LINKGATE
EncRadio SF
&
DecRadio SF

User Manual

MICROGATE

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2. Introduction

The transmission of an impulse via radio is a critical phase in timekeeping. The possibility of losing the data transmitted, of having very inaccurate timing and the transmission difficulties in some zones has often made timekeepers and trainers sceptical about this type of approach.
The LINKGATE system represents a radical innovation in the field of radio transmission of impulses for timekeeping. Technological evolution has enabled us to go from the old impulse transmission systems to the more modern data transmission concept, which can guarantee extreme accuracy, the transmission of large quantities of information and greater reliability. In addition, the compact size of the system makes the LINKGATE system the ideal instrument for training and competitions at every level.

Linkgate EncRadio SF and DecRadio SF represent a further innovation with respect to the well-known and highly esteemed Linkgate Encoder and Decoder. The evolution of the products has resulted in the embedding of high reliability low power radio modules (433 MHz 10 mW/500mW) for transmission and reception of signals in both the transmitter (Linkgate EncRadio SF) and receiver (Linkgate DecRadio SF).
Exploiting the characteristics of the modules, which work on FM on a very narrow band, and the intrinsic reliability of Linkgate EncRadio SF and DecRadio SF, long distance transmission (over 2Km for the 10mW version and over 9Km for the 500mW version) can be achieved.
In addition, the system's extremely low power consumption allows long autonomy of use which, together with the possibility of recharging the batteries, represents a great plus of the whole system.

3. Field of use and Homologization

The device is intended to be used for competitive sports activities (as indicated in Art. 334 of cod. P.T. point 4) in all sports disciplines (e.g. skiing, athletics, horse-racing, mountain bike, motor racing,etc.) both at amateur and professional level. The homologization code is DGPGF/4/2/03/3398837FO/.

4. EncRadio SF

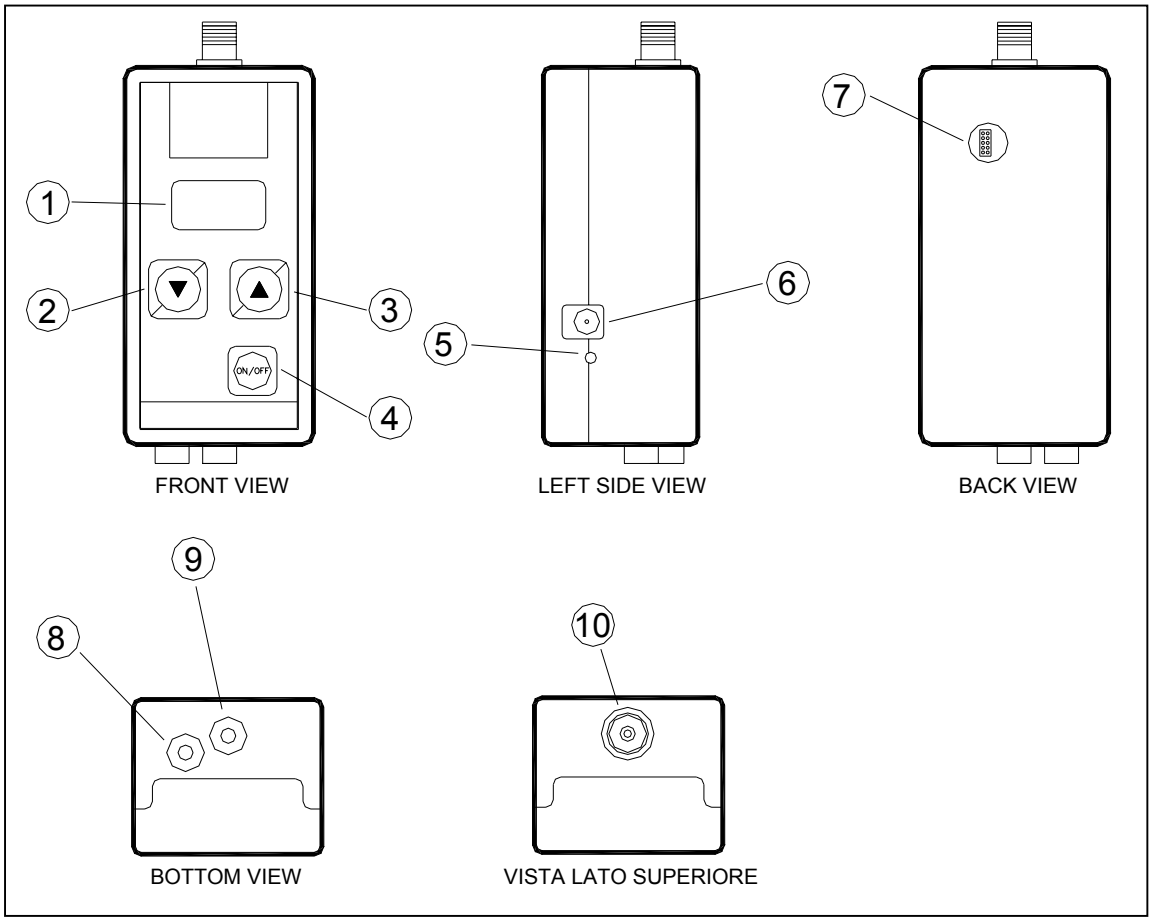


Figure 1

1 Numerical display
2 < **Down arrow** > key
3 < **Up arrow** > key
4 < **ON/OFF** > key for switching on/off
5 Led di segnalazione ricarica accumulatori
6 Connettore Jack per ricarica accumulatori
7 Coperchio per accesso al connettore di programmazione (riservato MICROGATE)
8 Boccola VERDE per ingresso segnali
9 Boccola NERA per segnale di Massa
10 Connettore TNC per collegamento antenna esterna

5. DecRadio SF

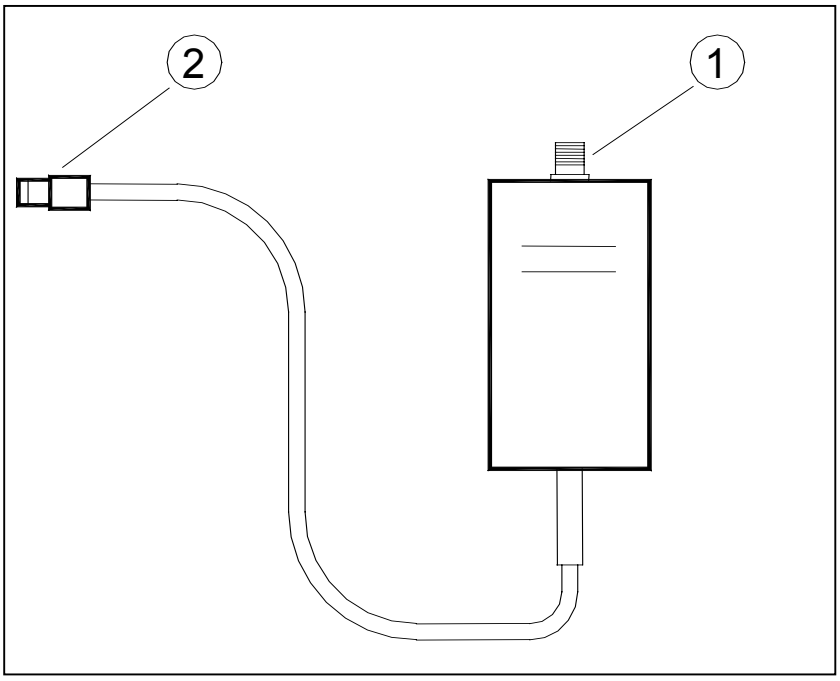


Figure 2

1 TNC for external antenna connection
2 5 pole Nucletron connector for Radio output

6. Linkgate EncRadio SF: safety features for radio transmission

To overcome unreliability and the various problems associated with the old system of radio transmission of impulses, LINKGATE Encoder SF offers a number of innovative solutions:

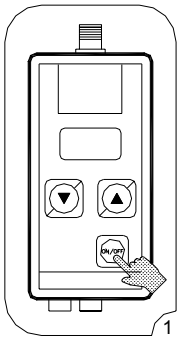
6.1. Digital transmission of impulses

Linkgate EncRadio SF transmits sets of data (no longer a single impulse) that contain a vast amount of information. In particular, the following are transmitted:

- The transmitter's Code (software selection from 127 channels and redundancy length data)
- Bib number (selectable with software)
- How long ago the event took place
- Battery Status (Low Battery)

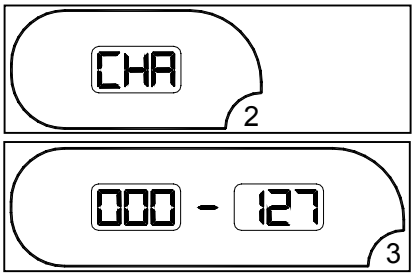
In addition, the kit contains numerous control codes and error auto-correction codes which prevent a signal from being incorrectly interpreted during reception.
All the data (information + control codes) is transmitted 16 times, in order to reduce the possibility of reception failure.
Even with very disturbed signal transmission, this system ensures maximum reliability and precision (+/- 0.4 thousandths of a second); in short, you only need the complete reception of a single set of data to be able to reconstruct the original time of the event.

7. Switching on

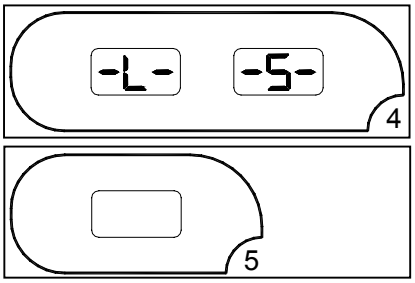


Pressing the ON/OFF key switches on the system.
The current EncRadio settings are shown:

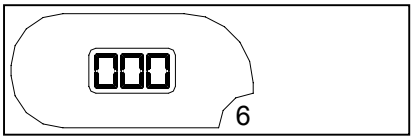
Check that the EncRadio transmission channel is the same as the channel set on the chronometer.



Current setting of transmission channel (CHANNEL):
The transmission channel is used to make sure that only Racetime2 or REI2 chronometers with the same reception channel setting can receive the transmitted signal as valid. Every Microgate chronometer allows you to view the channel currently selected. By selecting the same number on the EncRadio SF that you wish to use, you will be certain of receiving only the signals from your own timing system. This type of filtering of the signals received is particularly useful as, by selecting different channels, it is possible to use a number of systems (chronometer + EncRadio SF) in the same zone and also on the same radio frequency without the risk of the chronometers interfering with each other.



Current setting of signal redundancy:
With the setting of signal redundancy, transmission duration can be defined (about 2.3 seconds for long transmission <**-L-**> and 0.6 seconds for short <**-S-**>). Selecting long transmission results in greater information redundancy as the same data are transmitted 16 times. If short transmission is selected the set of information is transmitted only 4 times resulting in lower redundancy but considerably reducing transmission length.
For normal use we recommend you always use long transmission (<**-L-**>) to maximise redundancy of the data sent. However for particular applications, such as taking a number of intermediate times very close together, the use of short transmission is the only feasible solution to prevent a number of transmissions overlapping one another.

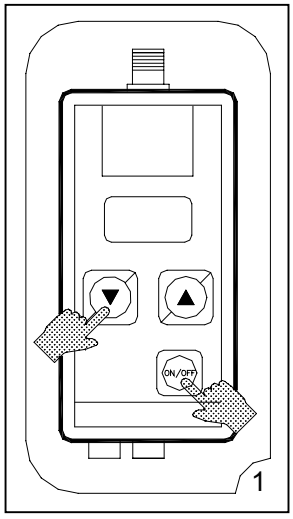


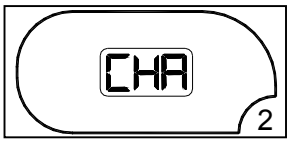
Long < BEEP >
Bib number 0 is displayed
View for settings terminated and system ready for use

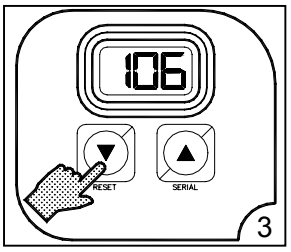
At the end of viewing Linkgate EncRadio emits a beep to signal that the system is ready for use.
To switch off the system press the ON/OFF key for about 1 second until the word “OFF” appears.
Releasing the ON/OFF key switches off the system.
Switching off and switching back on reset the system and delete the memory.

8. Changing Linkgate EncRadio SF settings

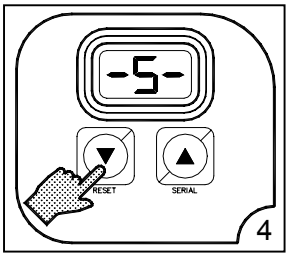
Changes in settings can be made by keeping an arrow key pressed down while switching on the device with the ON/OFF key.

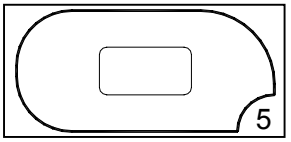




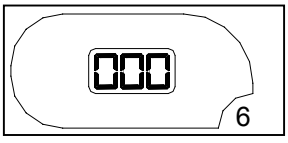


Changing transmission channel:
The user can change the transmission channel with the two arrow keys when the current setting is displayed (blinking).
The possible settings are:
< **000** > - < **127** > = From channel 0 to channel 127
The system passes automatically to the next setting after 4 seconds of inactivity.





Changing data transmission redundancy:
The user can change **data transmission redundancy** with the two arrow keys when the current setting is displayed (blinking).
The possible settings are:
< **-L-** > = Long transmission of about 4 seconds
< **-S-** > = Short transmission of about 0.6 seconds
The system passes automatically to the next setting after 4 seconds of inactivity.



Long < BEEP >
Bib number 0 is displayed
Settings modification is terminated and the system is ready for use.

9. Impulse transmission

An impulse can be transmitted by means of any signal given by the closing of a contact normally open produced by a gate or photocell, using the BLACK banana jack as a ground and the GREEN banana jack as the signal.

At the end of data transmission, the Linkgate EncRadio SF will emit a BEEP.

10. Setting the bib number

The two arrow keys can be used to set a bib number. In this way the chronometer can automatically relate an event received from EncRadio.
The function is disabled if the bib number 0 is set.
After transmission of an impulse the bib number automatically moves up.

11. Maintenance and battery recharging

11.1. Battery maintenance

The system is designed to eliminate the need for any kind of ordinary maintenance and in conditions of normal use the rechargeable batteries allow an autonomy of about 5000 transmissions for EncRadio SF and about 2000 transmissions for EncRadio SF 500.

11.2. LOW BATTERY warning

When the remaining time of Linkgate EncRadio's autonomy is limited, it warns the user with a visual and sound signal. The low battery warning is made with the emission of three short tones BEEP-BEEP-BEEP (and the indication < **Lo** > on the display) at the end of the transmission of an impulse.
Low battery status is also indicated with a blinking red Led located close to the recharge connector.
When an event is transmitted, the Racetime 2 or Rei 2 chronometers also receive the battery status and warn that EncRadio's autonomy is limited.
When this happens the battery should be recharged as soon as possible.

11.3. Battery recharge

The presence of the recharge current is signalled when the Led located close to the recharge connector is on. This Led also indicates if battery recharge is in progress (orange Led) or if it has finished (green Led).
The time needed for recharging depends on the current charge status of the battery.
When recharging is over, the battery status Led stays on and is continuous green.
Recharging finishes after about 1.5 hours if the battery is completely empty.

11.4. Battery charge indicator

When the ON/OFF key is pressed, the percentage of charge remaining in the battery is displayed.

12. Linkgate EncRadio SF technical data

Weight	145g
Size	100 x 50 x 40 mm (l x h x p)
Operating temperature	–25º/+70ºC
Frequency	434.075 MHz
Type of transmitter	PLL Synthesizer
Transmission mode	Digital FSK transmission; redundancy code with information accuracy check and autocorrection
Form of communication	TX monodirectional
Number of channels	1
Radio transmission power	EncRadio SF : 10mW EncRadio SF 500 : 500mW
Impulse transmission accuracy	± 0.4 ms
Time base	Quartz 4.194304 MHz ±5ppm from –25º/+70ºC
Supply:	
Battery	Rechargeable Lithium-Ion 3.7V 500mAh
Recharge	8V÷20VDC 300mA
Battery recharge	Built-in “smart” recharger
Autonomy	EncRadio SF: Over 5000 events EncRadio SF 500 : Over 2000 events Remaining charge indicator Visual and sound signalling of “Low Battery” status
Processor	8 bit C-MOS microprocessor
Keyboard and controls	• Signal and Repeat keys, 2 arrow and second function keys • ON/OFF key • Software selection of long/short signal • Software selection of transmission channel
Connections	• Auxiliary input on Ø 4mm socket for taking speeds (contact normally open)
Radio transmission range in normal conditions	EncRadio SF : Over 2 Km EncRadio SF 500 : Over 9 Km

13. Linkgate DecRadio SF technical data

Weight	110g
Size	90 x 50 x 25 mm (l x h x p)
Operating temperature	–25º/+70ºC
Frequency	434.075 MHz
Type of receiver	Double Superheterodyne, PLL Controlled Fixed channel
Reception mode	FSK decoding
Form of communication	RX monodirectional
Number of channels	1
Power supply	5 VDC, supplied directly from chronometer
Connections	Cable with 5 pole connector for connection to chronometer

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