MICROGATE

HILINK

User Manual

Firmware Version: 1.2.1

Manual Version: 1.1.1

Issue Date: 09/03/2023

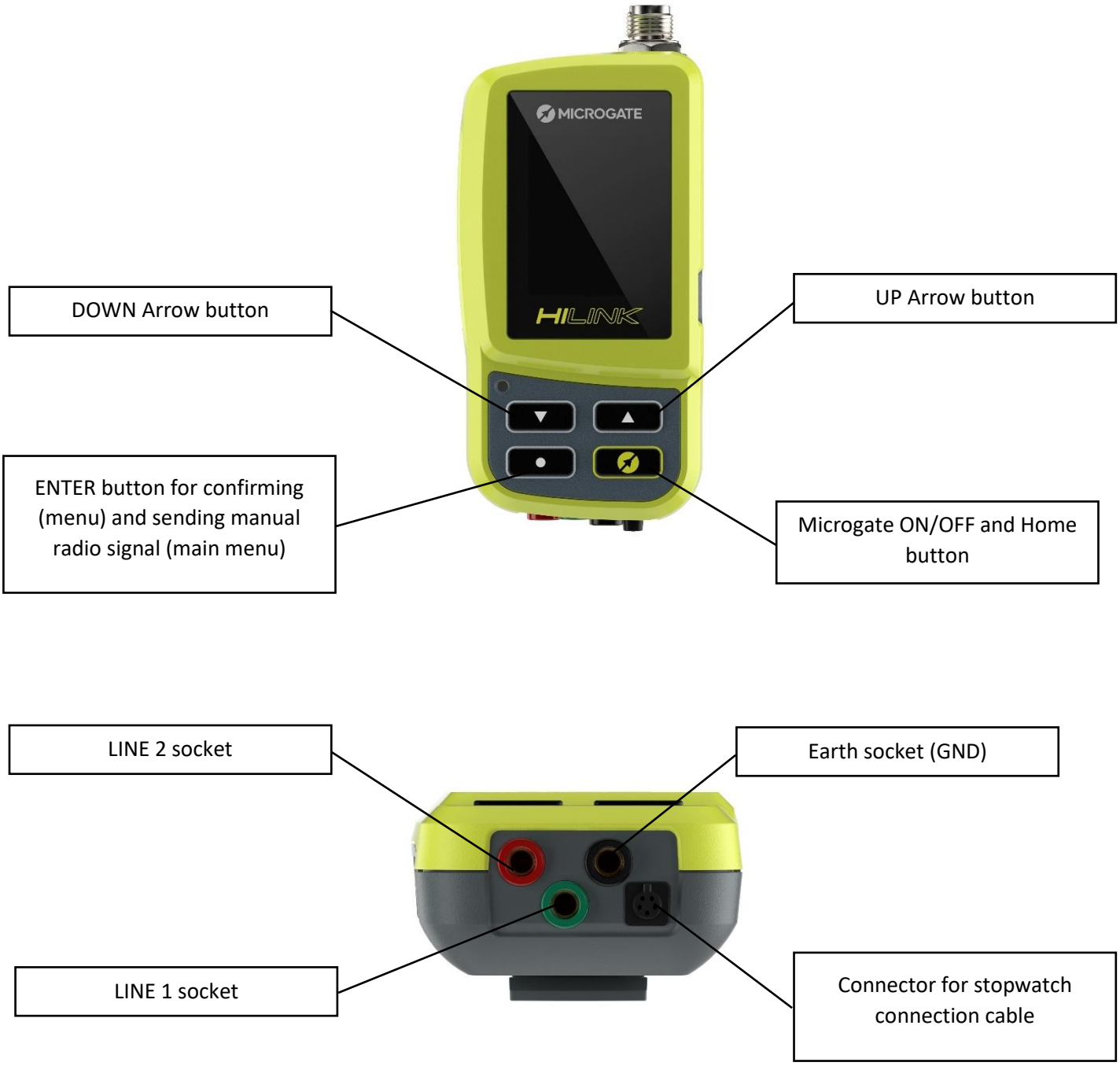
Contents

1 HiLink general description 5
2 Listen Before Transmit (LBT) 8
3 Management software 9
3.1 New Session 9
3.1.1 Header bar 10
3.1.2 Area of the currently selected settings 10
3.1.3 The bib number that will be transmitted 10
3.1.4 The screen when setting “Receiver” 11
4 Settings 11
4.1 Mode 12
4.1.1 Method of use (Mode) 12
4.1.2 HiSmart Trigger 13
4.1.3 HiSmart Black List 13
4.1.3.1 Example 1 13
4.1.3.2 Example 2 13
4.2 Lines 13
4.3 Radio 14
4.3.1 Radio Transmission 14
4.3.2 Radio Frequency 14
4.3.3 Group ID 14
4.4 GPS and Time Zone 15
4.4.1 GPS Synchronization Mode 15
4.4.2 Time Zone 15
4.4.3 GPS Status 15
4.5 Test radio signal 15
4.6 Brightness 16
4.6.1 Battery Saver 16
4.6.2 Auto Brightness (ON/OFF) 16
4.6.3 Set Brightness 16
4.7 Set Synchronization 16
4.8 Synchronization Output 17
4.9 Language 17
4.10 System Status 17

4.11 Test Time Base Calibration 18
4.12 Internal Time Base Calibration 18
4.13 HiSmart Bib 19
4.14 HiSmart RSSI Threshold 19
4.15 Reset Default 20
5 Battery charging and operating time 21
6 The Clip 22
7 Technical specifications 23
8 Connection to the ReiPro and RTPro Stopwatches 24
8.1 RTPRO-HiLink Connection via Bluetooth 25
8.2 Configuration of HiLink devices via Bluetooth 27
8.3 REIPRO-HiLink Connection via Bluetooth 29
8.4 Configuration of HiLink devices via Bluetooth 31
9 RTPro and HiLink Usage Configurations 33
9.1 Free RTPro and HiLink along the route 34
9.1.1 The connection to the stopwatch by cable 34
9.1.2 The connection to the stopwatch via Bluetooth 34
9.1.3 The setting of the transmission devices 35
9.2 RTPro and HiLink with connection at start or finish 36
9.3 RTPro and HiLink used in conjunction with EncRadio MF transmitters 36
9.4 RTPro and HiLink used in conjunction with EncRadio SF and Polifemo Radio SF transmitters 38
9.5 Racetime 2 and HiLink used as transmitter 39
9.6 Racetime 2 and HiLink used as receiver via cable 41
10 HiSmart the automatic system for the recognition of athletes 43
10.1 Switching On and Off 45
10.2 Charging HiSmart 46
10.3 Battery life 46
10.4 Sleep Mode and Hardware RESET 46
10.5 HiSmart technical specifications 46
11 HiLink Connectors (pin out) 47
11.1 Chronometer 47
12 HiLink Radio Frequencies 48
12.1 HiFamily Radio Frequency Table – 434 MHz Band 48
12.2 LinkGate Radio MF compatible Radio Frequency Table – 434 MHz Band 49
12.3 LinkGate Radio SF compatible Radio Frequency Table – 434 MHz Band 49

13 Method of use 50
14 Cleaning the devices 50
15 Technical support 51

1 HILINK GENERAL DESCRIPTION


DOWN Arrow button
UP Arrow button
ENTER button for confirming (menu) and sending manual radio signal (main menu)
Microgate ON/OFF and Home button
LINE 2 socket
Earth socket (GND)
LINE 1 socket
Connector for stopwatch connection cable

HiLink is the new Microgate radio transmission system that incorporates both the transmitter (**EncRadio**) and receiver (**DecRadio**) feature using a transceiver module operating in the 433 MHz band. The compact size (60x119x33 mm), extended temperature range (-30°C +70°C), temperature-compensated time base of ±1 ppm over the entire temperature range make it the ideal instrument for the radio transmission of timing pulses in all operating situations.

HiLink is not only a radio transmitter/receiver but is de facto for all intents and purposes a stopwatch, being able to use both Microgate protocols and time-of-day transmission.

HiLink also has a GPS module for synchronizing the time base with the satellite signal which can turn it into a synchronizer using one of its external lines.

The narrow-band radio module can be configured via software or remotely on one of the 68 available frequencies and can be supplied in the **10 mW** power version as well as in the **500 mW** version in the band from 433,075 MHz to 434,775 MHz.

HiLink has a Bluetooth module for communication with ReiPro and RTPro stopwatches and for receiving information about HiSmart-equipped competitors using Smart Identification protocols.

The system can also be used as a radio receiver connected by cable to all the old generation Microgate stopwatches (Rei2 and Racetime2) being fully compatible with the LinkGate EncRadio systems or as a transmitter in the presence of an old generation LinkGate DecRadio.

BASIC CHARACTERISTICS

EMBEDDED EncRadio and DecRadio functionality	
DIMENSIONS (WxHxD)	60 x 119 x 33 mm
TEMPERATURE RANGE	-20°C +60°C
TIME BASE	temperature compensated oscillator + GPS PPS
TIME MEASUREMENT UNIT	selectable down to 1/10,000 sec.
TIME ACCURACY	1/50,000 of a second
BT LE CONNECTIVITY	Radio in the 433,075 MHz to 434,775 MHz band with 68 user-selectable frequencies, 10 mW and 500 mW output power depending on the model. Bluetooth Low Energy connectivity
INTERACTION WITH	HiSmart Tag for Smart Identification

2 LISTEN BEFORE TRANSMIT (LBT)

HiLink has a particularly innovative feature that allows the device, when configured in “Normal” mode, to prevent simultaneous transmissions of multiple transmitters from overlapping with the chance of losing a pulse. Before starting any HiLink transmission it checks that the frequency being used is free and only then transmits the information. If the frequency is occupied, HiLink will wait for the frequency to become free taking account of any transmission delay.

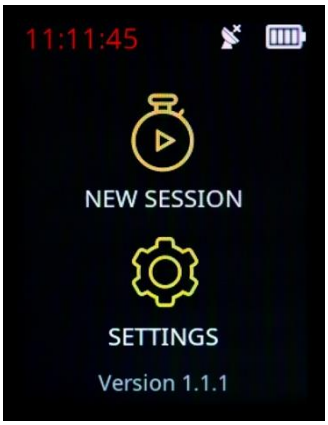
Think of a situation where one athlete is crossing a split and another one the finish line at the same time, or of the very common situation on horse obstacle-jumping courses where two horses are simultaneously on the course with a high probability of simultaneously interrupting two lines.

In all these situations, the “Listen Before Transmit” mode, by using a single transmission frequency, ensures that all the pulses arrive at their destination without any trouble.

3 MANAGEMENT SOFTWARE

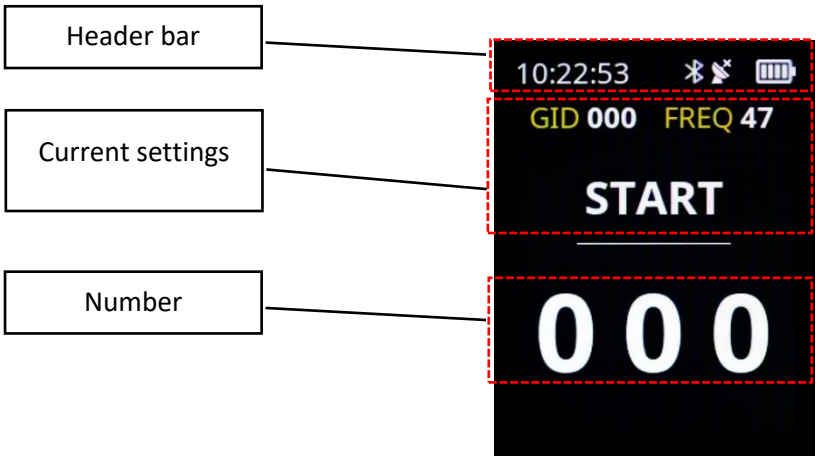
Once the system is turned on using the Microgate ON/OFF button, the home screen gives us two options:

1. Start a new session
2. Enter the settings menu



3.1 NEW SESSION

The screen gives us the following information:



3.1.1 Header bar

The following are displayed:

- the time of day
  - Red if not synchronized
  - White if the system has been synchronized
- the Bluetooth symbol
  - Only present when connected to another device
- the satellite symbol
  - White if not used
  - Red if enabled and a valid signal for synchronization has not yet been received
  - Green if enabled and a valid synchronization signal has been received
- the battery symbol with the marks for the current charge

3.1.2 Area of the currently selected settings

- GID (Group ID): represents a value that allows radio pulses to be received only from systems that have set the same Group ID. Equivalent to the old radio channel concept of the old LinkGate EncRadio systems
- FREQ: The frequency number set in transmission and reception (see table in appendix for matching frequencies and settings of old Linkgate EncRadio/DecRadio systems)
- The type of pulse being transmitted (START-STOP- LAP1...LAP14)

Changing this information is possible within the various menus in Settings or via Bluetooth connection from ReiPro and RTPro devices.

3.1.3 The bib number that will be transmitted

The number can be changed with the UP and DOWN arrows (press and hold to fast forward) or by touching the tens or hundreds of units for a faster change.

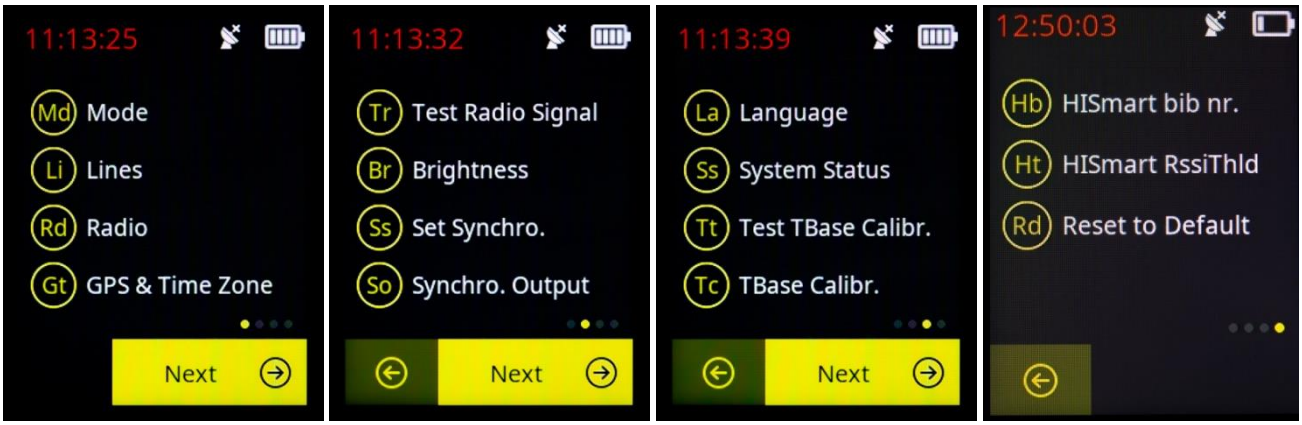
3.1.4 The screen when setting “Receiver”

When the system is configured to operate as a radio receiver only (choose “receiver” in the pulse type configuration), the main screen appears as follows

In this mode HiLink cannot transmit any pulses but only receive transmissions from other HiLink or HiSens (it acts as an old DecRadio). In the middle, in place of the bib number there is the quality of the radio signal received and the type of signal.

4 SETTINGS

In the SETTINGS menu we have 4 pages for complete system configuration. Pages are scrolled by using the Next or Back arrows highlighted on the Touch screen.



4.1 MODE

The mode describes how HiSmart devices operate and are used.

4.1.1 Method of use (Mode)

- **Normal**: this is the default value and means that the radio protocol used in transmission is that of the HiLink new generation
- **EncRadio**: if “EncRadio” mode is selected, the transmission protocol is that of the old generation of LinkGate EncRadio transmitters. In this mode HiLink can be used as a transmitter in conjunction with Rei2 and Racetime2 systems with DecRadio receivers. The “Send Device Status” (On/Off) feature can also be enabled.
- **Modem**: the system functions as a radio modem (for example for transmitting to a scoreboard) See HiLink Connectors (pin out)

4.1.2 HiSmart Trigger

This setting allows determining at what distance HiLink will consider HiSmart devices to be in the area, and therefore the number in transmission. The possible settings are:

- 0= Disabled
- 1= Immediate Range; approximate receiving distance 20cm (used for example at the start in skiing)
- 2= Near Range; approximate receiving distance 3m
- 3= Far Range; approximate receiving distance 30m
- 2= Very Far Range; approximate receiving distance 60m

4.1.3 HiSmart Black List

When selecting a HiSmart Trigger value other than "Disabled" we have a configuration called HiSmart Black List. This setting is enabled by default.

When this setting is enabled the HiSmart device will need to be detected by a START HiLink device in order to be visible to subsequent HiLink devices (LAP_N and STOP) and also once it has transited and been detected by a subsequent HiLink device (LAP_N and STOP) it will no longer be taken into account by that particular device.

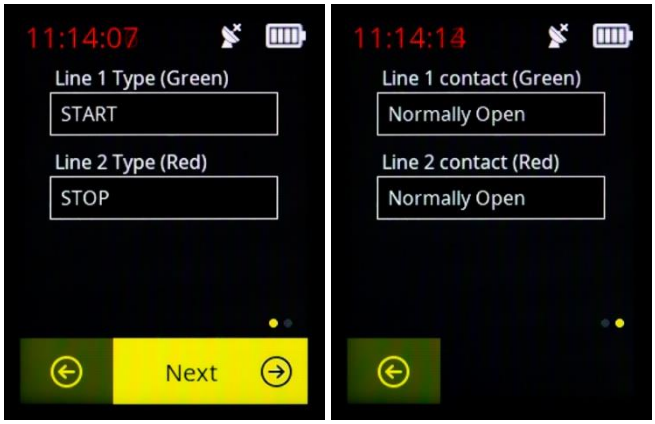
4.1.3.1 Example 1

Think of training for alpine skiing. The athlete is detected at the starting gate by a HiLink device configured as START, then when the athlete passes through the first split, the bib number is placed on a "Black List" for that split and is no longer detected until the athlete returns to the starting point again. The same applies to the finish. This situation, for example if the athlete passes near the finish and the splits with the lift, prevents them from getting incorrectly detected.

4.1.3.2 Example 2

However, if we want to detect an athlete on a circuit going back through the same intermediates without going back through the start (or running a round trip on the same intermediates) this parameter should be set to Disabled.

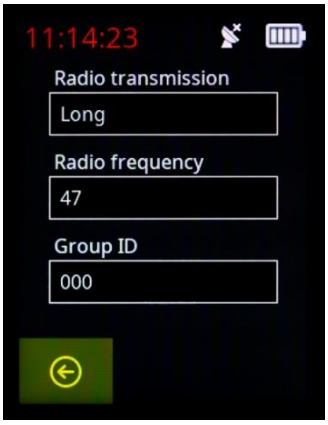
4.2 LINES



This menu makes it possible to define the type of pulse (logic channel) to be transmitted (START-STOP-LAP1...LAP14) when a signal is received on the Green (Line 1) and Red (Line 2) sockets. If the pulse is transmitted by pressing the Enter button (bottom left), the logic channel of Line 1 will be transmitted. You can

also specify whether the timing line is to be configured to accept “Normally Open” or “Normally Closed” signals. The HiLink system, unlike the old EncRadio systems, allows simultaneously transmitting the two timing lines by using a new data protocol. With this perspective, for example, two starts or finishes of a parallel can be transmitted using a single transmitter or the two pulses of a speed base (which in this case will be configured as an average speed on two different laps).

4.3 RADIO



In this section we can define the parameters of the radio transmission. In particular:

4.3.1 Radio Transmission

The set parameter can take the following values:

- **Long**: the transmission lasts approximately 2.6 seconds and has maximum redundancy (important when the frequency is disturbed). This is the default value.
- **Short**: The transmission lasts approximately 0.7 seconds and has reduced redundancy. This setting is preferred when I have to closely follow multiple radio transmissions that could have the signals overlap.

4.3.2 Radio Frequency

This parameter represents the channel of the frequency used (see HiLink Radio Frequencies for matching the actual frequencies in MHz).

4.3.3 Group ID

This corresponds to the channel of the old Linkgate transmission. The receiving stopwatch must have the same number set in the “radio channel”. Group ID is generally a filter that selects radio pulses that travel on the same frequency but belong to the same Group ID. The HiLink system makes it much more convenient to change frequency when there are several people transmitting on the same radio frequency

4.4 GPS AND TIME ZONE

HiLink can be synchronized with satellite time.

4.4.1 GPS Synchronization Mode

The synchronization of the internal time base with the satellite time base can be done in the following ways:

- **Disabled**: no synchronization with the satellite signal
- **One Time**: in this mode once the satellite signal is valid the internal base synchronizes with the satellite time and then continues with an accuracy of ±1 ppm
- **Continuous**: in this mode, once the satellite signal is valid, the internal base continuously synchronizes with the satellite time

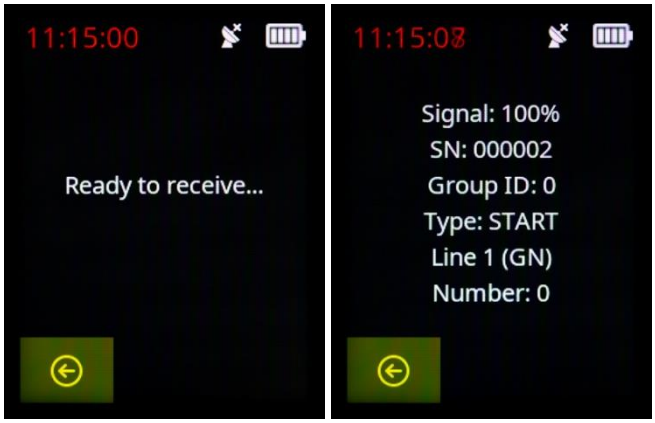
4.4.2 Time Zone

The satellite synchronization time is changed taking account of the time zone compared to UTC.

4.4.3 GPS Status

This is a screen of information about satellite signal quality.

4.5 TEST RADIO SIGNAL



This menu allows you to check the quality of the radio signal and the transmitted information

4.6 BRIGHTNESS

4.6.1 Battery Saver

This parameter represents the time after which the display turns off

4.6.2 Auto Brightness (ON/OFF)

HiLink has an external light sensor to automatically adjust the brightness according to the external light (parameter set to ON). If the parameter is set to OFF, the brightness is adjusted with the percentage indicated in the “Set Brightness” parameter

4.6.3 Set Brightness

In the case of Auto Brightness Off, it allows you to manually choose the brightness with values between 1 and 100%.

4.7 SET SYNCHRONIZATION

This menu allows the date and time to be set for a synchronization that can be done either manually by pressing the “Confirm time“ button on the display or via a pulse on Line 1 (green socket).

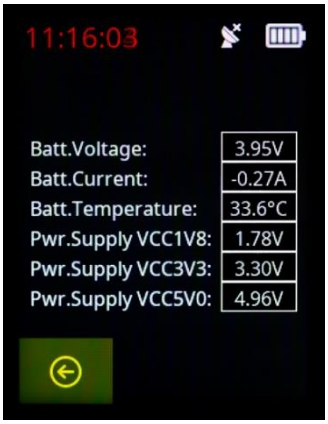
4.8 SYNCHRONIZATION OUTPUT

This menu is useful when we want to use HiLink as a synchronizer. By setting the time and the repetition time we will send a pulse on the green socket every repetition time starting from the indicated time. The “Next minute” button on the touch display allows you to pre-load the time of the next full minute and then define only the repetition time.

4.9 LANGUAGE

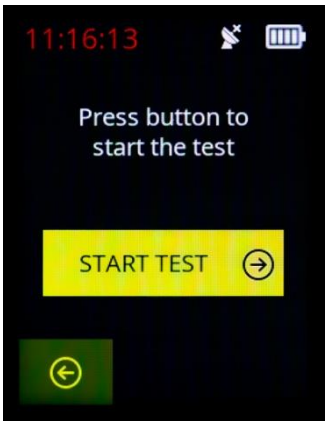
The HiLink menus can currently be displayed in Italian, English and German.

4.10 SYSTEM STATUS



This menu allows you to check the status of system parameters such as battery voltage, current and temperature and other parameters related to the different supply voltages.

4.11 TEST TIME BASE CALIBRATION

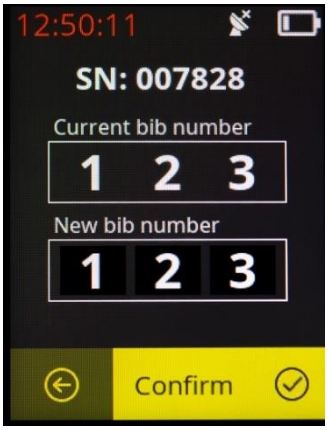


This test checks the internal time base calibration, when there is a valid GPS signal.

4.12 INTERNAL TIME BASE CALIBRATION

This test allows the internal time base to be calibrated, when there is a valid GPS signal.

4.13 HiSmart Bib

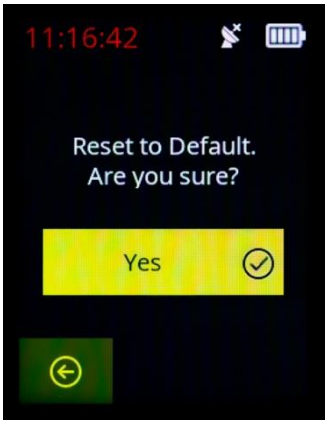


This menu allows you to detect a HiSmart device in the immediate vicinity of HiLink, showing the serial number and the current bib number. Entering a new number in the New Bib field, using the touch display and the arrows, and pressing the “Confirm” button on the display will assign the new bib number to the device.

4.14 HiSmart RSSI Threshold

This menu allows you to assign a level of dBm of the Bluetooth signal for each detection range of the HiSmart system. The dBm value is related to the detection distance of the HiSmart systems.

4.15 RESET DEFAULT



This option returns the HiLink device to the factory default settings.

5 BATTERY CHARGING AND OPERATING TIME

HiLink can be charged with any 5V charger with at least 500mA of power (almost all mobile phone chargers are suitable) with a USB-A to USB-C or USB-C to USB-C cable.

If the device is turned off, the status LED will light up steady AMBER when the power cord is plugged in. When charging is complete, the LED will be a steady GREEN light.

If on the contrary you want to charge the device while it is on, the external power supply symbol will appear at the top right of the display and the battery symbol will show moving bars until the battery is fully charged (all the battery bars lit steady).

Battery life is approximately 10 hours with one transmission a minute.

To perform a hardware reset, with HiLink turned on, press and hold the power button for at least 20 seconds until it turns off.

5V chargers must comply with IEC/EN 61010-1. In this case, they can alternatively comply with IEC/EN 62368-1 provided that their environmental conditions are compatible with those of the device.

6 THE CLIP

At the rear there is a clip that allows attaching the device to a belt or radio support straps. The clip can be removed when not in use by unscrewing the fixing screw with a Phillips screwdriver.

7 TECHNICAL SPECIFICATIONS

GENERAL	
Weight	298 g
Dimensions	66 x 125 x 35 mm
Operating temperature	–20°/+60°C
TIMING	
Measurement resolution	20 x 10^{-6}s (1/50000s)
Time base	24.0 MHz VCTCXO oscillator, stability ±1 ppm from -30° to +85°C (ageing in first year ±1ppm)
Accuracy	±0.0864 s/day for temperatures from -20° to +60°C
POWER SUPPLY	
Power supply	External power supply 5VDC 1.0A; Internal Li-Ion battery
Battery recharging	Built-in smart recharging device • Charging via USB C
Uptime	> 8 ore
Power ON/OFF	From the keyboard, with Microgate key
USER INTERFACE	
Keyboard	4-key keyboard, covered with a protective waterproof membrane
Display	High-brightness colour TFT graphical display, visual area 31 x 41 mm (2.0”), resolution 240 x 320 pixels, excellent/good visibility in sunlight, capacitive touchscreen, software brightness adjustment or automatic adjustment with built-in light sensor
Processing unit	Architecture based on a processor • 200 MHz MIPS32
CONNECTIONS	
Power supply Device USB	1 x USB C port • Connection for external power supply • USB 2.0 to devices
Input/output timing	1 x Ø 4 mm socket (Green) • Input: Start, Lap1..Lap14, Stop (rated value 5V DC; max 12V DC) • Output: Synchronization 1 x Ø 4 mm socket (Red) • Input: Start, Lap1..Lap14, Stop (rated value 5V DC; max 12V DC) 1 x Ø 4 mm socket (Black) • Reference ground for Green and Red Bushing inputs
Serial	1 x five-pole sockets • Input/output: Serial RS232 for connection to stopwatch, PC, scoreboard..
Radio	1 x Integrated UHF module • UHF narrow band multi-channel transceiver 434 MHz • Radio frequency: 433,075 MHz to 434,775 MHz • Radio transmission power: 10mW • Transmitter type: PLL synthesizer • Receiver type: Double superheterodyne • Modulation: FSK; redundant code with check on correct information and self-correction • Form of communication: Half duplex • Number of channels: 69 (with frequency steps between channels of 25 kHz) • Pulse transmission accuracy: ±0.4 ms • Radio transmission range: approximately 2 km 1 x TNC port • Connection to external UHF antenna
BT	1 x Integrated BT + Antenna module • Bluetooth: 5.1 BLE
GNSS	1 x Integrated GNSS + Antenna module • Simultaneous reception of GPS, Galileo, GLONASS, BeiDou

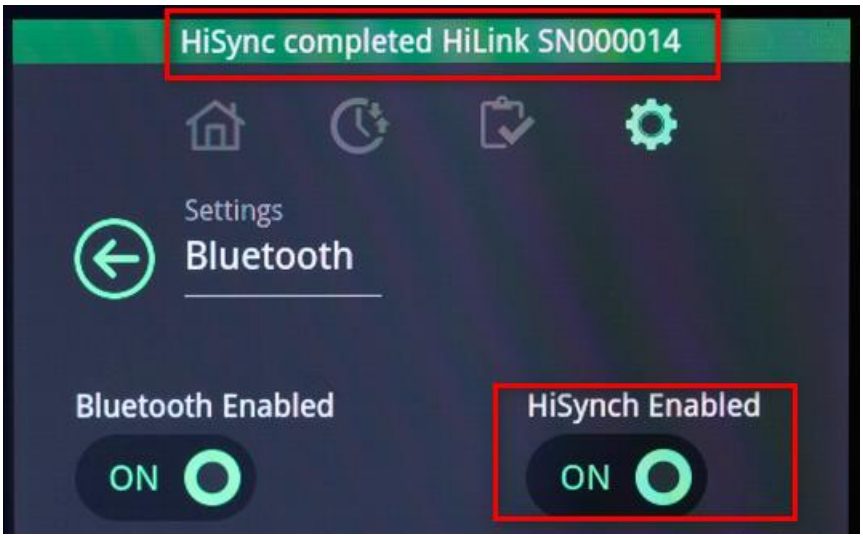
8 CONNECTION TO THE REIPRO AND RTPRO STOPWATCHES

The HiLink system when used as a receiver can be connected to the ReiPro and RTPro stopwatches either by cable (use the $CAB202 cable) or directly via Bluetooth.

In the case of a Bluetooth connection, HiLink decodes the radio signal and sends the time of day of the received pulse to the stopwatch. The stopwatch and HiLink must be synchronized in order to obtain correct information. By default, a configuration (HiSynch Enabled=ON) is active on ReiPro and RTPro which automatically synchronizes the time base of the stopwatch with that of HiLink when connected. In this case (HiSynch parameter enabled) “HiSynch completed HiLink SN0000XX” will also be displayed.

The BT connection symbol will also appear in the status bar on the HiLink device and if synchronization is complete the colour of the time of day will be White.

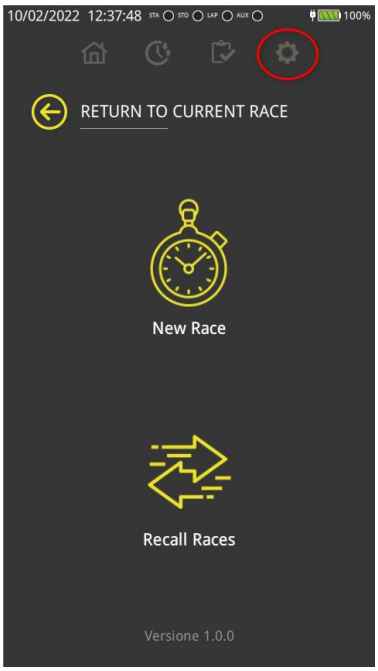
If the HiSynch parameter is disabled the stopwatch will receive the information only if both the stopwatch and HiLink are synchronized either by cable or via satellite signal.



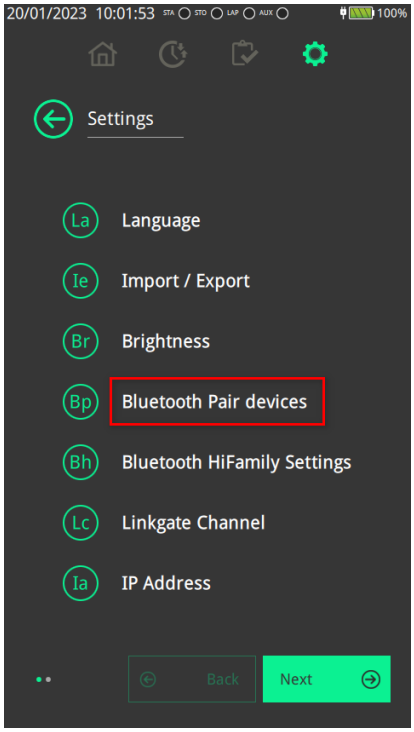
8.1 RTPRO-HILINK CONNECTION VIA BLUETOOTH

In the case of a Bluetooth connection of a new device (remembering that the devices supplied with the kits have already been initialized), the first time (after which you no longer need to do this) HiLink must be connected to the RTPro stopwatch by following the steps below:

1. From the RTPro main screen, click on the settings icon

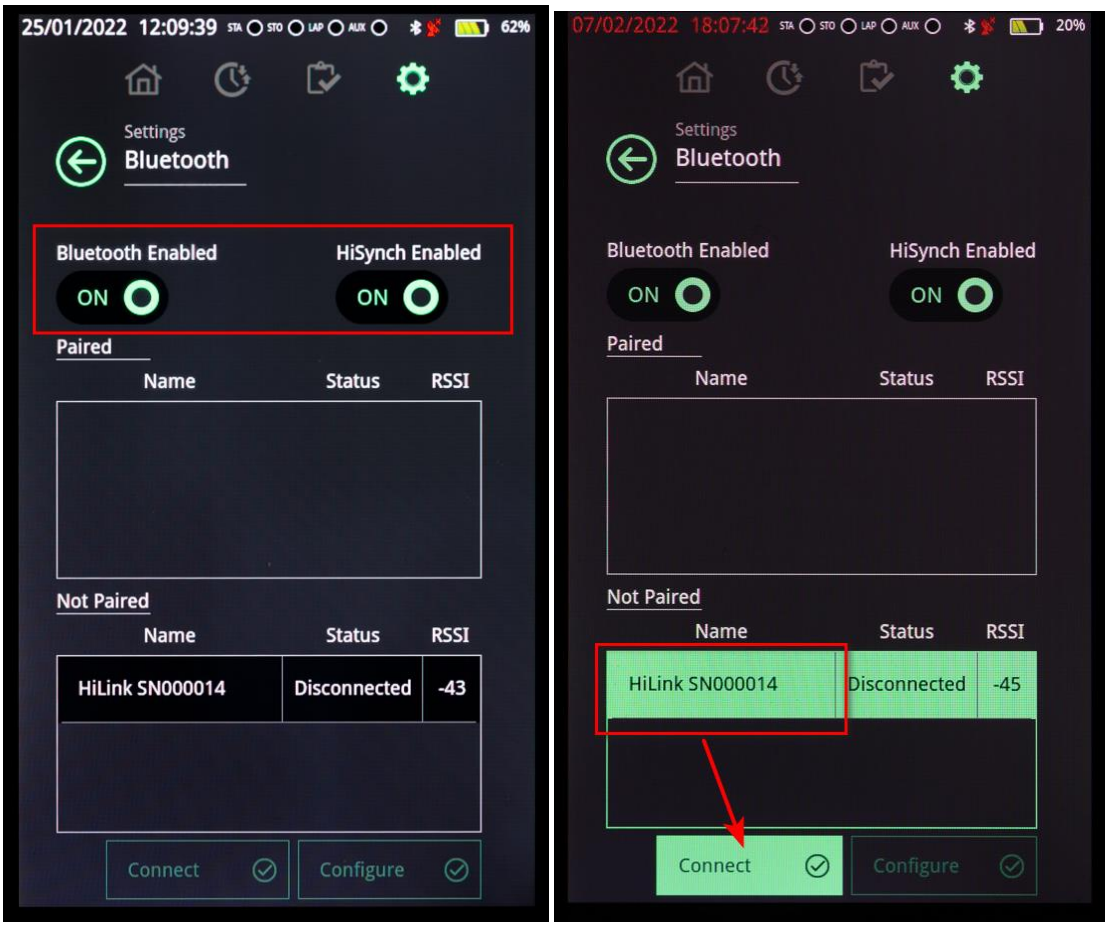


2. Select the Bluetooth menu

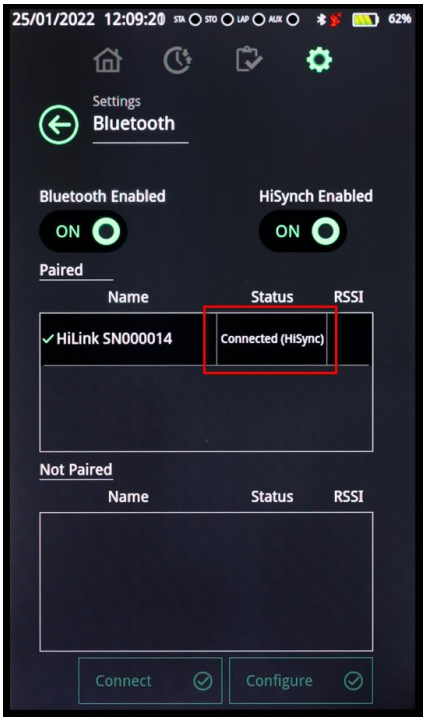


3. Make sure that the HiLink you want to use as a receiver is turned on.

4. Verify that the Bluetooth and HiSynch functions on RTPRO are enabled
5. Select that device from the list of available devices and press connect.



6. Wait until the device status is “Connected(HiSynch)”

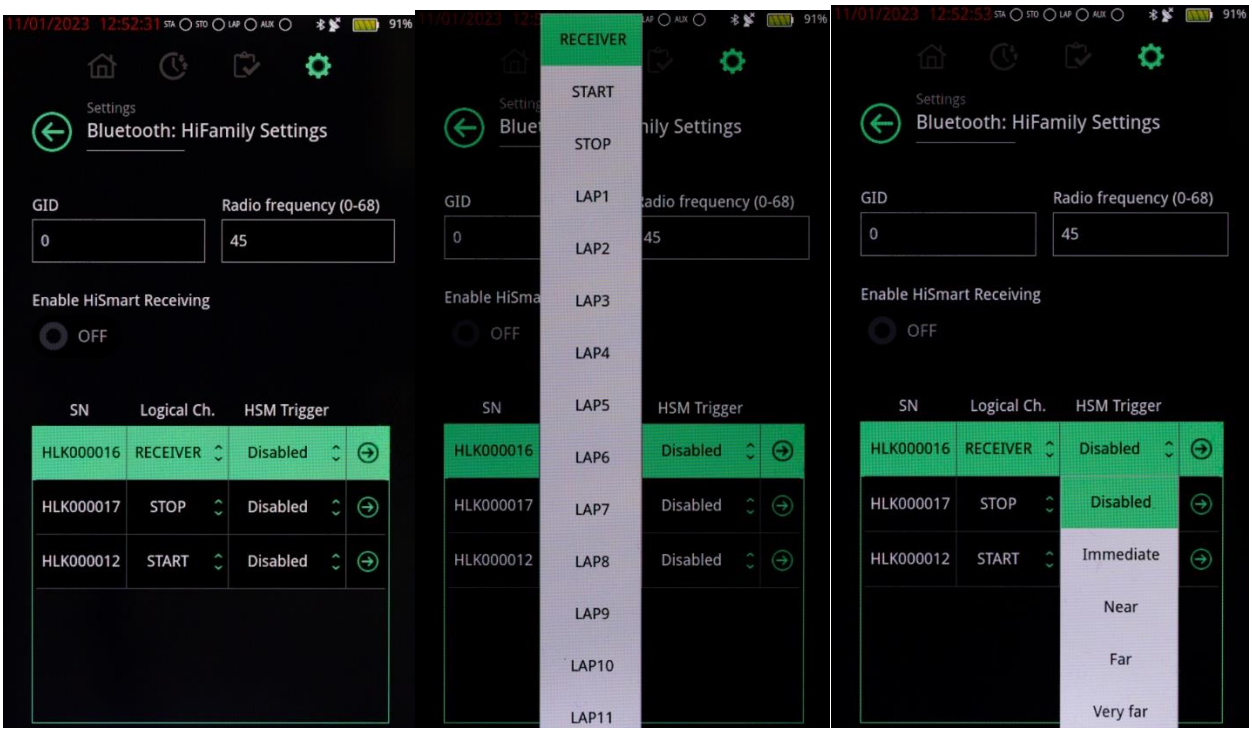


8.2 CONFIGURATION OF HILINK DEVICES VIA BLUETOOTH

Once the devices are paired to the stopwatch we can configure them directly from the “Bluetooth HiFamily Settings” menu found in the RTPro settings. The stopwatch detects the previously paired powered-on HiLink devices within the Bluetooth communication range and enables them to be configured. The GID (Group ID), Radio Frequency Channel (0-68) and HiSmart receive enable values that are set in this menu are automatically communicated to the currently connected devices and highlighted in the list via their serial numbers.

If instead we want to configure a single device, we have to select it from the list (the selected device will emit 3 consecutive beeps and the LED will flash) and then change the type of pulse sent (RECEIVER-START-STOP-LAP1...LAP14) and the reception distance of HiSmart devices, if any. As soon as we change the values, they will be automatically updated on the HiLink device. Using this configuration mode eliminates the need to change the general and special parameters on each connected device.

If a serial number is not easy to read or we have any doubts about the device we are modifying we can always transmit a pulse (either via the enter button or via the sockets) from HiLink and this will automatically be highlighted in the list.



When we enable the “Enable HiSmart Receive” flag, the following values are attributed to the HiSmart reception areas by default:

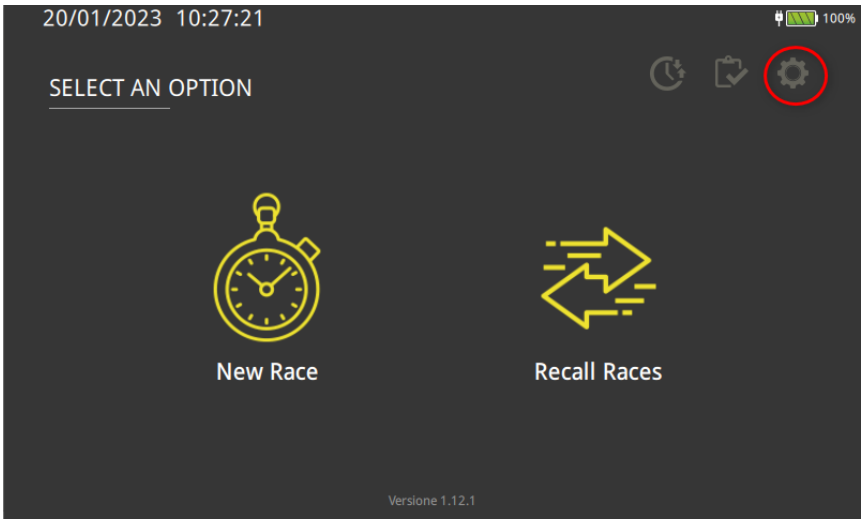
- Transmission of a START → HST set to Immediate
- Transmission of a STOP and LAP → HST set to Very Far
- RECEIVER → HST set to Disabled

Of course, the reception areas of each individual HiLink can then be manually changed to cover any specific needs.

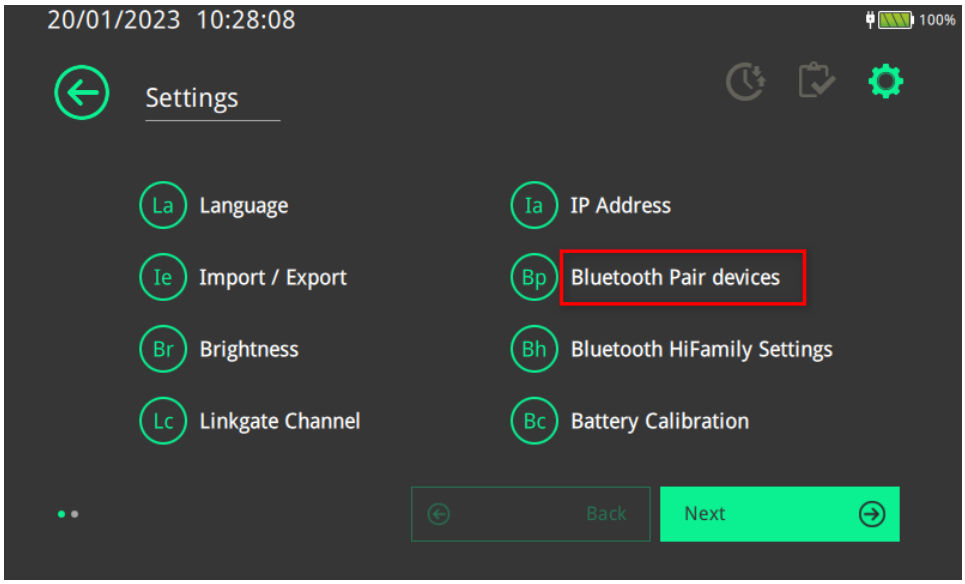
8.3 REIPRO-HILINK CONNECTION VIA BLUETOOTH

In the case of a Bluetooth connection of a new device (remembering that the devices supplied with the kits have already been initialized), the first time (after which you no longer need to do this) HiLink must be connected to the ReiPro stopwatch by following the steps below:

1. From the ReiPro main screen, click on the settings icon

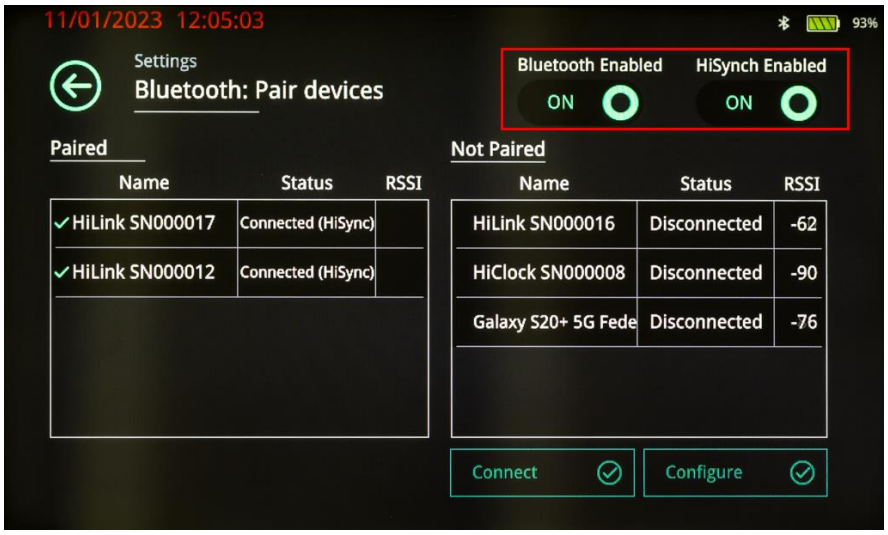


2. Select the “Bluetooth Pair devices” menu



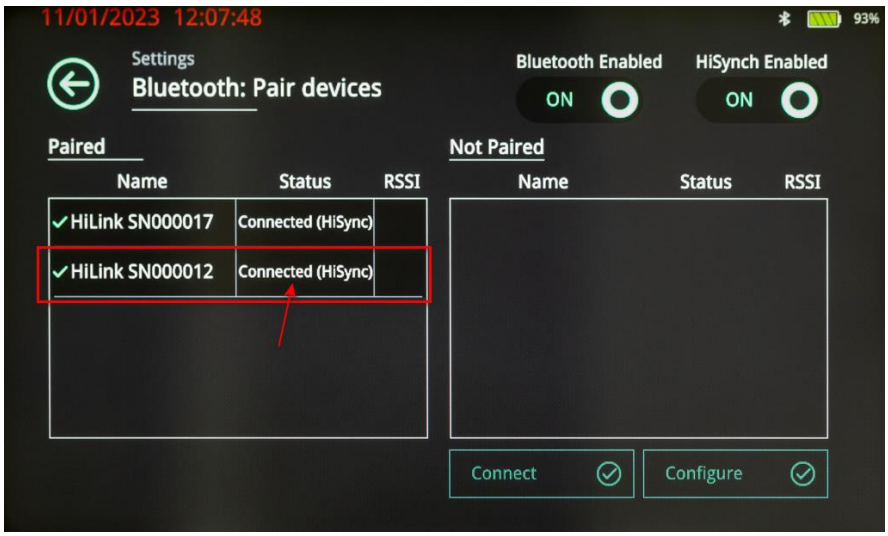
3. Make sure that the HiLink you want to use as a receiver is turned on.

4. Verify that the Bluetooth and HiSynch functions on RPRO are enabled



5. Select that device from the list of available devices and press connect.

6. Wait until the device status is “Connected (HiSynch)”

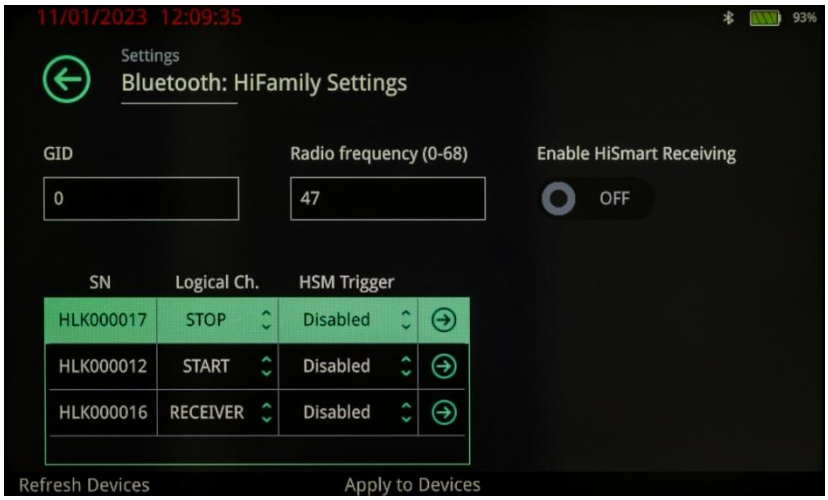


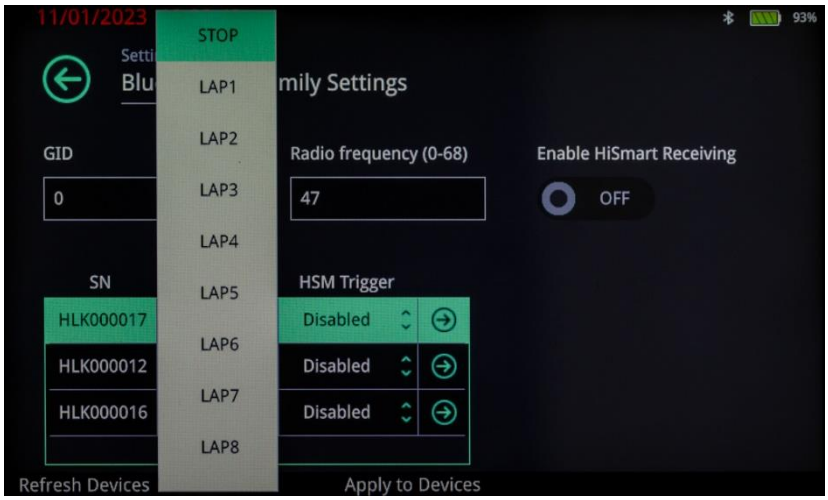
8.4 CONFIGURATION OF HILINK DEVICES VIA BLUETOOTH

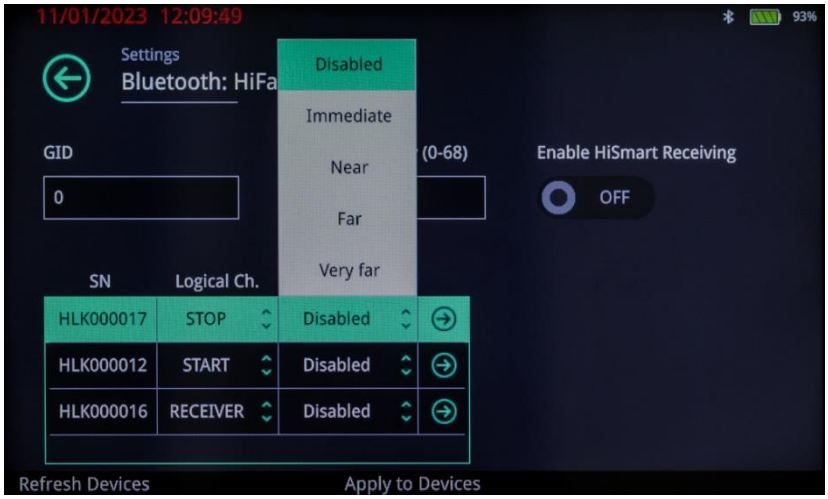
Once the devices are paired to the stopwatch we can configure them directly from the “Bluetooth HiFamily Settings” menu found in the ReiPro settings. The stopwatch detects the previously paired powered-on HiLink devices within the Bluetooth communication range and enables them to be configured. The GID (Group ID), Radio Frequency Channel (0-68) and HiSmart receive enable values that are set in this menu are automatically communicated to the currently connected devices and highlighted in the list via their serial numbers.

If instead we want to configure a single device, we have to select it from the list (the selected device will emit 3 consecutive beeps and the LED will flash) and then change the type of pulse sent (RECEIVER-START-STOP-LAP1...LAP14) and the reception distance of HiSmart devices, if any. As soon as we change the values, they will be automatically updated on the HiLink device. Using this configuration mode eliminates the need to change the general and special parameters on each connected device.

If a serial number is not easy to read or we have any doubts about the device we are modifying we can always transmit a pulse (either via the enter button or via the sockets) from HiLink and this will automatically be highlighted in the list.







When we enable the “Enable HiSmart Receive” flag, the following values are attributed to the HiSmart reception areas by default:

- Transmission of a START → HST set to Immediate
- Transmission of a STOP and LAP → HST set to Very Far
- RECEIVER → HST set to Disabled

Of course, the reception areas of each individual HiLink can then be manually changed to cover any specific needs.

9 RTPRO AND HILINK USAGE CONFIGURATIONS

The RTPro stopwatch together with the HiLink radio system can be used in several ways, and the HiLink system is fully compatible with previous generation Linkgate systems (Encoder and Decoder).

First of all, it is important to note that there are two ways to connect HiLink to RTPro:

- **By Cable using the specific cable ($CAB202)**

- **Via Bluetooth using the procedure described earlier in the chapter 8.1**

Let us now see how, by using one of these connection methods, the following operating modes can be established.

9.1 FREE RTPRO AND HILINK ALONG THE ROUTE

The steps to follow are as follows:

9.1.1 The connection to the stopwatch by cable

Connect HiLink to the RTPro stopwatch.

If you connect HiLink by cable, no configuration needs to be done on the device

9.1.2 The connection to the stopwatch via Bluetooth

See chapter 8.1 for the sequence of operations.

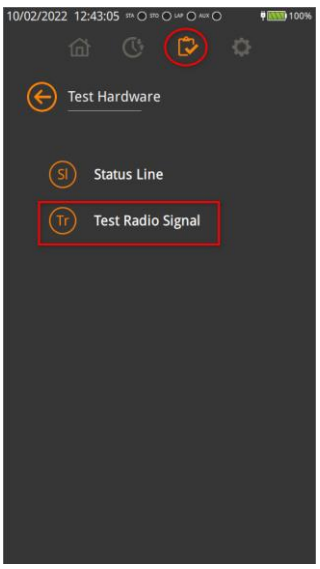
9.1.3 The setting of the transmission devices

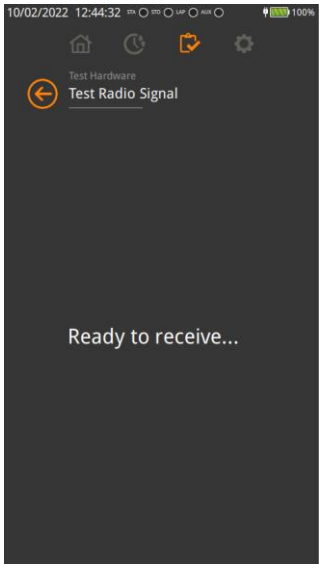
Depending on the function, the HiLink devices should be configured as follows:

Start	Intermediate	Finish
Settings **Lines** Line 1 = START **Mode** Mode= Normal HiSmart Trigger= 1 Immediate	**Settings** **Lines** Line 1 = LAP 1 (or the next one) **Mode** Mode= Normal HiSmart Trigger= 4 Very Far	**Settings** **Lines** Line 1 = STOP **Mode** Mode= Normal HiSmart Trigger= 4 Very Far

You should also check that all the HiLink devices are set to the same GroupID and on the same transmission frequency. See subsection 4.3 for configuring these parameters.

It is recommended to perform a successful transmit-receive check using the RTPro “Test Hardware” and “Test Radio Signal” menu.





9.2 RTPRO AND HILINK WITH CONNECTION AT START OR FINISH

In this situation the RTPro stopwatch can be connected by cable or via BT directly to the HiLink device at the start or finish using the methods described in the previous parameter. In the case of connection via BT, the stopwatch must remain at a communication distance supported by BT technology (approximately less than 50m).

9.3 RTPRO AND HILINK USED IN CONJUNCTION WITH ENCRADIO MF TRANSMITTERS

The HiLink system fully interfaces with the old EncRadio MF 10mW and 500mW transmitters without any need for specific configurations. However, the following parameters must be taken into account:

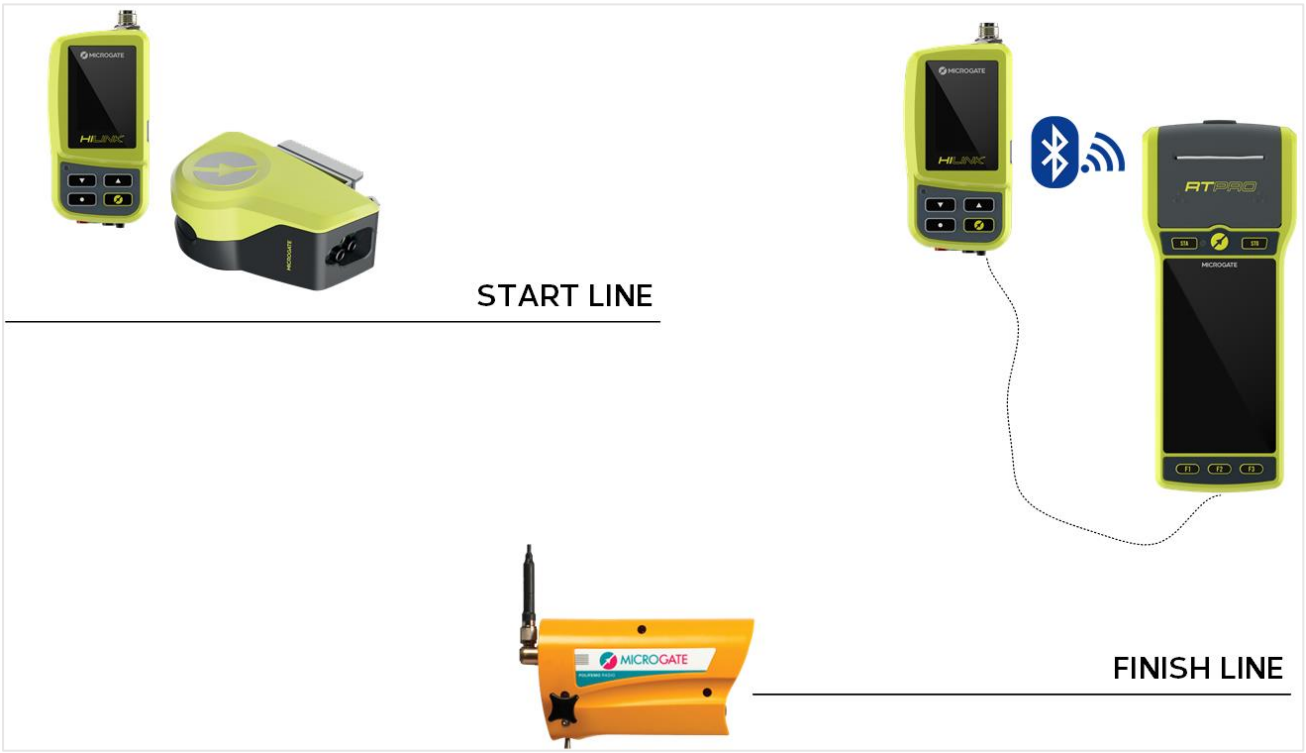
1. The transmission frequency of the EncRadio devices must be the same as that selected on the HiLink devices. The compatibility table is as follows:

Center Frequency [MHz]	HIFamily [FREQ Number]	LinkGate Radio (multi-frequency) [DIP SWITCH]			
		Switch 1	Switch 2	Switch 3	Switch 4
433.9000	33	ON	ON	ON	ON
433.9500	35	OFF	ON	ON	ON
434.0000	37	ON	OFF	ON	ON
434.0500	39	OFF	OFF	ON	ON
434.1000	41	ON	ON	OFF	ON
434.1500	43	OFF	ON	OFF	ON
434.2000	45	ON	OFF	OFF	ON
434.2500	**47**	**OFF**	**OFF**	**OFF**	**ON**
434.3000	49	ON	ON	ON	OFF
434.3500	51	OFF	ON	ON	OFF
434.4000	53	ON	OFF	ON	OFF
434.4500	55	OFF	OFF	ON	OFF
434.5000	57	ON	ON	OFF	OFF
434.5500	59	OFF	ON	OFF	OFF
434.6000	61	ON	OFF	OFF	OFF
434.6500	63	OFF	OFF	OFF	OFF

The default HiLink frequency is the default frequency of the EncRadio systems.

2. The Radio Channel of the EncRadio devices used must match the GroupID of the HiLink system.

9.4 RTPRO AND HILINK USED IN CONJUNCTION WITH ENCRADIO SF AND POLIFEMO RADIO SF TRANSMITTERS



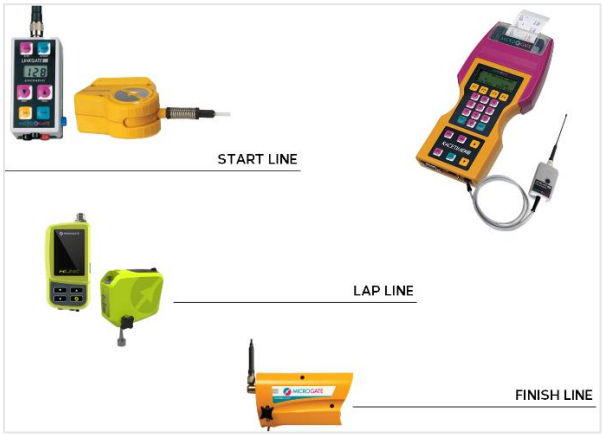
The HiLink system fully interfaces with the old EncRadio SF 10mW and 500mW transmitters and with the Polifemo SF photocells without any need for specific configurations. However, the following parameters must be taken into account:

1. The transmission frequency of the HiLink devices must be set to the following values:

Center Frequency [MHz]	HIFamily [FREQ Number]	Linkgate Radio SF/SF2/SF3/SF4 (single frequency)			
		SF	SF2	SF3	SF4
433.9200	Not compatible		*		
434.0750	40	*			
434.6000	61			*	
434.7000	65				*

2. The Radio Channel of the EncRadio devices used must match the GroupID of the HiLink system.

9.5 RACETIME 2 AND HILINK USED AS TRANSMITTER



If you have a Racetime2 stopwatch with a Linkgate MF or SF transmission system, you can always integrate it with new HiLink transmitters.

HiLink transmitters must be configured as follows:

Start	**Intermediate**	**Finish**
Settings **Lines** Line 1 = START **Mode** Mode= EncRadio HiSmart Trigger= 0-Disabled	**Settings** **Lines** Line 1 = LAP 1 (or the next one) **Mode** Mode= EncRadio HiSmart Trigger= 0- Disabled	**Settings** **Lines** Line 1 = STOP **Mode** Mode= EncRadio HiSmart Trigger= 0- Disabled

The following parameters must then be taken into account:

1. The transmission frequency of the HiLink devices must be set to the following values:

In the case of SF systems

Center Frequency [MHz]	HIFamily [FREQ Number]	Linkgate Radio SF/SF2/SF3/SF4 (single frequency)			
		SF	SF2	SF3	SF4
433.9200	Not compatible		*		
434.0750	40	*			
434.6000	61			*	
434.7000	65				*

In the case of MF systems

Center Frequency [MHz]	HIFamily [FREQ Number]	LinkGate Radio (multi-frequency) [DIP SWITCH]			
		Switch 1	Switch 2	Switch 3	Switch 4
433.9000	33	ON	ON	ON	ON
433.9500	35	OFF	ON	ON	ON
434.0000	37	ON	OFF	ON	ON
434.0500	39	OFF	OFF	ON	ON
434.1000	41	ON	ON	OFF	ON
434.1500	43	OFF	ON	OFF	ON
434.2000	45	ON	OFF	OFF	ON
434.2500	**47**	**OFF**	**OFF**	**OFF**	**ON**
434.3000	49	ON	ON	ON	OFF
434.3500	51	OFF	ON	ON	OFF
434.4000	53	ON	OFF	ON	OFF
434.4500	55	OFF	OFF	ON	OFF
434.5000	57	ON	ON	OFF	OFF
434.5500	59	OFF	ON	OFF	OFF
434.6000	61	ON	OFF	OFF	OFF
434.6500	63	OFF	OFF	OFF	OFF

2. The Radio Channel of the EncRadio devices used must match the GroupID of the HiLink system.

9.6 RACETIME 2 AND HILINK USED AS RECEIVER VIA CABLE

The HiLink system can also be used as a radio receiver for the cable-connected Racetime2 stopwatch.

In this case the HiLink system does not need any configuration.

The following parameters must then be taken into account:

2. The reception frequency of the HiLink device must be set to the following values:

In the case of SF transmission systems

Center Frequency [MHz]	HIFamily [FREQ Number]	Linkgate Radio SF/SF2/SF3/SF4 (single frequency)			
		SF	SF2	SF3	SF4
433.9200	Not compatible		*		
434.0750	40	*			
434.6000	61			*	
434.7000	65				*

In the case of MF transmission systems

Center Frequency [MHz]	HIFamily [FREQ Number]	LinkGate Radio (multi-frequency) [DIP SWITCH]			
		Switch 1	Switch 2	Switch 3	Switch 4
433.9000	33	ON	ON	ON	ON
433.9500	35	OFF	ON	ON	ON
434.0000	37	ON	OFF	ON	ON
434.0500	39	OFF	OFF	ON	ON
434.1000	41	ON	ON	OFF	ON

434.1500	43	OFF	ON	OFF	ON
434.2000	45	ON	OFF	OFF	ON
434.2500	**47**	**OFF**	**OFF**	**OFF**	**ON**
434.3000	49	ON	ON	ON	OFF
434.3500	51	OFF	ON	ON	OFF
434.4000	53	ON	OFF	ON	OFF
434.4500	55	OFF	OFF	ON	OFF
434.5000	57	ON	ON	OFF	OFF
434.5500	59	OFF	ON	OFF	OFF
434.6000	61	ON	OFF	OFF	OFF
434.6500	63	OFF	OFF	OFF	OFF

3. The Radio Channel of the EncRadio devices used must match the GroupID of the HiLink system.

10 HISMART THE AUTOMATIC SYSTEM FOR THE RECOGNITION OF ATHLETES

The HiSmart device is an integrated tag in the HiLink system designed for automatic recognition of athletes. HiSmart uses a Bluetooth protocol that allows the start, intermediate and finish HiLink to be sent the bib number of the athlete who will pass through that point. The device is supplied with a preset bib number that can be read in the top window and can be changed by HiLink (see HiSmart bib change menu) or by the ProUpdater program that can be downloaded from the Microgate website.

The HiLink system allows you to configure the distance at which HiSmart will be detected.

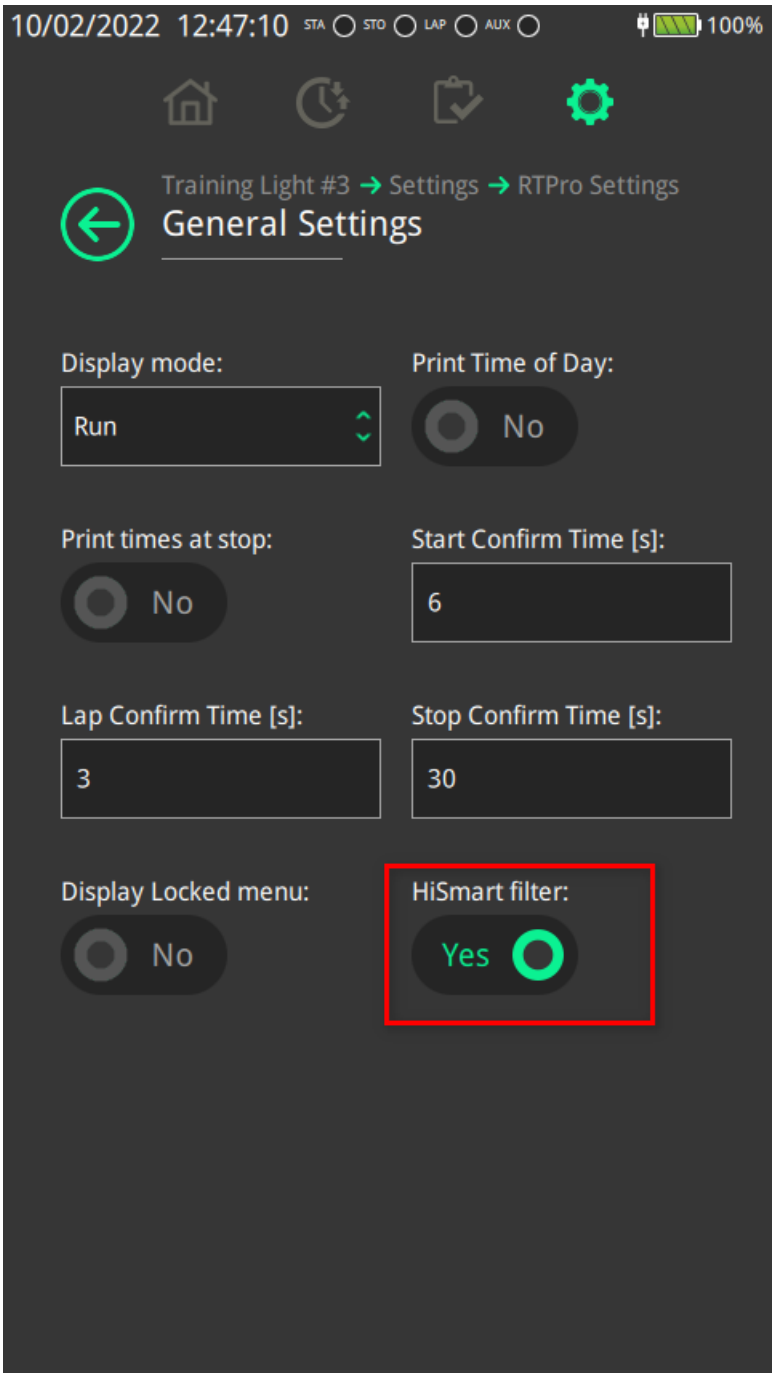
This setting allows determining at what distance HiLink will consider HiSmart devices to be in the area, and therefore the number in transmission. The possible settings are:

- 0= Disabled
- 1= Immediate Area; approximate receiving distance 20cm (used for example at the start in skiing)
- 2= Near Area; approximate receiving distance 3m
- 3= Far Area; approximate receiving distance 30m
- 4= Very Far Area; approximate receiving distance 60m

The recommended basic configurations are as follows:

Start	Intermediate	Finish
Settings **Lines** Line 1 = START **Mode** Mode= Normal HiSmart Trigger= 1 Immediate	**Settings** **Lines** Line 1 = LAP 1 (or the next one) **Mode** Mode= Normal HiSmart Trigger= 4 Very Far	**Settings** **Lines** Line 1 = STOP **Mode** Mode= Normal HiSmart Trigger= 4 Very Far

On the RTPro stopwatch, for the “Training Light” program, it is also possible to configure a parameter which, during timing, only filters the times of HiSmart owners detected by HiLink. In “Settings”- “RTPro Settings”- “Software Configuration” the parameter “HiSmart Filter”, if selected, enables this feature.



10.1 SWITCHING ON AND OFF

HiSmart is switched on by pressing and holding the middle button (Microgate symbol) for longer than 3 seconds. Once on, the status LED blinks slowly with a GREEN light. If the button is held down for less than 3 seconds, the RED LED (error signal) is shown for 3 seconds and the device remains off. This feature is designed to prevent the device from being turned on accidentally by briefly pressing the button.

To switch off, you need to press and hold the middle button for longer than 3 seconds and then the status LED will turn RED. At that time, on releasing the button, the device will switch off.

10.2 CHARGING HISMART

HiSmart is charged with any 5V charger with at least 100mA of power with a USB socket and a USB-A to USB-C or USB-C to USB-C cable or with an inductive charger (any mobile charger is suitable). Once set charging, the status LED will light up steady AMBER. When HiSmart is fully charged (full charging takes approximately 2 hours) the light is steady GREEN. If the status LED slowly blinks RED after the device is turned on, the device is in Low Battery status.

5V chargers must comply with IEC/EN 61010-1. In this case, they can alternatively comply with IEC/EN 62368-1 provided that their environmental conditions are compatible with those of the device.

10.3 BATTERY LIFE

With a full charge, HiSmart will run for more than 14 hours. Once low battery has been signalled, the device still has 2 hours of battery life.

With a full charge, HiSmart will run for more than 45 hours continuously. Once low battery has been signalled, the device still has 2 hours of battery life. If no motion is detected, the device goes into a standby condition that allows extending the usage time. The device wakes up from standby mode automatically when any movement is detected.

10.4 SLEEP MODE AND HARDWARE RESET

To perform a HiSmart Hardware reset, with the device turned on, press and hold the middle button until the status LED, which has turned RED, switches completely off. After doing this, HiSmart goes into a Sleep mode with very low power consumption (10nA) that preserves the battery.

On the contrary, switching the device off normally will deplete the batteries (if not used) in approximately 2 months.

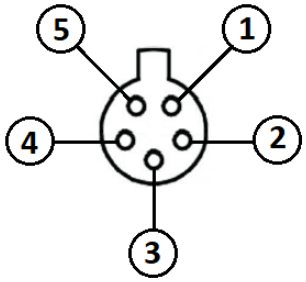
10.5 HISMART TECHNICAL SPECIFICATIONS

GENERAL	
Weight	17 g
Dimensions	42 x 42 x 14 mm
Operating temperature	–10°/+60°C
POWER SUPPLY	
Power supply	External power supply 5VDC 200mA; Internal Li-Po battery
Battery recharging	Built-in smart recharging device • Charging via USB C • Qi inductive charging (WPC v1.2)
Uptime	> 45 ore
Power ON/OFF	From the keyboard, with Microgate key
USER INTERFACE	
Keyboard	1-key keyboard, covered with a protective waterproof membrane
Processing unit	Architecture based on a processor • 32-bit 64 MHz ARM
Inertial sensor	Three-axis accelerometer Three-axis gyroscope
CONNECTIONS	
Power supply Device USB	1 x USB C port • Connection for external power supply • USB 2.0 to devices
BT	1 x Integrated BT + Antenna module • Bluetooth: 5.1BLE

11 HiLink Connectors (pin out)

All connectors are viewed from the contact side (as seen when looking at the HiLink from the front). The connection diagrams are provided for documentation purposes. Microgate recommends using its original cables, which are EC approved.

Female connector, Binder 5-pole 240°



11.1 Chronometer

Female connector, Binder 5-pole 240°

1	RS232 serial output (TXD)
2	Not connected
3	RS232 serial input (RXD)
4	Not connected
5	Ground

12 HiLink Radio Frequencies

12.1 HiFamily Radio Frequency Table – 434 MHz Band

Center Frequency [MHz]	HIFamily [FREQ Number]
433.0750	0
433.1000	1
433.1250	2
433.1500	3
433.1750	4
433.2000	5
433.2250	6
433.2500	7
433.2750	8
433.3000	9
433.3250	10
433.3500	11
433.3750	12
433.4000	13
433.4250	14
433.4500	15
433.4750	16
433.5000	17
433.5250	18
433.5500	19
433.5750	20
433.6000	21
433.6250	22
433.6500	23
433.6750	24
433.7000	25
433.7250	26
433.7500	27
433.7750	28
433.8000	29
433.8250	30
433.8500	31
433.8750	32
433.9000	33
433.9250	34
433.9500	35
433.9750	36
434.0000	37
434.0250	38
434.0500	39
434.0750	40
434.1000	41
434.1250	42
434.1500	43
434.1750	44
434.2000	45
434.2250	46
434.2500	**47**
434.2750	48
434.3000	49
434.3250	50
434.3500	51
434.3750	52
434.4000	53
434.4250	54
434.4500	55
434.4750	56
434.5000	57
434.5250	58
434.5500	59
434.5750	60
434.6000	61
434.6250	62
434.6500	63
434.6750	64
434.7000	65
434.7250	66
434.7500	67
434.7750	68

12.2 LinkGate Radio MF compatible Radio Frequency Table – 434 MHz Band

Center Frequency [MHz]	HIFamily [FREQ Number]	LinkGate Radio (multi-frequency) [DIP SWITCH]			
		Switch 1	Switch 2	Switch 3	Switch 4
433.9000	33	ON	ON	ON	ON
433.9500	35	OFF	ON	ON	ON
434.0000	37	ON	OFF	ON	ON
434.0500	39	OFF	OFF	ON	ON
434.1000	41	ON	ON	OFF	ON
434.1500	43	OFF	ON	OFF	ON
434.2000	45	ON	OFF	OFF	ON
434.2500	**47**	**OFF**	**OFF**	**OFF**	**ON**
434.3000	49	ON	ON	ON	OFF
434.3500	51	OFF	ON	ON	OFF
434.4000	53	ON	OFF	ON	OFF
434.4500	55	OFF	OFF	ON	OFF
434.5000	57	ON	ON	OFF	OFF
434.5500	59	OFF	ON	OFF	OFF
434.6000	61	ON	OFF	OFF	OFF
434.6500	63	OFF	OFF	OFF	OFF

12.3 LinkGate Radio SF compatible Radio Frequency Table – 434 MHz Band

Center Frequency [MHz]	HIFamily [FREQ Number]	Linkgate Radio SF/SF2/SF3/SF4 (single frequency)			
		SF	SF2	SF3	SF4
433.9200	Not compatible		*		
434.0750	40	*			
434.6000	61			*	
434.7000	65				*

13 METHOD OF USE

Environmental conditions of use of HiLink and HiSmart devices:

- Use: indoor and outdoor
- max altitude 3000m
- operating temperature HiLink: -20°C +60°C
- operating temperature HiSmart: -10°C +60°C
- relative humidity: max. 90%
- pollution degree: 2

If the devices are used outside the specified environmental limits or in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

14 CLEANING THE DEVICES

We understand that customers may have questions about cleaning and disinfection options for their Microgate products. The following applies to all Microgate products.

1. Disposable gloves are recommended when cleaning and disinfecting surfaces.
2. Turn off the device you want to clean and disconnect the AC power supply. Never clean a product while it is turned on or plugged in.
3. Do not spray liquids directly onto the product.
4. Moisten a microfibre cloth with a mixture of 70% isopropyl alcohol and 30% water. The cloth has to be moist, but not wet. If wet, wring the cloth thoroughly before wiping the product.
5. Gently wipe the moist cloth over the surfaces to be cleaned.
6. When cleaning the screen, gently wipe in one direction from the top of the screen downwards.
7. The surfaces must be completely dry before switching on the device after cleaning. The product surfaces must not show any trace of moisture before the product is turned on or connected to the power supply.
8. After cleaning or disinfecting a glass surface, it can be cleaned again using a specifically formulated glass cleaner for the surfaces of the display and following the instructions for that specific cleaner. Glass cleaning products containing ammonia should be avoided.
9. Dispose of used disposable gloves after each cleaning. Wash hands immediately after removing and disposing of gloves.

The use of the following chemicals or products containing these chemicals should be avoided:

- Any chlorine based cleaner, such as bleach
- Peroxides (including hydrogen peroxide)
- Solvents such as acetone, paint thinner, benzene, methylene chloride or toluene
- Ammonia (e.g. products for glass)
- Ethyl alcohol

Using any of the chemicals listed above will cause permanent damage to some product surfaces. By following the steps described in this document, you can minimize the risk of damage.

15 TECHNICAL SUPPORT

For any technical Support, please contact directly:

Microgate s.r.l.

Via Waltraud Gebert Deeg 3E

39100 Bolzano

Italy

https://timing.microgate.it

info@microgate.it