



## Assembly Instructions C1 Control Kit



In conjunction with  
Sorotec Basic Line  
or Compact Line

ETS.MINI.ESTLSET.01  
ETS.MINI.BEAMSET.01  
ETS.MINI.EDINGSET.02

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Version 1.7.0

## Technical Data

<b>Main board supply:</b>	via power supply
<b>Protection class:</b>	III (Safety extra-low voltage)
<b>Max. Operating voltage main board:</b>	36 VDC
<b>Max. Sum of the output currents:</b>	500 mA
<b>Max. Number of axis motors:</b>	4
<b>Control of axis motors:</b>	Leadshine power amps
<b>Inputs:</b>	4 x Reference input 1 x Emergency stop 1 x Tool length sensor (Probe)
<b>Outputs:</b>	2 x Transistor output +24 VDC (Fog / flood cooling, aux), max. 100 mA each 1 x Relay output for spindle potential-free (FI circuit max 5A) or +24 VDC, max. 100 mA
Machine frame, Sorotec, Alu-Line	1 x fan connection +24 VDC, max. 300 mA
<b>Power supply:</b>	
<b>Input voltage (primary side):</b>	100 ... 240 VAC (50/60 Hz)
<b>Max. Current consumption (input):</b>	1.9 A
<b>Power consumption:</b>	450 VA
<b>Output voltage (secondary side):</b>	36 VDC
<b>Max. Output current:</b>	3.7 A
<b>Max. Output power:</b>	133.2 W



### General safety information

Only operate the controller indoors.

Protect the controller from extreme heat, moisture and aggressive liquids.

Do not switch on the controller if you suspect a fault or if there is obvious damage. In this case, secure the device against being switched on again until perfect function is ensured. If in doubt, we will be happy to advise you at any time - give us a call.

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## Introduction

We thank you for the trust you have shown in us by purchasing the C1 Control kit. We recommend reading these instructions through completely before starting the installation and then proceeding step by step as described.

## Usage

The set of parts described here is supplied by Sorotec for the construction of a three-axis control for CNC machines, especially of the Basic Line and Compact Line type. For use with the Hobby-Line, there is another version of this manual, which you can download from our shop.

## Required tools

Ordinary hand tools such as screwdrivers of various shapes and sizes, wire cutters, etc. should be available. The following tools are also required:

- Wire stripper
- Crimping pliers for wire end ferrules



### Attention!

Only carry out the work if you are familiar with the necessary actions and suitable tools are available.

Sorotec GmbH assumes no liability for property damage or personal injury that occurs during installation or operation of the control!



### Attention!

The electrical structure described here works in the low voltage range below 60 volts, which is safe for humans. Nevertheless, pay careful attention to possible sources of error (insulation, grounding, ...) in order to ensure proper function. Short circuits in particular can damage parts of the system or cause fires.



Image 1: The kit

### Scope of delivery

 	Housing C1 Control	1	 	Oval head screw DIN 7981 2,9 x 9	14
 	Stepper motor output stage	3	 	Cylinderhead screw DIN 7981 M3 x 6	16
 	Motherboard	1	 	Cylinderhead screw DIN 7985 M3 x 6	8
 	Power supply 36 V	1	 	Cylinderhead screw DIN 912 M5 x 25	1
 	Ground connection cable	1	 	Fan screw 5 x 16	4
 	Fan set	1	 	Washer Ø M3  Ø M5 	8 1
 	Main switch	1	 	Tooth lock washer Ø M3  Ø M5 	22 4
 	Cable gland M12  M16 	6 3	 	Nut M5	2
 	Cable gland M16 EMV	3	 	Functional earth sticker	1
 	Rubber foot	4	 	Control line 2 x 0,5 mm <sup>2</sup>	1,5
 	Spacer nut M3 x 10	12	 	Blade Receptacle	2
			 	Ground cable	1

## Preparation of the housing

### Base

For this construction phase you will need:		#
1	Housing base	1
8	Cylinderhead screw M3 x 6	14
8	Tooth lock washer M3	20
8	Washer M3	18
8	Spacer nut M3	12
4	Rubber foot	11

- Glue the four feet **11** into the corners of the floor **1**. Lateral distance approx. 5 mm.
- Provide the eight bottom holes with spacer sleeves **12**. To do this, place washers **18** under the screw heads **14** and tooth lock washers **20** between the spacer sleeves and the base plate (see images 2 and 3).

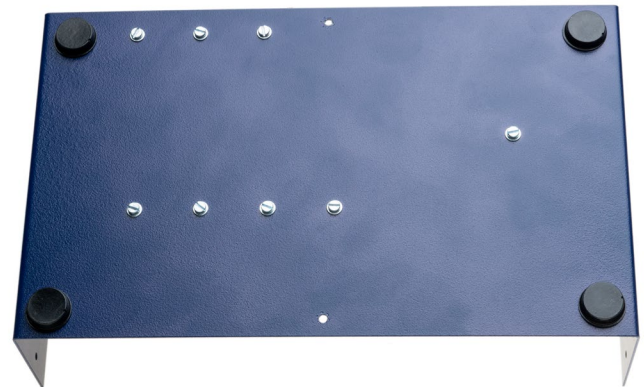


Image 2: Housing base



Image 3: Spacer nuts

### Cover

For this construction phase you will need:		#
1	Housing cover	1
1	Fan set	6
4	Fan screw	17

- Mount the fan **6** with the fan screws **17** and the fan cover on the housing cover **1**, as shown in Image 4.

#### **i** Note

*The fan should blow into the case. The direction of flow is marked with an arrow on the side of the fan.*

- Place the filter fleece on the fan cover and attach the filter cover.



Image 4: Housing cover with fan

### Front

For this construction phase you will need:		#
1	Housing front	1
1	Main switch	7
1	Front cover adapter module	

- Insert the main switch **7** into the rectangular opening on the front of the housing. The switch engages and does not need to be screwed down.
- Place the 3D-printed front cover that you received with the adapter module into the recess in the front of the housing and temporarily secure the part with an adhesive strip to prevent it from slipping out. Please refer image 5.



Image 5: Housing front

#### Note

*The cover is not part of the scope of delivery. It may be difficult to determine the correct orientation. However, when the housing is assembled later, the correct position becomes obvious and can be corrected quickly if necessary.*



Image 6: Always fit unused screw connections to seal all openings.

### Back

For this construction phase you will need:		#
1	Housing back	1
6	Cable gland M12	8
3	Cable gland M16	9
3	Cable gland M16 EMV	10
1	Cylinderhead screw	16
1	Washer M5	19
4	Tooth lock washer M5	21
2	Nut M5	22
1	Ground cable	26

- Remove the paint inside and outside 2 mm around the holes for the metal screw connections and the functional earth screw (FE) and mount the cable glands **8**, **9** and **10** as shown in image 6.
- Assemble the functional grounding screw (FE) together with the ground cable **26** as shown in image 7.

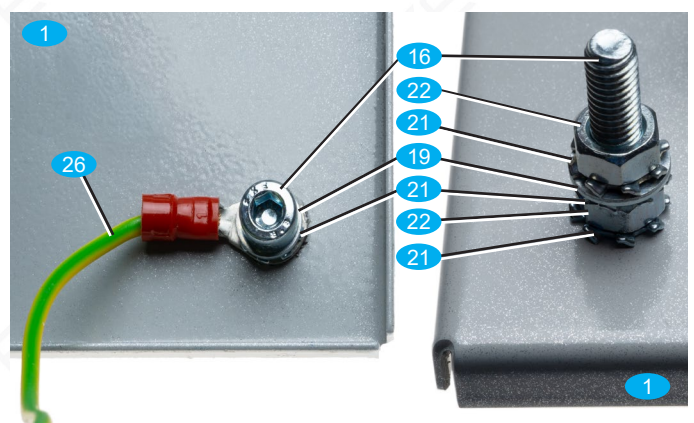


Image 7: Functional grounding screw (FE) inside / outside





### Attention!

Make sure there is good electrical contact between the earthed screw connections and the housing!

## Preparation of motherboard

### Adaptermodul montieren

For this construction phase you will need:		#
1	Motherboard	3
1	Adapter module	
1	Connection cable	
8	Cylinderhead screw M3 x 6	15
4	Spacer nuts M3	12
	pre-assembled housing base	

#### Note

The adapter module and the matching connection cable depend on the control software you are using and are not part of the scope of delivery.

Both Estlcam and Beamicon2 can be downloaded from the manufacturers' websites.

- Mount the four spacer sleeves **12** for the adapter module with cylinder head screws **15**. See image 8.
- Screw the adapter module into place with cylinder head screws **15**. See image 9.
- Connect the adapter module and the motherboard with the connection cable.

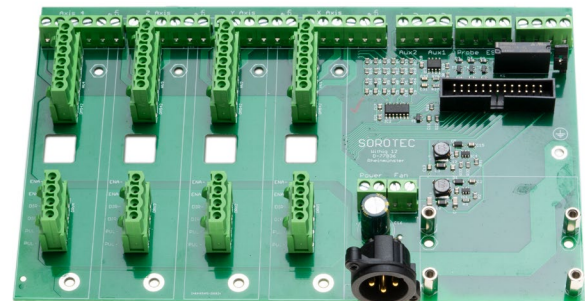


Image 8: Motherboard, the prepared space for the adapter module at the bottom right.

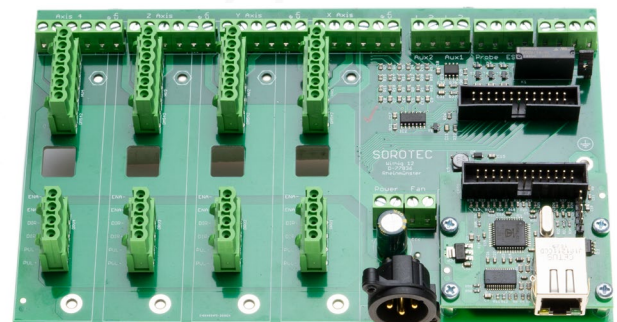


Image 9: Board with adapter module, here for Benezan / Beamicon. In front a module for Estlcam for comparison.

### Mounting the motherboard

For this construction phase you will need:		#
	pre-assembled motherboard	
	pre-assembled housing base	
8	Cylinderhead screw M3 x 6	14

- Mount the prepared main board with cylinder head screws **14** on the base. See image 10.

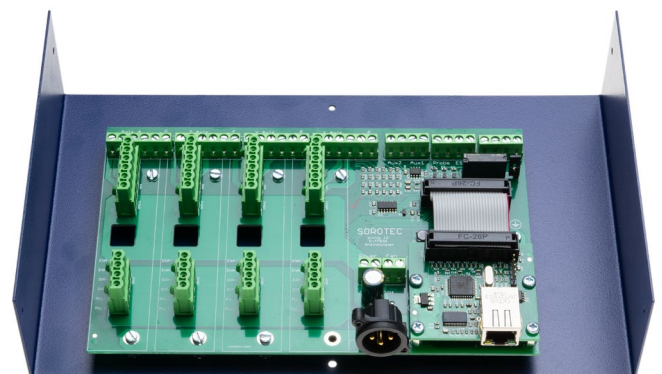


Image 10: Housing base with mounted motherboard

## Final assembly

### Front and base

For this construction phase you will need:		#
	pre-assembled housing base	
	pre-assembled housing front	
5	Tooth lock washer M3	20
5	Oval head screw	13

- First mount the housing front with two screws **13** and tooth lock washers **20** on the XLR socket for the power supply on the motherboard. Do not fully tighten the screws yet.
- Now screw the front with three more screws **13** and tooth lock washers **20** to the base and the sides of the housing base.
- Tighten the screws on the socket.

Connect the main switch to the terminals labeled „Power Switch“.

### Cabling

For this construction phase you will need:		#
	partially assembled control	
	pre-assembled housing back	
	Cable according to circuit diagram	
3	Tooth lock washer M3	20
3	Oval head screw	13
2	Blade Receptacle	25

#### **i** Note

*The cabling with a loose rear panel is described below. In principle, the rear panel can of course also be installed before the cables are connected. The terminals of the connections are then more difficult to reach.*

- Prepare the cables by stripping approx. 10 cm each and fitting the stripped ends with wire end sleeves.
- Guide the cables through the respective cable glands. Do not tighten the screw connection yet.

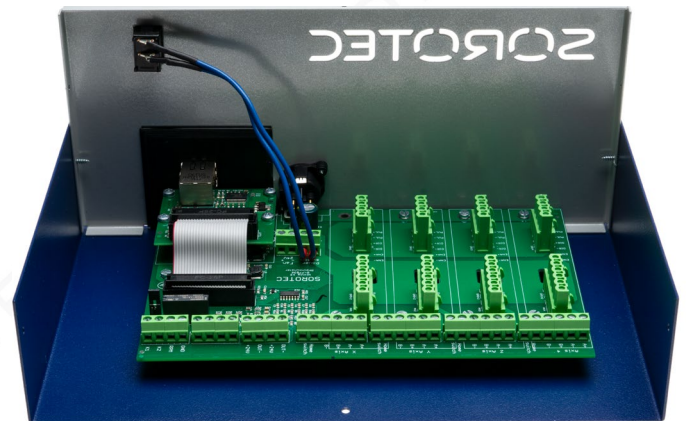


Image 11: Housing base with mounted front

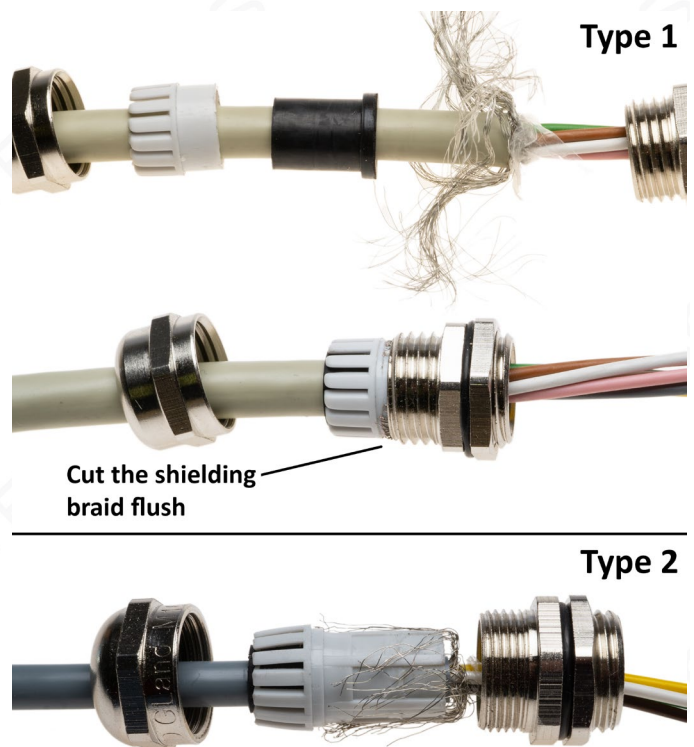


Image 12: Insertion of the cable shielding in the EMC screw

#### • EMC cable gland

The EMC cable glands made of metal should ensure a good electrically conductive connection between the shielding braid of the motor connection cables and the earthed housing ground.

Mount the motor cables as shown in image 12 by placing the suitably shortened shielding braid back on the outside of the plastic inner part and screwing it with the union nut.



- Connect the cables as described in the circuit diagram.
- Mount the back of the housing with screws **13** and tooth lock washers **20**.
- Push the cables into position in the feed-throughs and tighten the screw connections.
- Use the flat receptacles to connect the emergency stop switch **25**.  
Schließen Sie das Erdungskabel **26** an der Erdungsklemme an, wie in Bild 14 gezeigt.
- Connect the ground wire **26** to the ground terminal as shown in Figure 14.

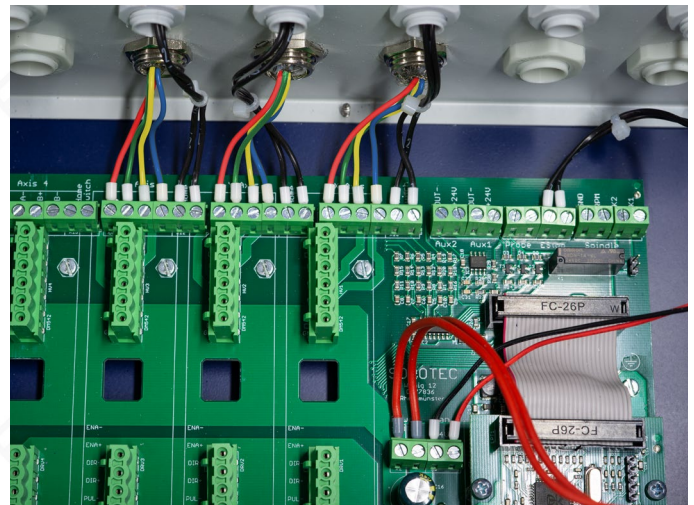


Image 13: Ready-connected cables for stepper motors, reference switches and emergency stop.

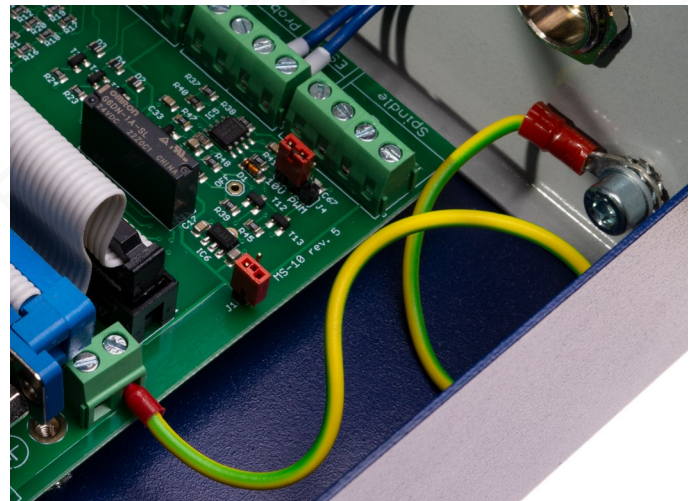


Image 14: Connecting the ground cable.

### Connecting the tool length sensor

**i** Note

*Always connect your tool length sensor as an opener. The correct wiring can be found in the data sheet of the TLS, or you can determine this with a continuity tester.*

- Connect the tool length sensor cable as shown in Fig. 15.

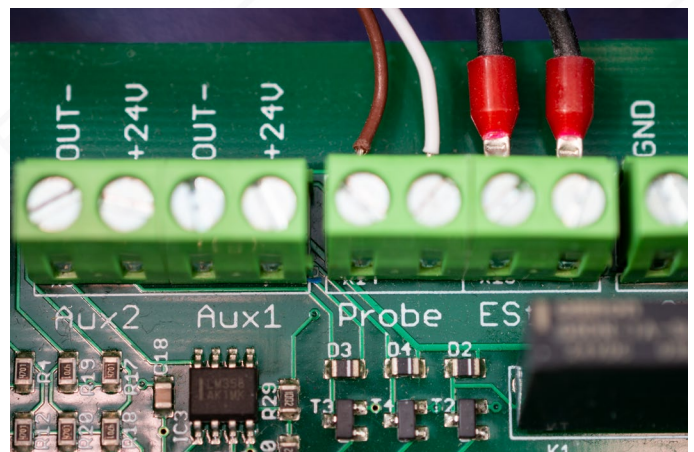


Fig. 15: Connection of the tool length sensor, here with brown and white wire.

### Preparation of the power amplifiers

Before installation, the output stages must be adapted to the stepper motors used. To do this, the eight **DIP switches** must be set correctly.

**Example:**

For the **motor set with 4.2 A rated current** offered by Sorotec for the **Hobby Line** and for the **542 power amplifiers** from Leadshine the following position of the DIP switches is correct:

1	2	3	4	5	6	7	8
On	Off	Off	Off	On	On	Off	On

**i** We strongly recommend that you set switches 1 to 3 only as specified, otherwise the motors could overheat.

However, this switch position is only an example. If other motors are used, the setting must be made using the tables printed on the output stages (see Image 16).

The first three DIP switches determine the current with which the respective motor is operated. The last four switches in the series regulate the „resolution“: This means the number of steps into which a single motor revolution is broken down.

The stepper motors used perform 200 steps of 1.8 ° per revolution. With the DIP switch setting shown, the output stage divides these full steps into 8 micro steps each. This then results in 1600 steps per revolution of the motor. With a spindle pitch of 10 mm / revolution, one microstep theoretically corresponds to a travel distance of 0.00625 mm.

### Install power amplifiers

- Remove the screw terminal connectors that are not required.
- Plug the prepared power amplifiers into positions one to three on the motherboard. See image 17.

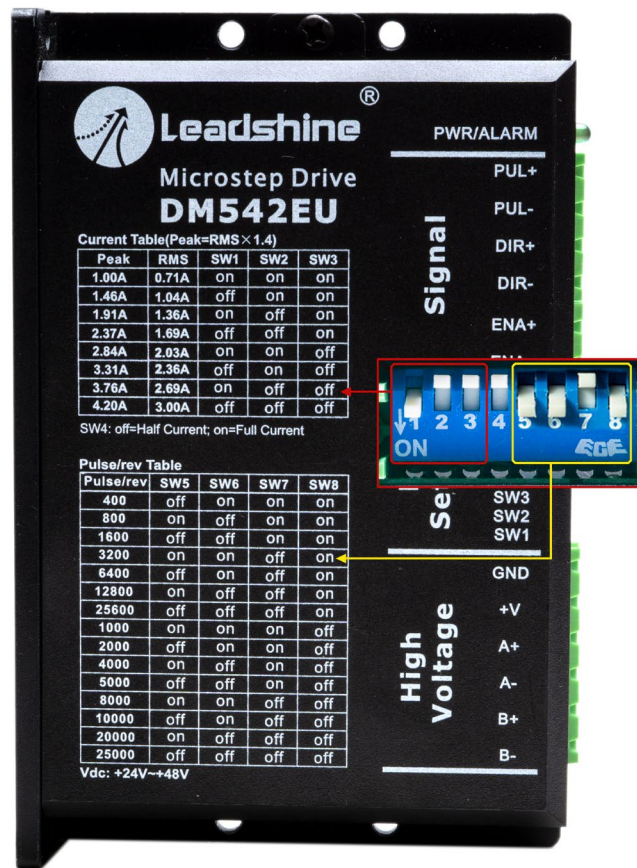


Image 16: DIP switch setting for current and resolution Example for motors with 4.2 A and 3200 steps



### Attention!!

Before commissioning, check the resolution entries in your control software! The machine cannot function if the values do not match the setting.



Image 17: Attached power amplifiers

### Fourth output stage in slave mode

If an axis is to be driven with two spindles and two motors, a fourth output stage is required. Four-axis software can usually be configured accordingly. When using three-axis software, the fourth output stage can be configured for slave operation with jumpers on the main board. The parallel connection can be made either for the X-axis (jumper 1-2) or for the Y-axis (jumper 2-3), as described in image 18.

Jumper bridges are not included in the scope of delivery.

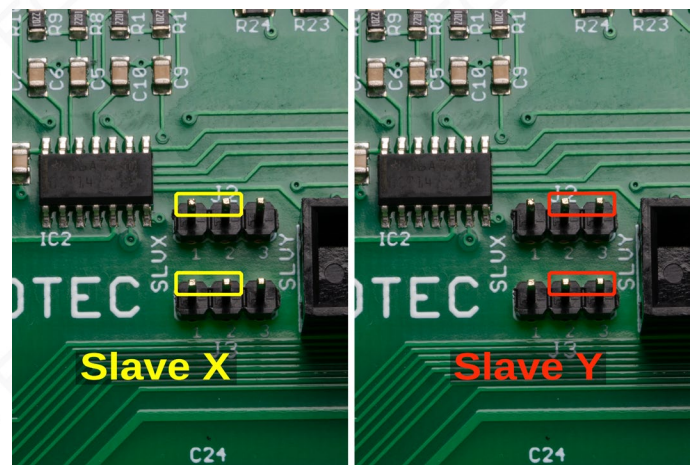


Image 18: Jumper for slave operation of a fourth output stage

### Option Switchbox

The switch box is optionally available in the Sorotec shop (EZB.MINI.SBR.01), which can be used to switch 230 V externally via a 24 V signal. Useful e.g. for operating minimum quantity lubrication or chip extraction.

The switch box is connected to the +24 V and Aux 1 or +24 V and Aux 2 terminals on the main board using the control cable supplied with 2 x 0.5 mm<sup>2</sup> 24. See image 20.

The box can also be used for the spindle (AMB / Mafell), here the jumper is plugged into the board and the switch box is clamped to K2 (+24 V) and GND at the spindle output.



Image 19: Option Switchbox



### Attention!

The sum of all currents at the terminals Aux 1, Aux 2, fan and spindle output must not exceed 500 mA. Higher currents can damage the motherboard. See also "Technical data" on page 2.

It is therefore advisable to supply a possibly existing spindle fan with its own power supply unit.

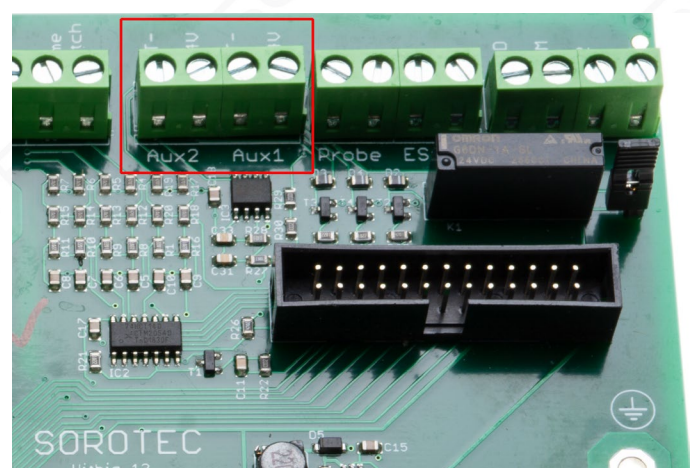


Image 20: The Aux 1 and Aux 2 terminals on the motherboard

### Cover

For this construction phase you will need:		#
	partially assembled control	
	pre-assembled housing cover	
6	Tooth lock washer M3	20
6	Oval head screw	13

- Connect the fan to the terminal labeled „X3“ on the motherboard. See image 21.
- Close the housing and mount the cover with screws 13 and tooth lock washers 20.

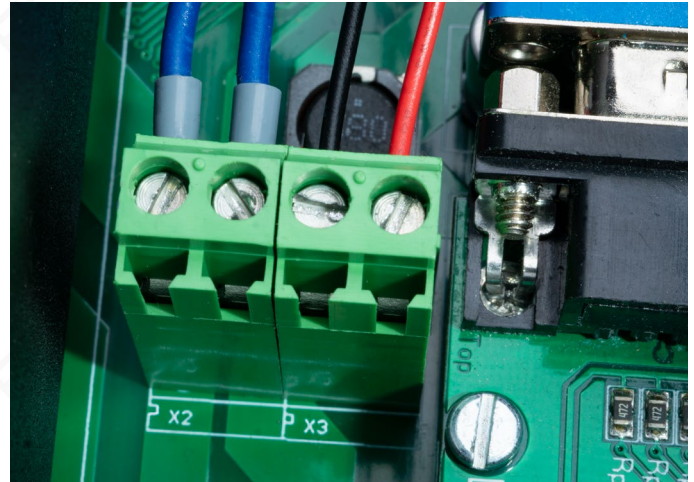


Image 21: Fan connected to X3. The main switch at X2.

### Earth connection cable

For this construction phase you will need:		#
	partially assembled control	
1	Earth connection cable	5
1	Functional earth sticker	23

- Affix the sticker 23 above the ground screw connection.
- Screw the ring cable lug 5 of the earthing connection cable between the washer of the toothed washer of the earthing screw connection. **Also lay all grounding cables coming from the machine here.** Make sure it is tight.

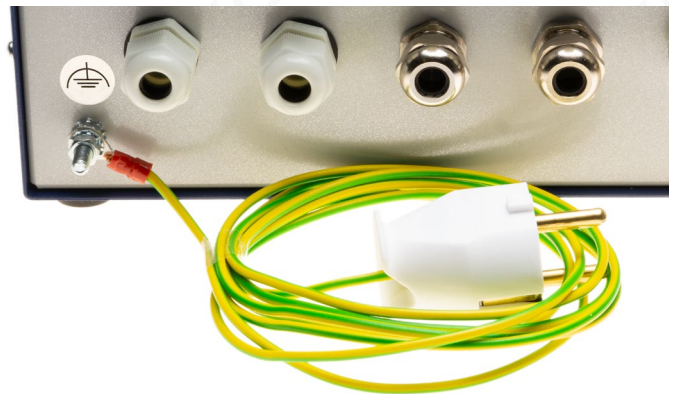


Image 22: Ground cable screwed to functional ground (FE)

### Connection

- Plug the earth connection cable into a properly earthed socket.
- Connect the control computer to the control.
- Establish the power supply with the external power supply unit.

The control is now ready for use and can be put into operation.



Image 23: Fully assembled C1 Control with power supply