500mW WIRELESS PHOTOCELL HL3-5x

User's Manual

Version 11/2017

1. Description

Our latest HL3-5 photocell has an internal quartz clock, and an integrated 500mW radio module.
Integrating this new technology with our existing products like the HL675 Radio Data/Impulse Transmission, it is possible to synchronize up to 8 photocells at zero or with Time-of-Day, corresponding to the 8 possible inputs (CP540/545 channels 1-4 and 5-8).This allows the photocells to independently transmit data (ToD) or impulses. This new concept also gives the ability to perform training without a Chronoprinter or MiniTimer, the photocells HL3-5x and a HL675 Receiver are directly connected to a PC using the timing software with our standard communication protocol TAG Heuer (THCOM08).

Two modules combine to form the HL3-5X photocell

- **Infra-red transmitter HL 3-000** : with **High** / **Low** positions to adjust the intensity of the transmitter (compatible with photocells HL3-1x and HL3-5x)

- **Wireless Photocell HL 3-500** : with 500mW wireless impulse and data transmission system and three modes :
    - **IMPULSE** mode : calibrated impulse length at each interruption (standard mode)
    - **DIRECT** mode : with timing impulses which correspond to the interruption of the Infra-Red transmitter. This mode enables remote monitoring of the photocell alignment
    - **Data** Mode : transmission of the internal time of the photocell to a HL675 Radio Receiver.
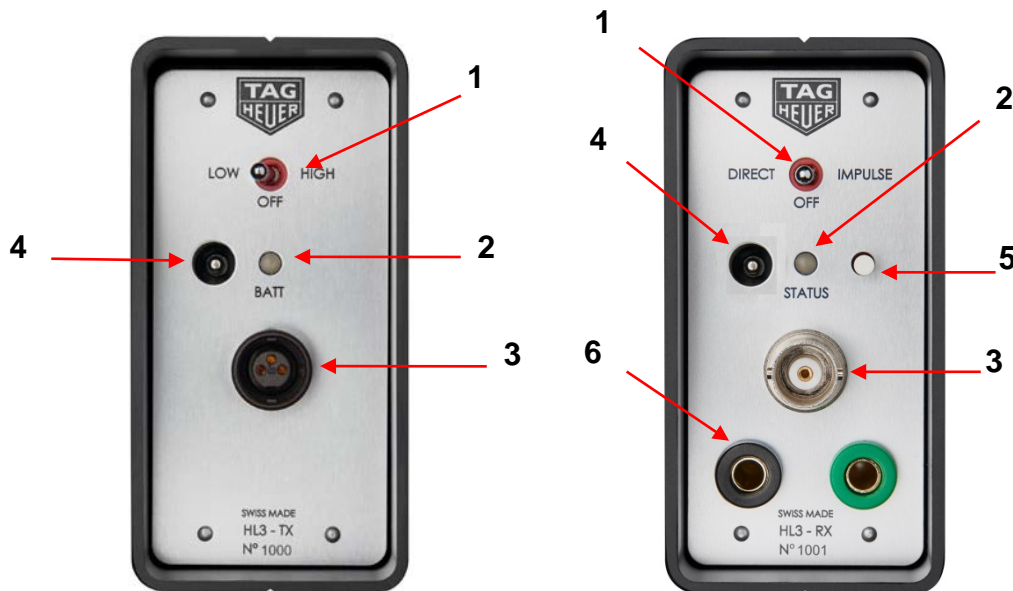
HL3-000 – Infra-Red Transmitter

1. High/Off/Low Power selector
2. Battery level LED
3. Connector Synchro (HL3-132)
4. Power Supply

HL3-500 – Wireless Photocell

1. Direct/Off/Impulse selector
2. Battery & Config. status LED
3. BNC antenna Connector
4. Power Supply
5. Select Button
6. Banana impulse connector

	NOTE:
	Photocells HL3-5x are compatible and connect wirelessly to the TAG Heuer Radio Data/Impulse Transmission Systems HL675.
	Functionality possibilities are described in this document.

2. Combinations

The HL3-X photocell generation allows multiple combinations to accommodate any sport and requirements.

HL3-531 – Wireless Kit photocell with reflector (HL3-500 + HL2-112)
Normal use & conditions, operating distance up to : 20m (65 ft)

Reflector HL2-112

Wireless Photocell
HL 3-500

HL3-532 – Dual Wireless Photocell with double Infra-red transmitter (2x HL3-500 + 2x HL3-000)
Normal use & conditions, operating distance up to : 40m/130ft (Low Power) & 80m/260ft (High Power)

2x Infra-red Transmitters
HL3-000
Synchro Cable – HL3-321

2x Wireless Photocells
HL3-500
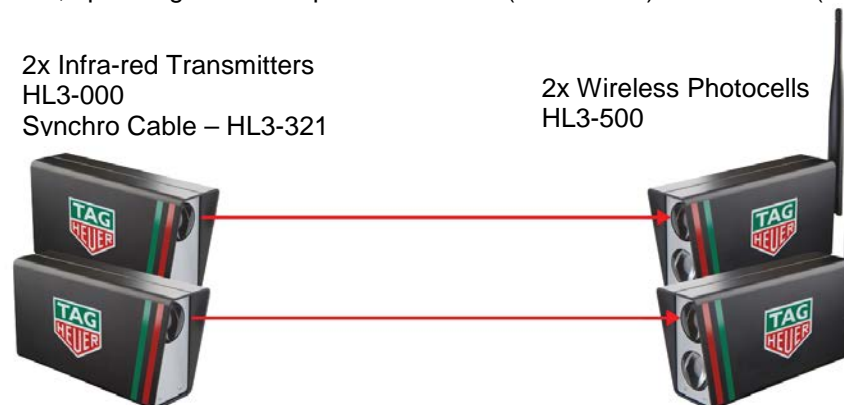
HL3-535 – Single Wireless Photocell with Infra-Red transmitter (1x HL3-500 + 1x HL3-000)
Normal use & conditions, operating distance up to : 40m/130ft (Low Power) & 80m/260ft (High Power)

1x Infra-red Transmitter
HL3-000

1x Wireless Photocell
HL3-500
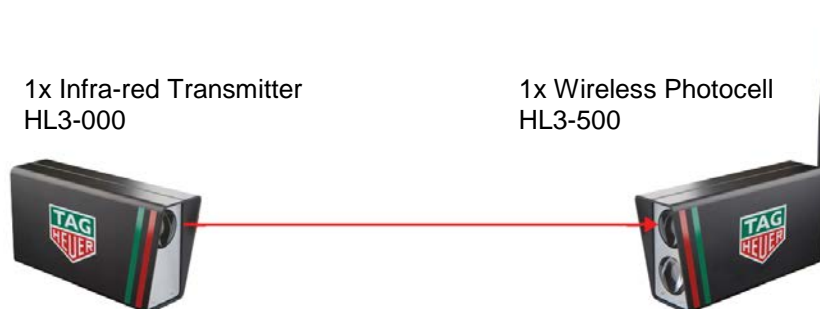
3. Configuration & Operation

HL3-000 : Infra-Red Transmitter

The **LOW** / **HIGH** selector modifies the intensity of Infra Red transmission and allows the distance between Transmitter and Wireless photocell to be increased or decreased.

LOW position : up to max. 40m (130 ft.)
HIGH position : up to max. 80m (260 ft.)

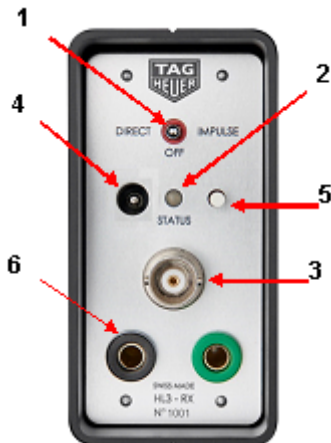Switch ON the transmitter by selecting your intensity setting using **LOW** / **HIGH** – selector (1)

Immediately following switch on the battery charge status is displayed and determined by the number of green flashes from the LED (2)

    4 green flashes: 80-100 %
    3 green flashes: 60-80 %
    2 green flashes: 40-60 %
    1 green flash: 20-40 %
    1 red flash: < 20%

WARNING

The battery autonomy will be significantly reduced in freezing temperatures.
 If the LED flashes red every second, the battery level is beyond the level for reliable operation.
 It is imperative that the photocell is recharged fully prior to further use.

HL3-500 : Wireless Photocell

Switch ON the transmitter by selecting your intensity setting using the **DIRECT** / **IMPULSE** - selector (1)

Immediately following switch on, the current Team & Channel status are displayed which can be determined by colour and number of flashes from the LED (2)

Team Status	**Channel Status**
4 green flashes: Team D	4 red flashes: Channel 4
3 green flashes: Team C	3 red flashes: Channel 3
2 green flashes: Team B	2 red flashes: Channel 2
1 green flash: Team A	1 red flashes: Channel 1
1 red flash : wireless disabled	x yellow flashes : indicates the channel number in DATA mode

Switch ON the transmitter by selecting **DIRECT** / **IMPULSE** - selector (1)

Impulse Mode: The length of the impulse is brief to allow for a subsequent and multiple impulses

Direct Mode: The length of the impulse represents the time the infra-red beam is interrupted. Prolonged interruption or an offline photocell will send an offline status to the timer.

Battery Status:

The battery charge status can be checked at any time when the photocell is on. By pressing briefly the Select Button (5) the status will be displayed and determined by the number of green flashes from the LED (2)

> 4 green flashes: 80-100 %
> 3 green flashes: 60-80 %
> 2 green flashes: 40-60 %
> 1 green flash: 20-40 %
> 1 red flash: < 20%

TEAM Configuration

- Press and hold the **select** button **(5)** then switch ON (1) - to **DIRECT** position
- LED **(2)** will flash red/green, indicating setting mode – now release **select** button **(5)**
- LED **(2)** will then flash green to indicate the current **TEAM** number (1 to 4)
- Each additional button **(5)** press, will increment the **TEAM** number 1 – 2 – 3 - 4 –0 – 1 etc.
- The LED **(2)** will flash after each change to indicate the **TEAM** number set
- Switch OFF to quit the setting mode

Selection change IMPULSE / DATA

- Press and hold the **select** button **(5)** then switch ON (1) to **IMPULSE** position
- LED **(2)** will flash red/green, indicating setting mode – now release **select** button **(5)**
- LED **(2)** will then flash green to indicate the current **TEAM** number (1 to 4)
- Press the **Select** button **(5)** for 5 seconds : a fast blinking of the LED **(2)** indicates the transmission mode :
  - DATA : Yellow blinking
  - IMPULSE : Red blinking
- Switch OFF to quit the setting mode

CHANNEL Configuration

- Press and hold the **select** button **(5)** then switch ON (1) - to **IMPULSE** position
- LED **(2)** will flash red/green, indicating setting mode – now release **select** button **(5)**
- LED **(2)** will then flash red to indicate the current **CHANNEL** number (1 to 4)
- Each additional button **(5)** press, will increment the **CHANNEL** number 1 – 2 – 3 - 4– 1 etc.
- The LED **(2)** will flash after each change to indicate the **CHANNEL** number set
- Switch OFF to quit the setting mode

Channel setting in DATA Mode - WARNING : the Receiver HL3-5x must be in DATA Mode !

- Press and hold the **select** button **(5)** then switch ON (1) to **IMPULSE** position
- LED **(2)** will flash red/green, indicating setting mode – now release **select** button **(5)**
- LED **(2)** will then flash to indicate in yellow the current **CHANNEL** (1 – 8)
- Each additional button **(5)** press, will increment the **CHANNEL** number 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 1 etc.
- The LED **(2)** will flash after each change to indicate the **CHANNEL** number set
- Switch OFF to quit the setting mode

WIRELESS Configuration

By default the wireless transmission is enabled. If you wish to use only the banana outputs of the photocell then the wireless feature can be disabled as follows.

- Press and hold the **select** button **(5)** then switch ON (1) - to **DIRECT** position
- LED (2) will flash red/green, indicating setting mode – now release **select** button **(5)**
- Press **select** button **(5)** until 1 red flash on LED (2) is seen. Wireless is now disabled
- To enable wireless repeat the steps above in **TEAM Configuration**

4. Photocell alignment

- The Infra-Red transmitter and the Wireless Photocell should be suitably fitted to a support HL 4, HL 4-3 or on a tripod HL 5

- On the Wireless Photocell (HL3-100), alignment is confirmed when the LED (2) is Off. When you interrupt the beam between transmitter and photocell, the LED of the photocell switches ON and an impulse is supplied to the output (banana output and radio).

- When aligning the photocells from the HL3-000, a red light indicated on the bottom lens of the HL3-100 will illuminate when the photocell is misaligned or interrupted and extinguish when it is aligned. Also from the HL3-000 LED (2) will be illuminated when the photocell is out of alignment and extinguish when correctly aligned.

- It is recommended to align the photocells along the vertical and horizontal axis to achieve the central point of alignment to give tolerance for windy conditions.
Photocells which are not correctly aligned will not function correctly and either miss impulses or output multiple spurious pulses.

Infra-red transmitter HL 3-000 **Aligned – No LED (2) illuminated**	**Misaligned – LED (2) illuminated**
Wireless Photocell HL 3-100 **Aligned – No LED (2) illuminated**	**Misaligned – LED (2) illuminated** **Also – red light on bottom lens indicates photocell is not aligned**

5. Synchronization

It is possible to synchronize all the Wireless photocells HL3-5x via Impulse/Data Wireless radio HL675 (Transmitter HL675-1 or Receiver HL675-2)

a. Time of Day synchronization
It is possible to send the time of day, via our Numerical Keyboard device HL940-C.
The Keyboard device could be connected (RS232) to our Wireless Radio HL675 (Tx or Rx)

88:88	When you switch ON the numerical keyboard, the display will show 4 bars on top. This display is also shown when you stop/abort the process.
17	Enter the year (only the last 2 digits – from 00 to 99) Example show 20**17**. Valid with #.
17:03	Next : enter the date (Day : Month) Here, March 17th. Validate with #.
09:45	Next : Time of day (hours : Minutes) . Validate with #.
5YПC	The photocells are now ready to receive the Impulse Synch. 1) Via Transmitter Input HL675-1 – (do not forget to put the Tx in mode IMPULSE before synchronization). 2) Via the functions SET + TEST from Tx/Rx HL675 3) Via Numerical keyboard button « # » (HL940-C)

Note :
a) It is important that the Numerical Keyboard is always connected to the radio during the synchro sequence.
b) To reset the data (Year, Date, Time of day) press the « ✳ » button once only.
c) To cancel/abort the complete sequence, at anytime, press the « ✳ » button twice in quick succession.

b. Synch Impulse

With Transmitter HL675-1	With Receiver HL675-2
a. **In Data mode** HL675 It is possible to send a Synch Impulse by pressing **SET**+ **TEST** buttons. If no time was previously set, the photocells will be synchronized at Zero. If a time of day was set, the synchronization will be done always to the same time of day	a. Press simultaneously buttons **SET** + **TEST**.
b. **In Impulse mode** Synch with buttons **TEST** or with an input impulse (banana plug). This latest solution allows you to synchronize several other devices in same time sure as ChronoPrinter 545. The lead time to transmit the synch impulse (200ms) is automatically compensate by the photocells	

c. Check Synch

With the Transmitter and Receiver, it is possible at anytime to check if all the photocells are correctly synchronized together, this means that the quartz of all photocells are synchronized with same time of day within a precision of +/- 50ms.

By simultaneously pressing the **SET + TEST/BATT** buttons, the Radio sends a synch time request to all radio.
Each photocell will reply with their time of day, in order of their channel (every 1 sec)

The process takes around 8 sec.

Photocell status are displayed with the available LED on the HL675

The Synch state is always made from the first channel received. Three statuses are possible :
- Photocell replies and synchronized: LED ON
- Photocell replies and but not synchronized: LED blinking
- No reply from Photocells : : LED OFF (Photocells OFF or channel not used)

We could have up to 8 channels, equivalent of the 8 inputs on 2x ChronoPrinter (2x CP545) :
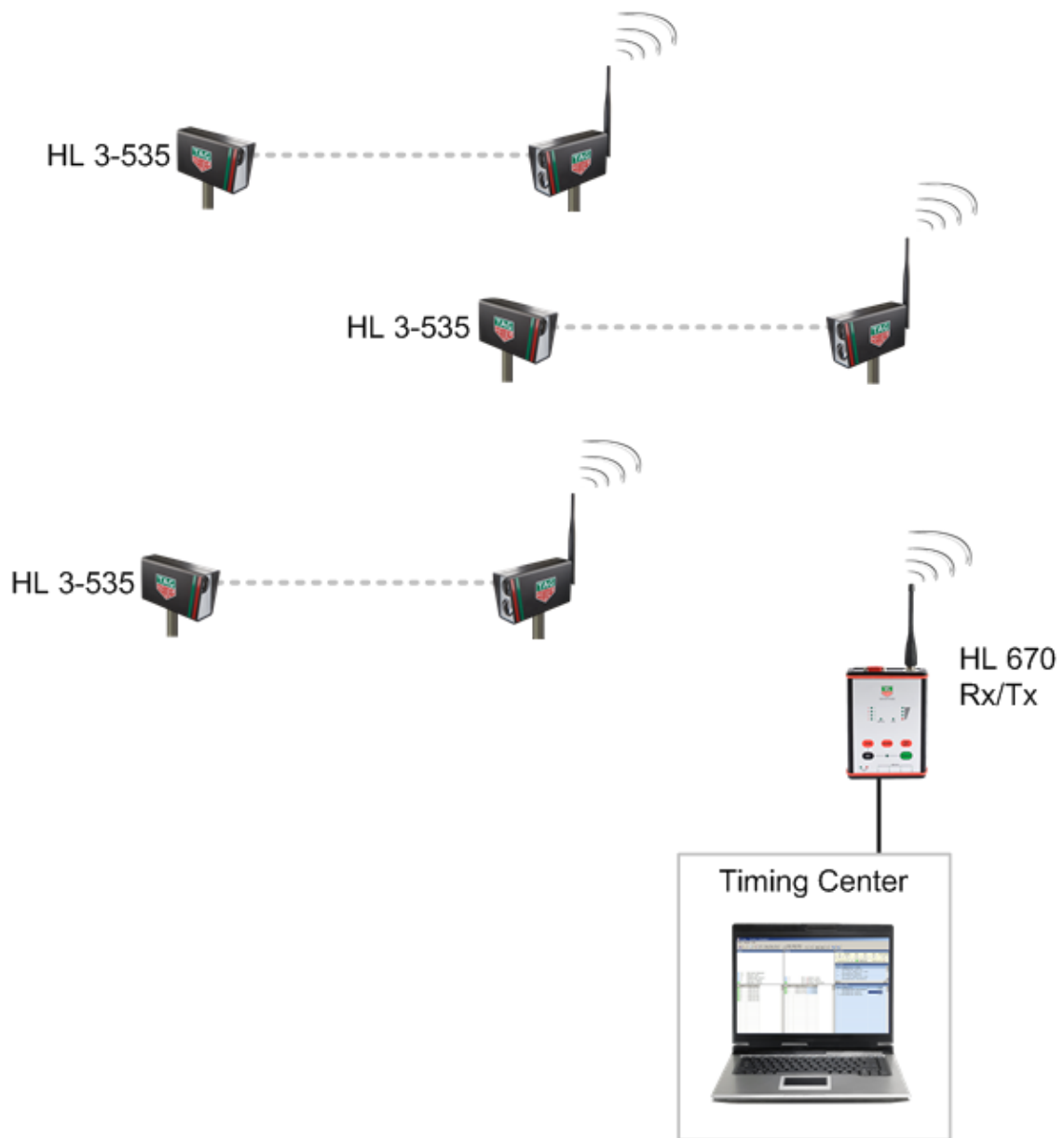
Channel	Transmitter	Receiver
1		
2		
3		
4		
5		
6		
7		
8		

6. Configuration

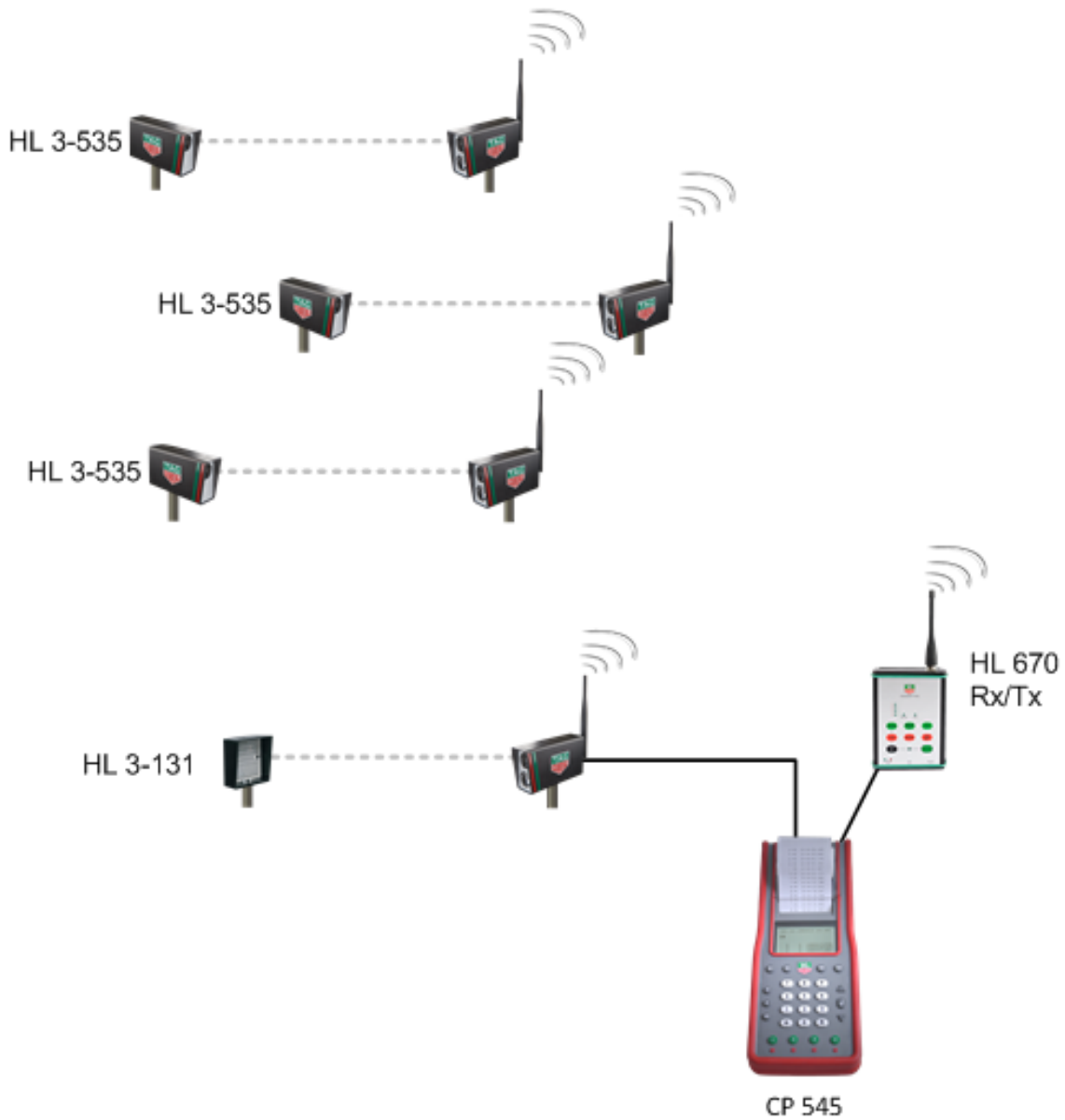**a.   Synch with HL675 Wireless radio and Numerical Keyboard HL940-C**
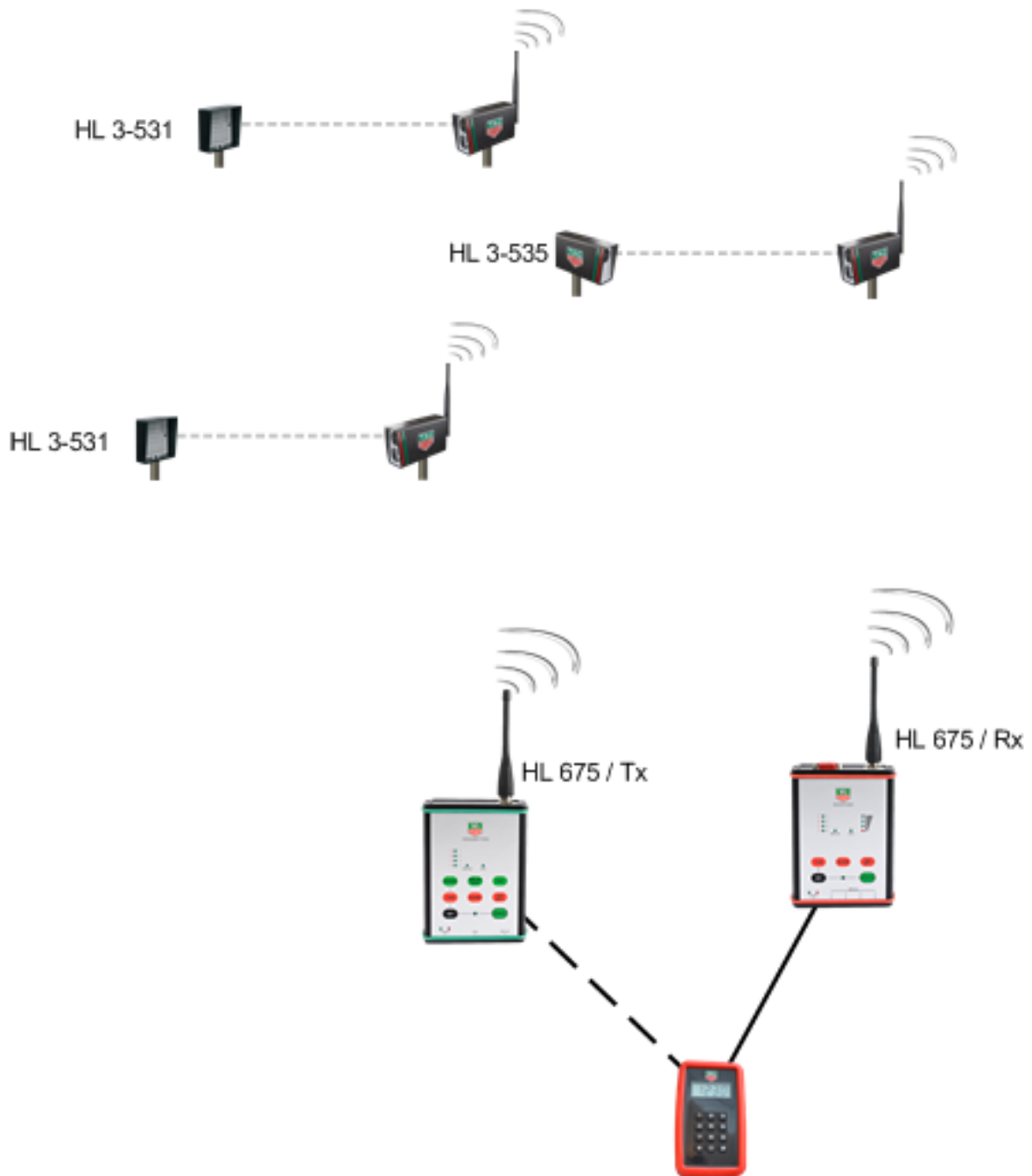
b. **Timing without ChronoPrinter (only for training)**

HL 3-535

HL 3-535

HL 3-535

HL 670
Rx/Tx

Timing Center

Mixed timing configuration (with Photocells and ChronoPrinter)

7. Maintenance

The HL3-X photocell range are designed for use in harsh conditions but we do recommend that the external cover is removed frequently to check for condensation especially in humid or extreme cold conditions.

8. Technical Specification

Principal:	High frequency infra-red (32.768kHz) Detection of signal by frequency interruption
Infra-Red Distance possible:	HL3-500 & Reflector (HL3-531) up to 20 meters (65 ft.) HL3-500 & HL3-000 up to 40 meters (130ft.) LOW power HL3-500 & HL3-000 up to 80 meters (260ft.) HIGH power
Output impulse:	Via opto couplers and working contact / open collector
Working temperature:	- 20°C to + 50°C
Battery :	Li-Pol 3.7V 3800mAh (+ power supply 7.5V 650mA HL3-1)
Autonomy - Wireless Photocell:	Approx. 330 hours at 20°C
Autonomy - Infra-Red Transmitter:	LOW position: 210 hours HIGH position: 100 hours
Input Precision:	Fixed delay 200ms, +/- 0.5/10'000 sec (+/- 0.02 ms)
Time Base precision	-/+ 1/1'000 sec
Output Lock Time:	Wireless ON : 200ms / Wireless OFF : 10ms
Dimensions:	150 x 80 x 40 mm
Weight:	800 gr
Frequency:	ISM Band– 868 MHz
Power :	500 mW
Range:	3.5 km under optimal conditions, direct line of sight
Memory:	All configurations are retained in memory when the photocell Is Off or when the battery is discharged

NOTE:

The Wireless photocell HL3-500 has an infra-red transmitter (for use with kit HL3-531).

When the HL3-500 photocell is switched ON, the infra-red transmitter is automatically enabled.

By pressing and holding down the **select** button **(5) for 5 seconds**, the internal infra-red transmitter is disabled.

To enable the infra-red transmitter, simply hold down the **select** button **(5) for 5 seconds** and the internal infra-red transmitter will be active
.
The infra-red transmitter is always active by default when switching ON the photocell

9. Note

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