ClockDrive v3
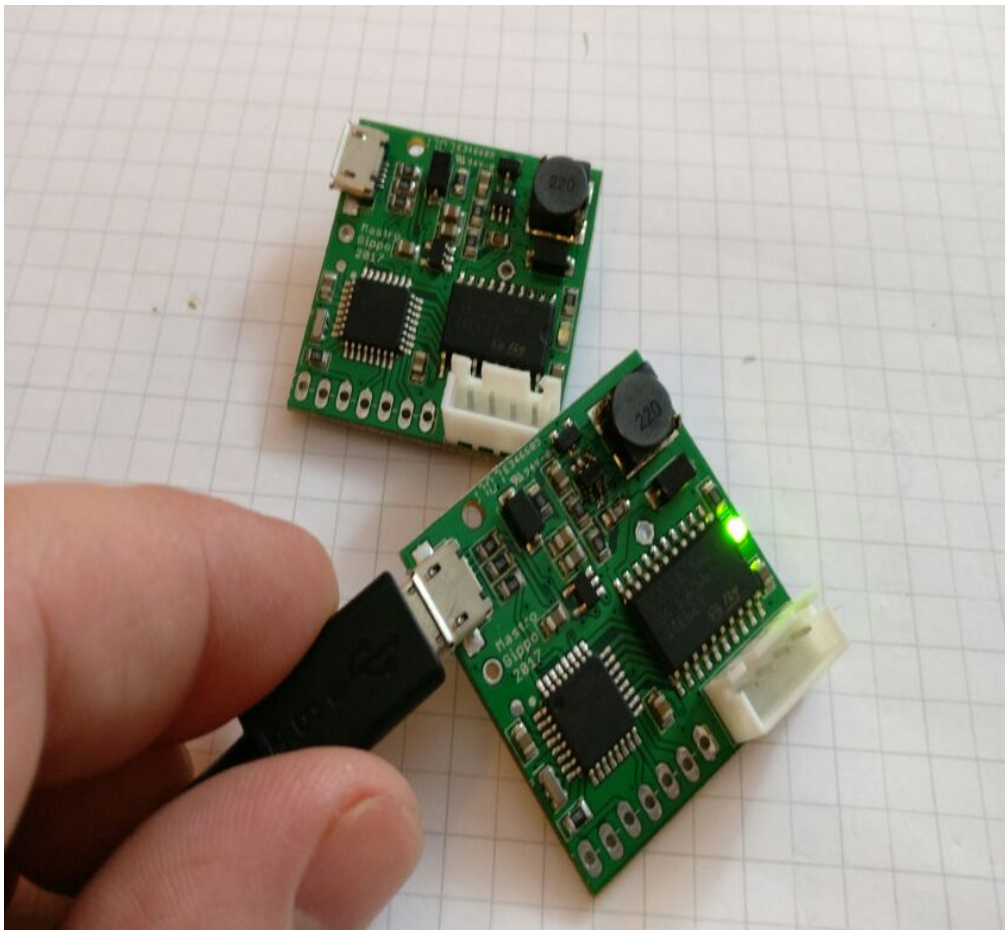## User manual

1. Introduction

ClockDrive is an electronic circuit that replaces the slave clock drivers to control mechanical clocks. This type of slave clocks does not have an internal system for measuring time but depends on an external pulse which is normally sent by a driver clock.

Solari Udine Cifra 6

The most common secondary flip clocks, like the one shown above, need a 1 second, 24V polarized pulse every minute.

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 require a pulse every 30 seconds, while those with the seconds hand usually work with one pulse per second.
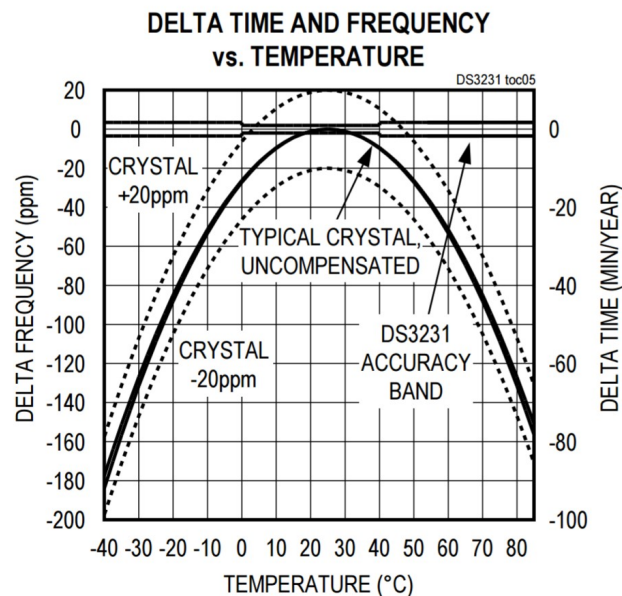
2. Technical details

Supply

The ClockDrive board can be powered by any USB power supply capable of supplying 5V and 500mA. A backup battery (3 or 4 alkaline batteries in series) can be connected to the secondary connector (2) to power the clock when the primary power fails. Indicatively, 3 AA batteries can keep a flip clock running for about 3 days.

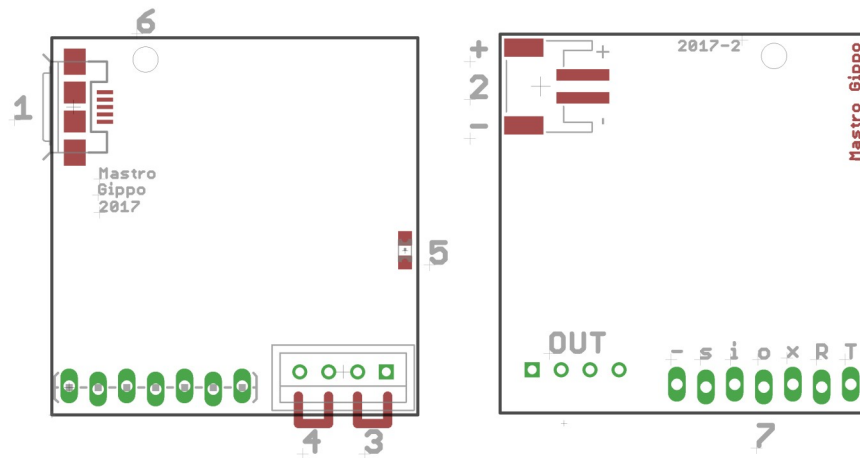The output can be configured for 12V/160mA or 24V/80mA.

Clock circuit

ClockDrive is based on a temperature compensated quartz oscillator (DS3231). The precision that can be achieved with this system is much better than the classic quartz clocks, with ± 2ppm from 0 °C to + 40 °C which translates to about ± 1 minute error per year.

TCO vs normal Crystal precision
https://www.maximintegrated.com/en/products/digital/real-time-clocks/DS3231.html

3. Board components

Seen from top (left image) and from bottom (right image)

Power supply:

1. Standard Micro USB 5V DC – 500mA
2. Backup battery 4V~6V DC – 500mA (JST-PH-2.0)

Output:

3. Primary output 12V 160mA or 24V 80mA
4. Secondary output 12V 160mA or 24V 80mA

LED (5)

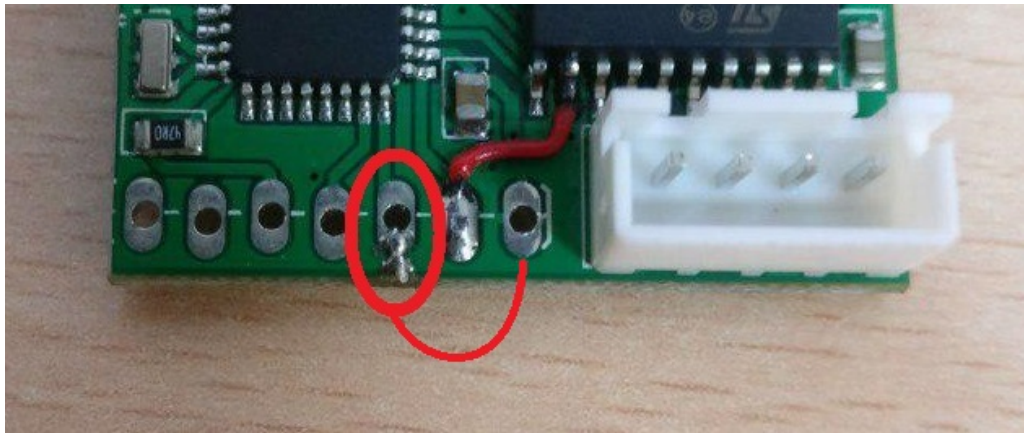M2 screw hole, max head diameter 4mm (6)

Programming (7)

1. GND
2. Clock
3. In (Configure 60/30 seconds)
4. Out (Quick step)
5. Reset
6. RX
7. TX

4. Installation

1. Prepare the clock and ensure it's working correctly
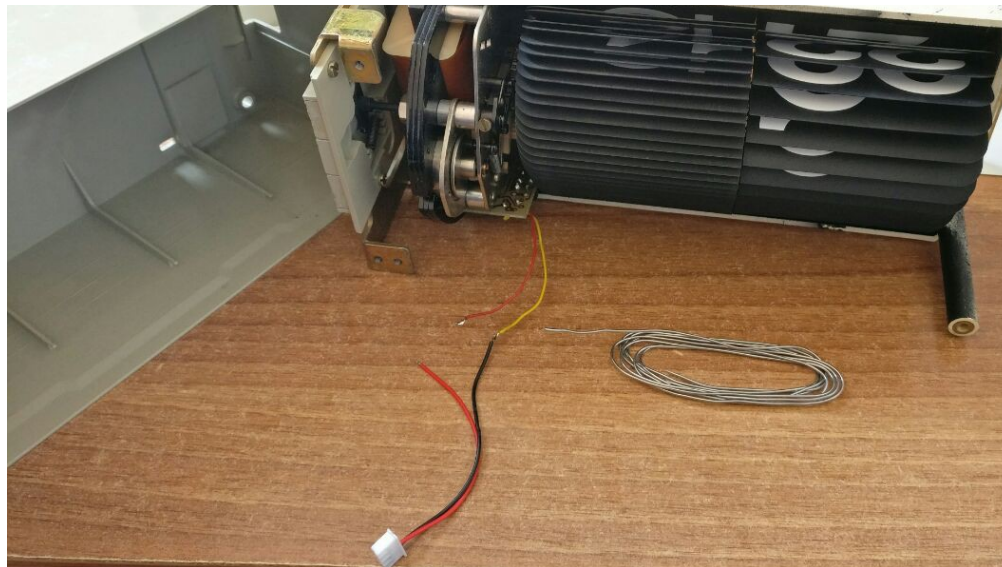2. Board setup

If the clock needs a pulse every minute, no changes are necessary.

To use the board with a clock that requires an impulse every 30 seconds, the board must be configured by connecting the pins "i" (IN) and "-" (GND) of connector 7. For a permanent modification, it is possible to slightly scratch the green paint under the pin and weld the two, as in the following picture:
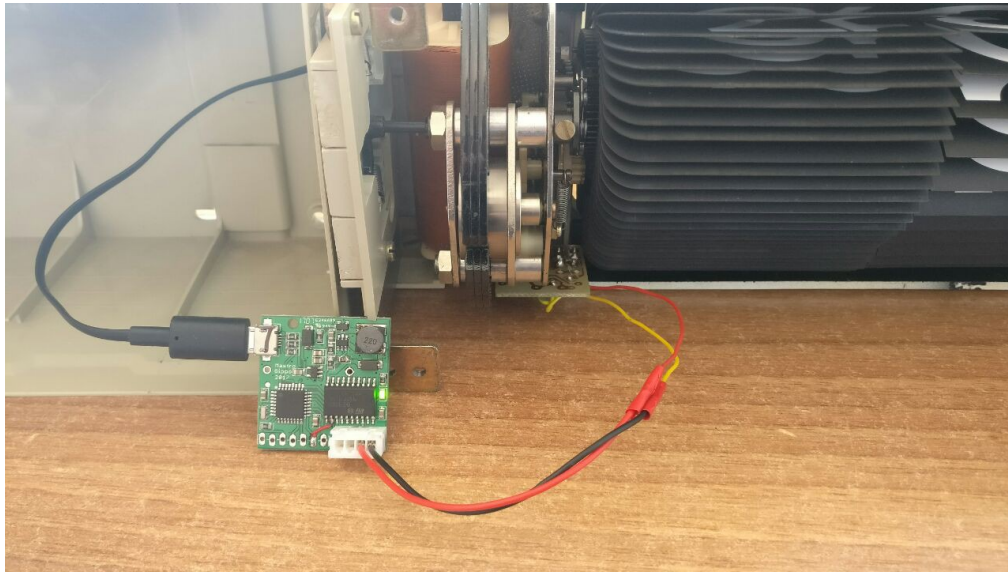

3. Connect the clock

The figure below shows an example of connection for installation inside the clock. The board can also be installed outside, in a separate container.

4. Connect the micro USB cable

When switched on, the LED will light up briefly; then it will flash briefly every 0.5 seconds and stay on for the duration of the pulse (1 second).

To test the clock it is possible to temporarily connect the "-" pin and the "o" pin of the connector (7) as shown in the figure below. This link will send the drive pulse with a 0.5 second interval.

5. Install the board and close the clock

If the board is installed inside the clock, make sure that the cables and the board do not interfere with the clock mechanism and the board doesn't touch any metallic surfaces.

6. Contacts

All the latest information can be found at [http://www.mastrogippo.it/slave-clock-driver/]. For custom programming, resale and technical support, the reference email address is [mastrogippo@mastrogippo.it].