



Arduino Solar Tracker Shield Wiring and Connections



How to Connect the Shield

Connections to the shield are made via convenient removable terminal blocks. Each terminal block is dedicated to a single device, ensuring a clean and simple wiring layout.

Arduino Uno Power Supply

Proximity Zero Power Supply

LCD 2004 Display

Stepper Motor Driver

Arduino Uno can be powered in two ways:

- Power jack (DC connector): accepts a voltage between 7 and 12 Vdc. Ideal for stand-alone installations.
- USB port (Type B): commonly used for programming from a PC, it can also provide 5V power, useful for lab testing or configuration.

Proximity Zero Power Supply

The shield requires a **separate 24Vdc power supply**, needed to operate the **inductive proximity switch** (used to detect the zero-position cam).

This type of sensor, with **PNP output and Normally Open (N.O.) logic**, operates at a typical voltage of **24Vdc**. When the zero cam is detected, the sensor output will provide 24Vdc.

The dedicated connections for the sensor are clearly marked on the shield's terminal block:

1. **+24V**
2. **GND**
3. **Zero (Sensor output signal)**

Proximity switches used in industrial automation



Although proximity switches operate over a wide supply voltage range (typically 10–30 Vdc), it is recommended to use a 24 Vdc power supply, as this is the standard for stepper motor driver systems.

Display

The LCD 2004 display (included in the kit) uses the I2C communication protocol, requiring only 4 wires for connection. On the shield, the silkscreen labels next to the terminal block clearly indicate the necessary connections; the same applies to the silkscreen labels on the display's I2C interface pins. Specifically, the connections to be made are:

- 1. SDA**
- 2. SCL**
- 3. GND**
- 4. +5V**

It is strongly recommended to follow these connections precisely: failure to do so may cause irreparable damage to both the shield and the display. Additionally, it is advisable not to exceed 30 cm in cable length.

Stepper motor driver

The stepper motor driver is a component that requires particular attention during use, as it offers various hardware configurations. It is recommended to carefully consult the user manual and take all necessary precautions before connecting and powering it together with the stepper motor.

As for the microstep configuration, it is essential that the value set on the driver (usually via dipswitch) is also set on the shield, using the configurator included in the kit. The connections on the shield are clearly indicated by the labels next to the dedicated terminal block.

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

Note:

There is already a 24Vdc voltage present on terminal 4, as it comes from the terminal block of the proximity switch.

Quick Functional Test

It is possible to test the functionality of the shield by powering it on without connecting the driver, the stepper motor, the proximity switch and the **zero-cam, a very important element for the proper functioning of the system.**

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

 It is still necessary to supply **24Vdc power** to the shield.

Procedure:

- **Power on the Arduino** and set parameters using the configurator tool.
- Wait for the GPS signal to be received.
- After acquiring the position, the following message will appear on the display:

"Zero set positioning, please wait..."

At this point, the shield is waiting for the zero signal from the proximity switch.

To simulate the zero acquisition, simply **briefly apply 24Vdc** to the "Zero" terminal.

The display will confirm that the zero position has been acquired. From this moment, the simulated advancement of the tracker **will be shown in real time.**

Note:

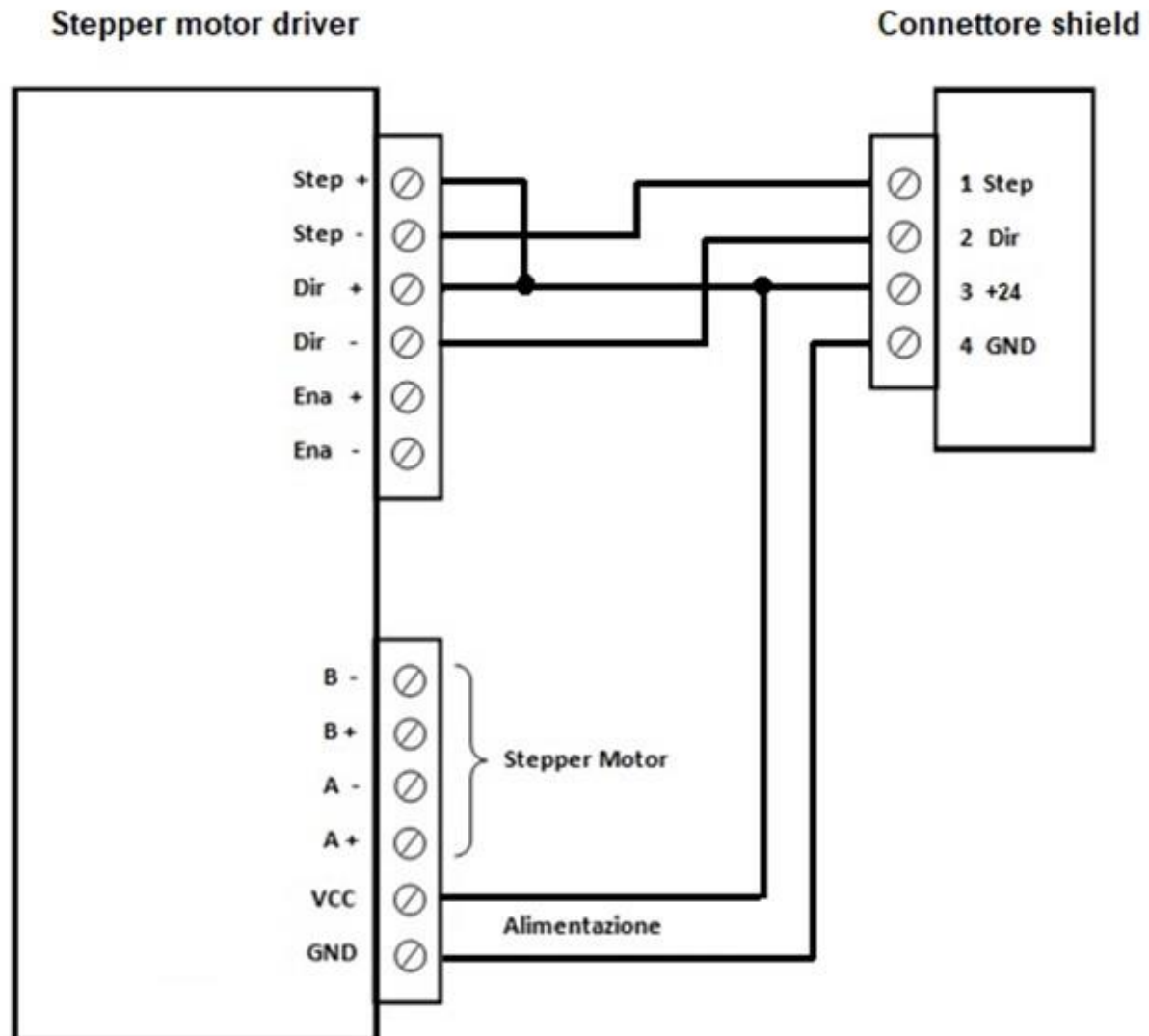
If the shield is left in this simulation mode, when the system automatically repositions for the next sunrise at sunset, it is necessary to repeat the manual simulation of the zero signal.

This is because the firmware checks the zero position also during the evening repositioning, automatically and transparently to the user.

This logic ensures that the zero position is always checked and corrected, guaranteeing maximum precision in solar tracking.

Example of Driver - Shield Connection

(NPN Sink mode)



Important Note:

The two power supplies (Arduino and shield) are independent and both must be present for the system to function properly. **The only shared connection is the GND**, which is essential to ensure the correct electrical reference between the 5V circuits (Arduino) and the 24V circuits (shield and sensors).