

# SOROTEC

## Assembly Instructions

CNC Control Kit CNC720 PRO  
for drives with integrated power stages



ETS.S3JMC720.OB.02.PB

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Version 1.2.1

## 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.



### Caution!

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

## 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.



### 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

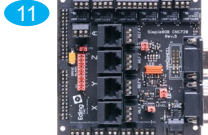
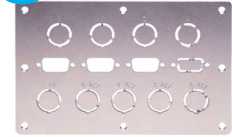








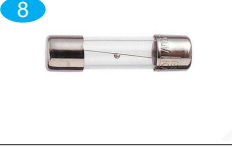



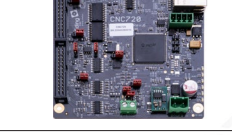

Illustration	Description	Number	Illustration	Description	Number
	steel housing PRO2	1		Simple BOB CNC720 Interface / Breakout Board	1
	connection panel	1		LED board with cable	1
	adhesive feet	4		obsolete	
	sticker	1		IEC chassis connector with fuse holder and 2 fuses 10 A slow blow	1
	wiring duct	3		fuse holder	3
	switching power supply 48 V	1		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
	coupling relay	2		outlet	2
	EDING-CNC Controller 720	1		fan 80 x 80 x 25 mm 24 V	1







Illustration	Description	Number
	fan damper	1
	protection and cover frame with dust filter for fans	1
	socket Binder 6pole	2
	cable connector Binder 6pole	2
	socket Binder 4pole	1
	cable connector Binder 4pole	1
	RJ45-D-SUB-9-adapter	3
	D-Sub-plug 9pole with solder cups	4
	Housing for D-SUB 9	4
	DIN rail	1





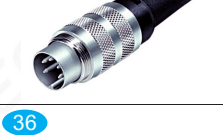





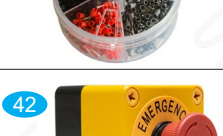
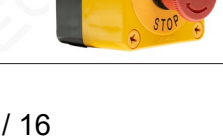









Illustration	Description	Number
	socket Binder 2pole	3
	socket Binder 3pole	3
	obsolete	
	cable connector Binder 2pole	3
	cable connector Binder 3pole	3
	ring terminal	8
	blade receptacle	7
	circular socket	4
	round plug	3
	range shrinkable tubingt	1
	range ferrules	1
	emergency stop in an IP 65 housing	1



Illustration	Description	Number
 <b>K1</b>	control line 2 x 0.5 mm <sup>2</sup>	3 m
 <b>K2</b>	patch cable RJ45 0.5 m	3
 <b>K3</b>	patch cable RJ45 2 m	1
 <b>K4</b>	PVC wire 0.5 mm <sup>2</sup> dark blue	20 m
 <b>K5</b>	PVC wire 0.5 mm <sup>2</sup> black	10 m
 <b>K6</b>	PVC wire 0.5 mm <sup>2</sup> violet	2 m
 <b>K7</b>	PVC wire 0.5 mm <sup>2</sup> orange	2 m
 <b>K8</b>	PVC wire 0.5 mm <sup>2</sup> light blue	2 m
 <b>K9</b>	PVC wire 0.5 mm <sup>2</sup> red	2 m
 <b>L1</b>	PVC wire 0.75 mm <sup>2</sup> black	10 m
 <b>L2</b>	PVC wire 1 mm <sup>2</sup> black	10 m
 <b>L3</b>	PVC wire 1 mm <sup>2</sup> light blue	10 m
 <b>L4</b>	PVC wire 1 mm <sup>2</sup> green / yellow	10 m

Illustration	Description	Number
 <b>S1</b>	lens head screw DIN 7981 M3,5 x 9,5	18
 <b>S2</b>	cylinderhead screw DIN 84 M3 x 6 <b>S2</b> M5 x 6 <b>S3</b> M6 x 25 <b>S4</b>	8 4 2
 <b>S5</b>	countersunk screw DIN 965 M3 x 12 <b>S5</b> M4 x 16 <b>S6</b> M4 x 40 <b>S7</b>	2 8 4
 <b>S8</b>	flathead screw Allen DIN 7381 M3 x 6	6
 <b>U1</b>	washer DIN 125 M6	3
 <b>UZ</b>	toothed washer DIN 6797 M6	10
 <b>M3</b>	nut DIN 934 M3 <b>M3</b> M4 <b>M4</b> M6 <b>M6</b>	2 4 5
 <b>PM</b>	plastic nut M3	4
 <b>D1</b>	stand off M3 / 20 mm 2 x M3 inner thread	4
 <b>D2</b>	stand off M3 / 20mm 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.02 .

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

### 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	30
3	cylinderhead screw M5 x 6	S3
1	power switch	17
1	fan	20
1	fan damper	21
1	dust filter for fans	22
4	countersunk screw M4 x 40	S7
4	nut M4	M4
3	fuse holder	15
2	fuse 6.3 A	16
1	fuse 1 A	8
1	IEC chassis connector	14
2	countersunk screw M3 x 12	S5
2	nut M3	M3
1	LED board with cable	12
2	flathead screw M3 x 6	S2
3	wiring duct	5
2	outlet	19
8	countersunk screw M4 x 16	S6
2	cylinderhead screw M6 x 25	S4
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 **17**, the IEC device connector **14** and the three fuse holders **15**.

- Cut the threads for the mounting screws:

8 x M4 for the sockets  
6 x M4 for the power amplifiers (see picture 13)  
3 x M5 for the mounting rail (see picture 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 **30** if necessary - it should be 16 cm.
- Mount the mounting rail with the screws **S3** in its place in the rear of the housing (see Fig. 13).
- Push the power switch **17** 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 **20** and the fan dumper **21** with screws **S7** 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 **22** with the dust filter inserted onto the grille cover of the fan.
- Mount the IEC connector **14** with screws **S5** and nuts **M3** in the opening provided on the rear.
- Mount the LED-Board **12** with screws **S2** in its place in the housing front.

- Lay the self-adhesive wiring duct **5**. To do this, use the course shown in Figure 13.

- Mount the two built-in outlets **19** with screws **S6**.

- Now install the three fuse holders **15** 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 **16** each.

- Equip the fuse holders next the IEC connector (F3) with the 1 A fuse **8**.



## 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 Fig. 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 Fig. 4.



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

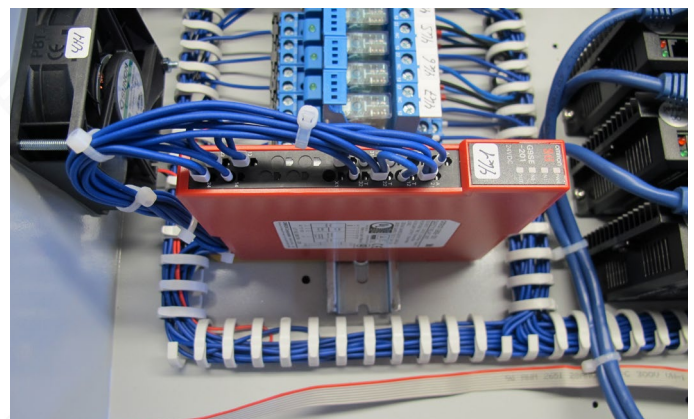


Fig. 3: Emergency stop module on mounting rail



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



## Grounding screws

For this construction phase you need:		#
2	cylinderhead screw M6 x 25	S4
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. 9). 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.

### Note

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

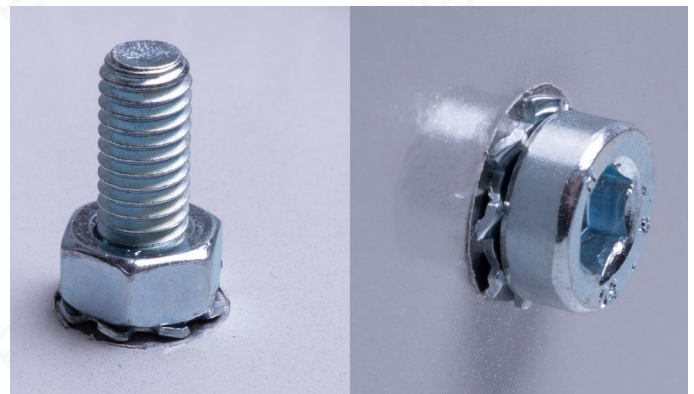


Fig. 5: Ground screw on the floor (left) and on the rear wall.



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



Fig. 7: Earthing screw cover

## Power supply and motors

For this construction phase you need:		#
1	power supply 48 V	6
4	flathead screw M4 x 6	S8
1	power supply 24 V	7
2	coupling relay	9

- Snap the 24 V power supply **7** onto the DIN rail as shown in Fig. 13.
- Mount the 48 V power supply **6** with screws **S8**, as shown in Fig. 19.

## Preparation of the motors

### Note

The settings described here refer, for example, to the 3 Nm variant iHSS60 of the JMC drive motors preferably used by Sorotec. The scope and procedure of the configuration of motors from other manufacturers may differ.

The configuration is based on the tables printed on the motors (see figure). We recommend setting the DIP switches of the power amplifiers integrated in the motors as follows:

### 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.**

### Triggering and direction of rotation

The switch S5 determines whether a motor step is triggered at the beginning or at the end of a switching pulse. In order to avoid step losses, the position pulse end / S5 On has proven itself („falling edge“, „down edge“).

Switch S6 determines the basic direction of rotation: Off for CCW („counterclockwise“) and On for CW („clockwise“).

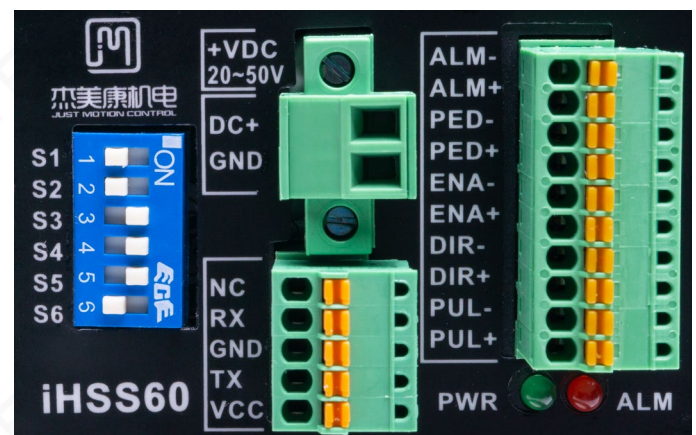


Fig. 8: DIP switch on the output stage integrated in the motor. Setting for JMC iHSS60 according to the table below.

Pulse/rev Table				
Pulse/rev	Sw1	Sw2	Sw3	Sw4
Default	on	on	on	on
800	off	on	on	on
1600	on	off	on	on
3200	off	off	on	on
6400	on	on	off	on
12800	off	on	off	on
25600	on	off	off	on
51200	off	off	off	on
1000	on	on	on	off
2000	off	on	on	off
4000	on	off	on	off
5000	off	off	on	off
8000	on	on	off	off
10000	off	on	off	off
20000	on	off	off	off
40000	off	off	off	off

Sw5: off=up edge, on=down edge  
Sw6: Motor DIR, off=CCW, on=CW

Fig. 9: Table with switch positions for the JMC iHSS60 stuck to the motor.



## Coupling relay

The coupling relays **9** 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 Figure 13.

## Controller and Breakout Board

For this construction phase you need:		#
1	Eding-CNC Controller 720	<b>10</b>
1	Simple BOB CNC720	<b>11</b>
4	stand off 2 x M3 inner thread	<b>D1</b>
2	stand off M3 inner / outer thread	<b>D2</b>
6	cylinderhead screw M3 x 6	<b>S2</b>

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 **10** and the breakout board **11** 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.

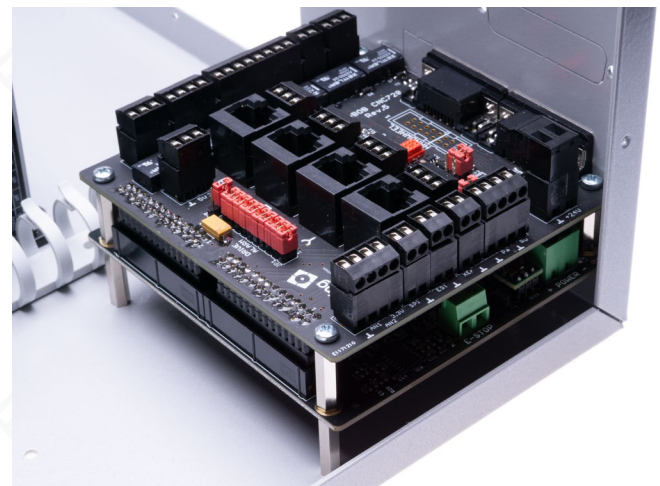


Fig. 11: Mounting of controller and Simple BOB

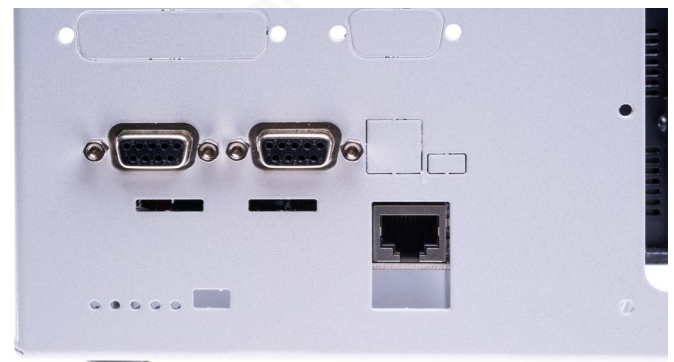


Fig. 12: Outer ports of the combination

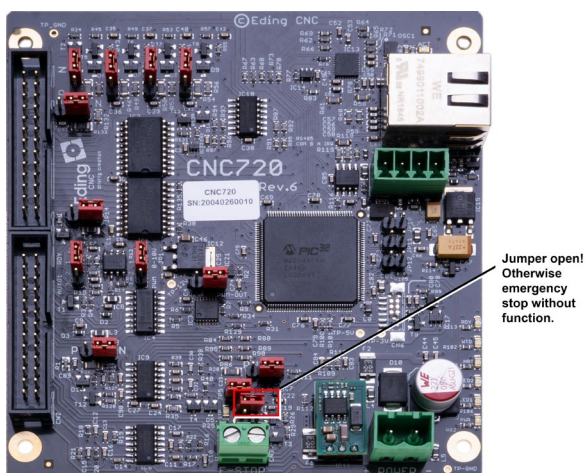


Fig. 10: Correct position of jumpers

## Wiring

For this construction phase you need:		#
1	connection panel	2
8	lens head screw	S1
2	socket 6pole	23
1	socket 4pole	25
3	socket 3pole	32
3	socket 2pole	31
3	RJ45-D-SUB-9-adapter	27
3	Patchkabel RJ45	K2
8	ring terminal	36
7	blade receptacle	37
4	circular socket	38
3	round plug	39
	shrinkable tubing	40
	ferrules	41
	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

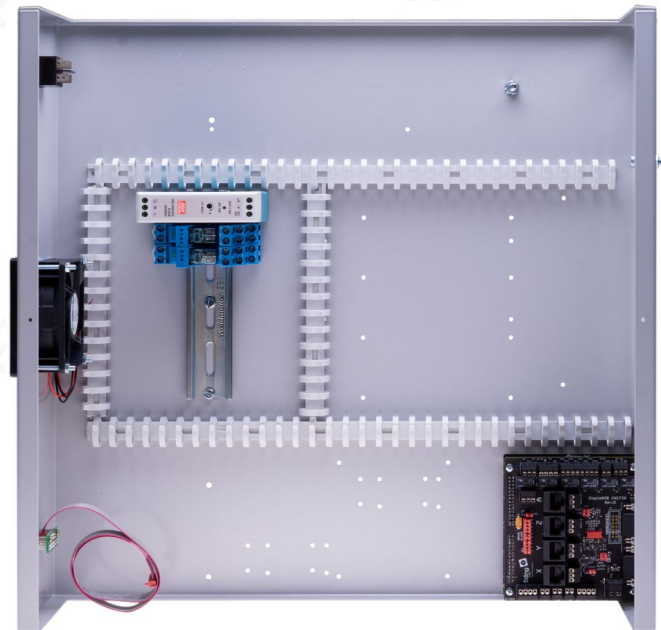


Fig. 13: Housing with internals before the start of the wiring



Fig. 14: The sockets for cooling and milling spindle

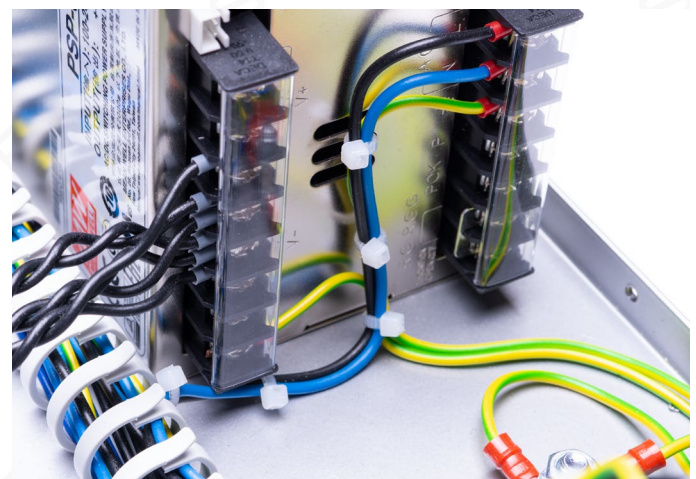


Fig. 15: The terminal block on the power supply



## 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. 17).

## 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. 16.

## Mounting the sockets

For wiring the built-in sockets [23](#), [25](#), [31](#) and [32](#), it has proven useful to first roughly cut the cables to length, solder them outside the housing and only then install the sockets. It also makes sense to first prepare the connection panel [2](#) completely in this way and only then to assemble it with screws [S1](#) in front of the opening on the rear of the housing. See pictures 16 and 18.

To create the connection cables between the RJ45 signal outputs of the breakout board and the RJ45-D-SUB-9-adapters [27](#) of the connection panel use the patch cables [K2](#). Figure 18 shows the correct mounting.

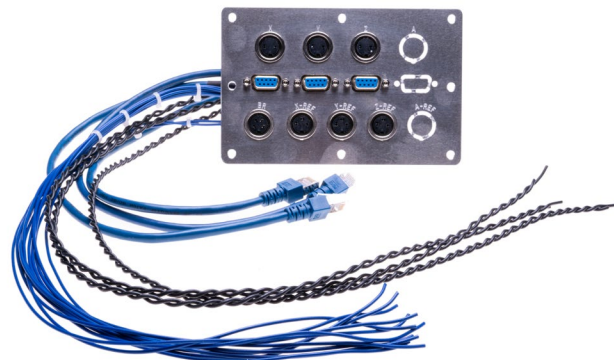


Fig. 16: Power lines are twisted in pairs



Fig. 17: Each pin individually insulated with shrink tubing

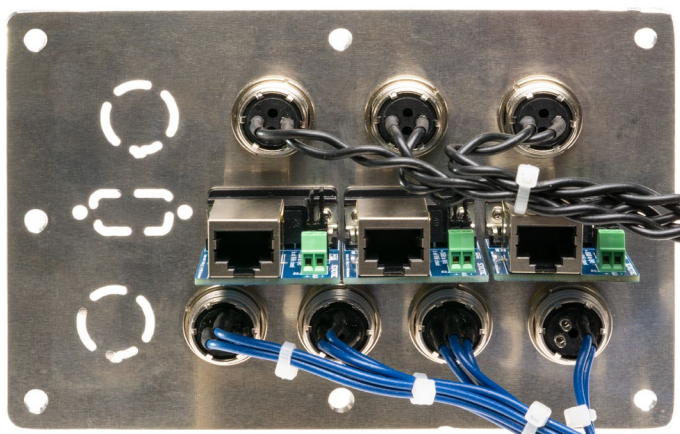


Fig. 18: Pre-wired connection panel

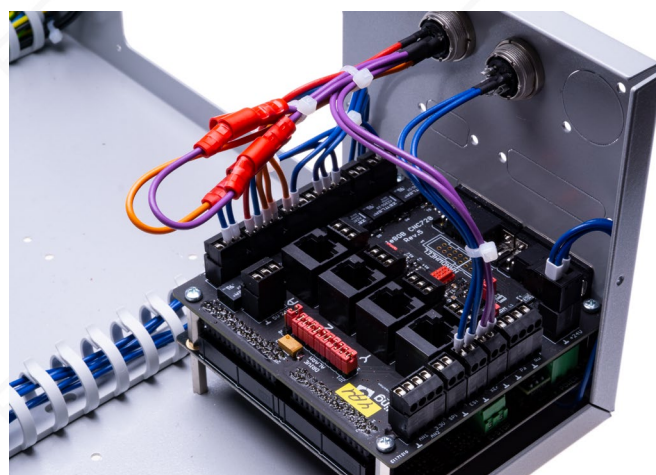


Fig. 19: Jumper with circular plugs / sleeves for optional frequency converter connection

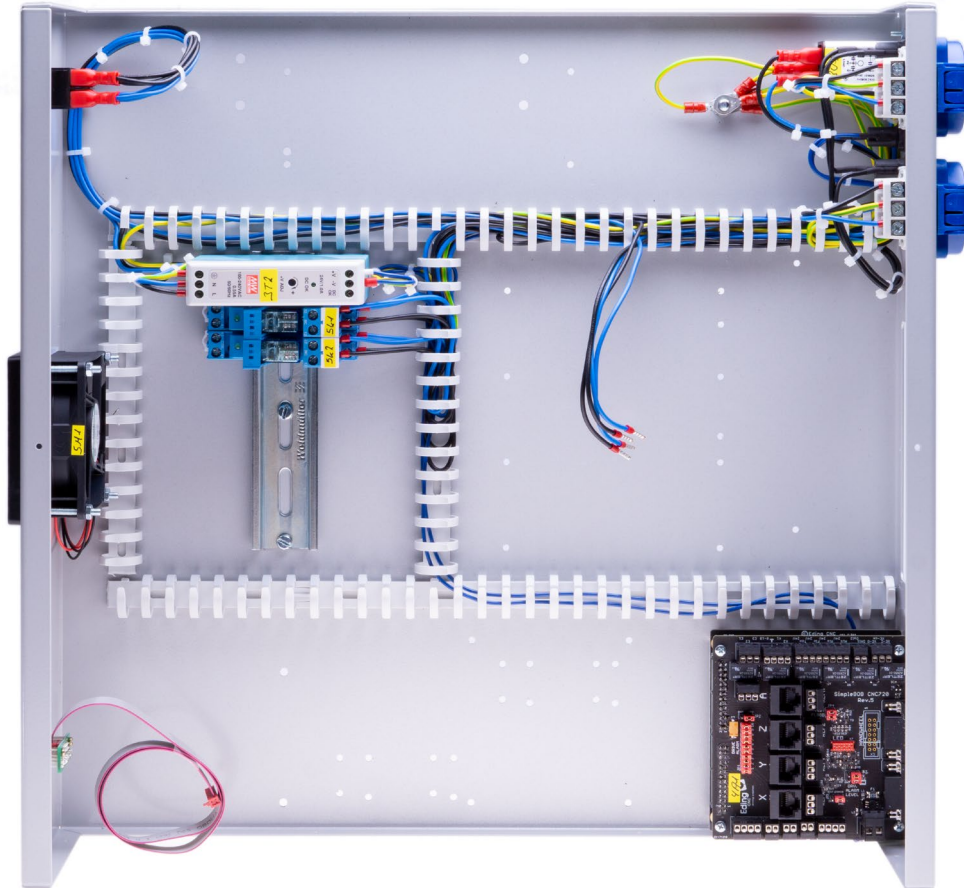


Fig. 20: Basic wiring with mains voltage and ground lines

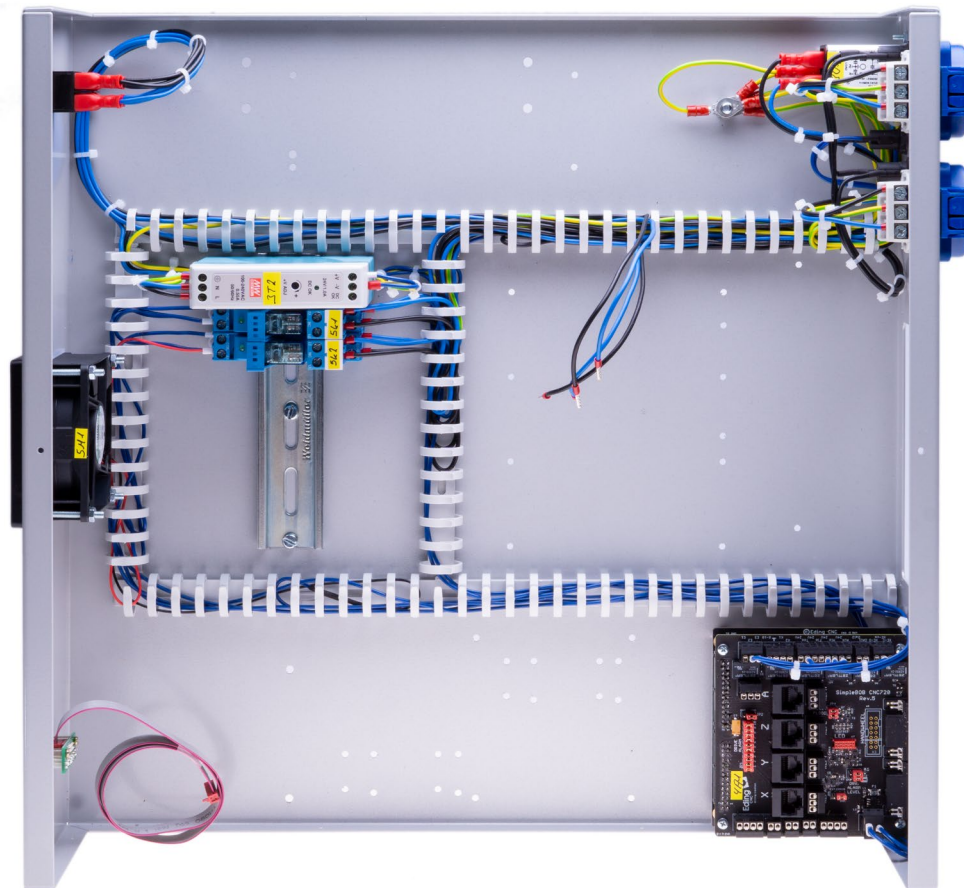


Fig. 21: Connecting fan, relays and controller



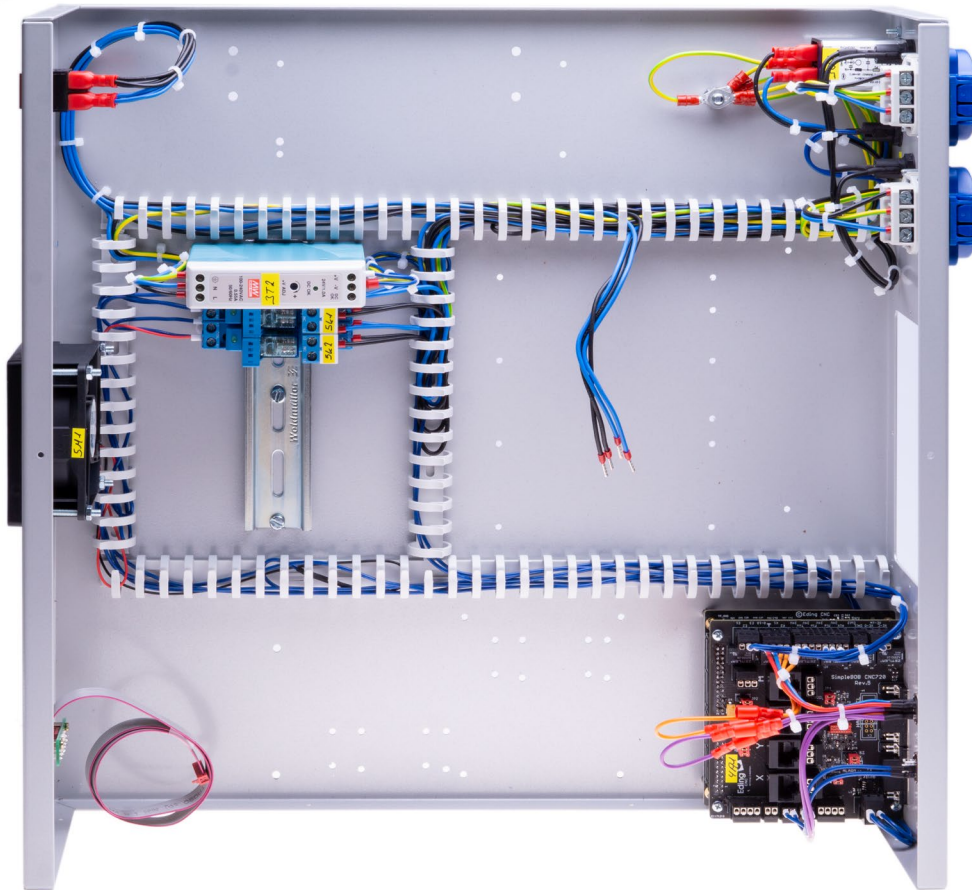


Fig. 22: Connecting emergency stop, jumpers for optional FC connection

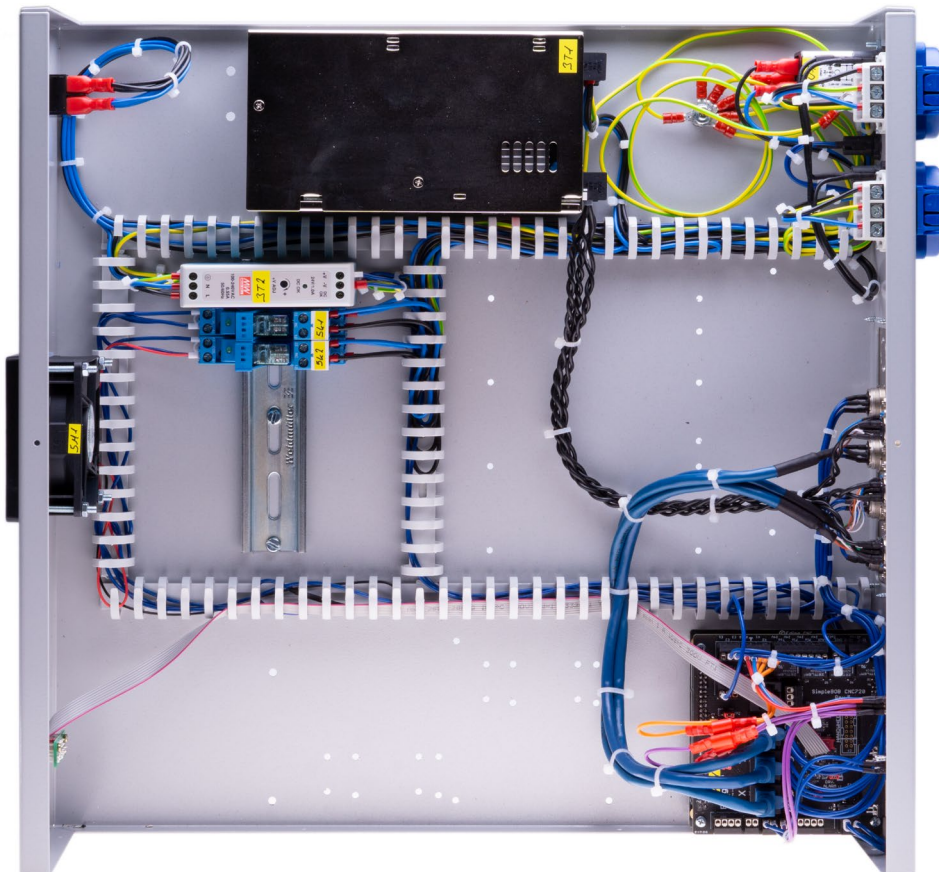


Fig. 23: Finished control with power supply and connection panel

