

SOROTEC

Assembly Instructions

CNC Control Kit CNC720 3 axes, PRO housing 5.6 A



ETS.63LE720.OB.02.PB

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Introduction

We thank you for the trust you have placed in us, which you have shown with the purchase of the control kit. We recommend reading through these instructions completely before building and then assembling the kit step by step as described.

Required tools

Ordinary hand tools such as screwdrivers in various shapes and sizes as well as side cutters etc. should be available. The following tools are also required:

- Electronics soldering equipment
- Wire stripper
- Crimping pliers for end sleeves
- Crimping pliers for cable lugs
- Thread cutter for M4 and M5



Attention danger!

The mains plug must be pulled out before opening the housing.



Caution!

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

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



Attention danger!

It is expressly pointed out that the electrical connection is the responsibility of the electrical installer! In particular, the correct connection of the protective conductor and the subsequent protective conductor test must be carried out by electrotechnically qualified personnel in accordance with the relevant national regulations!



Scope of delivery

Illustration	Description	Number	Illustration	Description	Number
	steel housing PRO2	1		coupling relay	2
	connection panel	1		EDING-CNC Controller 720	1
	adhesive feet	4		Simple BOB CNC720 Interface / Breakout Board	1
	sticker	1		LED board with Cable	1
	wiring duct	3		CAT crossover adapter RJ45	1
	switching power supply 48 V	1		IEC chassis connector with fuse holder and 2 fuses 10 A slow blow	1
	adapter board for power stage	3		fuse holder	3
	power stage	3		fuse 6.3 A slow blow	2
	switching power supply 24 V	1		power switch	1
	fuse 1 A slow blow	1		power cord	1

Illustration	Description	Number
	outlet	2
	fan 80 x 80 x 25 mm 24 V	1
	fan damper	1
	protection and cover frame with dust filter for fans	1
	socket Binder 6pole	5
	cable connector Binder 6pole	5
	socket Binder 4pole	1
	cable connector Binder 4pole	1
	DIN rail	1
	ring terminal	8
	blade receptacle	7

Illustration	Description	Number
	circular socket	4
	round plug	3
	range shrinkable tubing	1
	range ferrules	1
	emergency stop in an IP 65 housing	1
	control line 2 x 0.5 mm ²	3 m
	patch cable RJ45 0.5 m	3
	patch cable RJ45 2 m	1
	PVC wire 0.5 mm ² dark blue	20 m
	PVC wire 0.5 mm ² black	10 m
	PVC wire 0.5 mm ² violet	2 m
	PVC wire 0.5 mm ² orange	2 m










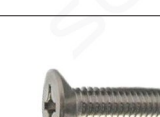






Illustration	Description	Number
 K8	PVC wire 0.5 mm ² light blue	2 m
 K9	PVC wire 0.5 mm ² red	2 m
 L1	PVC wire 0.75 mm ² black	10 m
 L2	PVC wire 1 mm ² black	10 m
 L3	PVC wire 1 mm ² light blue	10 m
 L4	PVC wire 1 mm ² green / yellow	10 m
 S1	lens head screw DIN 7981 M3.5 x 9.5	18
 S2	cylinderhead screw DIN 84 M3 x 6 S2 M4 x 6 S3 M5 x 6 S4 M6 x 25	8 4 4 2
 S6	countersunk screw DIN 965 M3 x 12 S6 M4 x 16 S7 M4 x 40 S8	2 8 4
 F1	flathead screw Allen DIN 7381 M3 F1 M4 x 6 F2	2 6
 U1	washer DIN 125 M6	3

Illustration	Description	Number
 UZ	toothed washer DIN 6797 M6	10
 M3	nut DIN 934 M3 M3 M4 M4 M6 M6	2 4 5
 PM	plastic nut M3	4
 D1	stand off M3 / 20 mm 2 x M3 inner thread	4
 D2	stand off M3 / 20 mm 1 x M3 inner thread 1 x M3 outer thread	4

Option package suppression kit and emergency stop module

We recommend setting up the control with the interference suppression kit to improve the EMC properties and the emergency stop circuit to increase operational safety. Both options are available as a package under the order number ZB.ETS.ENTNOT.01.

The installation of the options is described in the course of these instructions at a suitable point in each case.

Note

The subsequent installation of the options is possible, but requires more effort, since parts of the wiring then have to be reinstalled.



Fig. 1: Option package consisting of an emergency stop module and interference suppression kit

Scope of delivery option package

Suppression kit

Illustration	Description	Number
	Line filter 250 V /10 A	1
	Flat headed screw M4 x 6 Allen	2
	Ring cable lug	1
	Flat receptacle	4
	Snap ferrite 25 MHz: 151 Ω 100 MHz: 270 Ω	3
	Snap ferrite 25 MHz: 141 Ω 100 MHz: 241 Ω	6

Emergency stop module

Illustration	Description	Number
	Emergency stop relay	1
	Power contactor 24 V/DC, 4kW 3 x 400 V + 1 Ö	1
	Illuminated pushbutton white	1
	Label holder with label „Reset“	1
	LED element white 12 ... 30 V AC/DC	1
	Contact element normally open	1

Preparing the housing

For this construction phase you need:		#
1	steel housing	1
4	adhesive feet	3
1	DIN rail	29
3	cylinderhead screw M5 x 6	S4
1	power switch	19
1	fan	22
1	fan damper	23
1	dust filter for fans	24
4	countersunk screw M4 x 40	S8
4	nut M4	M4
3	fuse holder	17
2	fuse 6.3 A	18
1	fuse 1 A	10
1	IEC chassis connector	16
2	countersunk screw M3 x 12	S6
2	nut M3	M3
1	LED board with cable	14
2	flathead screw M3 x 6	F1
3	wiring duct	5
2	outlet	21
8	countersunk screw M4 x 16	S7
2	cylinderhead screw M6 x 25	S5
1	washer M6	U1
5	toothed washer M6	UZ
3	nut M6	M6

Prepare the housing **1** for the installation and wiring of the modules as follows:

- Open (if not already done) the pre-punched installation openings for the power switch **19**, the IEC device connector **16** and the three fuse holders **17**.

- Cut the threads for the mounting screws:

8 x M4 for the sockets
 6 x M4 for the power amplifiers (see Fig. 13)
 3 x M5 for the mounting rail (see Fig. 13)

- Remove all burrs and sharp edges from the installation openings.
- Glue the rubber feet **3** into the four corners on the bottom of the case. Distance from each side approx. 8 mm.
- Check and correct the length of the mounting rail **29** if necessary - it should be 16 cm.
- Mount the mounting rail with the screws **S4** in its place in the rear of the housing (see Fig. 13).
- Push the power switch **19** with the „0“ upwards into the rectangular opening on the front of the housing until the edge of the switch lies flat. The switch is self-holding, a screw connection is not necessary.
- Mount the fan **22** and the fan dumper **23** with screws **S8** and nuts **M4** with the connection cable downwards behind the grille opening on the front. Screw the grill cover of the fan onto the outside of the housing. Pay attention to the direction of flow: The cool air should be blown into the housing!
- Slide the cover frame **24** with the dust filter inserted onto the grille cover of the fan.
- Mount the IEC connector **16** with screws **S6** and nuts **M3** in the opening provided on the rear.
- Mount the LED-Board **14** with screws **F1** in its place in the housing front.
- Lay the self-adhesive wiring duct **5**. To do this, use the course shown in Fig. 13.
- Mount the two built-in outlets **21** with screws **S7**.
- Now install the three fuse holders **17** in the holes underneath the outlets and besides the IEC connector.
- Equip the fuse holders next the outlets (F1 and F2) with a 6.3 fuse **18** each.
- Equip the fuse holders next the IEC connector (F3) with the 1 A fuse **10**.

Optional components

i Note

The area around the components shown in the pictures may differ from your specific structure.

- Mount the line filter **O1** with the flat head screws **O2** in the center of the rear of the housing (see Fig. 2).
- Place the emergency stop module **P1** on the mounting rail (see Figure 3).
- Also plug the power contactor **P2** onto the mounting rail.
- Screw the illuminated pushbutton **P3** to the label holder **P4** in the hole on the front of the housing.
- Assemble the LED element **P5** and the contact element **P6** to the illuminated pushbutton as shown in picture 4.



Fig. 2: Line filter in front of the output panel

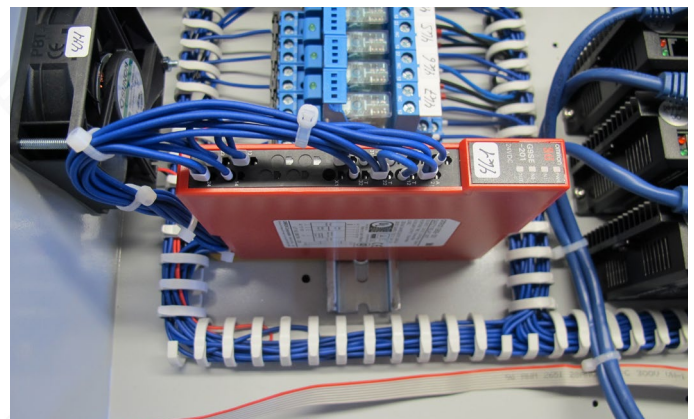


Fig. 3: Emergency stop module on mounting rail



Fig. 4: Assembly of button, LED element, contact element

Grounding screws

For this construction phase you need:		#
2	cylinderhead screw M6 x 25	S5
3	washer M6	U1
10	toothed washer M6	UZ
5	nut M6	M6



Caution!

Poor grounding is a common and difficult to detect source of errors. Carry out the work with special care.

The holes for the earthing points are located on the bottom of the housing and on the rear wall (see also Fig. 13). The screws installed here must have good conductive contact with the housing plate.

- **Remove the paint a millimeter or two around the hole.**
- Mount the grounding screws as shown in Fig. 5 to 7.
- The grounding screw of the housing cover is connected to the grounding point on the floor before the housing is closed.

i Note

Earthing cables are connected to screws with ring cable lugs between tooth lock washers.

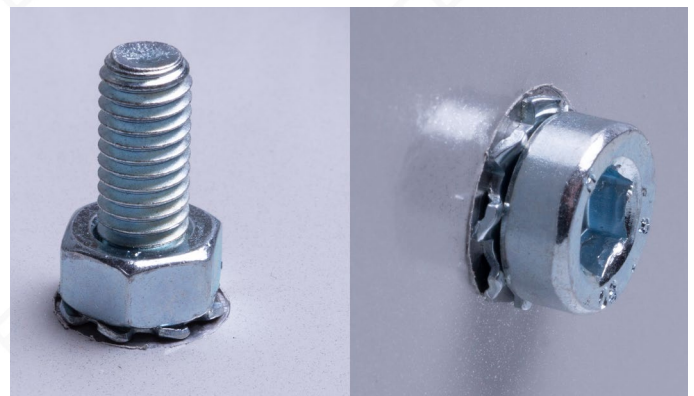


Fig. 5: Ground screw on the floor (left) and on the rear wall.



Fig. 6: Earthing screw, rear wall, outside.



Fig. 7: Earthing screw cover

Power supply and Stages

For this construction phase you need:		#
1	power supply 48 V	6
2	cylinderhead screw M4 x 6	S4
1	power supply 24 V	9
3	power stage	8
6	flathead screw M4 x 6	F2
3	adapter board for power stage	7
2	coupling relay	11

- Snap the 24 V power supply **9** onto the DIN rail as shown in Fig. 13.
- Mount the 48 V power supply **6** with screws **S4** as shown in Fig. 20.

Preparation of the power stages

The configuration is based on the tables printed on the output stages (see figure). We recommend setting the DIP switches of the output stages as follows.

Current

The current setting applies to stepper motors with 3 Nm / 4.2 A. **When using motors with a different current, the settings must be adjusted accordingly.**

We recommend adjusting the current for the motors based on the motor temperature during operation. If the temperature of the motor is a maximum of 50 ... 60 ° C, the current is set correctly. If the motor temperature is more than 60 ° C, the current should be reduced.

Resolution

A stepper motor executes 200 steps of 1.8 ° per revolution. With the DIP switch setting shown, the power stage divides these full steps into 16 micro steps each. This then gives 3200 steps per revolution of the motor. With a spindle pitch of 10 mm / revolution, a microstep theoretically corresponds to a travel distance of 0.003125 mm.

If a different resolution is selected, this must be changed accordingly in the software setting.

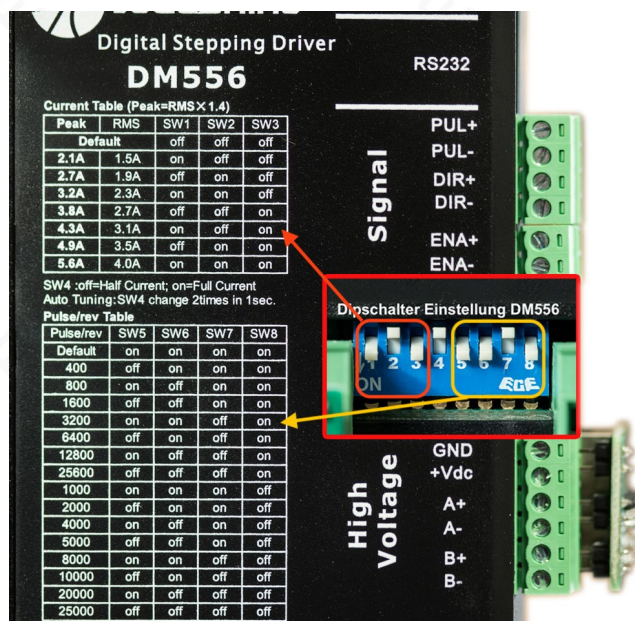


Fig. 8: Setting of resolution and current

Adapter

Terminal strip adapters with RJ45 sockets for the power amplifiers are included in the kit.

- Assemble the adapters as shown in Fig. 9.
- Mount the three power amplifiers with screws **F2** as shown in Fig. 13.

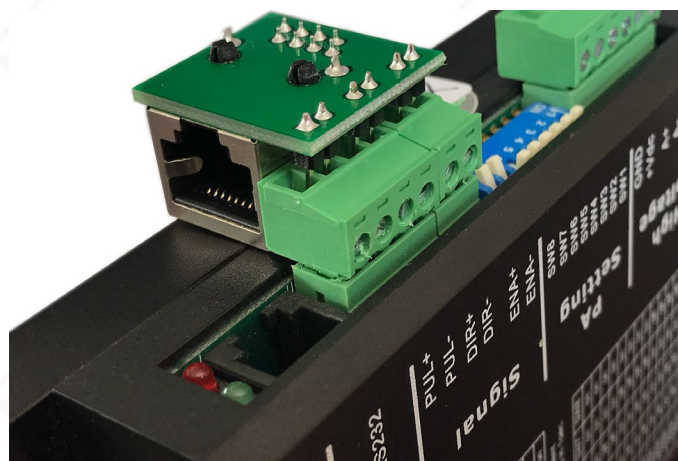


Fig. 9: Mounting the RJ45 adapter on the terminal block

Coupling relay

The coupling relays **11** are connected upstream of the sockets for milling spindle and cooling. See the „Feed / Supply“ circuit diagram for details.

- Place the coupling relays on the mounting rail as shown in Fig. 13.

Controller and Breakout Board

For this construction phase you need:		#
1	Eding-CNC Controller 720	12
1	Simple BOB CNC720	13
4	stand off 2 x M3 inner thread	D1
2	stand off M3 inner / outer thread	D2
6	cylinderhead screw M3 x 6	S2

Prepare the controller and the breakout board Simple BOB as follows:

- Be sure** to open the jumper on the controller board above the „E-Stop“ terminal, as shown in Fig. 10.

Note

If the jumper remains closed, the emergency stop switch has no effect!

- Connect the controller **12** and the breakout board **13** with screws **S2** and the spacers **D1** and **D2**, as shown in Fig. 11.
- Mount the combination with screws **S2** on the floor and the SUB-D screw connections on the rear wall of the housing. See Fig. 11 and 12.

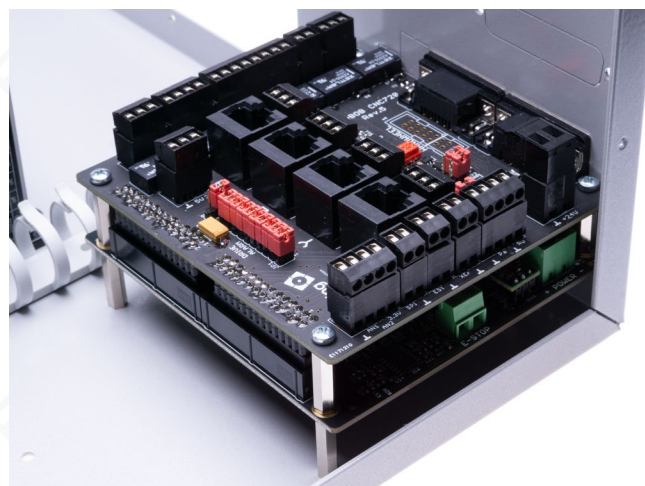


Fig. 11: Mounting of controller and Simple BOB

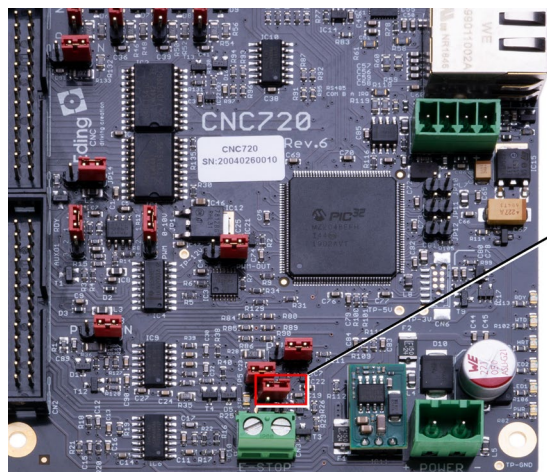


Fig. 10: Correct position of jumpers

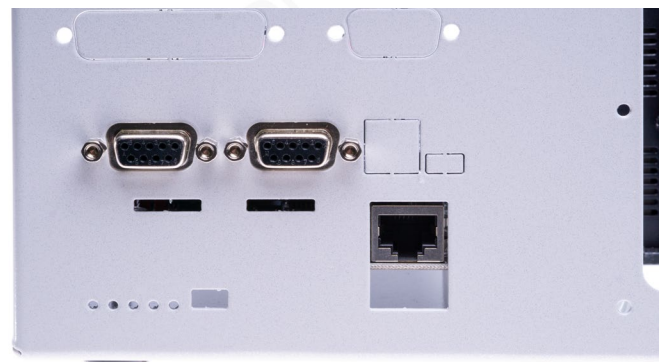


Fig. 12: Outer ports of the combination

Wiring

For this construction phase you need:		#
1	connection panel	2
8	lens head screw	S1
5	socket 6pole	25
1	socket 4pole	27
6	ring terminal	30
7	blade receptacle	31
2	circular socket	32
2	round plug	33
	shrinkable tubing	34
	ferrules	35
	PVC core cable according to circuit diagram	

All the information required for wiring is contained in the circuit documentation that you received together with these instructions. In addition to the connections to be created, this applies in particular to:

- Cable cross-sections
- Core colors
- Pinouts from plugs

Please take the time to study the circuit documentation in detail before you start wiring.

In the following, these instructions provide general information, such as for soldering sockets.

In addition, pictures show the gradual completion of the wiring as an example for a sensible laying and bundling of the cables.

Cable ends

Please always use the appropriate equipment for the cable ends for your connections:

- End sleeves for screw terminals
- Flat receptacles for plug connections
- Ring cable lugs for grounding



Fig. 13: Housing with internals before the start of the wiring



Fig. 14: The sockets for cooling and milling spindle



Fig. 15: The terminal block on the power supply

Mounting the sockets

Mount the connection panel **2** with screws **S1** in front of the opening on the rear of the housing. For wiring the sockets **25** and **27**, it has proven useful to first roughly cut the cables to length, solder them outside the housing and only then install the sockets. Please also note the following information on soldered connections.

Solder connections

Cross-circuits are a common source of errors when soldering connectors and plugs. It is therefore essential to insulate each individual pin with shrink tubing (see Fig. 16).

Twisted lines

To reduce electrical fields, the cables for power supply to the output stages and motors must be twisted in pairs. See also Fig. 18.

Option folding ferrites

The hinged ferrites contained in the option package are used to suppress alternating electrical fields also. Clip two black **O6** and one white **O5** snap ferrite onto each of the three twisted motor cables. Figure 19 shows the correct arrangement.



Fig. 16: Each pin individually insulated with shrink tubing

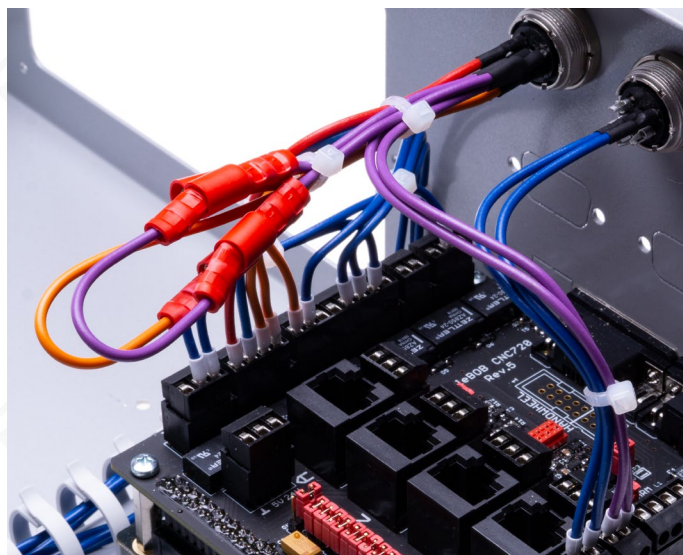


Fig. 17: Jumper with circular plugs / sleeves for optional frequency converter connection



Fig. 18: Power lines are twisted in pairs

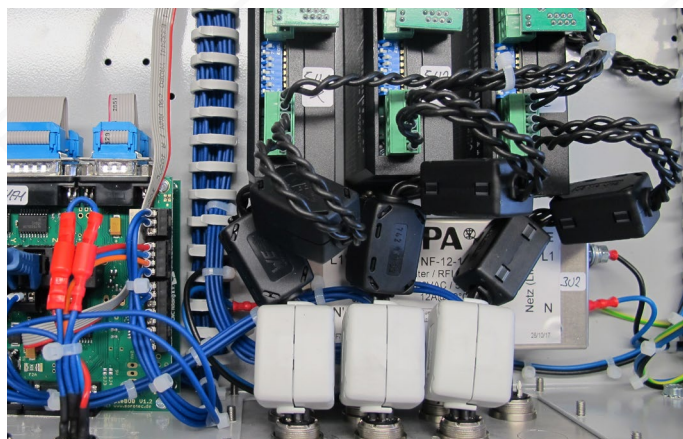


Figure 19: Optional folding ferrites on the motor cables

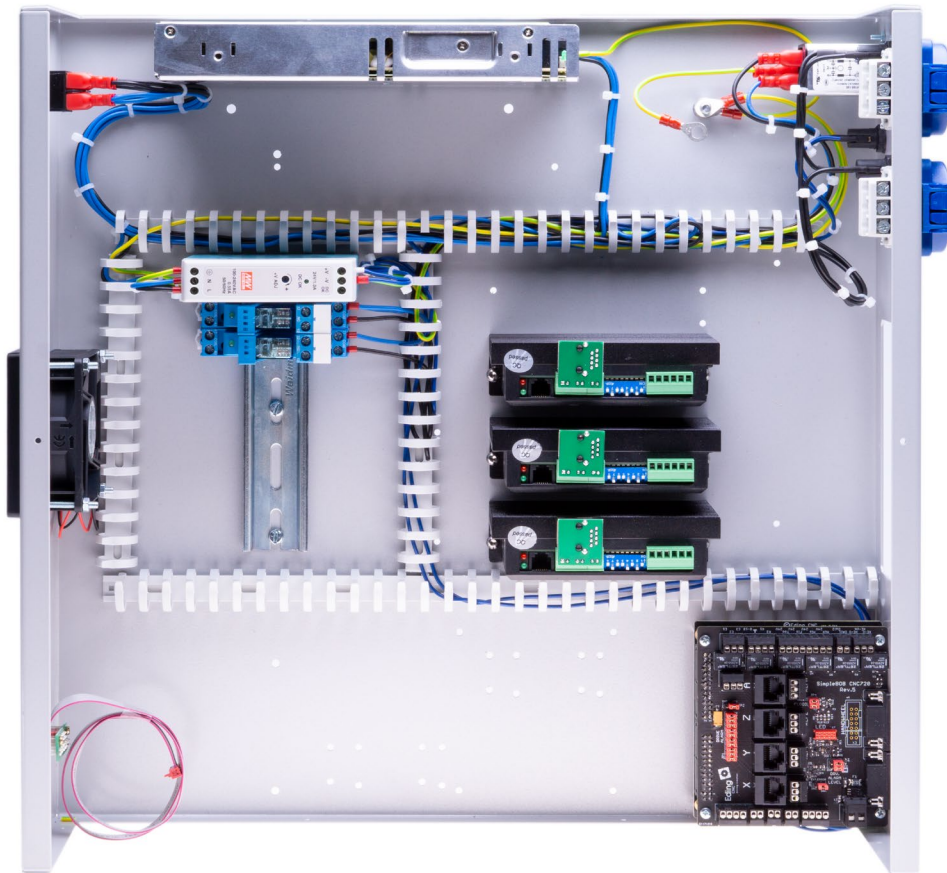


Fig. 20: Basic wiring with mains voltage and ground lines

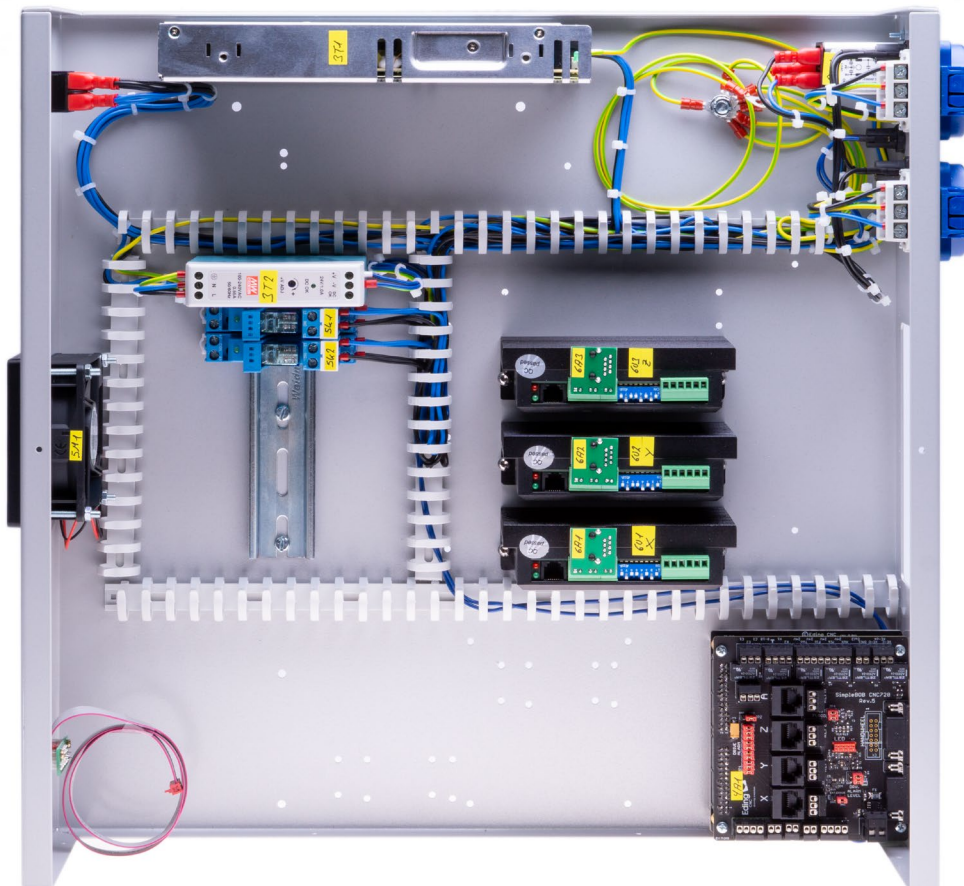


Fig. 21: Outlets connected

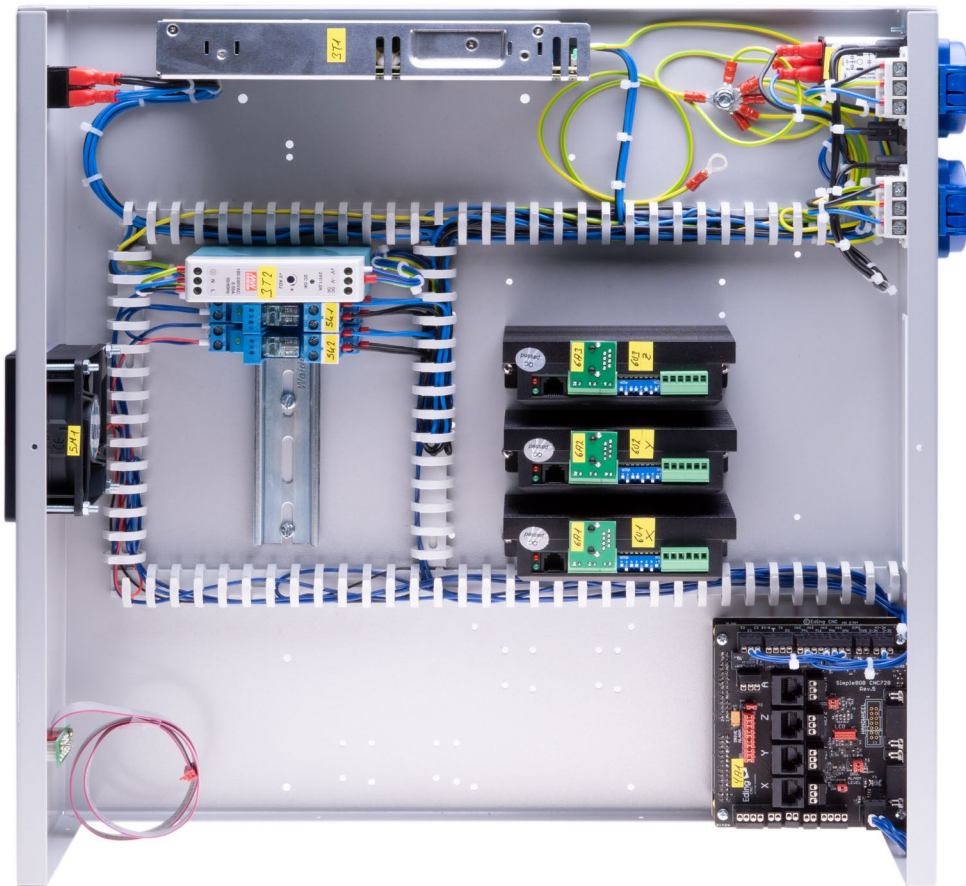


Fig. 22: Connecting fan, relays and controller. Loose grounding cable for cover.

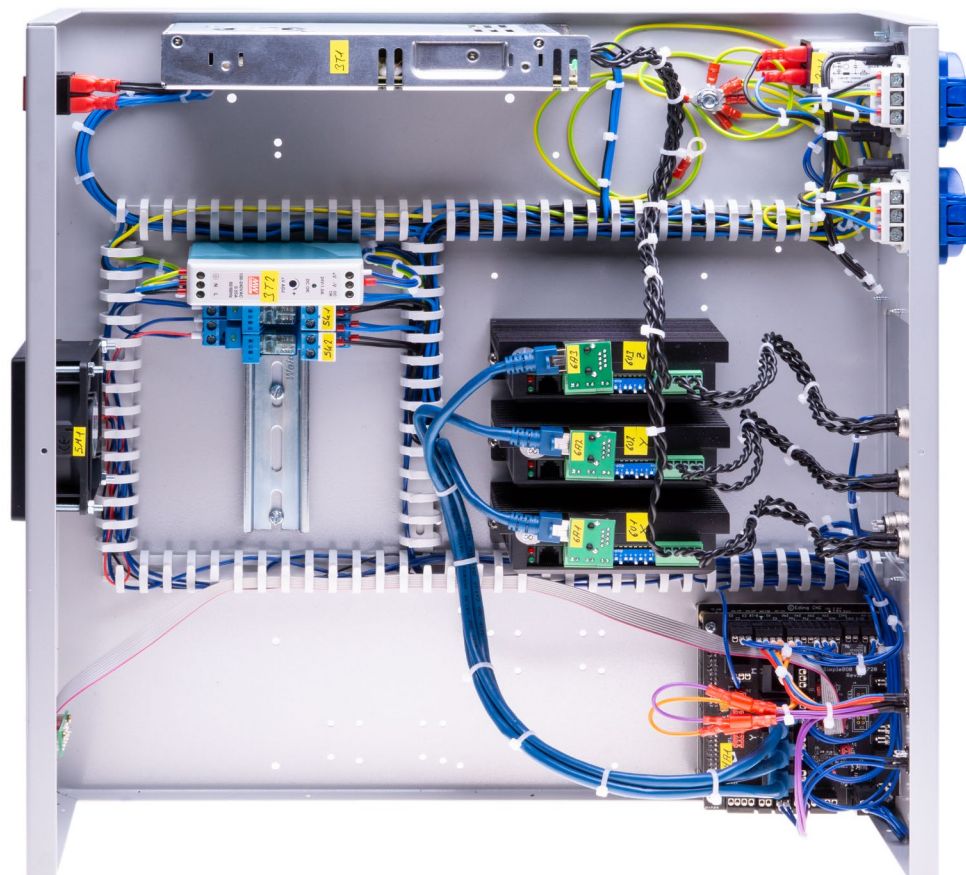


Fig. 23: Finished control with patch cables between the interface and the power amplifiers and jumpers for FC connection.

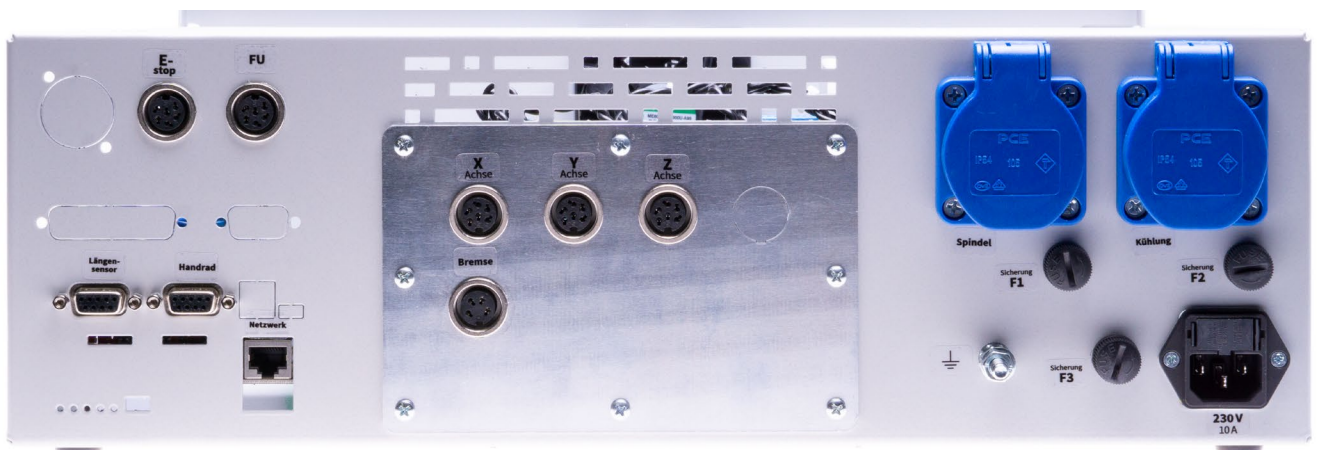


Fig. 24: Rear of the fully assembled control

Further wiring

For this construction phase you need:		#
1	sticker	4
3	patch cable RJ45	K2
1	emergency stop	36
	control line 2 x 0.5 mm	K1
1	cable connector 6pole	26

- Mark the connections on the back of the housing with the corresponding stickers.

Patch cable

- Connect the signal outputs (RJ45 sockets) of the interface and the control inputs of the output stages with the patch cables **K2**.

Pay attention to the correct assignment of the outputs to the axes. The arrangement is printed on the breakout board.

Emergency stop



- Install the emergency stop switch **36** near the machine so that it is easily accessible.
- Wire the switch to the control line **K1**.
- Solder the cable connector **26** to the free end of the control line.
- Connect the emergency stop to the control.

i Note

If an emergency stop switch is already available (as for example on all machines in the Hobby Line), you should preferably connect it. The switch included with this kit can then either be omitted or additionally integrated in a series connection.