INSTRUCTIONS FOR USE

Chronometer +

2 optical sensors

DM241012

TWINSE

School Equipment for Science Education

Description

This chronometer is composed of one ergonomic box with six boards. Delivered with two optical sensors.

Technical features

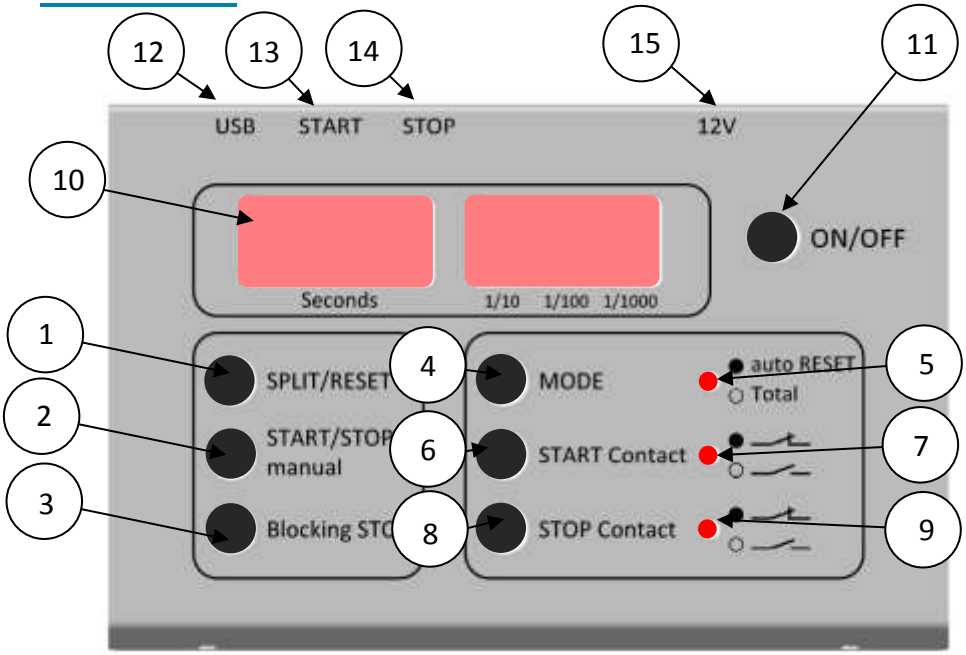
Chronometer:

- Board with seconds, 1/10, 1/100, 1/1000
- START and STOP manual or with sensors
- USB port
- Power supply: 12V (included)
- Dimensions: 170 x 110 x 50 mm
- Weight: 550 g

Pair of optical sensors:

- H-shape supports with clamping screw and optical cell
- Dimensions: 100 x 85 x 20 mm
- Weight: 230 g

Presentation



1. **SPLIT/RESET**: the board comes back to zero whatever the current step: count in progress or stop.
2. **START/STOP manual**: starts and stops the count with manual way.
3. **Blocking STOP**: when the count is in progress, it enables to avoid the chronometer stop by the optical sensor contact "STOP". In manual, it enables to fix the count value without stopping it.
4. **MODE**: count selection with reset to zero at every starting "auto RESET" or in "Total" mode with start-stop intervals.
5. **Light MODE**: when light is on, it is the "autoRESET" mode: chronometer comes back to zero on every launch. When light is off, it is the "Total" mode: chronometer adds measure intervals.
6. **START Contact**: it chooses the starting mode of the chronometer in case of using optical sensors.
7. **Light START Contact**: when light is on, there is an open contact in rest. It means that, in rest, an object is located between the arms

of the optical sensors. The chronometer starts when there is no longer the object in the optical sensor.
When light is off, there is a closed contact in rest. It means that, in rest, there is no object between the arms of the optical sensors. The chronometer starts when an object appears in the optical sensor.

8. **STOP Contact**: it chooses the stop mode of the chronometer in case of using optical sensors.
9. **Light STOP Contact**: when light is on: an open contact is in rest. It means that, in rest, an object is located between the arms of the optical sensors. The chronometer stops when there is no longer the object in the optical sensor.
   When light is off, there is a closed contact in rest. It means that, in rest, there is no object between the arms of the optical sensors. The chronometer stops when an object appears in the optical sensor.
10. **Time display**: the first screen gives seconds; the second screen gives $1/10^{th}$, $1/100^{th}$ and $1/1000^{th}$ of seconds.
11. **ON/OFF**: start-up and pausing of the chronometer.
12. **USB**: connects the chronometer to a computer in order to exploit relevant data.
13. **START**: jack port 3.5mm connects the optical sensor which starts the chronometer.
14. **STOP**: jack port 3.5mm connects the optical sensor which stops the chronometer.
15. **12V**: jack port 3.5mm connects the power supply 12V.

Use

A. Manual mode

On manual starting mode, the chronometer starts and stops by pressing the button “START/STOP manual”.

The two modes “auto RESET” and “Total” can be used in manual launch.
The chronometer comes back to zero by pressing the button “SLIP/RESET”.

As optical sensors are not used, buttons “START CONTACT” and “STOP CONTACT” have to be on open contact (light is on).

B. Automatic launch mode with two optical sensors

On this automatic launch, the chronometer starts and stops thanks to contacts open and closure of optical sensors START and STOP.

The button “Blocking STOP” avoids the chronometer stop when the stop sensor is used (use for measure on several periods).

It is important to choose the right contact mode for the sensors START and STOP. Indeed, the chronometer is programmed to react to contacts (open or closed) and not to transitions (rising or falling fronts). A bad use can lead to erroneous indications.

C. Automatic launch mode with one optical sensor

On this automatic launch, chronometer starts and stops thanks to contacts open and closure of optical sensor START.

The button “Blocking STOP” avoids the chronometer stop when the stop sensor is used (use for measure on several periods).

It is important to choose the right contact mode for the sensor START. Indeed, the chronometer is programmed to react to contacts (open or closed) and not to transitions (rising or falling fronts). A bad use can lead to erroneous indications.