



# MOSTRAC – Motion Sensor TRAck Control

## USER'S MANUAL

3508.500.02 | Version 1.3 | January 2025



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## Caution and safety precautions

- Never use any other charger than the supplied or a type approved by Swiss Timing. This could destroy the battery, cause damage to unit, and possible cause personal injury due to fire or/and electrical shock.
- Never bypass a power cord ground lead by breaking off the ground pin, or by using inappropriate extension cords or adapters.
- Never plug a power cord into the AC power source until you have made sure that all installation, cabling and power levels, are proper, and that the applicable procedures in this manual have been followed.
- Protect the equipment against splashing, rain and excessive sun rays.
- Never use the device if it is damaged or insecure.
- Verify the selection of the power distribution.
- Verify that the voltage quoted on the rating plate is the same as your voltage. Connect the appliance only to power sockets with protective earth. The use of incorrect connection voids warranty.
- This program may be modified at any time without prior notification.
- Do not open the case; there is nothing that needs servicing inside it. Nevertheless, if the case must be opened, you must call for some qualified personnel. The power supply cable must be disconnected before opening the case.
- During the transport of all Swiss Timing equipment delivered with a reusable carry case, the said case should be used at all times. This is imperative to limit the damage, such as shocks or vibration that can be caused to the units during transport.
- The same cases should also be used when returning equipment to Swiss Timing for repair. Swiss Timing reserves the right to refuse all guarantees if this condition is not fulfilled.
- If the installation includes a horn, be sure to maintain a sufficient security distance from the public.

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This symbol indicates that this product should not be disposed with household waste. It has to be returned to a local authorized collection system. By following this procedure you will contribute to the protection of the environment and human health. The recycling of the materials will help to conserve natural resources.

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# 1 INTRODUCTION

The main function of this system is to give the start of an athletic race in lane and measure the reaction time of each athlete using any kind of starting block.

On competition day, a motion sensor is fixed on each starting block; it will detect acceleration around the start time and transmit wirelessly the reaction time to the StartTime V FS.

The system is working up to 10 lanes and with up to 3 wireless recaller.

Please also refer to document 3481.560 for the usage of StartTime V and @-GUN.



Rue de l'Envers 1  
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Switzerland

Monaco, 7 February 2022

## TO WHOM IT MAY CONCERN

Technological devices other than the reaction time measuring module of the Start Information System (SIS) (e.g. Timing Systems, Wind Gauges, Distance Measuring Equipment etc.) used in athletics are not issued a certificate by World Athletics and therefore no certified lists for such devices are available.

The MOSTRAC accelerometer based reaction time measuring device of the SIS by Swiss Timing Ltd (firmware 3.561, catalogue 3508.9xx) meets the current requirements for a World Athletics Product Certificate.

All measuring equipment used in the competition shall be manufactured and calibrated according to international standards. The accuracy has to be guaranteed by the manufacturer according to the relevant international standards and shall have been verified by an appropriate organisation accredited by the national measurement authority.

To our knowledge and experience, the equipment of Swiss Timing Ltd meets this condition and is also successfully used in international athletics competitions organised under World Athletics Rules and Regulations.

Sincerely,

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@WorldAthletics  
f t i n

## 1.1 Material

Content of a kit for 8 lanes (3508.900):

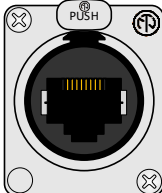
- |                                                          |                                      |
|----------------------------------------------------------|--------------------------------------|
| A. Startime V PRO FS including :                         | art : 3481.774                       |
| 1 antenna                                                | art : 9051.6111                      |
| 1 antenna support                                        | art : 9051.6112                      |
| 1 tripod                                                 | art : 9051.6339                      |
| 1 charger 12V                                            | art : 3418.753                       |
| <br>B. @-GUN including :                                 | art : 3481.704                       |
| 1 headset/microphone                                     | art : 9051.8162                      |
| 1 transportation case                                    | art : 9072.6012                      |
| <br>C. 3 loud speaker including :                        | art : 3399.730                       |
| 1 cable of 30m                                           | art : 1849.030.PU                    |
| 2 cables of 10m                                          | art : 1849.010.PU                    |
| <br>D. 8 MoSen (movement sensor) including :             | art : 3508.700 (EU) ou 3508.701 (US) |
| 1 charging case                                          | art : 3508.610                       |
| 1 power supply 5V                                        | art : 9051.3621                      |
| <br>E. 16 fixation clips for starting blocks including : | art : 3508.013                       |
| 16 adhesive foam double face for fixation clips          | art : 9038.3592                      |



## 1.2 StartTime V PRO FS

StartTime V PRO FS have some differences comparing to StartTime V:

- Included wireless interface board with external antenna connection for communication with MoSen.
- Additional connectors:

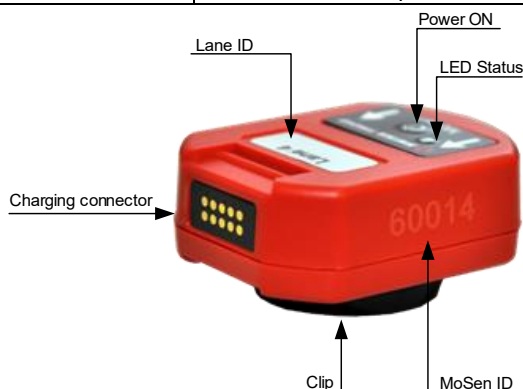
| Description                                                                                                                                                                                                                         | Connector type (Front view)                                                                             | Pin | Pin description              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|-----|------------------------------|
| <b>START 2</b><br><i>This connector is used to transmit the start pulse or to receive the ready signal.</i>                                                                                                                         | <b>TUCHEL 4pMT</b><br> | 1   | Ready input, negative side   |
|                                                                                                                                                                                                                                     |                                                                                                         | 2   | Start output, positive side  |
|                                                                                                                                                                                                                                     |                                                                                                         | 3   | Start output, negative side  |
|                                                                                                                                                                                                                                     |                                                                                                         | E   | Ready input, positive side   |
| <b>SERIAL</b><br><i>Full duplex RS485 serial line, for example to transmit reaction time to photofinish.</i>                                                                                                                        | <b>TUCHEL 7pFT</b><br> | 1   | Power supply output (+12VDC) |
|                                                                                                                                                                                                                                     |                                                                                                         | 2   | Power supply output (+12VDC) |
|                                                                                                                                                                                                                                     |                                                                                                         | 3   | TX-                          |
|                                                                                                                                                                                                                                     |                                                                                                         | 4   | TX+                          |
|                                                                                                                                                                                                                                     |                                                                                                         | 5   | RX-                          |
|                                                                                                                                                                                                                                     |                                                                                                         | 6   | RX+                          |
|                                                                                                                                                                                                                                     |                                                                                                         | E   | GND                          |
|  <b>(LAN)</b><br><i>This is a 100BASE-T standard Ethernet connection that can be used for StartTime configuration or specific communication.</i> | <b>RJ45</b><br>      | 1   | TX+                          |
|                                                                                                                                                                                                                                     |                                                                                                         | 2   | TX-                          |
|                                                                                                                                                                                                                                     |                                                                                                         | 3   | RX+                          |
|                                                                                                                                                                                                                                     |                                                                                                         | 4   | NC                           |
|                                                                                                                                                                                                                                     |                                                                                                         | 5   | NC                           |
|                                                                                                                                                                                                                                     |                                                                                                         | 6   | RX-                          |
|                                                                                                                                                                                                                                     |                                                                                                         | 7   | NC                           |
|                                                                                                                                                                                                                                     |                                                                                                         | 8   | NC                           |

StartTime V PRO FS has two START connectors (START 1 and START 2), so you can connect a main and backup timing system on two different lines. To use READY 1 (from START 1 connector) and READY 2 (from START 2 connector), select "READY 1 + READY 2" in SETUP MENU – READY (see chapter 3.3.3 of document 3481.560).

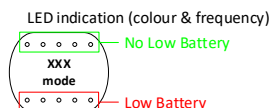
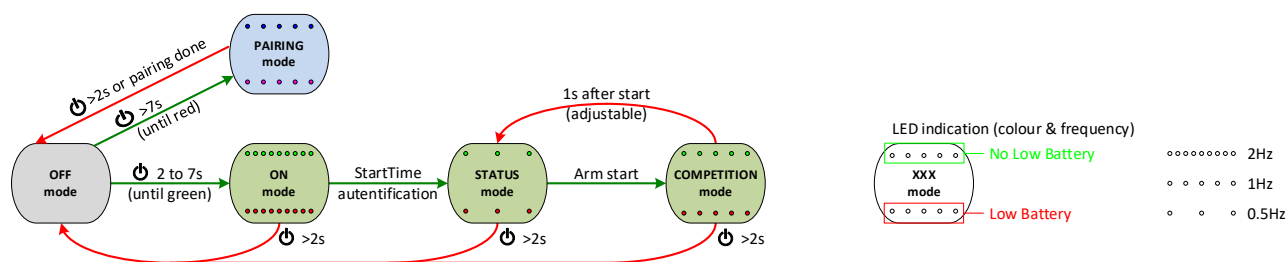
For standard StartTime usage, please refer to document 3481.560.

## 1.3 MoSen characteristics

|                       |                                                       |
|-----------------------|-------------------------------------------------------|
| Dimensions (LxWxH)    | 57 x 46 x 29 mm                                       |
| Weight                | 40g                                                   |
| Connection            | Wireless to StartTime V FS                            |
| Power supply          | Included battery with charging case                   |
| Full recharge time    | ~2h                                                   |
| Battery autonomy      | ~12h                                                  |
| Operating temperature | -20°C to +60°C<br>(0°C to +50°C for battery charging) |
| Storage temperature   | -40°C to +80°C                                        |
| Protection class      | IP55                                                  |
| Certifications        | CE and RoHS compliant                                 |



**Note:** Charging connector in red -> European version (868MHz)  
Charging connector in black -> American and Asian version (916MHz)



### LED signification:

| Normal battery                               | Low battery                                         | Motion sensor status                                   |
|----------------------------------------------|-----------------------------------------------------|--------------------------------------------------------|
| OFF                                          | OFF                                                 | OFF                                                    |
| Green fast blinking<br>(0.05s ON, 0.45s OFF) | Red fast blinking<br>(0.05s ON, 0.45s OFF)          | ON mode                                                |
| Green slow blinking<br>(0.05s ON, 1.95s OFF) | Red slow blinking<br>(0.05s ON, 1.95s OFF)          | STATUS mode                                            |
| Green blinking<br>(0.05s ON, 0.95s OFF)      | Red blinking<br>(0.05s ON, 0.95s OFF)               | COMPETITION mode                                       |
| Blue blinking<br>(0.05s ON, 0.95s OFF)       | Magenta blinking<br>(R+B: 0.05s ON, 0.95s OFF)      | PAIRING mode in progress                               |
| Blue fast blinking<br>(0.05s ON, 0.45s OFF)  | Magenta fast blinking<br>(R+B: 0.05s ON, 0.45s OFF) | PAIRING mode failure<br>(communication OK but bad Fix) |

**Note: MoSen is automatically switched OFF:**

- When paired StartTime is switched OFF.
- When no communication with StartTime occurs within 20 minutes.
- After successful pairing with StartTime.
- 1 minute after set in pairing mode, if no successful pairing done.

## 1.4 Charging case

Connect the provided power supply to power plug and charging case.

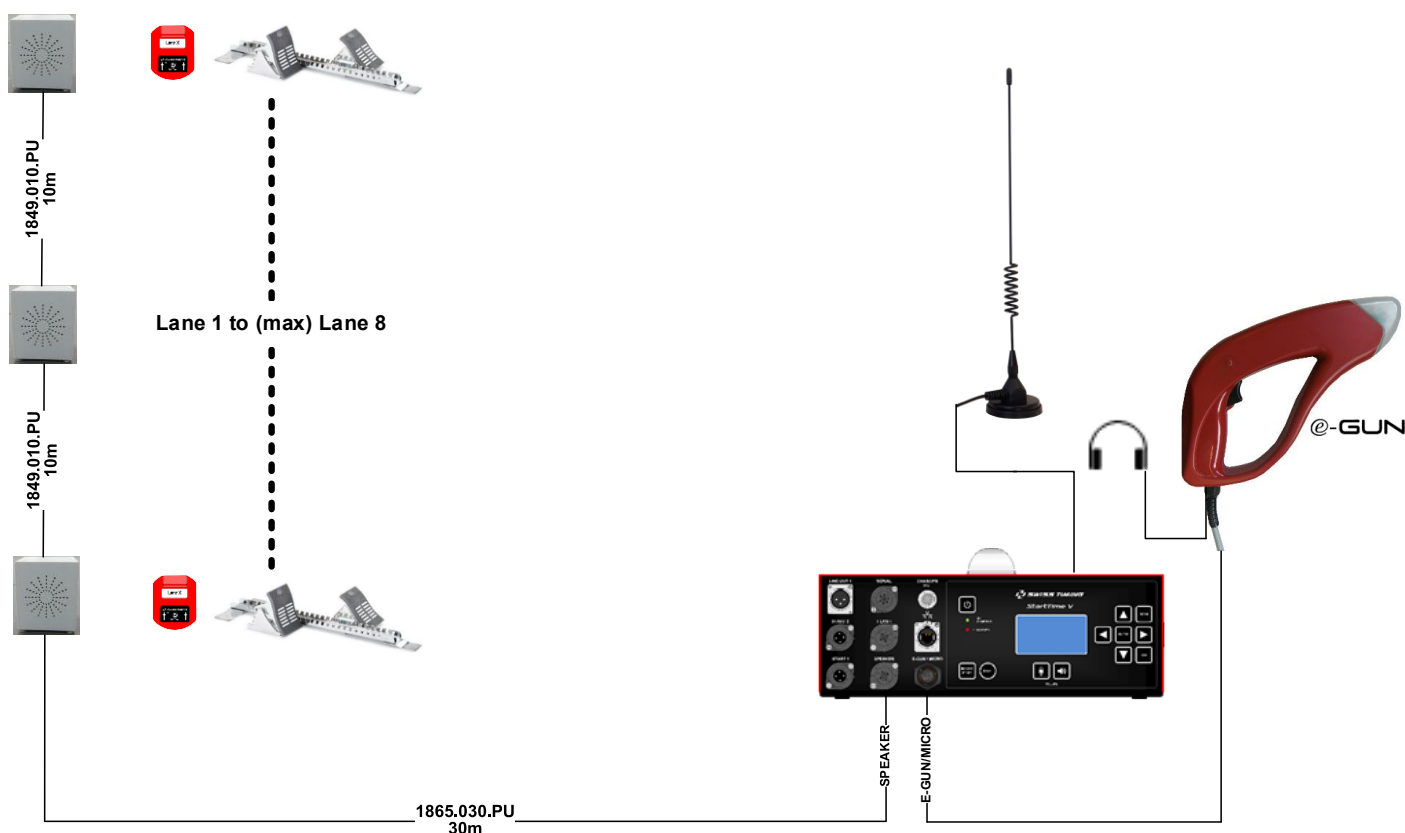
Charging case contain 8 slots to charge MoSen. Each one has a LED indicating:

- Orange : MoSen in charge.
- Green : MoSen charged.
- OFF : Empty slot (or MoSen not correctly plugged).

Note: USB connector on charging case is used for MoSen firmware upgrade (first slot only).



## 1.5 General cabling



START output of StartTime should be connected to timing device (photofinish for example).

SERIAL output (RS485) of StartTime can be connected to photofinish system to automatically transmit reaction time:

- Transmission parameters: **9600 bauds**, 1 start bit, 8 data bit, 1 stop bit, no parity
- Same transmission protocol as ASC1, ASC2 and ASC3, including a keep alive message sent every 2.5s.

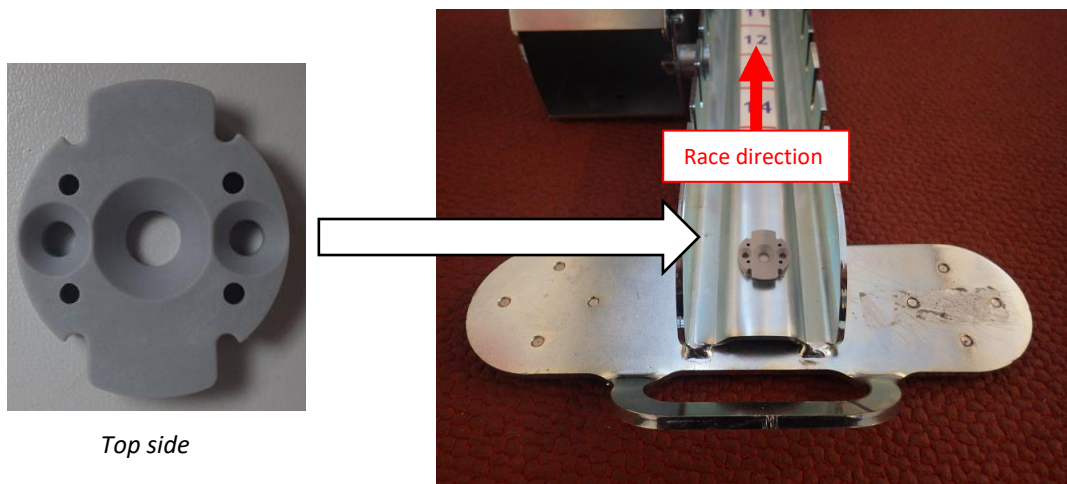
## 1.6 Mechanical setup

You have two possibility to fix the fixation clip for starting block:

- Double side tape (clean the surface before). *Included in the set.*
- With screws (not provided). *Recommended M3 conical screw.*

The fixation clip need to be mount in right position if you will have the MoSen in the race direction.

The preferred location to mount the system is at the rear of the starting block where the athlete will not step on it to plant spikes of starting block.



To fix the MoSen on the fixation, just push down (1) and turn 90° the device (2). The arrows on the MoSen **must** be in the race direction (3).

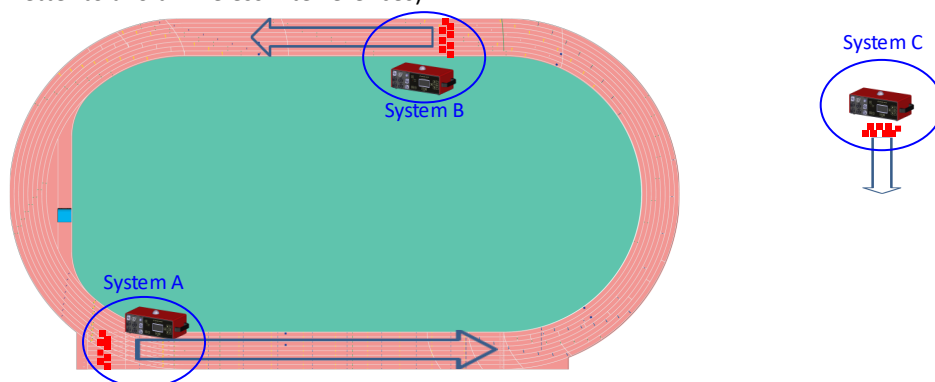


To dismount the MoSen, push it down and turn it by 90°.

## 1.7 Multi-usage

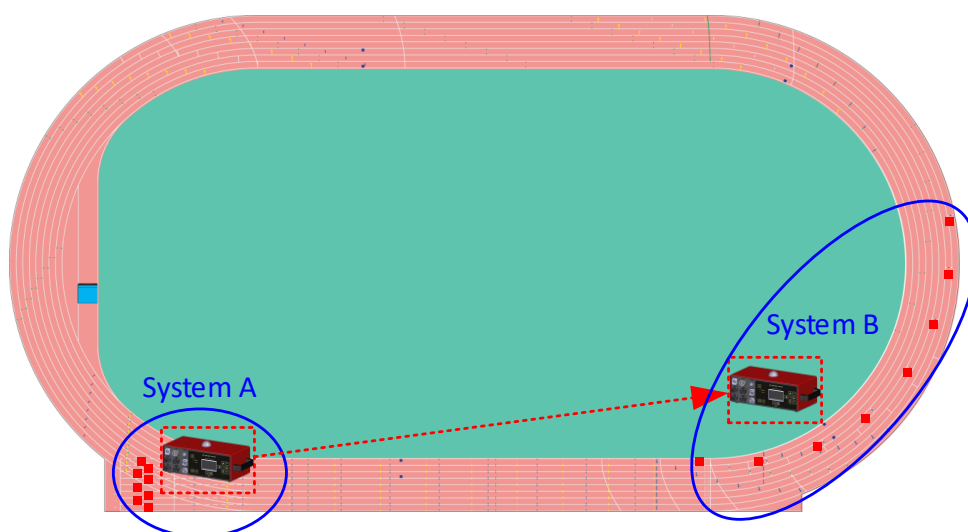
StartTime can be set to be used in four different systems (A, B, C or D).

First application is to be able to use up to 4 different StartTime in the same area (they need to be programmed with a different system letter to avoid wireless interferences):



*Sample: System A used for 100m start, system B used for 60m start, system C used in a nearby location for training (all systems used simultaneously).*

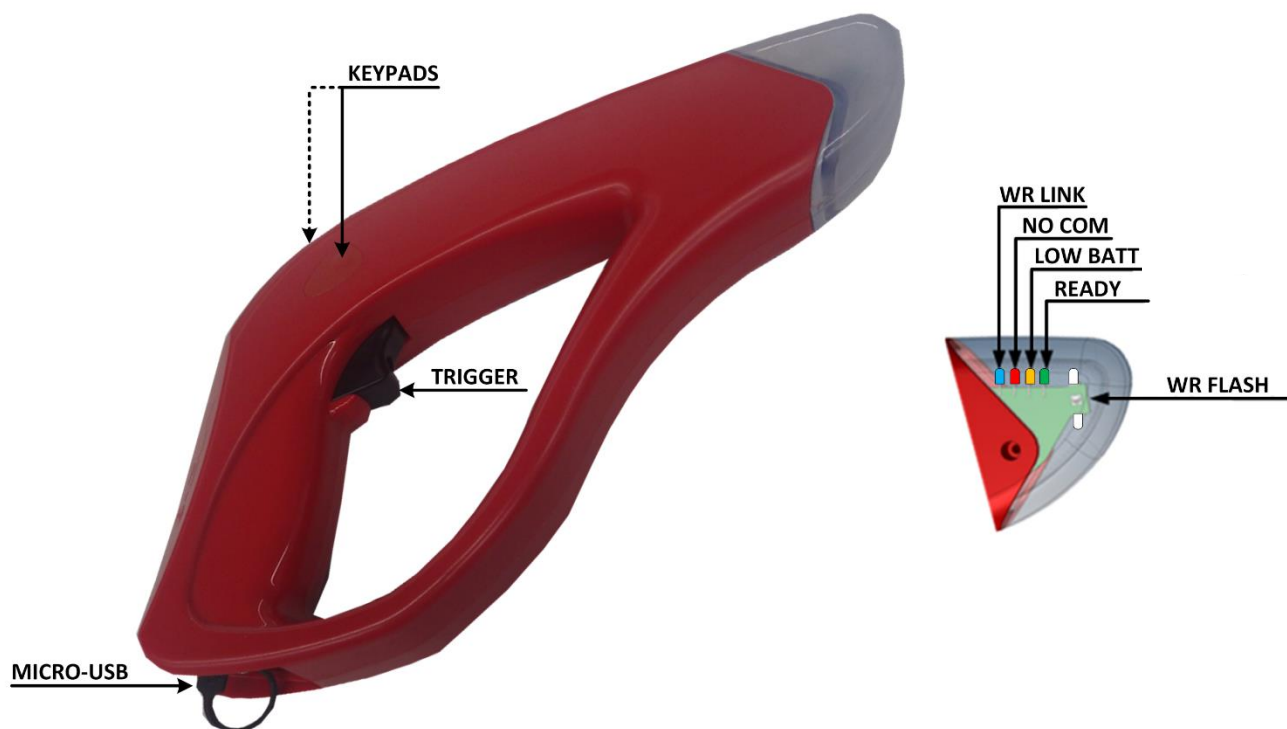
Second application is to use different sets of MoSen on the same StartTime without need to redo the pairing. For example you have a set of MoSen for 100m races (paired once with StartTime Sytem A) and another set of MoSen for 400m races (paired once with the same StartTime but on System B). When you move from one start location to the other one, you don't move the MoSen and Starting block, but only the StartTime; on the StartTime, you just need to change from System A to System B in the settings (or vice-versa).



## 1.8 Wireless recallers

By pressing a second time the trigger on e-Gun, starter signal a manual false start. Help starters can do the same with e-Gun wireless recaller option.

By default, manual false start (triggered by starter or help starters) is indicated with two Bang sounds; automatic false start (triggered by a reaction time measured between -0.100s and +0.099s) is indicated with three Beep sounds.



| LED / Key       | Description                                                                                                                                |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WR LINK</b>  | ((●)) → Wireless connection with STV                                                                                                       |
| <b>NO COM</b>   | ((●)) → No wireless communication with STV                                                                                                 |
| <b>PAIRING</b>  | ● → Waiting for pairing                                                                                                                    |
| <b>CHARGING</b> | (●) → Battery is charging                                                                                                                  |
| <b>LOW BATT</b> | ((●)) → Battery level is low                                                                                                               |
| <b>READY</b>    | ● → Main timing device is ready (Start allowed)                                                                                            |
| <b>KEYPADS</b>  | Allows to: <ul style="list-style-type: none"> <li>1x (~5s) Switch off the Wireless Recaller</li> <li>1x + 1x (~3s) Mode PAIRING</li> </ul> |
| <b>TRIGGER</b>  | Power ON and false start<br>Allows judge to make a recall                                                                                  |

Micro-USB is used to recharge the wireless recaller.

Up to 3 wireless recallers can be paired on the Start Time. False start is generated by pressing the trigger within one second after the start (default setting). Source of the first false start indicated by a judge is display on bottom line of StartTime.

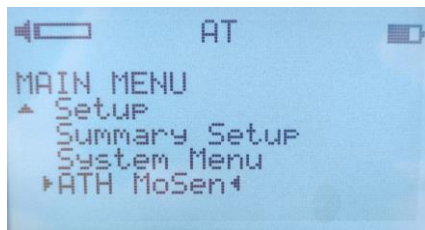
Note: MoSen can also be used as recaller (should be paired as *Recaller* and not *Lane*). Button of the MoSen is used to signal the false start.



## 2 SYSTEM SETUP

### 2.1 Configuration Start Time V FS

- Turn the unit ON by pressing the  key (5sec.).
- Press the  button, select *Sport* with the , press , select *Athletics (AT)* with  and press .
- Press the  button, select *ATH MoSen* with the , press , select *Setup* with  and press .



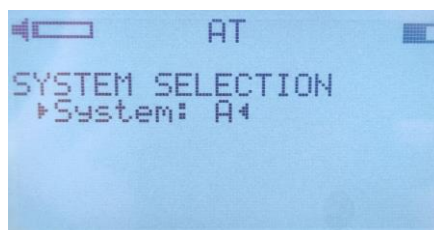
#### 2.1.1 Base Frequency

- Select *Base Frequency* and press .
- Choose the correct *Region* with the   button and press .



#### 2.1.2 System A/B/C/D

- Select *System A/B/C/D* and press .
- Choose the system you want to use with the   button and press .



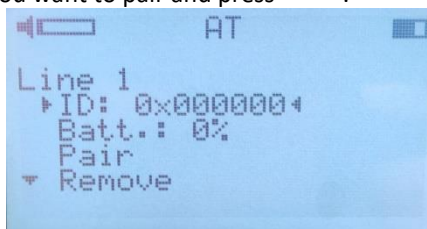
#### 2.1.3 Delete All

- Select *Delete All* and press  to delete all existing pairing with MoSen.
- Press  again to confirm.

## 2.2 Pairing each lane

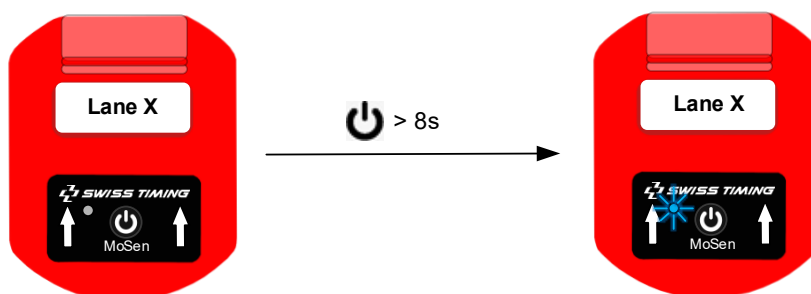
- In the *ATH motion sensor* menu select *Lanes* and press .

- Choose the lane (= lane number) you want to pair and press .

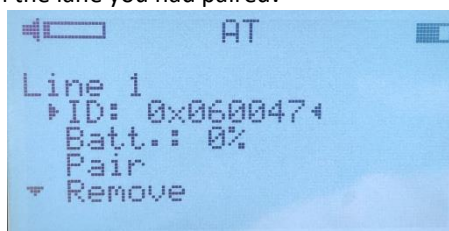


- Select *Pair* with  and press .

- Put the MoSen in pairing mode by pressing  on the MoSen. Stay on the button upon the green led turn off (> 8s). Now the MoSen blink with a led in blue.



- Press  on the Start Time V.
- You can now see the MoSen ID on the lane you had paired.

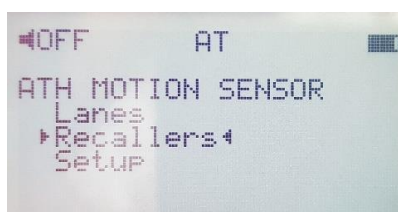


*Note: The MoSen turn off after the pairing process.*

- Identify the MoSen, for example with provided sticker (Lane 1A, Lane 2A, ... or Lane 1B, Lane 2B,...).
- Repeat the process for each lane available on your track (4, 6, 8...).

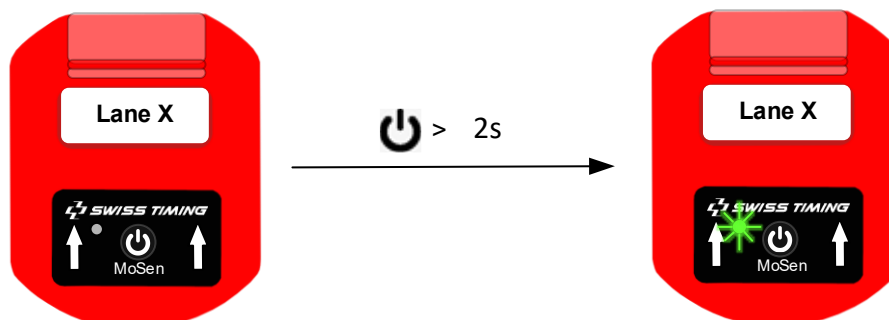
## 2.3 Pairing wireless recaller

Wireless recallers are paired the same way as MoSen, in *ATH motion sensor* menu select *Recallers* instead of *Lanes*, then the procedure is the same.

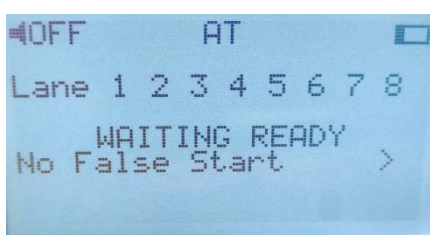


### 3 PREPARE THE RACE

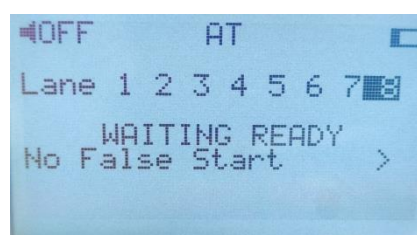
- Turn on each MoSen by pressing  more than 2sec (upon the green led appear).



- Now the led blink fast (2Hz) in green, as soon StartTime is detected led will blink slower (0.5Hz).
- On the main page of the Start Time V, check if each MoSen are connected. You can see an example below :

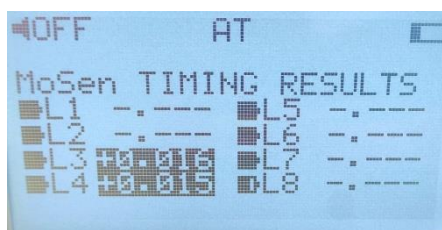


*Lane 1 to 8 are connected*



*Lane 8 not connected  
(powered off or bad wireless transmission)*

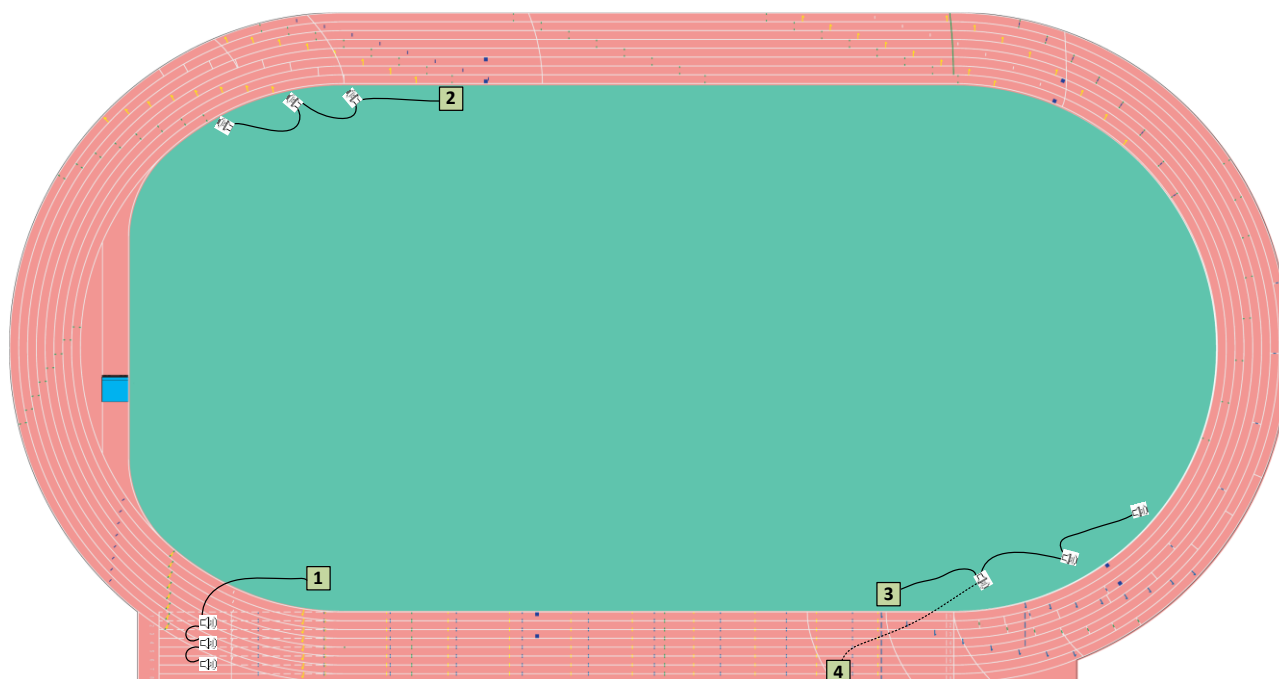
- **Tip:** Only paired MoSen lane number are visible; so if your track has only 6 lanes, pair only 6 MoSen (from 1 to 6), then numbers 7 and 8 will not be visible on above screen samples.
- Check the battery of each MoSen. Press  and you can see a little battery icon for each MoSen.



*MoSen of Lane 8 is not fully charged.  
StartTime battery (top right corner) is low.*

- Make sure, all the battery are ok for the Start. If the MoSen blink in red, the device need to be charged with the charging case.
- Put each MoSen on a starting block **in the correct lane**.

### 3.1 Recommended Starter Position



- 1 Recommended starter position for 100m
- 2 Recommended starter position for 200m
- 3 Recommended starter position for 400m
- 4 Alternative starter position for 400m
-  Loudspeaker

### 3.2 Position of the antenna

Up to 110m races, antenna can be placed on the StartTime (about 1.5m height).

For 200m and 400m we recommend to put the antenna at least 2m above the Start Time V. With this position we guarantee a good reception between the MoSen on the starting block and the StartTime V.



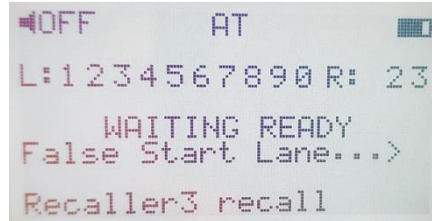
Antenna at 4m above the Start Time V

## 4 RACES

When a race is ready to start, the StartTime is automatically armed by the timing room (Ready signal) or manually by

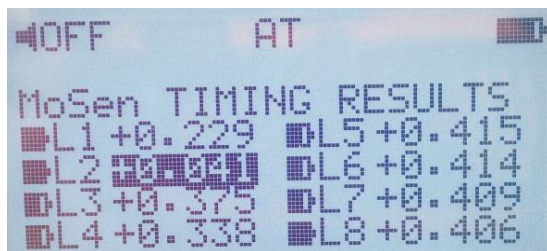
pressing . StartTime screen will pass from "WAITING READY" (STATUS mode) to "READY" or "MANUAL READY" (COMPETITION mode). After few seconds, LED on MoSen is blinking once per seconds (1Hz = competition mode) meaning movements are analysed.

When a start is generated, movements just before and after the start are analysed to define the reaction time. If reaction time is between -0.100s and +0.099s a false start sound is automatically generated.



*MoSen 1 to 10 paired and present  
Recallers 2 & 3 paired and present (Recaller 1 not paired)  
False start detected by the system  
(at least) Recaller 3 signals a false start.*

After the start, reaction time can be visualized on StartTime screen by pressing .



*Reaction times generating an automatic false start (between -0.100s and +0.099s) are indicated in inversed video.*

Reaction time with minus sign means movement before the start.

By default (StartTime settings), motion is analysed from 0.3s before the start to 1.0s after the start.

Reaction time measured between -0.100s and smaller than +0.100s will generate the false start sound.

Reaction time smaller than -0.100s don't generate false start sound indication, Starter should detect these movement and generate himself the false start by triggering again the @-GUN.

Press  to resend reaction time data on the SERIAL output.

Press  to exit this view.

After a start, the system goes back in STATUS mode, LED of MoSen blinks again slowly (0.5Hz).

A Ready should be provided to do a new race/start.

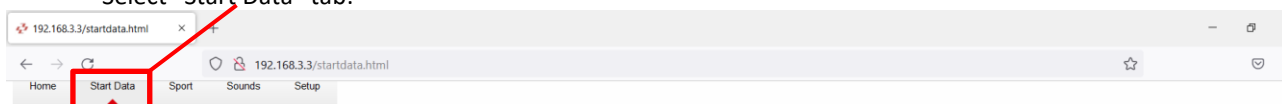
**Tip:** between races, you can store @-GUN in StartTime handle.



## 5 REACTION TIME CURVES

Reaction time curves can be displayed on networked device:

- Connect a laptop or tablet on  (Ethernet) connector of StartTime (if your tablet has no Ethernet connection [RJ45 connector], use a USB – Ethernet accessory converter).
- Open a web-browser (Firefox recommended).
- Enter StartTime IP address. Default value is 192.168.3.3. To view actual StartTime IP-address, open “System menu” “About ST5” in StartTime.
- Select “Start Data” tab:

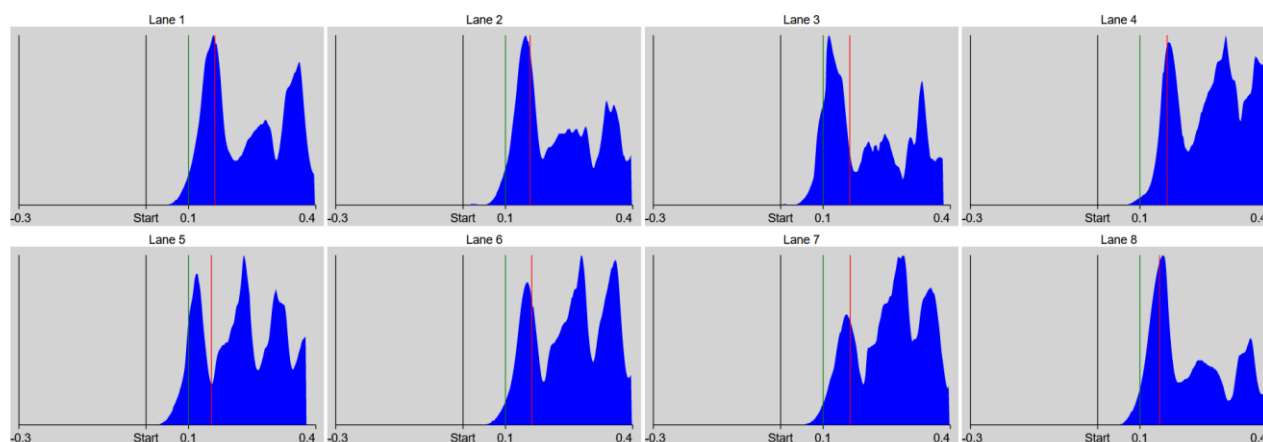


### Reaction Times and Curves

[Refresh Page](#) [Clear Curves](#) [Print Page](#)

Start data loaded: 1.6.2022 15:27:01

| Lane 1 | Lane 2 | Lane 3 | Lane 4 | Lane 5 | Lane 6 | Lane 7 | Lane 8 | Lane 9 | Lane 10 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| +0.162 | +0.158 | +0.163 | +0.164 | +0.154 | +0.162 | +0.164 | +0.146 | +0.159 | +0.335  |



- Last reaction times and corresponding curves are displayed.
- Refresh button will transfer again data from StartTime.
- **Data are not stored; use the “Print Page” button to store a PDF document or print it.**

## 6 WEB-SERVER

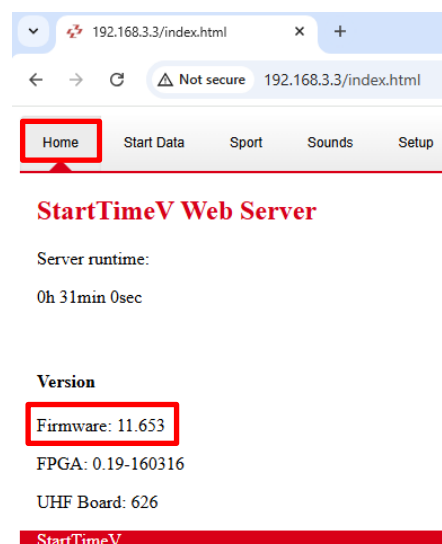
Some parameters of StartTime V can only be modified by connection on its web-server:

- Connect a laptop or tablet on  (Ethernet) connector of StartTime (if your tablet has no Ethernet connection [RJ45 connector], use a USB – Ethernet accessory converter).
- Open a web-browser (Firefox recommended).
- Enter StartTime IP address. Default value is 192.168.3.3. To view actual StartTime IP-address, open “System menu” “About ST5” in StartTime.

### 6.1 Firmware version

Firmware version is visible on StartTime screen (menu “System Menu” “About ST5”) or in “Home” tab of the web server.

Ask Swiss Timing client services for firmware update.



## 6.2 IP address change

StartTime IP address can be change from the web-browser by using the "Setup" tab:

**Setup**

**Reset Configuration**

Password:

**Reset Firmware**

Password:

**Network**

For network configuration changes restart the device to apply new values !

IP  (Default: 192.168.3.3)  
Mask  (Default: 255.255.255.0)  
Gateway  (Default: 0.0.0.0)  
TCP Port  (Default: 7045)

**Mode**

Changing the mode will automatically switch the device off !

Choose a mode:

**Protocol OSV**

Select a communication protocol for serial RS422 line

☒ STBP  
☐ ASCII

**Screen Configuration**

Contrast  : 30 (Default:30, useful setting range 10 to 50. Full potentiometer range 0 to 255)

Do not change settings of the Mode:

- Only "Mostrac" should be checked (old firmware) or "ATH MoSen" should be selected (new firmware).
- "Wireless Recaller" should not be checked/selected even if you are using it (this is for another hardware).

## 6.3 Protocol OSV

In new firmware (11.653 or above), you can select the protocol to connect to photofinish software.

You should select "STBP" for use with:

- OSV9 software with MAGIC PRO or MYRIA photofinish camera ("ASC3-MOSTRAC" connection in OSV9 software), bi-directional serial line requested.

You should select "ASCII" for use with:

- OSV9 software with MYRIA camera ("ASC3" connection in OSV9 software).
- OSV7 software with MYRIA or STAR cameras.

Older firmware had no protocol selection, ASCII protocol was outputted.

## 7 CONNECTION TO PHOTOFINISH

Two kinds of connection are requested between the StartTime V and the photofinish:

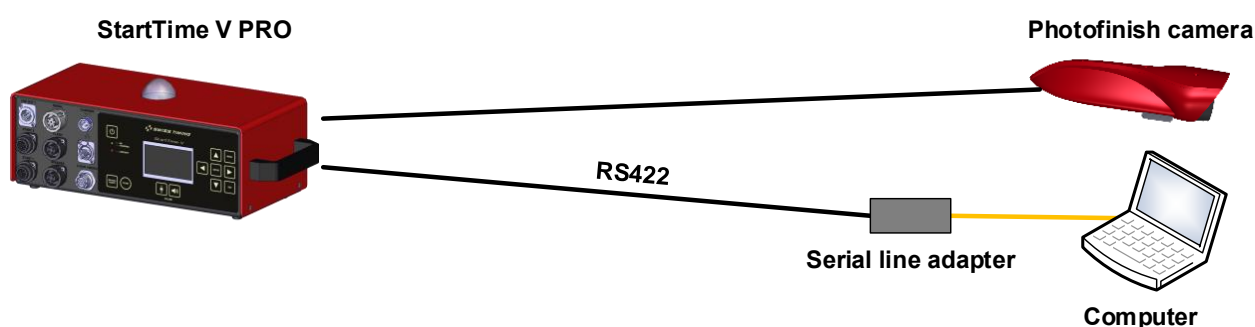
| Photofinish camera | STAR or MYRIA                                                            | MAGIC PRO                                                                                |
|--------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Analog line        | Start (Start device → Timing room)<br>Ready (Timing room → Start device) | Start (Start device → Timing room)                                                       |
| RS422              | Reaction time (Start device → Timing room)                               | Reaction time (Start device → timing room)<br>Digital ready (Timing room → Start device) |

New MAGIC PRO photofinish camera is no more providing an analogic READY signal to the starting system on a dedicated line. Instead, a “digital ready” is sent on the RS422 line; so, it is mandatory this line is bi-directional (using two pairs of wires). Transmission direction from timing room to start device is mainly used to transmit digital ready; transmission direction from start device to timing room is mainly used to transmit reaction times.

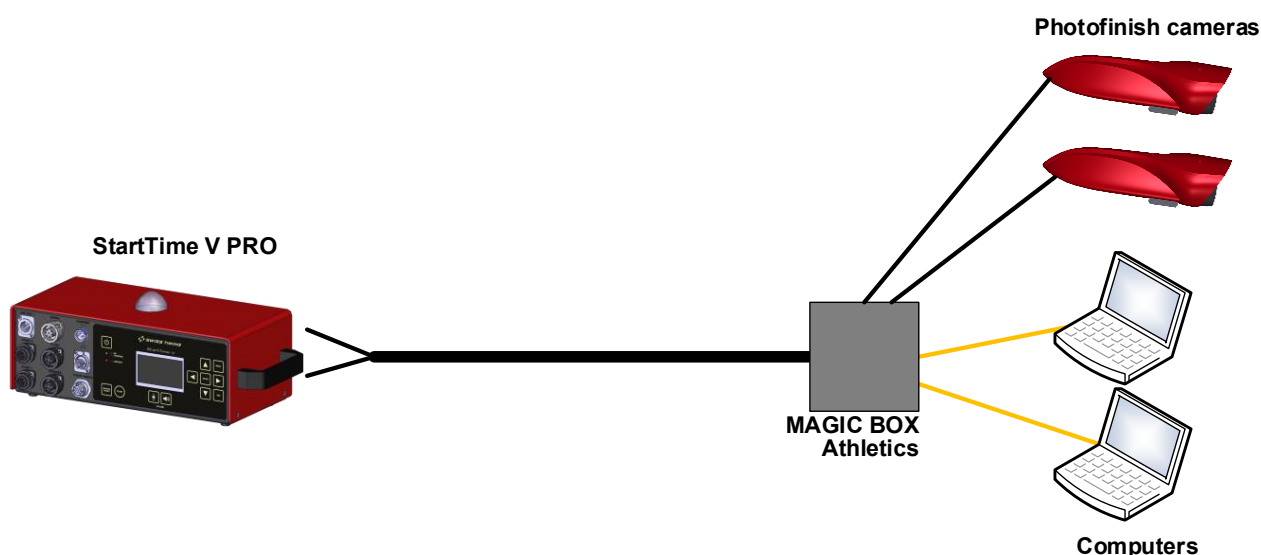
**MAGIC PRO is only working with a StartTime V PRO with firmware version 11.653 or above.**

Start signal can directly be connected to the STAR/MYRIA camera or PowerTime III (for MAGIC PRO).

A RS422 adapter (INT131 for example) should be used to connect the serial line to the computer.



Note: If several photofinish cameras are used at the same time (Main and Infield cameras for example), Swiss Timing propose a distribution box (MAGIC BOX Athletics) to distribute and transform directly the signals, please contact [client services](#) for more details.



## 8 APPENDICE

### 8.1 Version history

| Version | Modifications since last version |
|---------|----------------------------------|
| 1.0     | Initial version                  |
| 1.1     | More details in chapter 1.1      |
| 1.3     | Chapters 6 and 7 added           |

## NOTES