



PROFESSIONAL TIMING

START CLOCK HL 920

OPERATING INSTRUCTIONS

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I. START CLOCK PRESENTATION

There are many new innovative features on this Start Clock that uses a special 3-motor analogue movement developed entirely by TAG Heuer

- The operation of the start clock is based on a microprocessor that checks the exact position and alignment of the clock hands every minute to ensure a total precision and reliability of the Official Time.
- Digital “Countdown” display for every start accompanied with acoustic “beeps” and the color changes of a rotating disk that indicates valid start periods (red, green and yellow available depending on sport regulations).
- Complete control by the operator for start interval changes during the competition.
- START / STOP function for start processes.
- An Input for timing signals (from start gates or photocells) allows the HL 920 to take and memorize every start time in sequential order.
- An RS 232 serial data port can be used to connect a dedicated printer (such as the PTB Printer) to print in hard copy all recorded start times as they happen. The differences between the start times and the ideal times are also printed.

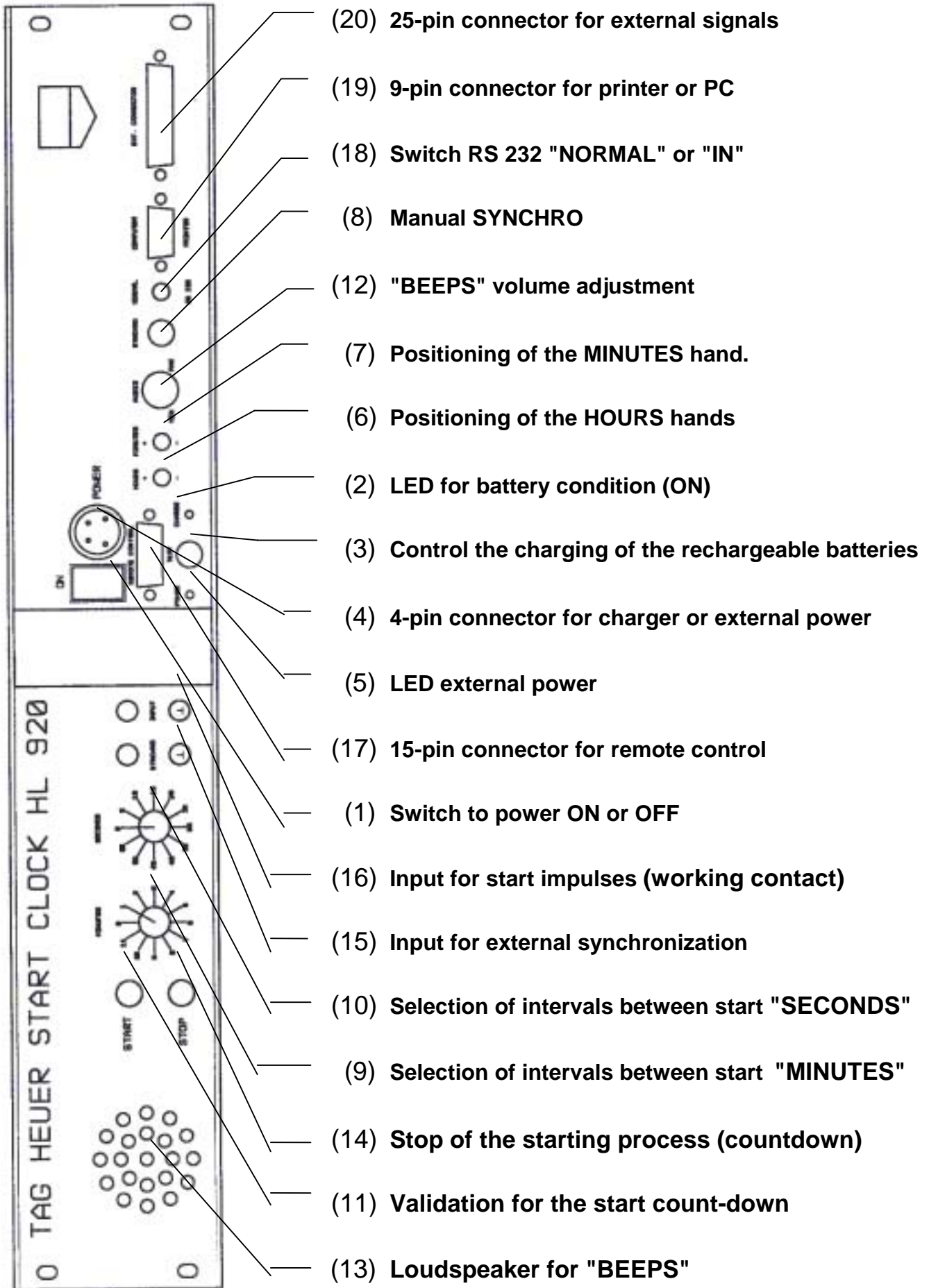
Printed example!

| | | |
|---------------|---------------|--------------------------------|
| SYNCHRO AT | 13 :00 :00 | |
| STARTED AT | 13 :00 :16 | |
| WITH INTERV | 30 | |
| 13 :00 :59.86 | | } 1 st start départ |
| DIFF | -0.1 | |
| IDEAL TIME | 13 :01 :00.00 | } 2 nd start départ |
| IDEAL TIME | 13 :01 :30.00 | |
| 12 :01 :31.42 | | } |
| DIFF | +1.4 | |

- The RS 232 data port also serves as a way to control the function parameters of the HL 920 start clock.
- A supplementary output provides control signals for signal lights or additional loud speaker.
- Rechargeable batteries assure excellent operational duration down to – 25° C.
- **The start clock can be fixed on a wooden-post using the support HL 920-4 or on a tripod (HL 5R or HL6).**

Option

- Automated Time Setting is assured by a built-in time management system where the accuracy is controlled by GPS or other (DCF 77) synchronization signals.
- Remote Control (soon available **ref. HL 920-1**).



II. START CLOCK MODE

| | | |
|----|---------------------------|--|
| 1 | ON | Switch to power ON or OFF the start clock |
| 2 | CHARGE | LED for battery condition LED flashes when battery is discharged (see autonomy) |
| 3 | TEST | Control key for the charging of the batteries |
| 4 | POWER | 4-pin connector for the charger or for external power (12V battery) (12 ÷ 24 VDC, see pin-out) |
| 5 | POWER | LED external power. |
| 6 | HOURS | Switch for the positioning of the hours hand. (Forwards + / Backwards -) |
| 7 | MINUTES | Switch for the positioning of the minutes hand. (Forwards + / Backwards -) |
| 8 | SYNCHRO | Manual contact for synchronization. |
| 9 | MINUTES | Selection of intervals between Starts "MINUTES" (From 0 to 11 minutes) |
| 10 | SECONDS | Selection of intervals between starts "SECONDS" (From 0 to 55 seconds) |
| 11 | START | Validation key for the starts count-down |
| 12 | AUDIO | "BEEPS" volume adjustment |
| 13 | | Loudspeaker for "BEEPS" Start |
| 14 | STOP | Stop of the starting process (count-down) |
| 15 | SYNCHRO | Input for external synchronization (working contact) |
| 16 | INPUT | Input for start impulses (working contact) |
| 17 | REMOTE CONTROL | 15 pin connector for the remote control. |
| 18 | NORMAL / RS 232 | Switch for NORMAL or GPS mode (RS 232) . - NORMAL : Programming of the start clock parameters. Times printed on hard copy (on printer HL 605-2) Download of memorized times. - RS 232 : Operation in GPS mode (if integrated) |
| 19 | COMPUTER / PRINTER | - 9-pin connector for the printer or the PC. |
| 20 | EXT. CONNECTOR | 25-pin connector for external signals. - Control for external starting lights (5 lights-Type F1) - Control for external lights RED – YELLOW – GREEN (same as the disk). - Audio line (for external loudspeaker) - TOP SECONDE / TOP MINUTES / TOP ZERO (TOP OF THE START). |

III. OPEARTING INSTRUCTIONS

Be sure that the programmed parameters of your start clock are appropriate to the desired application.

1 Power ON by the switch (1) "ON"

- All the hands are moving to "zero" (at 12 o'clock).
- In the meantime the digits indicate "88".
- The rotating disk does one rotation and stops on the RED position.
- The light "CHARGE" is on and should not flash (see autonomy).

After having switched OFF the Start clock, you should wait 5 seconds before switching it ON again.

2 Time-of-day synchronization (without GPS option)

Positioning the hands at the desired time:

- Hours with the switch **(6)** Forwards + or Backwards -
- Minutes with the switch **7** Forwards + or Backwards -

! WARNING !

The Start Clock HL 920 is running on a 24 hours range.

When the hands are in position "zero", the represented time is 12h00.

- To synchronize it at 9h00 for example, it is necessary to backward the hours hand on 9.
- To synchronize it at 21h00, it is necessary to turn forward the hours hand on 9.
- This is obligatory when the start clock is used with the printer (HL 605-2) or the computer to download the memorized times.

3 Synchronization at the exact day time

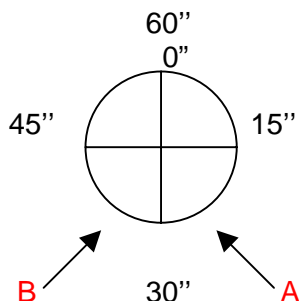
- Manually, by pressing on the contact **(8)** SYNCHRO (Starting time).
- By the Input **(15)** SYNCHRO (yellow and black "banana plugs") for a synchronization with several start clocks in parallel or other timing devices
- We advise to use a manual contactor (HL 18) for this operation.
- If other devices have to be synchronized we recommend the use of our impulse distributors with HL 553.

4.0 Control of start intervals

- Select the interval with the MINUTES **(9)** and SECONDS **(10)** switches).

- Intervals can be settle from 10" to 11' 55" by step of 5".
- To activate the countdown, it is necessary to press START (11) during the 15 seconds period which precedes the start of the programmed countdown.
- While you press on START, the colored disk does 1 rotation (Starts validation).

Examples: (for the 1st start at time "0")



- A. Press START between 15" and 30" if the programmed countdown is 30".
- B. Press START between 30" and 45" if the programmed countdown is 15".

4.1 Advised countdowns for several intervals.

See chapter V "START CLOCK PROGRAMMATION "

- 5" for intervals of 10 seconds.
- 10" for intervals of 15 seconds.
- 15" for intervals of 20 to 55 seconds.
- 30" for intervals of 1 minute and more.

4.2 Change of intervals during the race.

See chapter V "START CLOCK PROGRAMMATION".

Carry out the change before that the last competitor who have the former interval is starting (or, if possible, during the countdown).

Example:

Intervals programmed at 30" until 12h 06' 00"

New interval to program at 15" from 12h 06' 00"

The interval should be changed between 12h 05' 30"
and 12h 06' 00"

4.3 Stop of the starting process (Race interruption for ex.)

- Press STOP (14) during 2 seconds minimum (Blanking of the display and rotating disk on RED position)
- New starts can be decided as you wish respecting the previous rules

5 Do not forget to adjust the audio volume (12)

1 x "BEEP" at 10" from the start.

5 x "BEEPS" for the last 5 seconds with a high-pitched BEEP for the start.

6 **The 3 colors rotating disk (red green and yellow) allows to visualize valid start periods.**

Ski The disk is RED between starts.
The disk becomes GREEN 5 seconds before the ideal starting time and return to RED after 5 seconds.

Rally The disk is RED between starts.
The disk becomes YELLOW 5 seconds before the ideal starting time (Attention, start) and GREEN for start validation when the display indicates 0.
The disk returns to the RED position after 5 seconds.

7 **Fixation**

- The start clock can be fixed on a tripod 3/8" (camera thread), mounting ball, or support. **Contact your agent.**
- We recommend the use of a high quality tripod to assure the stability.
- In case of strong wind, we recommend to secure or stabilize the tripod with additional weight fixed on his base.

8 **! WARNING !**

- **Do not clean the plexiglas with a dry or dirty cloth.**
You must clean it with a wet cloth and a sweet cleaning product (Soap and water).

9 **HL 920 complete set :**

- 1 transport case HL 920-7.
- 1 charger 110 / 220 VAC (Type of plug to be confirmed USA / Europe) HL 920-3.
- 1 fixation HL 920-4 (depending on the used tripod).
- 1 operating instructions.

10 **Option:**

Printer HL 605-2 for the printing of the ideal time and real starting times with difference between these two values.

IV. AUTONOMY AND CHARGING OF THE START CLOCK HL 920

The HL 920 has an excellent autonomy.

Of course, it depends on the state and on the maintenance of the rechargeable batteries.

With well-charged and maintained battery we can guarantee the following values with 1 Start per minute and maximum Loudspeaker volume.

24 hours at 20° C
15 hours at 0° C
10 hours at -20° C
8 hours at -30° C

- The LED CHARGE (2) flashes when the rechargeable battery is partially discharged (~50%).
- At this moment, we recommend to use an external power supply or to recharge the Start clock.
- You can control the state of charge of the battery by pressing TEST (3) during 5 seconds.
- If the LED (2) is not flashing, it means that the start clock batteries are guaranteed for several hours.
- When the LED (2) is flashing, the key TEST should not be used.
- An additional security allows you to save the timing when the capacity of the battery is low.
 - The two digits display will indicate "LO", the rotating disk and the start "BEEPS" will stop working. The official time of the start clock will continue to be correct carry during ~1 hour.

Use and functions of the charger

- Connect the charger HL 920-3 to a normal household ac current receptacle
- Connect the charger to power (4)
- **RED LED Flashing very fast** ⇒ The red LED is flashing faster than one flash per second.
Batteries are totally DIS-CHARGED
- **RED LED ON** ⇒ The LED is continually red
Batteries are CHARGING
- **RED LED Flashing** ⇒ The red LED is flashing every second.
Batteries are totally CHARGED

Important notes:

- **Never leave the start clock discharged for a long period.** At the beginning, it is however advised to **discharge and recharge the start clock 3 to 4 times to fully enjoy the accumulators capacity.**
- The charger can also be used as an external power supply when the start clock is working in so far as this one is not completely discharged.
- **!! WARNING !!** If the start clock is OFF, the LED CHARGE (2) is not active when you plug the charger. The charger led is on the external power supply.

V. START CLOCK PROGRAMMATION

CHANGE THE START CLOCK PARAMETERS USING THE PROGRAM "HL 920 CONTROLER"

1. **Connect your PC to start clock HL 920 on the "COMPUTER" (19) plug.**
2. **Switch RS 232 (18) on "NORMAL" position.**
3. **Start the PC and launch the "HL 920 CONTROLER ".**
4. **Start the HL 920 (1).**

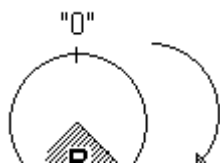
Short description of window "HL 920 CONTROLER"

- | | |
|--------------------|--|
| ▪ SERIAL PORT | : Choice of the serial port (COM X) |
| ▪ COLOR DISK | : Choice of the 3 colors rotating disk for the starting process. RED: Prohibited starts. YELLOW: Warning start (if desired). GREEN: Authorized starts. |
| ▪ ACCOUSTIC SIGNAL | : AUDIO starting signals (BEEPS). |
| ▪ GET STARTS | : Download of the memorized starting times in the HL 920. |
| ▪ GPS TIME | : Only for HL 920-GPS. Adjustment of the time-of-day compared to GMT. |
| ▪ FILE | : Download of the variable parameters in the start clock HL 920. Click on "SAVE PARAMETERS TO CLOCK". |
| ▪ COMMAND STATUS | : Download or connection with the PC confirmation. YELLOW: HL 920 is not connected. RED: "NACK" Datas not transferred. GREEN: "ACK". OK. Datas transferred. |

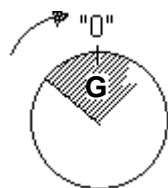
5. **Click on SERIAL PORT and to select COM1 (or other). The start clock answers "CONNECTED...".**
6. **Click on COLOR DISK to program the visual periods of the 3 colors disk.**

! REFER TO THE IDEAL STARTING TIME "0"

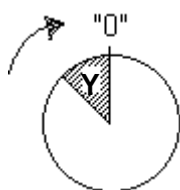
RED : Insert the wished number between "0" and the red color start.



Green : Insert the wished number of seconds between the green color start and "0".



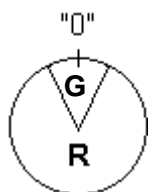
YELLOW : Insert the wished number of seconds between the yellow color start and "0".



Save parameters by clicking on FILE and SAVE PARAMETERS TO THE CLOCK.

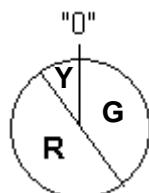
Examples:

SKI : The disk is red between starts. The disk becomes green 5 seconds before the ideal start time and turns back in red position 5 second after.



RED: 05 sec. GREEN: 05 sec. YELLOW: 00 sec.

RALLY : The disk is red between starts. The disk becomes yellow 5 seconds before the ideal start time and green at "0". The disk turns back in red position 20 seconds after.



RED: 20 sec. GREEN: 00 sec. YELLOW: 05 sec.

7 Click on **COUNT DOWN** for a timing countdown from 01 to 59 seconds.

Examples:

- For starts each minute, a countdown from 30 seconds is sufficient.
- For starts each 30 seconds, a countdown of 15 seconds for the ski and 10 seconds for the rally are advised.

Important rule:

If the count down is programmed with a higher value than the wished intervals, the start clock will always begin the new countdown 5 seconds after the ideal start time of the last competitor (Especially for the rally, it is necessary to take this rule into account because the starts are possible during 20 seconds).

Save parameters by clicking on FILE and SAVE PARAMETERS TO CLOCK.

8 Click on ACCOUSTIC SIGNAL to program the wished "BEEPS" sequence before starts.

Generally, we use:

1 BEEP, 10" before the start (SINGLE BEEP 10 seconds).

5 BEEPS for the last 5 seconds before the start (CONTINUOUS BEEP 5 seconds).

Save parameters by clicking on FILE and SAVE PARAMETERS TO CLOCK.

To confirm the parameters while clicking on FILE and SAVE PARAMETERS TO CLOCK.

9 Click on GET STARTS when you wish to download the memorized ideal and real starting times in the start clock HL 920.

Of course, this operation has a meaning only if the start clock HL 920 were used with a starting accessory (photocell, starting gate) on the input (16).

The delivered precision is the one used in rally which mean the 1/100 of seconds with the calculated difference compared to the ideal start time at the 1/10 of seconds. For a use at the 1/1000 of seconds, contact your agent.

10 Click on GPS TIME to adjust the local time with the GMT time.
This function is available only with a start clock with integrated GPS.

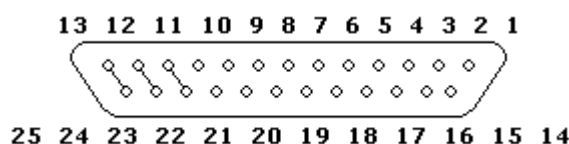
11 PROTOCOL HL 920

Available on: www.tagheuer-timing.com, under the "Operating instructions and protocol" headline.

When all the start clock parameters are configured. Carry out the time-of-day synchronization (chapter II and III)

VI. 25 PIN EXTERNAL CONNECTOR

Pin description



- 1 : lamp 1 command
- 2 : lamp 2 command
- 3 : lamp 3 command
- 4 : lamp 4 command
- 5 : lamp 5 command

- 6 : external GND (mass of the signals on pins 1, 2, 3, 4, 5, 14, 15, 16, 17, 18, 19)

- 7 : START input
- 8 : STOP input

- 9 : AUDIO LINE output

- 10 : SYNCHRO input

- 11 : Activation of the red, yellow and green lamp commands (activation = ponted to pin 23)
- 12 : Activation of the lamps 1, 2, 3, 4 and 5 commands (activation = ponted to pin 24)
- 13 : Activation of the TOP MINUTE, TOP SECOND and TOP "0" commands (activation = ponted to pin 25)

- 14 : lamp RED command
- 15 : lamp YELLOW command
- 16 : lamp GREEN command

- 17 : TOP SECOND output
- 18 : TOP MINUTE output
- 19 : TOP "0" output

- 20 : internal GND (mass of the signals on pins 7, 8, 9, 10)
- 21 : idem
- 23 : idem
- 24 : idem
- 25 : idem

VII. TECHNICAL SPECIFICATIONS

General

- The HL 920 is a multi-function start clock that is very precise and reliable
- 3 separate motor stepping make up this sophisticated movement to control the hours, minutes and seconds hands.
- In addition to the analogue movement, two seven-segment numeric indicators countdown the remaining seconds to each start interval.
- Further, another indicator comprised of a rotating red, green and yellow disk provides information on start validity.
- An acoustic signal rounds out the battery of indicators that serve this start clock

Start Intervals

- From 10 seconds to 11 min 55 sec in 5 second increments

Time Setting

- From internal RTC clock or manually

Time Base

- 16 MHz Thermocompensated Quartz Crystal
- $\pm 0,5$ ppm at 20° C
- $\pm 2,5$ ppm from -30° to 75° C

Inputs

- Timing Impulses
- Synchronization
- Remote Control

Outputs

- 1 RS 232 Data output for computer or printer at 9'600 bds
- 25 Pin Connector with multiple outputs of timing signals for lights, additional audio systems or other visual indicators

Temperature Range

- 25° C to + 75° C (without heating)

Power Supply

- Internal : 12V DC rechargeable battery
- External : 12-18V DC source

Autonomy

- 18 hours at 20° C
- 8 hours at - 20° C

Housing

- Hot lacquered black aluminum case

Dimensions/Weight

- 7,3 kg
- 320 x 500 x 115 mm
- Clock face diameter : 270 mm
- digits height : 100 mm