MICROGATE

HISENS

User Manual

Firmware Version: 1.1.9

Manual Version: 1.0.0

Issue Date: 27/02/2024

Contents

1 HISENS GENERAL DESCRIPTION

Antenna with TNC connector
(for radio version only)

USB-C connector for charging and data output

Banana-banana connectors for signal output

Tightening knob

Adjustable joint rotating through 90°

Sight for alignment

Alignment LED

Power button

Status LED

HiSens is the first lens-free professional timing photocell, developed thanks to the know-how and technology from the field of telescopes. This technical solution has significantly increased its optical range (up to 40 metres) and improved its efficiency.

In addition to the basic functionality of a classic photocell (used with a reflector or in dual mode with a range of up to 90m), **HiSens** introduces the idea of a new generation sensor that guarantees considerably greater operational distances, easy alignment and immunity to optical interference.

Available models:

code	description	Line	Bluetooth	Radio	Duration
$HSS001	Model with radio transmission (10mW)	X	X	X	>16 h
$HSS002	Model without radio transmission	X	X		>18 h
$HSS003	Reflector				

Its extended temperature range, thermocompensated time base of ±1 ppm, GPS module for synchronizing the time base with the satellite signal and Bluetooth connectivity make it an ideal device for integration with the **HiLink** and **HiSmart** systems and the Pro Series **ReiPRO** and **RTPRO** stopwatches.

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

The version with built-in radio transmission (power of 10mW) then integrates both transmitter functionality (**EncRadio**) and receiver functionality (**DecRadio**) using a transceiver module operating in the 433 MHz. band and allows it to be used with the **HiLink** systems using up to 68 frequencies.

BASIC CHARACTERISTICS

EMBEDDED EncRadio and DecRadio functionality (on the Radio version)

DIMENSIONS (WxHxD)	128 x 118 x 56 mm
WEIGHT 515 g	
TEMPERATURE RANGE	-20°C +60°C
TIME BASE	temperature compensated oscillator + GPS PPS
TIME MEASUREMENT UNITS	selectable down to 1/10,000 of a second
TIME ACCURACY	1/50,000 of a second
RADIO and BT LE CONNECTIVITY	Radio in the 433,075 MHz to 434,775 MHz band with 68 user-selectable frequencies, 10 mW output power $HSS001 model. Bluetooth Low Energy connectivity
INTERACTION WITH	HiSmart Tag for Smart Identification
BATTERY	3.35Ah Li-ion with operating time > 16h ($HSS001 model) > 18h ($HSS002 model)

2 LISTEN BEFORE TRANSMIT (LBT)

HiSens has a particularly innovative feature that allows the device to prevent simultaneous transmissions of multiple transmitters from overlapping with the chance of losing a pulse. Before starting any **HiSens** transmission it checks that the frequency being used is free and only then transmits the information. If the frequency is occupied, **HiSens** 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 SWITCH-ON AND ALIGNMENT

The **HiSens** photocell is switched on by briefly pressing the Microgate ON/OFF button.

The photocell has two separate LEDs, with these meanings:

	Upper alignment LED: - Red = photocell not aligned - Amber = photocell at the limit of alignment - Green = photocell aligned When aligned, the light (green if OK, amber if at the limit) starts blinking with one flash every 3 seconds and then goes back to steady. When interrupted, the light turns red and goes back to the previous colour when the competitor has passed
	Lower status LED: - See LED Status chapter

The alignment on the reflector (code $HSS003) is made by loosening the tightening knob and using the alignment LED and the sight to aim at the reflector. When the photocell is aligned, the audible signal ceases and the upper alignment LED appears steady Green.

4 MEANING OF STATUS AND ALIGNMENT LEDS

4.1 PHOTOCELL OFF

4.1.1 Status LED

LED status	Meaning
Off	Photocell off
pulsing red	External power supply and issue with battery (temperature)
Pulsing amber	External power supply and battery charging
Steady green	External power supply and battery charged

4.1.2 Alignment LED

LED status	Meaning
Off	The photocell is off

4.2 PHOTOCELL ON

4.2.1 Status LED

LED status (various short-long flashes)	Meaning
Short red	Battery almost flat
Short green	Battery with a good charge
Long green	Transmission of an event on the selected radio frequency
Long amber	Transmission waiting for the frequency to become free
Short amber	GNSS Sync status: Awaiting the signal
Short white	GNSS Sync status: Continuous synchronisation activated
Long blue	Bluetooth communication with another device is active

4.2.2 Alignment LED in SINGLE operation (Default) or DUAL RX

LED status	Meaning
Steady red	Photocell not aligned or interrupted
Steady amber and after 10 seconds Short amber	Photocell not perfectly aligned or reflector positioned far off
Steady green and after 10 seconds Short green	Photocell optimally aligned

4.2.3 Alignment LED in DUAL TX operation

LED status	Meaning
Flashing green	TX mode activated

5 SETTINGS

The settings of the **HiSens** photocell can be defined with a Bluetooth connection:

- to one of the two stopwatches **ReiPRO** or **RTPRO**
- using the Hisettings configuration app

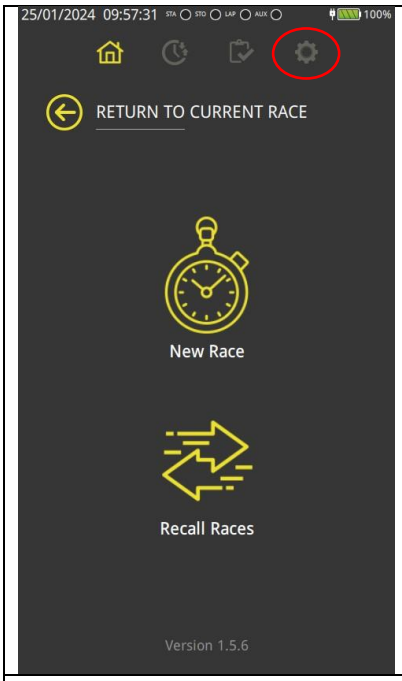
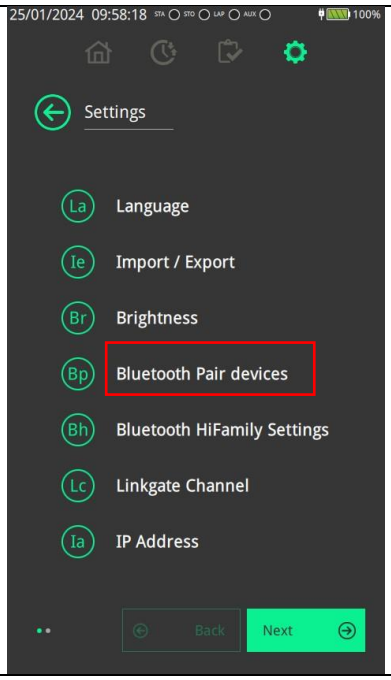
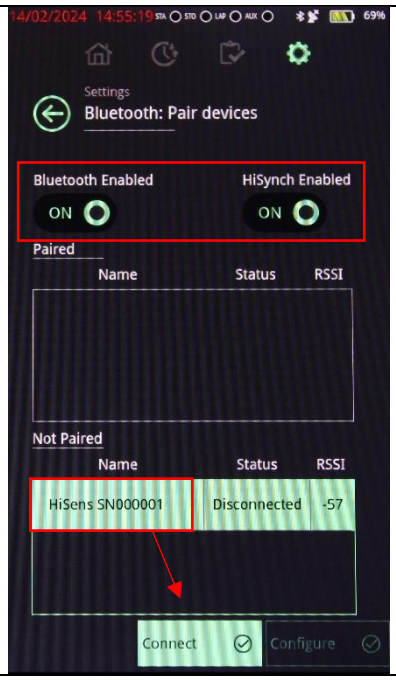
5.1 SETTING VIA STOPWATCH RTPRO – REIPRO

The Bluetooth connection is made with the following procedure:

- Pair the photocell with the stopwatch (to be done once only)
- Select the paired device and change the settings

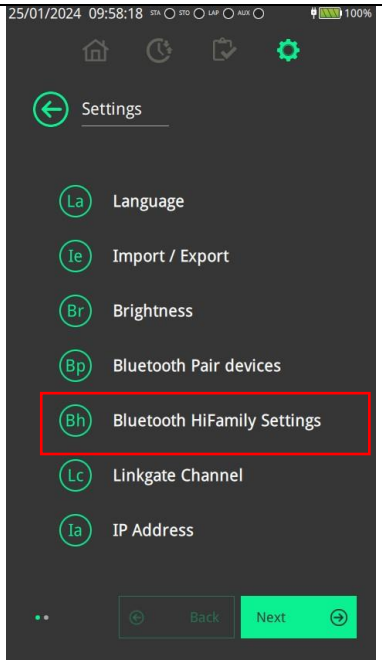
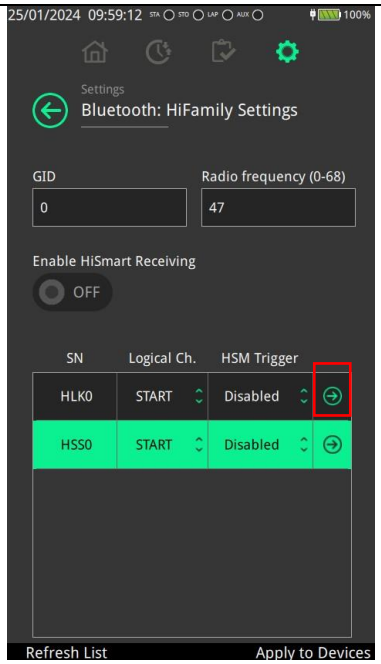
5.1.1 Pairing the photocell with the stopwatch

The first step is to connect the photocell to the stopwatch, by making the Bluetooth pairing with the stopwatch:

		
1. From the RTPro main screen, click on the settings icon	2. Select the “Bluetooth Pair devices” menu	3. Verify that the **Bluetooth** and **HiSynch** functions are enabled 4. Select that device from the list of available devices and press connect.

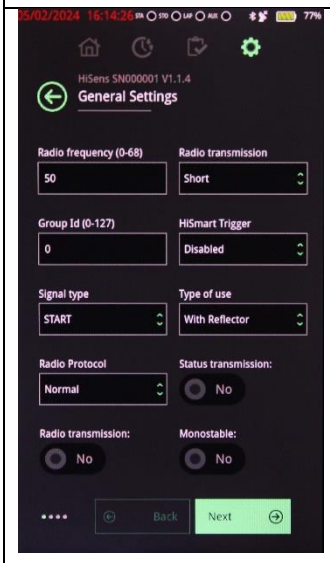
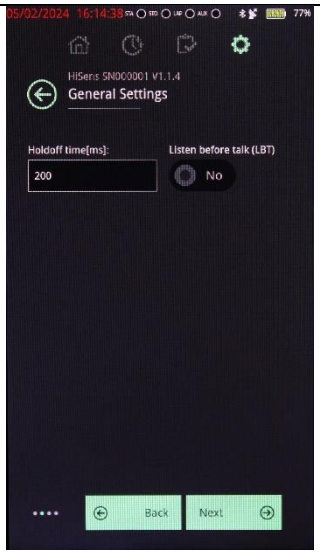
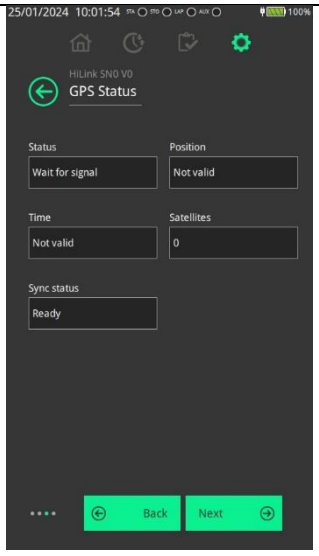
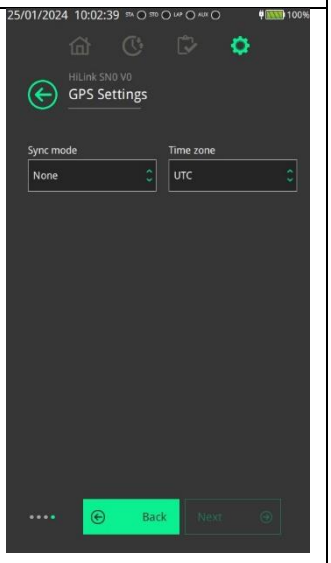
5.1.2 Selecting the paired device and changing the settings

After connecting the device via Bluetooth pairing, the device will be visible in the Bluetooth HiFamily Settings section

Select the “Bluetooth HiFamily Settings” menu	The following page shows the GID settings and frequency along with a list of connected devices, each one with its own serial number	
		**GID** = group identifier. Up to 127 separate Groups can operate on each selected frequency **Radio Frequency (0-68)** = identifier of the selected radio frequency, around 434 MHz (frequency 47 = ENC-DECradio) Enable Hismart Receiving = see dedicated chapter After selecting the device, I can change the logical channel (STA, LAP1-14, STO) and the HiSmart detection power in the list. The right arrow enables the advanced setting of the photocell Refresh list → refresh device list Apply to devices → applies the GID and radio frequency changes to all the devices in the list

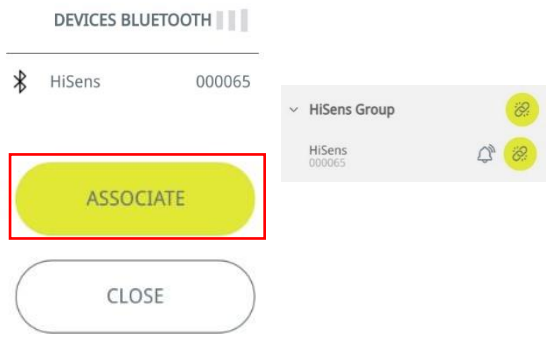
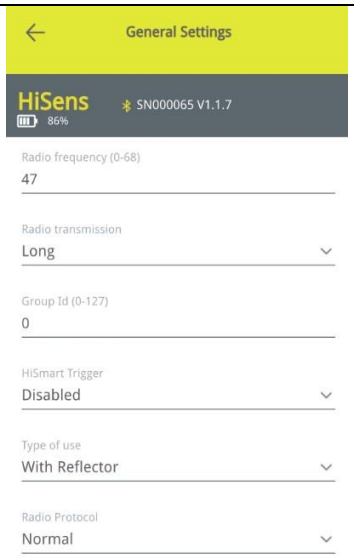
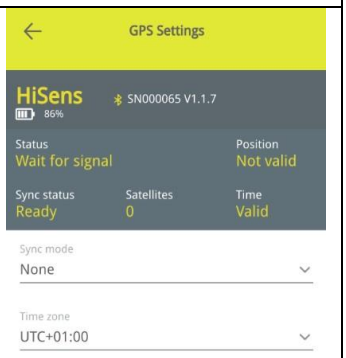
When the photocell is selected in the list you hear a double beep and the status LED blinks to signal which photocell you are working on.

The following menus appear when the right arrow is selected:

General Settings 1/2	General Settings 2/2	GPS Status	GPS Settings
			

5.2 SETTING VIA HISETTINGS APP

By using the HiSettings configuration app you can define the same parameters described above:

Add and connect the device	General Settings	GPS Settings
 add HiSens to the list of devices  ASSOCIATE, select from the list and CONNECT		

5.3 RADIO

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

5.3.1 Radio Frequency

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

5.3.2 Group ID - GID

This corresponds to the channel of the old Linkgate transmission. The receiving stopwatch must have the same number set in the Group ID. Group ID is generally a filter that selects radio pulses that travel on the same frequency but belong to the same Group ID.

Radio Frequency and GID must be the same on all the devices for the radio system to work properly.

5.3.3 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.

5.3.4 IR mode

Normal if I want to operate only with HiFamily devices, **ENCradio** if I want to use devices in the previous LinkGate series (NB: they must all be set in this way)

5.3.5 Listen Before Transmit (LBT)

When enabled, it adds the function described at the start of this document, that is the possibility of managing overlapping pulses, queueing them and sending them as soon as the frequency becomes free.

5.3.6 Event Transmission

By default it is set to **Yes** so radio transmission is active. Set to No if you do not want to transmit the event by radio.

5.3.7 Status Transmission

When enabled, the photocell transmits information on status, such as for example the battery charge level

5.4 PHOTOCELL SETTINGS

5.4.1 Selecting the logical channel by radio

Selecting the logical channel associated with the device: the detected signal is transmitted as **STOP**, or as **LAP1-14** (if using as intermediate) or as **START** if using at the start (for example for Mountain bike starts, …)

5.4.2 Type of Use

This permits selecting its use:

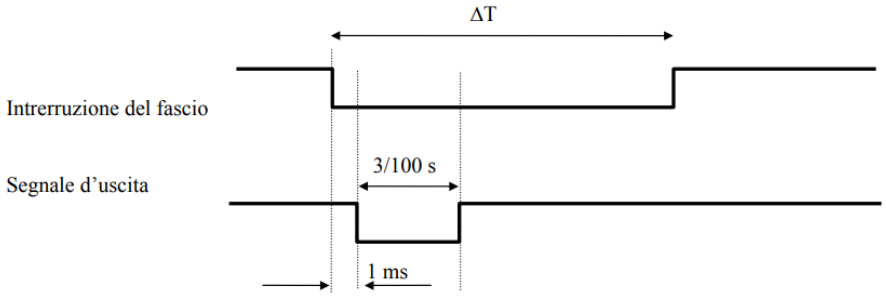
- **With Reflector** - using the single photocell (Standard)
- **Double RX** – using two opposing photocells, this is set as receiver
- **Double TX** – using two opposing photocells, this is set as transmitter

5.4.3 Holdoff times

This permits adding a time in which the photocell is “not active”, in other words it manages no runs detected within the set time. This option is useful in the case of a slow run or a vehicle passing with more than one wheel (e.g. Mountain bike at the start, which passes slowly with its two wheels)

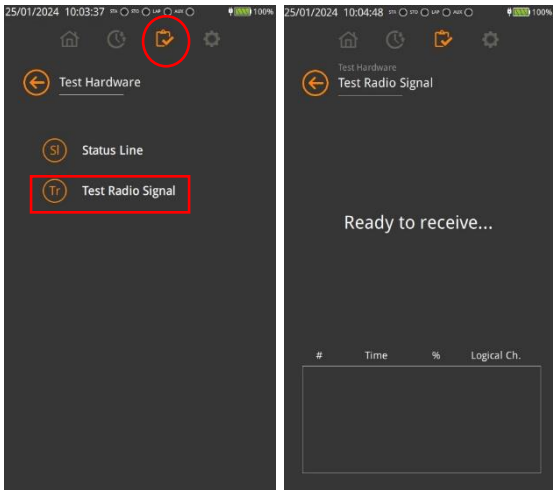
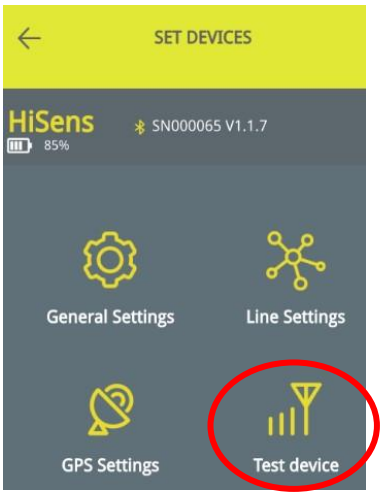
5.4.4 Monostable

A particular way of using the photocell when it is necessary to capture multiple signals on the same line with no risk of a permanent interruption of one of the photocells (e.g. an incorrectly centred photocell) permanently blocking the whole line.



5.5 HOW TO CHECK THAT THE SET PARAMETERS ARE CORRECT

To verify whether the settings are correct:

On RTpro or ReiPro	On the setting app
	

Interrupt the beam of the photocell and verify whether these parameters are correct:

Dispositivo: HiSens SN: 65 GID: 0 Segnale: 100% Canale L.: STOP	**Device: HiSens** (HiLink) Serial number **SN: 65** (on the label) Group ID – **GID = 0** Signal strength - **Signal: 100%** Logical channel – **L. Channel: STOP**

5.6 USING HISMART

5.6.1 HiSmart Trigger

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

- 0= Disabled; you do not intend to use HiSmart
- 1= Immediate Area; approximate receiving distance 20cm (not to be used for HiSens)
- 2= Near Area; approximate receiving distance 3m
- 3= Far Area; approximate receiving distance 30m
- 2= Very Far Area; approximate receiving distance 60m

Depending on the position, it is recommended to set the HiSens photocell as follows:

Start	Intermediate	Finish
Radio Type = START **Mode** = Normal **HiSmart Trigger**= 2 Near Area	**Radio Type** = LAP 1 (or the next one) **Mode** = Normal **HiSmart Trigger**= 4 Very Far	**Radio Type** = LAP 1 (or the next one) **Mode** = Normal **HiSmart Trigger**= 4 Very Far

5.6.2 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\HiSens devices (LAP_N and STOP) and also once it has transited and been detected by a subsequent HiLink\HiSens device (LAP_N and STOP) it will no longer be taken into account by that particular device.

5.6.2.1 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.

5.6.2.2 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.

5.7 GPS AND TIME ZONE

HiSens can be synchronized with satellite time.

5.7.1 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
- **Once**: in this mode once the satellite signal is valid the internal base synchronizes with the satellite time and then continues with the accuracy of the internal clock of ±1 ppm
- **Continuous**: in this mode, once the satellite signal is valid, the internal base continuously synchronizes with the satellite time

5.7.2 Time Zone

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

For example, for Italy:

UTC + 2:00 if summer time (March - October)
UTC + 1:00 if standard time (November - February)

5.7.3 GPS Status

This is a screen of information about satellite signal quality.

6 BATTERY CHARGING AND OPERATING TIME

HiSens 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.

Battery operating time is longer than 16 hours with one transmission a minute for model $HSS001 and longer than 18h for model $HSS002.

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.

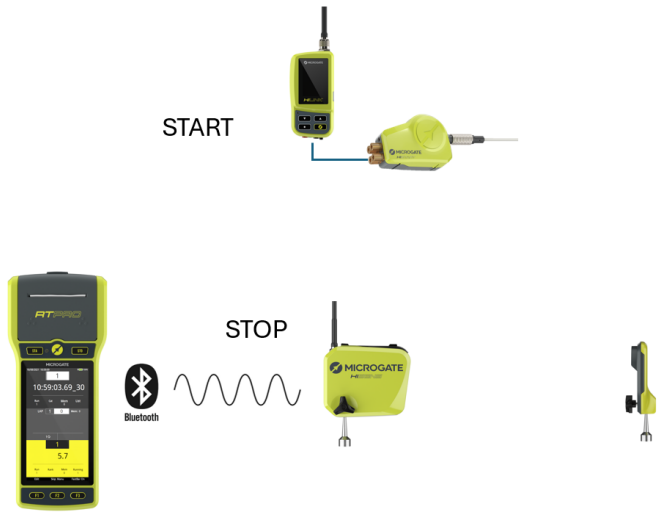
The **HiSens** battery has to be charged in a temperature range of between +10°C and +45°C

7 TECHNICAL SPECIFICATIONS

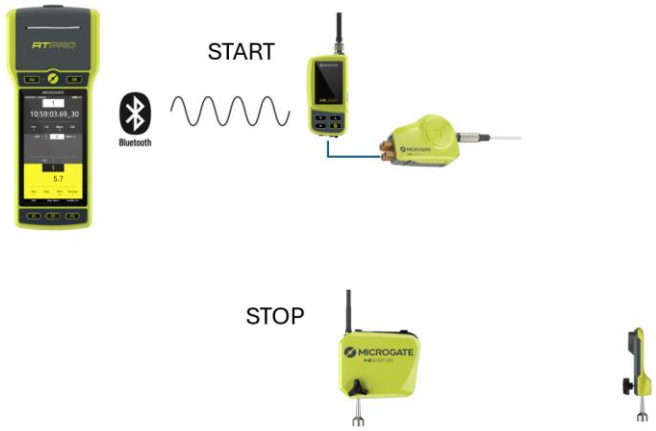
GENERAL	
Weight	515 g
Dimensions	128 x 118 x 56 mm
Operating temperature	–20°/+60°C
IP rating	IPX0
TIMING	
Measurement resolution	20 x 10^{-6}s (1/50000s)
Time base	24.0 MHz VCTCXO oscillator, stability ±1 ppm from -30° to +85°C (ageing in first year ±1ppm)
Accuracy	±0.0864 s/day for temperatures from -20° to +60°C
OPTICS	
Minimum resolution	0.1 ms
Delay in relation to the event	1 ms
Optical range	40 m
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	> 16 hours for model $HSS001 > 18 hours for model $HSS002
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 • 200 MHz MIPS32
CONNECTIONS	
Power supply Device USB	1 x USB C port • Connection for external power supply • USB 2.0 to Host devices
Output timing	1 x Ø 4 mm socket (Green) • Opto-isolated output
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 • Number of channels: 68 (with frequency steps between channels of 25 kHz) • Radio transmission range: approximately 2 km line of sight at 1m off the ground • Connection to external UHF antenna with TNC connector
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 POSSIBLE USES

8.1 HIFAMILY: HISENS RADIO, HILINK AND RTPRO (OR REIPRO) – VIA RADIO

<table>
<tr>
<td> 
</td>
<td>START: gate HiStart connected by cable to HiLink radio (green-black bushings)

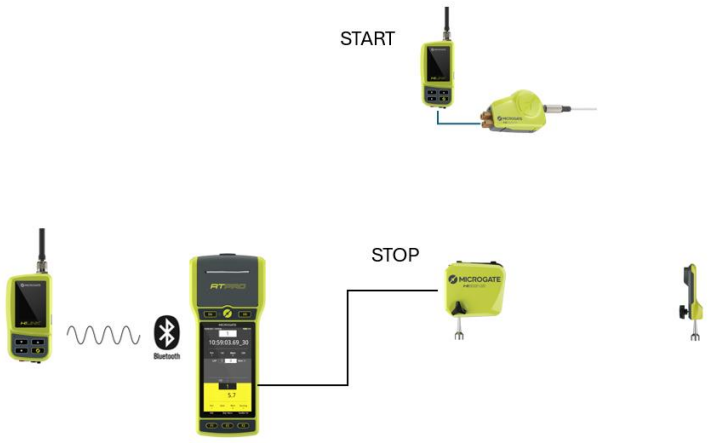
STOP:
HiSens Radio photocell aligned with reflector
RTpro (or ReiPro)

Operation:
- HiLink on START sends the start via radio to the HiSens photocell
- RtPro via Bluetooth receives the start and finish from the HiSens photocell</td>
</tr>
<tr>
<td> 
</td>
<td>START: gate HiStart connected by cable to HiLink radio (green-black bushings)
RTpro (or ReiPro)

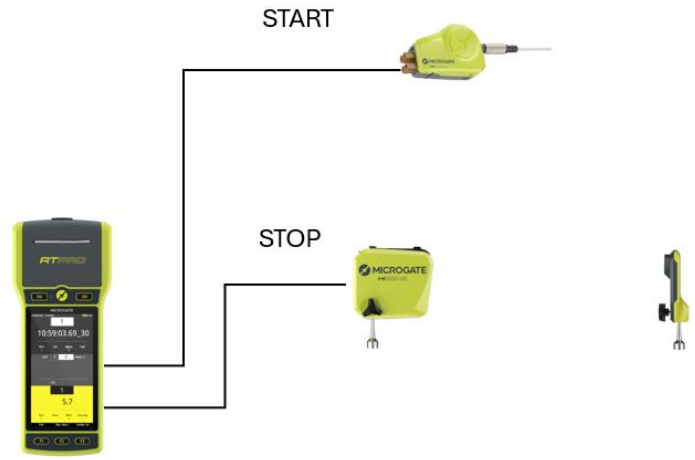
STOP:
HiSens Radio photocell aligned with reflector

Operation:
- HiLink on START sends the start via Bluetooth to RtPro
- Hisens sends the finish via radio to HiLink at the start, which sends it via Bluetooth to RTpro</td>
</tr>
<tr>
<td colspan="2">Note: In this mode the start number can be set on the HiLink radio and received by the RtPro (or ReiPro) stopwatch, while the Hisens photocell only transmits the pass (unless using HiSmart)</td>
</tr>
</table>

8.2 HiFamily: HiSens, HiLink and RTpro (or ReiPro) – by cable or mixed

<table>
<tr>
<td> 
</td>
<td>START: gate HiStart connected by cable to HiLink radio (green-black bushings)

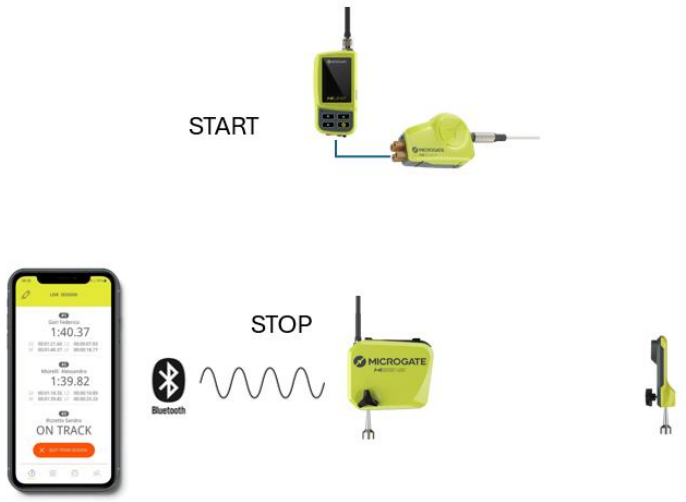
STOP:
HiSens photocell aligned with reflector
RTpro (or ReiPro) connected by cable to the HiSens photocell and via Bluetooth to the HiLink receiver

Operation:
- HiLink on START sends the start via radio to the HiSens photocell
- RtPro receives the start via Bluetooth and the finish by cable from the HiSens photocell</td>
</tr>
<tr>
<td> 
</td>
<td>START: gate HiStart connected to the finish by cable

STOP:
HiSens photocell aligned with reflector
RTpro (or ReiPro)

Operation:
- Gate sends pulse by cable to RTpro
- Hisens sends pulse by cable to RTpro</td>
</tr>
<tr>
<td colspan="2">Note: In this mode the device receives only pulses and numbers have to be assigned directly on the stopwatch</td>
</tr>
</table>

8.3 HiFamily: HiSens, HiLink and HiTiming APP – via radio

<table>
<tr>
<td> 
</td>
<td>START: gate HiStart connected by cable to HiLink radio (green-black bushings)

STOP:

HiSens Radio photocell aligned with reflector

HiTiming APP connected via Bluetooth to HiSens

Operation:

- HiLink on START sends the start <u>via radio</u> to the HiSens photocell
- HiTiming APP via Bluetooth receives the start and finish from the HiSens photocell</td>
</tr>
<tr>
<td> 
</td>
<td>START: gate HiStart connected by cable to HiLink radio (green-black bushings)

HiTiming APP connected via Bluetooth to HiLink radio

STOP:

HiSens photocell aligned with reflector

Operation:

- HiLink on START sends the start via Bluetooth to the HiTiming APP
- Hisens sends the finish <u>via radio</u> to HiLink at the start, which sends it via Bluetooth to the HiTiming APP</td>
</tr>
<tr>
<td colspan="2">Note: In this mode the start number can be set on the HiLink radio and received by the HiTiming APP, while the Hisens photocell only transmits the pass (unless using HiSmart)</td>
</tr>
</table>

8.4 USING ENC-DEC MF RADIO SYSTEMS AND\OR POLIFEMO RADIO PHOTOCELLS

The HiSens 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 HiSens 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
		ON	ON	ON	ON
		OFF	ON	ON	ON
		ON	OFF	ON	ON
		OFF	OFF	ON	ON
		ON	ON	OFF	ON
		OFF	ON	OFF	ON
		ON	OFF	OFF	ON
		OFF	**OFF**	**OFF**	**ON**
		ON	ON	ON	OFF
		OFF	ON	ON	OFF
		ON	OFF	ON	OFF
		OFF	OFF	ON	OFF
		ON	ON	OFF	OFF
		OFF	ON	OFF	OFF
		ON	OFF	OFF	OFF
		OFF	OFF	OFF	OFF

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

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

8.5 USING ENC-DEC SF RADIO SYSTEMS AND\OR POLIFEMO SF RADIO PHOTOCELLS

The HiSens 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 HiSens 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
	Not compatible		*		
	40	*			
	61			*	
	65				*

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

9 HISMART THE AUTOMATIC SYSTEM FOR THE RECOGNITION OF ATHLETES

The HiSmart device is an integrated tag in the HiLink\HiSens system designed for automatic recognition of athletes. HiSmart uses a Bluetooth protocol that allows the start HiLink or the intermediate and finish HiSens 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 HiSens system allows you to configure the distance at which HiSmart will be detected.

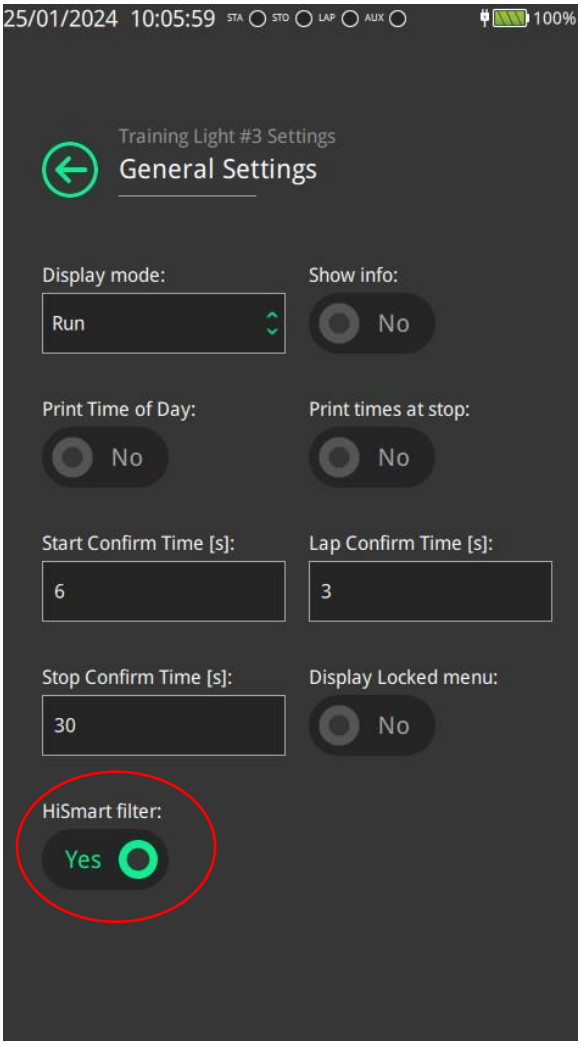
This setting allows determining at what distance HiSens will consider HiSmart devices to be in the area, and therefore the number in transmission. The possible settings are:

- 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**
Radio Type = START **Mode** = Normal **HiSmart Trigger**= 2 Near Area	**Radio Type** = LAP 1 (or the next one) **Mode** = Normal **HiSmart Trigger**= 4 Very Far	**Radio Type** = LAP 1 (or the next one) **Mode** = Normal **HiSmart Trigger**= 4 Very Far

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



9.1 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.

9.2 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.

The HiSmart battery has to be charged in a temperature range of between +5°C and +45°C

9.3 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.

9.4 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.

9.5 HISMART TECHNICAL SPECIFICATIONS

GENERAL	
Weight	17 g
Dimensions	42 x 42 x 14 mm
Operating temperature	–10°/+60°C
IP rating	IPX0
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 Host devices
BT	1 x Integrated BT + Antenna module • Bluetooth: 5.1BLE

10 HISENS RADIO FREQUENCIES

10.1 HIFAMILY RADIO FREQUENCY TABLE – 434 MHZ BAND

Center Frequency [MHz]	HIFamily [FREQ Number]	Center Frequency [MHz]	HIFamily [FREQ Number]	Center Frequency [MHz]	HIFamily [FREQ Number]

10.2 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
	33	ON	ON	ON	ON
	35	OFF	ON	ON	ON
	37	ON	OFF	ON	ON
	39	OFF	OFF	ON	ON
	41	ON	ON	OFF	ON
	43	OFF	ON	OFF	ON
	45	ON	OFF	OFF	ON
	47	**OFF**	**OFF**	**OFF**	**ON**
	49	ON	ON	ON	OFF
	51	OFF	ON	ON	OFF
	53	ON	OFF	ON	OFF
	55	OFF	OFF	ON	OFF
	57	ON	ON	OFF	OFF
	59	OFF	ON	OFF	OFF
	61	ON	OFF	OFF	OFF
	63	OFF	OFF	OFF	OFF

10.3 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
	Not compatible		*		
	40	*			
	61			*	
	65				*

11 METHOD OF USE

Environmental conditions of use of HiSens and HiSmart devices:

- Use: indoor and outdoor
- max altitude 3000m
- HiSens operating temperatures: -20°C +60°C
- HiSmart operating temperatures: -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.

12 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.

13 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