Radio Printer
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Radio Printer USB

User Manual

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Receiving unit for
***TempStick Radio* and**
Intelligent Sensors + Radio Nodes

Firmware version 2.5

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Introduction

The *Radio Printer* is a wireless receiving unit for the *TempStick Radio* sensor/transmitter and the *Intelligent Sensor + Radio Node* transmitter. The main options and functions will be described here. The *Radio Printer* receives data from the sensors/transmitters (that send data at fixed intervals) and saves them according to its own acquisition interval. This unit also generates alarms when the readings exceed preset thresholds and thanks to its on board printer, it is able to print the data acquired as instructed by the type of monitoring it is carrying out (either continuous monitoring or transport monitoring).

Radio Printer USB

This is a special version of the *Radio Printer*: it has a USB connection where a USB pen-drive can be connected to save the acquisition data from the *Radio Printer* memory. Then it is possible to import these data into the *TSR* software where they can be analysed in graph, table, printed in report and exported in *MS Excel* (SLK format).
To know how to use this function read the *Acquisitions management* chapter (p. 15)

Basic operations

Scrolling through the menus and using the Keyboard

The RadioPrinter panel has 8 keys: **OK**, **ESC**, 4 directional keys, **PRN** (Print) and **Feed Paper**.
The 4 directional keys are used to select functions. Use the up and down buttons to move from one item to another in the Menu being displayed. Use the left and right buttons to set special options or configure numbers and names (name of the sensor, date, time, thresholds and so on).
OK is used to accept the selected function.
ESC is used to exit from the menu currently being displayed and return to the previous one. This is true for most cases, however in special cases this works differently, for example when configuring the *Monitoring Process*, pressing **ESC** makes you advance in the configuration, disabling the option displayed when you pressed the key (p. 12).
PRN is used to print acquired data (Note that this function has to be enabled in the selected monitoring mode > see p. 12).
Feed Paper is used to feed the printer with new paper as well as to unroll a small amount of paper such that it is easier to cut the printout from the rest of the roll.

Applying changes

When particular changes are being applied the following message may appear: "*ANY CHANGES WILL DESTROY ALL DATA*". When this message appears the keyboard is disabled: please wait a few seconds to advance to the next menu.

The Receiving Menu

The *Receiving Menu* of the *Radio Printer* holds a list of all the data that has been received by the unit. These are stored in the order they have been received. The top header holds the following information: *[hh:mm Sensors °C]* or *[hh:mm Sensors °F]*, where *hh* (hours) and *mm* (minutes) display the time at which the data has been logged. This is the default menu displayed on the *Radio Printer*. The bottom bar in this page displays the acquisition mode currently set. **The unit will automatically return to this menu after a few minutes if left idle in another menu.**

Configuring the date and time

If the *Radio Printer* is reset or turned off, or if the battery runs flat, you will need to re-input the date and time. Simply step through the digits using the left and right buttons, and use up and down to change the value. Press **OK** to confirm the changes. If you need to change the unit's date and time, for any other reason, please follow these steps: from the *Receiving Menu* press the **OK** key to enter the *Main Menu*. Here choose *CONFIGURATION* to enter the *Configuration* menu, then select *CLOCK*. Press **OK** to confirm the changes.

Check the unit status

To display the current status of the *Radio Printer*, press **OK** when in the *Receiving Menu,* then select *Status* and **OK** again. The window will display the *Actual Time* as well as the date and time of the *Next Acquisition* (if the unit is acquiring). If you are in the *Fixed Time* or *Fixed Step* monitoring mode (p. 12) you will also see the *Printing at* date and time. Press **ESC** to exit.

How to query the acquisition mode currently set on the unit

To find out in which mode the *Radio Printer* is currently working simply look in the bottom left corner of the *Receiving Menu* screen. The actual mode is displayed in brackets: to identify the codes of each different mode, refer to the chapters below.

Adjusting the contrast

You can adjust the display contrast by keeping the ESC button pressed, and pressing the up or down arrow to increase or decrease the contrast.

The LEDs

The Radio Printer has four LEDs.

Printer

This LED indicates the printer status. If is turned off, the printer is also turned off. If it is on, the printer is on (not necessarily printing). If it is blinking slowly then the printer is out of paper. If it is blinking fast the head of the printer has over heated: in this case wait for the unit to cool down, at which point the blinking stops.

Alarm

This is the LED for alarm status. If it is off, there is no alarm. If an alarm occurs, it will start blinking. Please refer to the alarms behaviour described below for more details.

Main Power

The LED is on when the main power is connected.

Battery

This indicates the battery status: when the battery voltage drops too low it will go on.

Feed Paper

Press this key to let some paper come out of the printer. This key is usually disabled, because it works only when the printer is on. To turn on the printer, press **OK** from the *Receiving Menu*, select *CONFIGURATION* and press **OK** and then press the down arrow till the *LOGO* item is displayed. Select it and press **OK**: the printer is turned on and the *Feed Paper* key is enabled.

Configure the unit

Set unit name, type and temperature units (C° or F°)

You can assign a name to your *Radio Printer* unit by entering the *Main Menu* and selecting *CONFIGURATION* and then *UNIT*. Use the directional keys to set the name of the unit in the *Unit Name* menu and then press **OK**; next choose the *UNIT TYPE* and select *PRINTER* and press **OK** and finally the *TEMPERATURE MODE,* choosing between *°C* and *°F* and press **OK** to save the new configuration in the unit's memory.

Pairing and thresholds setting

Before being able to receive data from a transmitter you will need to pair it with the RadioPrinter. From the *Receiving Menu* press **OK** and then select *CONFIGURATION* and *SENSORS*. If no transmitter has ever been paired, you will see the text "*No Item. Press > To Add*": press the right key to access the *Pairing* menu. A list of the radio serial numbers (not the sensor numbers) that the unit is receiving is shown. When the radio you wish to pair is displayed, press **OK**. In the *Set Descr.* menu assign a name to this sensor and press **OK**; next set the *Minimum* threshold for the alarms and press **OK** and do the same for the *Maximum* threshold. You can set any number consisting of up to three digits and one decimal digit, and you can also change the + or - sign. To do this press left until the second block to the left of the number is selected; press up or down to change the sign. Press up or down once again to display the hundreds digit. Then press right to select the tens digit and then right again for the physical units and the decimal digit. If you press **ESC** on one or both of the thresholds, you will disable that threshold for the alarm feature. After setting these parameters you will be asked to set the *Hysteresis* for the alarms, after which press **OK**.
After this operation you will see that the sensor has now been paired; press **ESC** to go back or right to add another sensor.

Removing a sensor from the pairing list

To remove a sensor from the pairing list simply select it and press the left key.

Important timing information

It is very important to understand the timing parameters (acquisition step, transmission rate, etc.) used by the unit.

Transmission rate

Every transmitter (*TempStick Radio* or *Intelligent Sensor* + *Radio Node*) transmits according to a time step that is programmed directly into the transmitter using a separate program and the accompanying serial interface (Radio Configuration Interface): the software may be downloaded free of charge from the Tecnosoft website. As an example, the transmission rate could be set such that the transmitter sends data every minute.

Acquisition rate

The *Radio Printer* receives data from each of the paired transmitters, and stores the most recent data in memory according to the acquisition rate.

Example

Let's suppose you want the *RadioPrinter* to log data every 5 minutes. To do this you must set the acquisition rate to 5 minutes. Even if the transmitters are programmed to send every minute, the *Radio Printer* will receive all the data transmitted by the sensors, but will, on the fifth minute, only store the most recent value in its memory. For this reason the effective timestamp for the stored data is slightly different to the 5 minute step. The difference between the acquiring time step and the actual sample time can range, in this example, from zero to something less than 5 minutes: the limiting cases occur when the last sample is received exactly in conjunction with the acquisition time step (practically a zero difference) or when the last valid sample was received exactly after the previous acquisition time step (e.g. For our 1 minute transmission example, if the

other four transmissions got lost). This method, whereby the unit logs at a slower rate with respect to the transmissions, results in maximum reliability of the wireless system.
More frequent transmissions (i.e. shorter transmitting rate) means there is a higher probability that data is received (unfortunately it also results in a shorter transmitter battery life). We suggest that the transmission rate on the sensors is set to about 5 times the acquisition rate on the RadioPrinter.

Printing rate

Printing rate should be greater or equal to the acquisition rate. In our example above, if the printing rate is set to 30 minutes, you will get 6 printed values per sensor each time.

The Alarms

Alarms work as follows: when the temperature exceeds the thresholds, an audible sound is played for one minute, and an led blinks until the temperature returns within the thresholds. To disable the audible sound you must press the **ESC** key, within the first minute. The led will remain blinking. If the LED is already blinking due to a particular sensor, and another sensor results in an alarm condition, the audible sound will again be played for one minute.

Printing Modes

The *Radio Printer* can print data based upon two types of report. You will be able to choose among these modes when configuring a *Monitoring Mode* (p. 12). In some modes you will not be able to choose the *Printing Mode*.

Summary

In this type of report only the Minimum (*MIN*), Average (*AVG*) and Maximum (*MAX*) values for the data acquired for each sensor are printed. There is also the sensor serial number and its calibration expiry date: if the calibration is expired this will be indicated by an asterisk (*), if the calibration is about to expire, within a month, a question mark will be printed (?).

Detail

In this mode all the data, ordered sensor by sensor, will be printed.

Summary + Detail

In this mode the report will first contain the information as for the *Summary* report, followed by all the information as for the Detail report.

The Report printed

The report is divided into the following sections:
- *Logo*: holding an image or the name of the company;
- *Header*: that holds the unit name, the date and time of printing, date and time of the acquisitions printed (*From* and *To*);
- *Summary* (if enabled): as described above;
- *Detail* (if enabled): as described above.

If any data value exceeds the thresholds, you will see a star printed next to it (*).

Monitoring Modes

The *Radio Printer* may be configured in one of four monitoring modes. To do this access the *Configuration* menu and select *ACQUISITIONS*. When any one of these modes is selected, with the exception of the *Transport* mode, the *Radio Printer* will start acquiring data according to its configuration (for example, if you set a delayed starting time, it will not record data until that time has elapsed). **Please note that changing mode will delete all the data from memory; please ensure you have a hardcopy of the data before carrying out this operation.**
Note: The unit must have acquired at least two data points in order to be able to print a report, otherwise even if the unit actually acquired one data point, a NO DATA message will appear.
When the *Radio Printer* is acquiring data (in any of the monitoring modes), it will beep once the acquisition interval elapses; that is every time it saves the most recent data from each of the paired sensors.

Print on demand

In this mode, when the **PRN** button is pressed, the *Radio Printer* will immediately print all the data starting from the last value printed to the most recent value acquired. To select this mode click **OK** on this item and set the *Acquire Start* time and date (set a past date or the present time and date to make the unit start acquiring immediately). In the next window set the *Acquire step* (i.e. acquisition rate, expressed in hours and minutes). After this, once the *Receiving Menu* is displayed, you can press the **PRN** key to print the acquired data (of course allow some time for the data to be collected). The unit will print all the data it has acquired starting from the last time the **PRN** button was pressed, up to the present moment. Older data, which has already been printed, is still stored in the memory and may be reprinted by accessing the *PRINTER* menu (p. 14). In this case you will not be asked to select a *Printing Mode,* as the default *Printing Mode* for this *Monitoring Mode* is *Detail* (p. 11).
In the *Receiving Menu,* this mode is indicated with the code: *[RQT]*.

Print at fixed step

In this mode the *Radio Printer* will periodically print all the data acquired since the last data point printed. The period is specified as a fixed step (every hour, for example) starting from a preset date and time. Click **OK** on this mode and set the *Print Step* (expressed in hours and minutes), this is the rate at which *Radio Printer* will print a report. Next you will be asked to choose a *Printing Mode* (SUMMARY, DETAIL, SUMMARY + DETAIL) and the *Acquire Start* date and time, and after this the *Acquire step* (acquisition rate, expressed in hours and minutes). After this, whenever the period set under *Print Step* elapses, a report is automatically printed; the **PRN** key is disabled in this mode. The unit will print all data that has been acquired starting from the last time a report was printed to the present moment. Older data, which has already been printed, is still stored in the memory and may be reprinted by accessing the *PRINTER* menu (p. 14)
In the *Receiving Menu* this mode is indicated with the code: *[FXS]*.

Print at fixed time

In this mode the unit will, at fixed times (e.g 8:00, 12:00, 16:00, 20:00), print the data starting from the last data point printed to the most recent data acquired. It will start this process from a preset date and time. Click **OK** on this item and set the *Print Time:* the time within a day (up to a maximum of 5) at which the *Radio Printer* will print a report. If you would like to set less than 5 preset times, press the **ESC** button to skip the subsequent fields: for example, if you just want just two reports in a day, set the first two, clicking **OK** after which press **ESC** to disable the last three positions). Next you will be asked to select the *Printing Mode* (SUMMARY, DETAIL, SUMMARY + DETAIL), the *Acquire Start* date and time, and the *Acquire step* (acquisition rate, expressed in hours and minutes). Whenever the unit time matches any of the times set under *Print Time*, a report is automatically printed; note that the **PRN** key is disabled in this mode. The unit will always print the data acquired since the last report was printed. Older data, which has already been printed, is still stored in the memory and may be reprinted by accessing the *PRINTER* menu (p. 14).
In the *Receiving Menu* this mode is indicated with the code: *[FXT]*.

Transport

In the transport mode the *Radio Printer* will print all the data acquired from the start of the monitoring mission to the most recent value whenever the **PRN** key is pressed. Click **OK** on this item and choose the *Printing Mode* (SUMMARY, DETAIL, SUMMARY + DETAIL) and the *Acquire step* (acquisition rate, expressed in hours and minutes). To start the monitoring mission in this mode press the **up** key and then the **down** key from the *Receiving Menu*. Existing data will be erased after which the acquisition will start.
Typical Application: A distributor's delivery van is about to start delivering goods in the morning. The *Radio Printer* has already been configured in the *Transport Mode*. The monitoring mission is started and the van starts the delivery route. Upon arrival at the first delivery point, the operator presses the PRN button in order to produce a printout of temperature readings from the start of the mission to the present moment. This report is simply handed to the customer. The same procedure is repeated for each subsequent delivery point. At the end of the day, the van returns to base, and again presses the PRN button to produce a report that contains all the data from the start of the mission to the end. This report is then stored by the distributor for traceability.
In the *Receiving Menu* this mode is indicated with the code: *[TRP]*.

Printing data Manually

Regardless of which *Monitoring Mode* you have configured, it is possible to print the data at any moment in time. To do this simply press **OK** when in the *Receiving Menu,* select *PRINTER* and press **OK**. In the Print menu select which items you would like to include in the printout.

SUMMARY

This prints a summary starting from the last value that has been printed to the present moment.

DETAIL

This prints the summary (as above) as well as the details, again from the last value printed to the present moment.

SUMMARY ALL

This prints a summary of all the data points stored in memory.

DETAIL ALL

This prints a summary as well as the details of all the data points stored in memory.

Acquisitions management

In the *Acquisitions* menu (select *ACQUISITIONS* from the *Main Menu*) you are given two options to manage the data stored in the *Radio Printer* memory.

SHOW

By selecting this item you will see all the acquired data since the last erase operation.

ERASE

Select this item to erase all the data stored in memory.

USB (for Radio Printer USB only)

To save data from the *Radio Printer* memory on a USB pen-drive, insert the pen-drive in the USB connector if the *Radio Printer* itself. Select the USB option in the *Acquisitions* menu and wait for the display to return to this screen (i.e.; wait for the indication *WRITING USB* to be removed) and that the LED above the connector is turned off. Don't extract the pen-drive before the LED turns off.
The *Radio Printer USB* works with most of the available pen-drives provided they are formatted with FAT 16 or FAT 32 format. **If an error should occur and the data are not saved on the pen-drive, repeat the operation and if the error still occurs, try with another pen-drive.**

Saved data format

The *Radio Printer USB* creates a folder in the USB pen-drive with the same name of the *Radio Printer* itself (the one set in configuration). In this folder one or more files are saved, according to the number of mission exported in the pen-drive (each monitoring mission creates one file that is eventually overwritten if the exported data refers to the same mission).
Those files have the following format, where the starting date and time of the mission are expressed:

YYMDDHmm.PRN

where:

- *YY*: last two digits of the year;
- *M*: a letter indicating a month, according the following table:

Letter	Month
A	Janaury
B	February
C	March
D	April
E	May
F	June
G	July
H	August
I	September
J	October
K	November
L	December

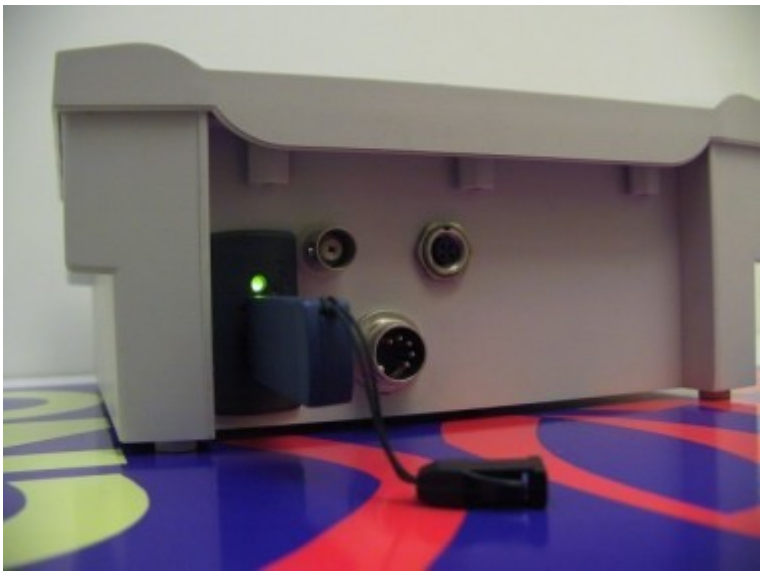
- *DD*: digits of the day;

- *H*: a letter indicating the day, accordign to the following table:in base a questa tabella

Letter	Hour
A	00
B	01
C	02
D	03
E	04
F	05
G	06
H	07
I	08
J	09
K	10
L	11
M	12
N	13
O	14
P	15
Q	16
R	17
S	18
T	19
U	20
V	21
W	22
X	23

- *mm*: the minutes.

To import the file on PC refer to the *TSR* manual.



Stand By

If you are not going to use the *Radio Printer* for a long time, you can turn the unit off by placing it in Standby. To do this access the *Configuration* menu, select the *STAND BY* option and press **OK**.
The *Radio Printer* will be turned off: press any key to turn it on again.
Remember that the internal batteries of the Radio Printer are for backup only and the device is not intended to work without external power constantly.

LOGO

The logo menu, accessible from the *Configuration* menu, just below *STAND BY,* is used by the installers of the unit (Tecnosoft or your local dealer) when commissioning the unit. You can select this item only to turn on the printer and enable the *Feed Paper* button.

Radio Printer menus

The list of the menus of the *Radio Printer* will follow. For commands and functions, please refer to the User's manual.

Receiving Menu

```
hh:mm Sensors °C/°F
15:26  SNS00  +20.6

[TRP] OK Menu
```

Main Menu

```
STATUS
PRINTER
ACQUISITIONS
CONFIGURATION
```

Status

```
   Actual Time
24/02/09 15:30:02
 Next Acquisition
24/02/09 15:31:09
```

Printer

```
SUMMARY
DETAIL
SUMMARY ALL
DEATAIL ALL
```

Acquisitions

```
SHOW
ERASE
USB
```

Configuration

```
CLOCK
UNIT
SENSORS
ACQUISITIONS [> Mode]
STAND BY
LOGO
```

Mode

```
PRINT ON DEMAND
FIXED STEP
FIXED TIME
TRANSPORT MODE
```

Hardware Manual

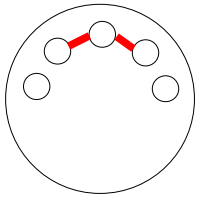
The Radio Printer

The *Radio Printer* device is the wireless receiver of the entire system. It is equipped with a display, an 8 key keyboard and an embedded thermal printer. It also provides a connector for external power, a connector for a serial cable used by the installer/dealer when setting up the unit, and a connector for an external antenna (ask your dealer if you wish to purchase an external antenna).

Power management

The unit is supplied with an internal rechargeable battery and a mains power supply that also recharges the battery.
The internal battery pack can provide backup power to the unit for a number of hours, however the unit should preferably be used with the external power supply. The unit may also be supplied with an external battery (e.g. that used in the delivery vehicle): in this case the external battery will be used to recharge the internal battery.
The unit does not have an ON/OFF switch: use the Stand By option to turn off the unit.
The following power status modes can be defined:

a) the unit is operating and is supplied by the primary power supply (this is the unit's normal mode);
b) the unit is operating and is supplied by the internal battery (this occurs when the main power is off; the battery is being used as backup power);
c) the unit is in the stand by mode. This is a power saving mode where the unit is not acquiring data. When any key is pressed the unit exits this mode. The unit date and time settings are maintained.
d) No main power source is available, and the internal battery is flat. In this case the date and time settings are lost. To exit this mode it is necessary to connect a primary power supply, thereby causing a reset. The unit reboots and waits for the user to enter the current date and time. In particular cases, it may be noted that the display remains blank, even though the keyboard is active; to resolve this unplug the connector of the power supply and short circuit two pins on the power connector using a metallic object (screwdriver, clip, etc.; short the central top pin with one of the two adjacent pins, as shown below)). This will causes a reset. This operation should be carried out only if absolutely necessary. The unit will automatically enter this mode when the battery voltage is dangerously low, in order to preserve the batteries. When the batteries are completely flat (e.g. After months of self discharging) it will be necessary to leave the power supply connected for a couple of hours before carrying out the reset procedure by shorting the pins. A complete recharge of the internal batteries will take around 48 hours to complete. Again note that the unit's normal mode of operation is by means of the external power supply.



Changing the printer paper

To change the printer paper you need to open the printer cover. Since this locks tightly you will need to use both thumbs to prise it open. Lift the small central flap so that the main cover will open. At this point simply insert the new paper roll inside, with the external side facing the *PRN* button and guide the free paper end to exit the printer paper slot.

The sensors

The unit can work with both *TempStick radio* or *Radio Nodes* + *Intelligent Sensors*. To configure the sensor transmission rate you will need the *Radio Configuration Interface* and the *Radio Starter* software (this is a free download from the Tecnosoft website) or the *TSR* software, necessary if you have the *Radio Printer USB*.. Each sensor is identified by two serial numbers: the sensor serial number and the radio node number.

Recalibration

To recalibrate *TempStick Radio* sensors you need the return the entire unit to Tecnosoft, who will recalibrate it and send it back. To recalibrate *Intelligent Sensors*, simply contact Tecnosoft who will supply you with a recalibrated sensor. When you receive this simply unplug the existing one from the *Radio Node* and return it to Tecnosoft. Plug the new *Intelligent Sensor* to the *Radio Node;* the system will automatically recognize the new sensor and continue working seamlessly.

Technical Features

Radio Printer	
Size	20 X 17,6 X 8,6 cm
Display	Graphic and alphanumeric with selection menu
LED	Status indicators (external power, low battery, etc.)
Printer	Thermal printer for data printing (customizable logo)
Keyboard	6 key keyboard (OK, ESC, 4 directional keys) + Print button
Acquisition Mode	– Non-stop monitoring with print on demand – Non-stop monitoring with print at intervals – Non-stop monitoring with print at set times – Transport monitoring with print on demand
Print Mode	– Summary print (Max, Min, Average) – Detailed print (all data points for each sensor)
Alarms	Programmable alarms against preset temperature thresholds
Power source	Re-chargeable internal back-up battery, mains power supply or cigar lighter receptacle
Connections	Radio connections for communication with the ***TempStick Radio*** or the ***Intelligent Sensor*** + ***Radio Node***
N. of sensors	Manages data from up to 32 sensors
Radio type	433 MHz
Radio transmission range	250 meters in open space; in closed environment depends on many variables and obstacles
Accessories	Battery charger included, with cigarette lighter adaptor

TempStick Radio	
Size	6,5 X 5 X 4,5 cm
Unit Temperature Range	-20 °C ÷ +60 °C
Sensor Temperature Range	-40 °C ÷ +90 °C
Resolution	0,03 °C
Accuracy	±0,25 °C with calibration certificate ±1 °C without calibration certificate
Transmission interval	From 1 reading every 3 seconds to 1 reading every 255 minutes
Battery (Radio)	Factory replaceable
Autonomy	More than 500.000 acquisitions/transmissions - more than 10 years with standard use (24 acquisitions per day)

Intelligent Sensor + Radio Node	
Size (Radio Node)	6,5 X 5 X 4,5 cm
Radio Node Temperature Range	-20 °C ÷ +60 °C
Sensor Temperature Range	-40 °C ÷ +90 °C
Resolution	0,03 °C
Accuracy	±0,25 °C with calibration certificate ±1 °C without calibration certificate
Transmission interval	From 1 reading every 3 seconds to 1 reading every 255 minutes
Battery (Radio Node)	Factory replaceable
Autonomy	More than 500.000 acquisitions/transmissions - more than 10 years with standard use (24 acquisitions per day)

Characters order

When you need to input characters, you will cycle through the possible options in the order shown below (first, second and third column):

[space]	>	\
!	?	]
"	@	^
#	A	_
$	B	`
%	C	a
&	D	b
'	E	c
(	F	d
)	G	e
*	H	f
+	I	g
,	J	h
-	K	I
.	L	j
/	M	k
0	N	l
1	O	m
2	P	n
3	Q	o
4	R	p
5	S	q
6	T	r
7	U	s
8	V	t
9	W	u
:	X	w
;	Y	x
<	Z	y
=	[	z

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