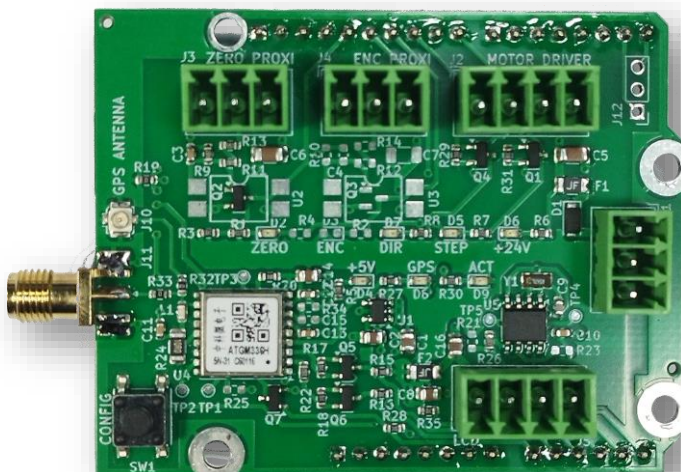




Solar Tracker Shield

Wiring and connections



How to connect the Shield

The shield features removable terminal blocks for all external connections. Each terminal block is dedicated to a single device, ensuring orderly and simple wiring connections.

The bottom side of the board features silkscreen labels indicating the connections.

Power supply zero proximity (J1)

Stepper motor driver (J2)

Zero proximity (J3)

Encoder proximity (J4) Not currently used

Display LCD 2004 (J5)

Antenna GPS (SMA J11 or IPEX J10)

The Controller board ATmega328P can be powered in two ways:

- Power jack (5.5 mm connector, center positive): accepts a DC voltage between 7 and 12 V.
- USB port (Type C): also used for PC configuration.

Power supply zero proximity

The Shield requires a **dedicated 24 V DC power supply (J1)**, necessary for the operation of the **inductive proximity switch** (used to detect the zero-position cam).

This type of sensor must have a **PNP output with N.O. (Normally Open) logic**.

The connections dedicated to the sensor are indicated on terminal block **J3** of the Shield:

- 1. +24V**
- 2. Out**
- 3. Gnd**

Although proximity switches operate with a wide supply voltage range, the use of a 24 V DC supply is recommended, as this represents the standard for powering stepper motor drivers.

Display

The 2004 LCD display uses the I2C communication protocol and requires only 4 wires for connection. On terminal block **J5**, the connections to be made are:

1. **Gnd**
2. **SCL**
3. **SDA**
4. **+5V**

Next to the display's I2C interface pins, the same silkscreen labels are provided.

 It is strongly recommended to strictly follow these connections. Otherwise, both the Shield and the display may suffer irreversible damage.

 It is recommended not to exceed a cable length of 30 cm for the connection.

Stepper Motor driver

The Stepper Motor driver is a component that requires special attention, as it offers several hardware configuration options. It must be connected to terminal block **J2**.

It is recommended to carefully consult the user manual and to take all necessary precautions before connecting it and applying power.

Regarding microstep configuration, it is essential that the value set on the driver is also entered on the Shield using the configurator included in the kit.

1. **+24V** (see note)
2. **Step**
3. **Dir**
4. **Gnd**

Note:

Terminal 1 already has +24 V, as it is supplied from terminal block J1.

Quick functional test

It is possible to test the operation of the Shield by powering it on **without connecting** the driver and the Stepper Motor. For board testing, **the zero cam is not required, even though it is a critical element for the real system operation.**

In this mode, the system simulates the behavior of the solar tracker.

 It is still necessary to supply the Shield with **24 V DC power** via terminal block **J1**.

Procedure:

- Power on the Controller board via the USB port on the Shield (or using the onboard jack).
- Wait for the GPS signal to be received.
- After position acquisition, the following message will appear on the display:

"Zero set positioning, please wait..."

At this moment, the Shield is waiting for the zero signal from the proximity sensor.

To simulate zero acquisition, it is sufficient to bring a metal object close to the top of the sensor.

The display will confirm that zero has been acquired (in this case, a simulated zero), after which it will begin showing the **simulated real-time** movement of the tracker.

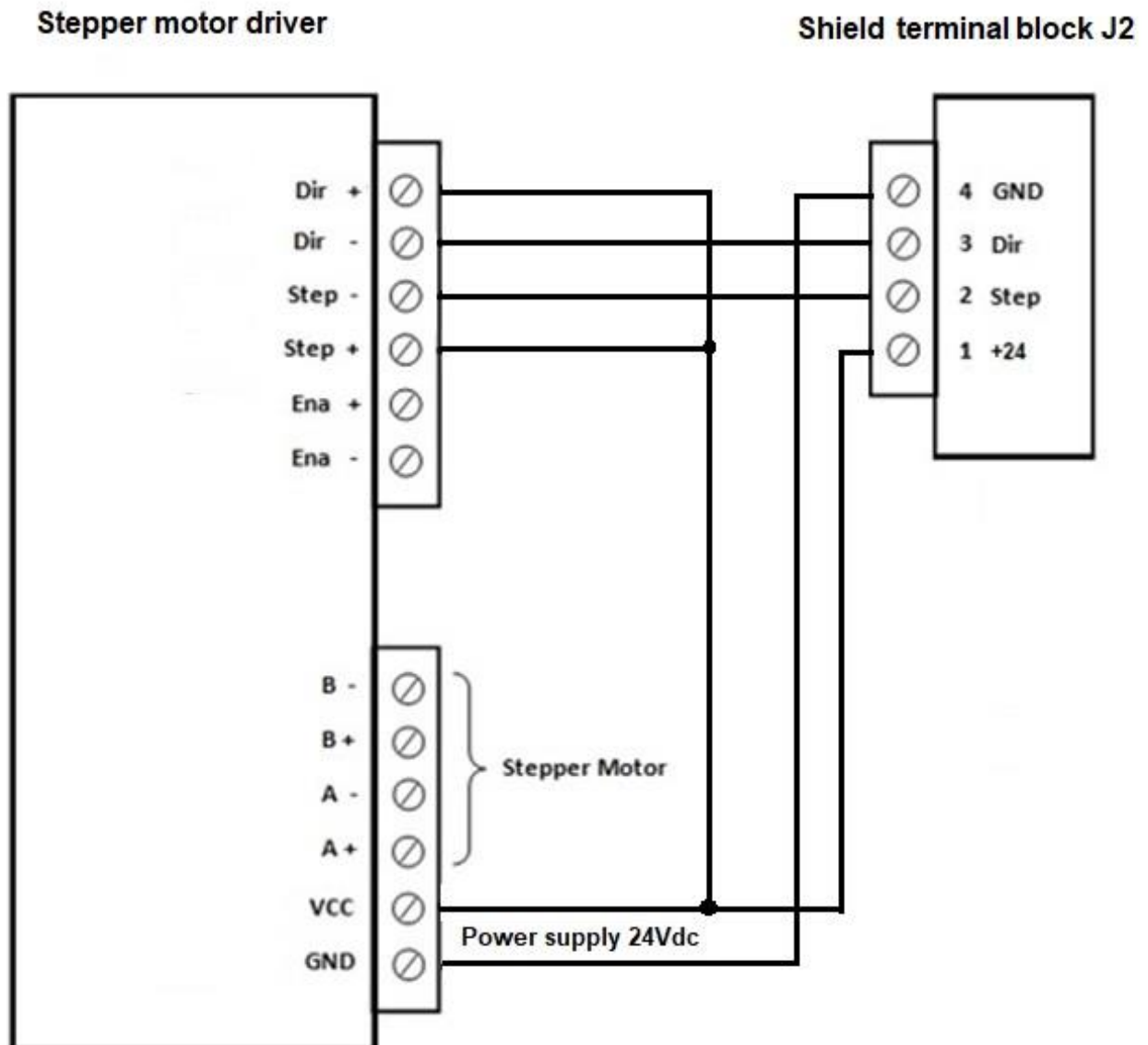
Note:

Leaving the Shield powered on in this simulation mode, at sunset the system will automatically perform the repositioning for the following sunrise, including automatic zero-position acquisition during the return procedure. For this reason, it will be necessary to manually repeat the zero-position acquisition, as performed at startup.

This logic ensures that the zero position is always verified and correct, guaranteeing maximum accuracy in solar tracking.

During normal operation, with the zero cam correctly installed, this procedure is handled automatically by the firmware without any intervention from the operator.

Wiring sample Driver - Shield (NPN Sink mode)



Important note:

The two power supplies (Controller board ATmega328P and 24Vdc Shield supply) are independent and both must be present for the system to operate correctly. **The only common connection is GND**, which is required to ensure a proper electrical reference between the 5 V Arduino circuits and the 24 V circuits of the proximity switch and the stepper motor driver.