

# CONTROLLER BOARD CNC

## 4x A4988 motor driver for Arduino Uno

## 1. GENERAL INFORMATION

Dear Customer,

Thank you for choosing our product. In the following, we will show you what to consider during commissioning and use.

If you encounter any unexpected problems during use, please feel free to contact us.

## 2. SAFETY INSTRUCTIONS

With this set you lay the foundation for installing a custom CNC router. The controller board is suitable for use with the Arduino Uno or Arduino Uno compatible boards and can be operated with 12 to 36 V as required. Up to 4 axes can be controlled with the included A4988 motor drivers.

The expansion board is easy to drive as it is 100% [GRBL](#) compatible.

Since potentially dangerous machines can be controlled with this expansion board, please observe the following safety instructions:

**Never reach into the machining area while the machine is running.**

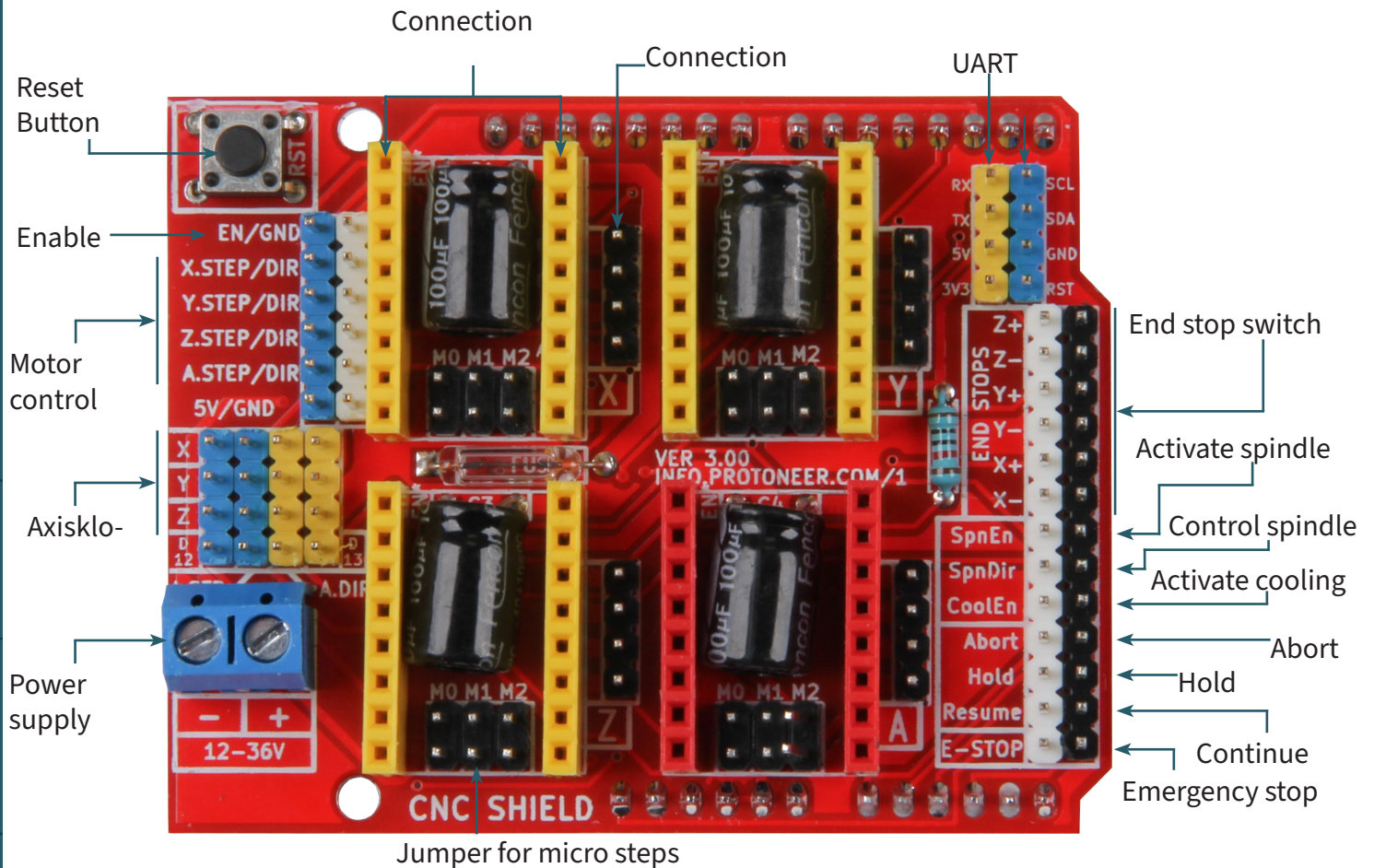
Do not remove chips by hand. Use aids such as brushes, hand brushes or compressed air for this purpose. Never change tools or workpieces while the tool spindle is running. Make sure that the workpieces are adequately secured so that the resulting load, e.g. during drilling or milling, can never move the workpiece out of its position. Never leave the machine running unattended! Always keep a sufficient safety distance to the running machine.

**Use the ARD-CNC-Kit1 only in dry environments.**

When using components of other manufacturers, please inform yourself about their safety regulations and observe them.

**We are not liable for damages in case of improper use.**

### 3. PIN ASSIGNMENT

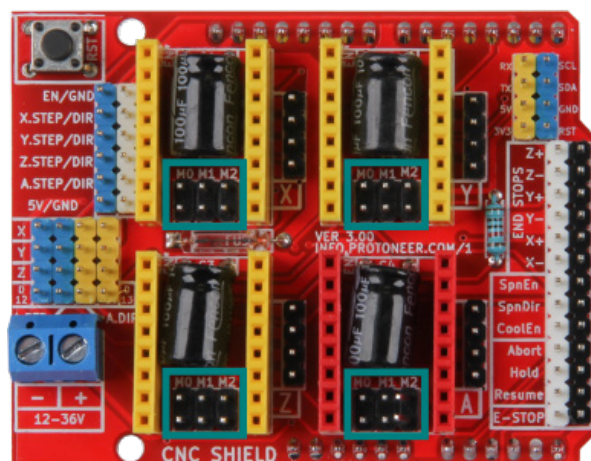


### 4. MICROSTEPS

To determine the step size for the motors, you can make a setting via jumpers on the main board. The corresponding pins are marked in the following picture.

#### Jumper positioning for microsteps

M0	M1	M2	MICROSTEPS
No	No	No	Whole step
Yes	No	No	Half step
No	Yes	No	1/4 step
Yes	Yes	No	1/8 step
Yes	Yes	Yes	1/16 step

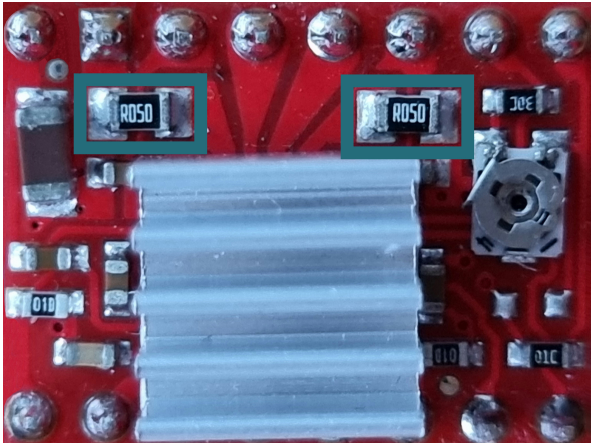


## 5. ADJUSTING THE MOTOR DRIVER

### 5.1 Different resistors

Please note that the motor drivers of the CNC kit must first be adapted to the motors to be operated before they can be used. The adaptation must be carried out in order not to cause any damage to the motors or the motor drivers themselves in the long run.

For this you have to pay attention to certain resistors on the motor driver boards, as you will see in the following picture, because these are needed to determine to which value the rotary potentiometer has to be set.



There are different variants of the A4988 motor drivers, so there are also different resistors with different values. The most common variants use the resistors **R050** (0.05 Ohm), **R100** (0.1 Ohm) and **R200** (0.2 Ohm).

### 5.2 Calculation of the value to be set

In order to be able to calculate to which mV value the rotary potentiometer must be set, we calculate:

$$V_{REF} = 8 * I_{MAX} * R_{CS}$$

**V<sub>REF</sub>** (reference voltage) is the value that must be set on the rotary potentiometer.

rotary potentiometer.

**I<sub>MAX</sub>** (rated current) can be found in the data sheets of the motors you want to use.

**R<sub>CS</sub>** (Current Sense Resistor) is the value of the resistors marked in the picture above.

### 5.3 Measuring the value to be set

*To now be able to set the rotary potentiometer correctly, you will need a multimeter, a cable with crocodile clips and a conductive screwdriver.*

You must set the multimeter to the setting (**V<sub>DC</sub> voltage**). Next, you need to attach the alligator clip cable with one side to the positive measuring tip of the multimeter and with the other side to the metal of the screwdriver. With the negative measuring tip of the multimeter, go to the nearest GND of the PCB. Now you can read on your multimeter how much voltage is coming to your motor driver. To increase the voltage you must turn the screwdriver clockwise and to decrease the voltage turn it counterclockwise.

## 6. CONNECTING THE EXPANSION BOARD

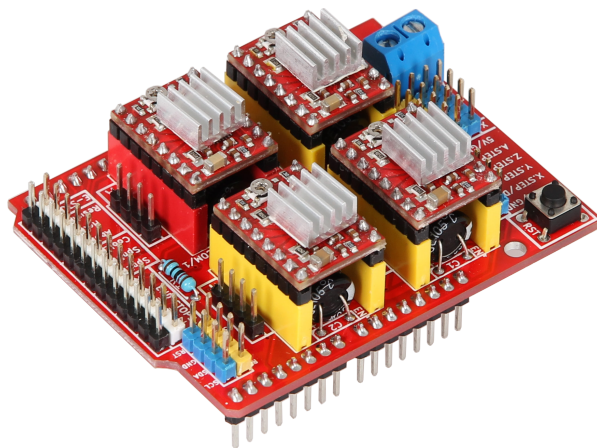
The ARD-CNC-Kit1 supports the Arduino Uno and Arduino Uno compatible boards.

The CNC expansion board is simply plugged onto your Arduino Uno. It needs an additional power supply between 12 V and 36 V.

### ATTENTION!!!

**Pay attention to the correct orientation of the A4988 motor driver, otherwise it will be damaged.**

**Place the motor driver on your CNC board as shown in the following picture.**



## 7. EXAMPLE CODE

On the following page you can have a code example with which you can easily test your CNC kit. Please copy the code completely into your Arduino IDE.

### ATTENTION !!!



```

#define EN 8 /* Enable pin for all stepper outputs */
#define X_DIR 5 /* Direction pin for X-axis */
#define X_STEP 2 /* Step pin for X-axis */
#define Y_DIR 6 /* Direction pin for Y-axis */
#define Y_STEP 3 /* Step pin for Y-axis */
#define Z_DIR 7 /* Direction pin for Z-axis */
#define Z_STEP 4 /* Step pin for Z-axis */
#define A_DIR 13 /* Direction pin for A-axis */
#define A_STEP 12 /* Step pin for A-axis */
int Count = 0; /* Counter to count the steps made */
boolean Direction = LOW; /* Rotation direction of the stepper
motors */
void setup()
{
    Serial.begin(9600);
    /* Pins of the motor drivers are configured as outputs */
    pinMode(EN, OUTPUT);
    pinMode(X_DIR, OUTPUT);
    pinMode(X_STEP, OUTPUT);
    pinMode(Y_DIR, OUTPUT);
    pinMode(Y_STEP, OUTPUT);
    pinMode(Z_DIR, OUTPUT);
    pinMode(Z_STEP, OUTPUT);
    pinMode(A_DIR, OUTPUT);
    pinMode(A_STEP, OUTPUT);
    digitalWrite(EN, LOW); //Low to activate
}
void loop()
{
    /* Count one step */
    Count++;
    /* When 500 steps have been reached, change the direction
and reset the counter. */
    if (Count >= 500)
    {
        Direction = !Direction;
        digitalWrite(X_DIR, Direction); // Low = CW
        digitalWrite(Y_DIR, Direction); // Low = CW
        digitalWrite(Z_DIR, Direction); // Low = CW
        digitalWrite(A_DIR, Direction); // Low = CW
        Count = 0;
    }
    /* Step the X, Y, Z, and A motors */
    digitalWrite(X_STEP, HIGH);
    delay(1);
    digitalWrite(Y_STEP, HIGH);
    delay(1);
    digitalWrite(Z_STEP, HIGH);
    delay(1);
    digitalWrite(A_STEP, HIGH);
    delay(1);
    digitalWrite(X_STEP, LOW);
    delay(1);
    digitalWrite(Y_STEP, LOW);
    delay(1);
    digitalWrite(Z_STEP, LOW);
    delay(1);
    digitalWrite(A_STEP, LOW);
    delay(1);
}

```

## 8. INFORMATION & TAKE-BACK OBLIGATIONS

Our information and take-back obligations under the Electrical and Electronic Equipment Act (ElektroG).



### Symbol on electrical and electronic equipment:

This crossed-out trash can means that electrical and electronic equipment does not belong in household trash. You must hand in the waste equipment at a collection point. Before dropping off, you must separate used batteries and accumulators that are not enclosed by the waste equipment from it.

### Return options:

As an end user, when you purchase a new device, you may return your old device (which performs essentially the same function as the new device you purchased from us) for disposal at no charge. Small appliances with no external dimensions larger than 25 cm can be returned in household quantities regardless of the purchase of a new appliance.

### Possibility of return at our company location during opening hours:

SIMAC Electronics GmbH, Pascalstr. 8, D-47506 Neukirchen-Vluyn, Germany.

### Possibility of return in your area:

We will send you a parcel stamp with which you can return the device to us free of charge. To do so, please contact us by e-mail at [Service@joy-it.net](mailto:Service@joy-it.net) or by phone.

### Packaging information:

Please pack your old device securely for transport, if you do not have suitable packaging material or do not wish to use your own contact us and we will send you suitable packaging.

## 9. SUPPORT

We are also there for you after the purchase. If any questions remain or problems arise, we are also available to assist you via email, phone and ticket support system.

E-Mail: [service@joy-it.net](mailto:service@joy-it.net)

Ticket-System: <http://support.joy-it.net>

Phone: +49 (0)2845 9360 - 50 (Mo. - Thur.: 08:45 - 17:15, Fri.: 08:45 - 14:45 ó clock)

For more information, please visit our website:

[www.joy-it.net](http://www.joy-it.net)