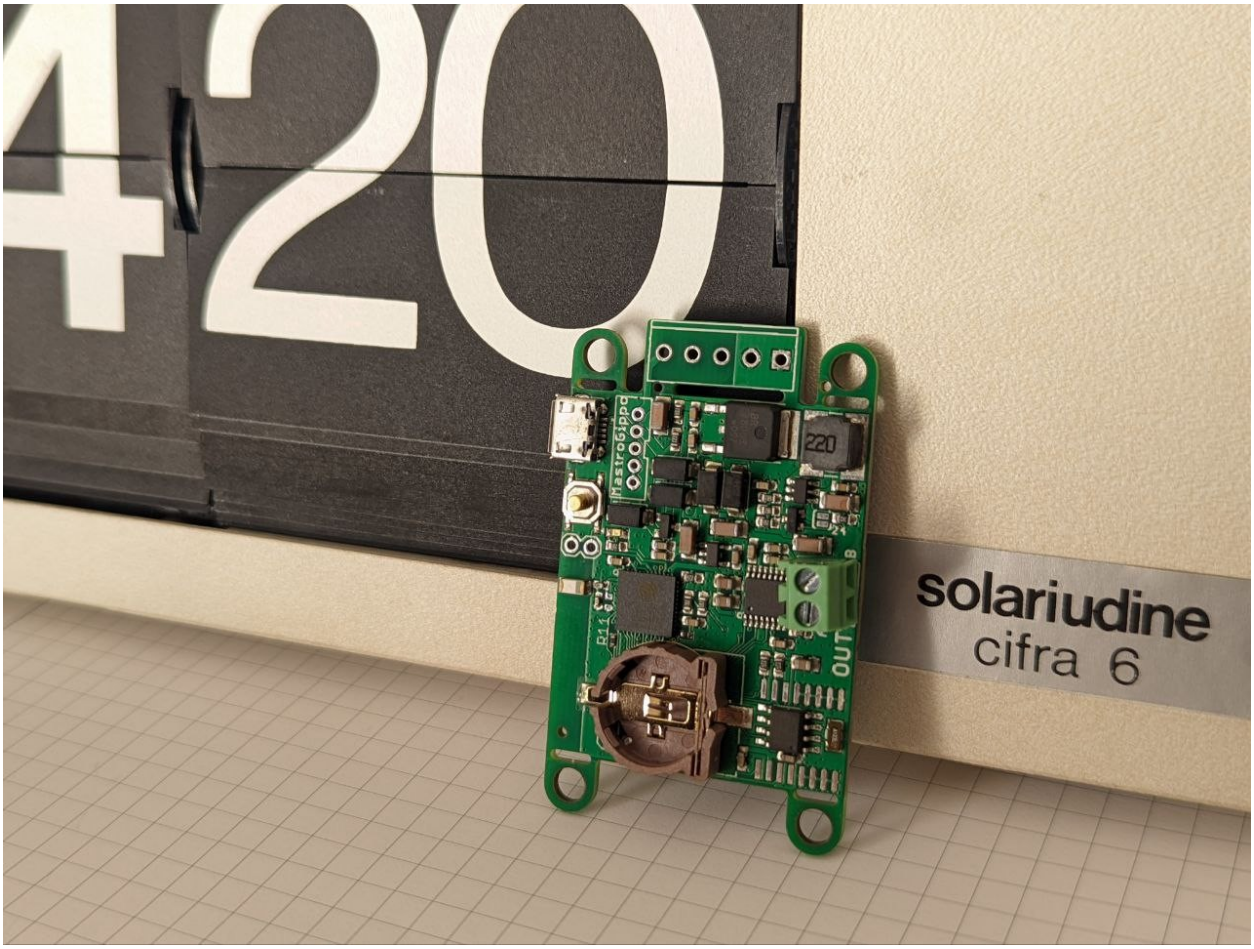
ClockDrive v7.1

User Manual



Ver 1 Rev 1
09 April 2022
www.mastrogippo.it/orologio-pilota

1. Introduction

ClockDrive is an electronic circuit that replaces master clocks to control secondary mechanical clocks. This type of secondary clock does not have an internal timekeeping system but relies on an external pulse, which is typically sent by a master clock.

Secondary clock *Solari Udine Cifra 6*

The most common flip clocks, like the one shown in the figure above, require a polarized 24V pulse lasting 1 second every minute.

Secondary clock *Synchronome type 6*

Photo By Deben Dave at the English language Wikipedia, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=38191927

Many analog clocks, on the other hand, require pulses every 30 seconds, while those with a second hand typically operate with a pulse every second.

2. Technical data

Power supply

The **ClockDrive board** can be powered by any USB power supply capable of providing 5V and at least 500mA to the microUSB connector (1). Use only high-quality power supplies and cables.
If using power from the USB or the 5V input, the output can be configured to 12V or 24V.

To determine the maximum current supplied to the clock when using USB power, use this formula:

Iout = ((Iin * Vin) / Vout) * 0.8

For example, with a 5V 1A USB power supply and choosing to power the clock at 12V, the maximum output current will be:

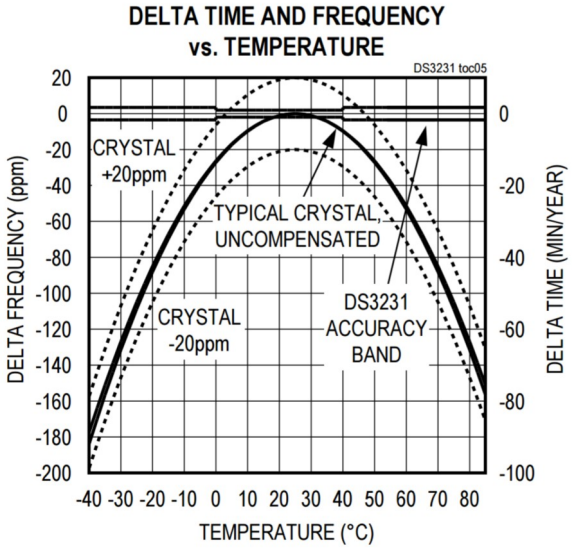
Iout = ((1 * 5) / 12) * 0.8 = 0.33A

Through the secondary connector (6 and 7), the board can be powered directly with 9V to 26V (input between 24V and GND); in this case, this voltage is used directly to power the clock, with a maximum current of 1A.

A battery (4 alkaline cells in series) can be connected to the secondary connector (positive to Batt and negative to GND) to power the clock when the primary power source is unavailable. Typically, 4 AA batteries can keep a Cifra6 clock running for about 3 days.

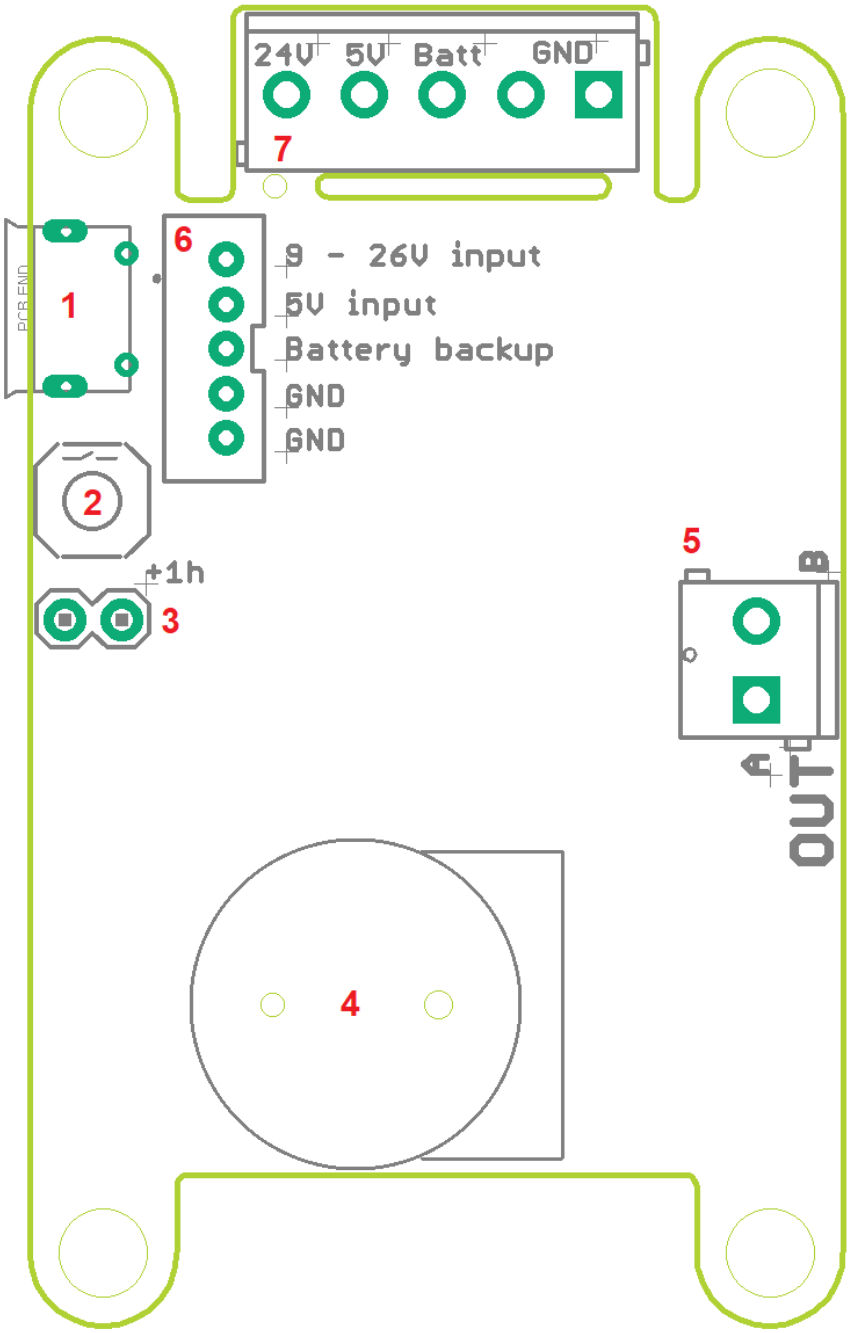
Clock circuit

ClockDrive is based on a temperature-compensated quartz oscillator (DS3231). The accuracy achievable with this system is much better than that of traditional quartz clocks, reaching ±2ppm from 0°C to +40°C, which translates to about ±1 minute of deviation per year. A more affordable version is available, which achieves a maximum deviation of ±8 minutes per year, or less if the clock remains within the temperature range of 15-35°C.



Precision of a temperature-compensated quartz oscillator compared to a regular quartz oscillator
https://www.maximintegrated.com/en/products/digital/real-time-clocks/DS3231.html

3. Board layout



4. Installation

1. Adjust the clock and verify its correct operation

2. Choose the power source

Three power options are available:

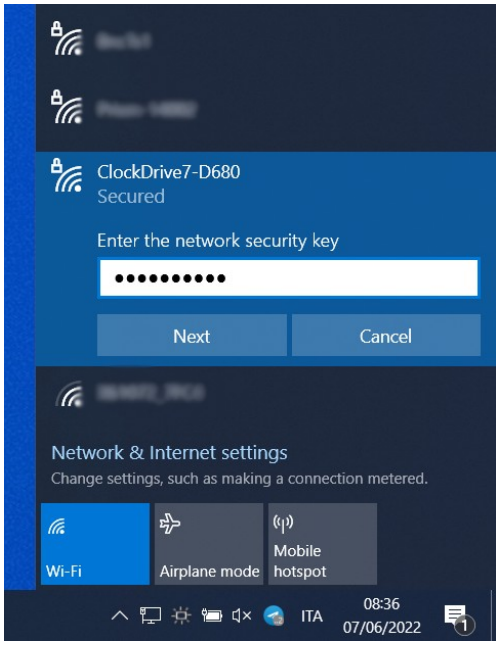
- Via USB
- Through the “5V input” (6) or “5V” (7) pins and “GND” of the auxiliary connector.
- Through the “9V – 26V input” (6) or “24V” (7) and “GND” of the auxiliary connector. In this case, the input voltage is used directly to power the clock, so choose an appropriate power supply.

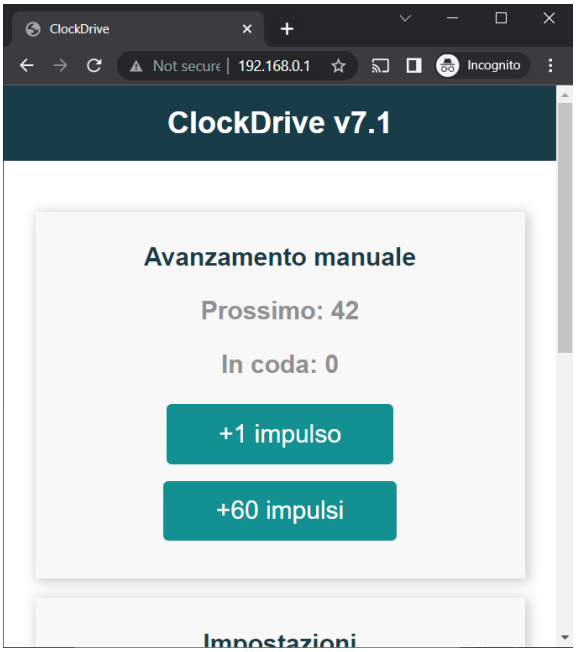
IMPORTANT: Only use one of the indicated power modes!

It is also possible to use a backup battery (4 alkaline cells in series) by connecting the positive to the **Batt** terminal and the negative to **GND**.

3. Set the operating mode of the board

- Power the board and connect to the WiFi network ClockDrive7-XXXX. The password is “clockdrive”
- Open a browser and go to http://192.168.0.1/
- In the “Avanzamento manuale” window, you can see how many seconds are left until the next pulse and how many pulses are “queued”
- Clicking the “+1 pulse” button will add a pulse to the queue. You can press the button multiple times to add a certain number of pulses, which will then be sent according to the set timing.
- Clicking the “+60 pulses” button will add 60 pulses to the queue.





Settings Menu

- Set the pulse duration in seconds (default: 1 second)
- Set the interval between pulses (default: 1 pulse every 60 seconds)
- Set the polarity of the pulses
  - Inverted with each pulse
  - Always A+ and B-
  - Always A- and B+
- Set the output voltage (default: 24V)
- Press the **Save** button to apply the settings

Note: The WiFi turns off after about 20 minutes to save power. To reactivate it, briefly press button (2) or turn it off and on again.

4. Connect the two clock wires to the screw terminals

The figure below shows an example of how to connect the wiring for installation outside the clock.

IMPORTANT: Cut, remove, or insulate any unused wires! A short circuit could damage both the board and the clock.

5. Test the operation and set the clock

To quickly test the clock, press and hold the button (2) “+1h.” Pulses will be sent continuously until the button is released. You can also connect an external button to the terminals (3). Pressing the button also reactivates the WiFi.

6. Secure the board firmly

If the board is installed inside the clock, make sure that the wiring and the board do not interfere with the clock's mechanism. If necessary, you can break the screw supports at the corners of the board using pliers.

5. Contatti

All the latest information can be found at [www.mastrogippo.it/orologio-pilota]. For custom programming, resale, and technical support, you can email [mastrogippo@mastrogippo.it].