a result of a change, power cycle the instrument to make the change effective.

## INSTRUMENT CONFIGURATION

The programmable parameters in the instrument are:

- Operation mode (MULTI, SINGLE, DIRECT)
- Continuous transmission frequency (from 1 to 5 Hz)
- Communication protocol: (continuous or on request)
- RF transmission power (from 0.15mW to 10 mW)

The programming of these parameters is performed using the PC application PWIN38 that allows through a wizard to configure the RF system in few steps. The PC is connected via USB port used as Virtual COM Port; alternatively the PC can be connected via Rs232. Refer to the manual of the software for the programming procedures. The communication parameters are fixed at 38400,N,8,1.

The screenshot shows the 'Configurazione Corrente' (Current Configuration) window. At the top, a central icon of a device labeled 'RRF' is connected to a list of parameters: 'Impostazioni COM: COM2 (38400,n,8,1)', 'Indirizzo: 0', 'Modalità: MULTI', and 'Trasmittitori collegati: 4'. Below this, a note states: 'Numero di Trasmittitori collegati in modalità MULTI non programmabile, selezionabile solo tramite dip switch (range 1-15)'. A vertical line connects the central device to a grid of 15 individual transmitter icons, labeled 'Ind 1' through 'Ind 15'. Indicators 1-4 are active, while 5-15 are inactive. Below the grid are two large green arrows: a left-pointing arrow labeled 'Fine' and a right-pointing arrow labeled 'Configura Rete RF'.

## STATUS LED

Inside the container there is a LED indicator, which signal the following conditions:

**DIRECT MODE:** blink to indicate a data reception.

**SINGLE and MULTI MODE:** indicates the proper operation or malfunction of the instrument. The table below shows the different conditions:

N. of flashes every 5 sec.	Description
0	Instrument turned off
1	Normal operating
2	Not used
3	Failure to programming RF
4	Failure to acquire TRF weight
5	Set-up period active



### Special conditions:

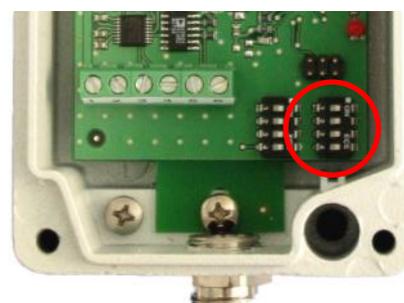
- LED lit: Function of the boot-loader on, waiting to receive file.
- LED blinks continuously : Function of the boot-loader in progress.

## FIRMWARE BOOT-LOADER

The instrument has the boot-loader function for firmware update. This can be done with the instrument installed. The transmission of the firmware to the instrument is made through RS232 serial port or through USB, with the appropriate PC application (cod. PWIN01) which is set to 9600, N, 8.1.

**IMPORTANT:** The selection "*Abilita Imp. RF*" must NOT be considered.

The boot-loader function is activated by placing at ON the dip-switch 4 of block near the edge of the container, shown in the figure.



During normal operation, keep the dip-switch 4 = OFF.

## COMMUNICATION PROTOCOL IN MODE SINGLE AND MULTI

The communication parameters are fixed to **38400,N,8,1**. The transmission strings are as follows:

### Binary Encoding:

0x80	<b>&lt;TRF1&gt;</b>	<b>&lt;TRF2&gt;</b>	...	<b>&lt;TRFn&gt;</b>	<b>&lt;CS&gt;</b>	<b>EOT</b>
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Where **<TRFx>** consists of 5 fields:

<b>&lt;FLAGS&gt;</b>	<b>&lt;HW&gt;</b>	<b>&lt;MW&gt;</b>	<b>&lt;LW&gt;</b>	<b>&lt;VBAT&gt;</b>
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Where:

- **<FLAGS>** : Register of flags, encoded as shown in the table below:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Timeout	1	Out of range	Overweight	Underweight	Unstable weight	Negative sign

- **<HW>**: Most significant byte (bit 23 ... bit 16) of the weight value in 24-bit (0xFF if timeout)
- **<MW>**: Intermediate Byte (bit 15 ... bit 8) of the weight value in 24-bit (0xFF if timeout)
- **<LW>**: Least significant byte (bit 7 ... bit 0) of the weight value in 24-bit (0xFF if timeout)
- **<VBAT>**: Battery voltage in tenths of Volts (binary data)(0xFF if timeout)
- **<CS>**: Checksum calculated as the sum of the first 6 bytes in binary 2's complement (0xFF - sum)
- **EOT**: end of transmission; character of end string (ASCII value 0x04).

### ASCII Encoding:

0x80	<b>&lt;TRF1&gt;</b>	<b>&lt;TRF2&gt;</b>	...	<b>&lt;TRFn&gt;</b>	<b>ETX</b>	<b>&lt;CHKSUM&gt;</b>	<b>EOT</b>
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Where **<TRFx>** consists of 3 fields:

<b>&lt;STATO&gt;</b>	<b>&lt;PESO&gt;</b>	<b>&lt;BATT&gt;</b>
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Where:

- **<STATO>** : weight status, can take the values shown in the following table:

“S”	“M”	“E”	“O”	“U”	“Z”	“T”
Stable weight	Weight in motion	Out of range	Overweight	Underweight	Initial zero not performed	Timeout

- **<PESO>**: ASCII string of weight expressed with 8 characters right justified, with any decimal point and minus sign. (In case of timeout are transmitted 8 characters '-').
- **<BATT>**: ASCII string of voltage battery, 2 characters expressed in tenths of Volts.
- **ETX**: end of text; text end character (ASCII value 0x03).
- **<CHKSUM>**: two-character checksum of string data. It is calculated by performing the exclusive OR (XOR) of all the characters from STX to ETX, STX and ETX excluded. The result of the XOR is decomposed into two separate characters, considering separately the upper 4 bits (first character) and the lower 4 bits (second character). The two obtained characters are then encoded ASCII. (Example: XOR = 5Dh; C C = «5D» that is 35h e 44h).
- **EOT**: end of transmission; character of end string (ASCII value 0x04).

### String for weight request:

In case of transmission on request, for both encoding type, The request string is as follows:

0x80	“N”	EOT
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Where:

- **“N”**: character identifier of the request (ASCII value 0x4E).
- **EOT**: end of transmission; character of end string (ASCII value 0x04).

## TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
No communication	Transceiver turned off	Verify that the instrument is power supplied correctly by referring to this manual
	Wrong wiring	Check connection by referring to this manual
	No radio communication	Verify the installation by referring to this manual
	Hardware failure	Use the diagnostic LED to indicate the fault detected
The receiver does not receive the correct string	Incorrect communication parameters	Correctly program the communications parameters referring to this manual
	Configuration or communication protocol was not applied correctly	Check the protocol applied by referring to this manual