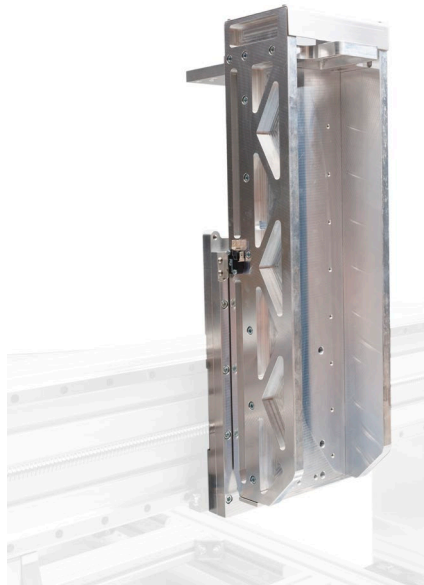




## Assembly Instructions

Z-axis Kit (420 mm)  
Alu Line



AL.ZA0002.BL

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Version 1.0.0

## Description

This kit contains all the parts for the mechanical construction of a Z-axis, as is also the case with all Sorotec Alu-Line machines. **The second part of this description provides guidelines for constructive integration in environments other than those originally intended.**

The Z-axis of the Alu-Line portal milling machine is a self-contained assembly that can also be easily integrated into other projects. Be it as the core of your own new construction, be it as a suitable completion of a new building that has long been underway. But replacing an older machine is also an option, whether as a repair, to improve rigidity, or to use a milling motor for which no suitable mount is available so far.



### Attention!

Construction and use of the Alu-Line Z-axis take place at your own discretion and risk. Sorotec assumes no liability for the technical suitability of the entire system or the consequences of its use.

### Technical features:

- Travel 420 mm
- Linear guides size 20
- HIWIN ball screw tolerance class T07

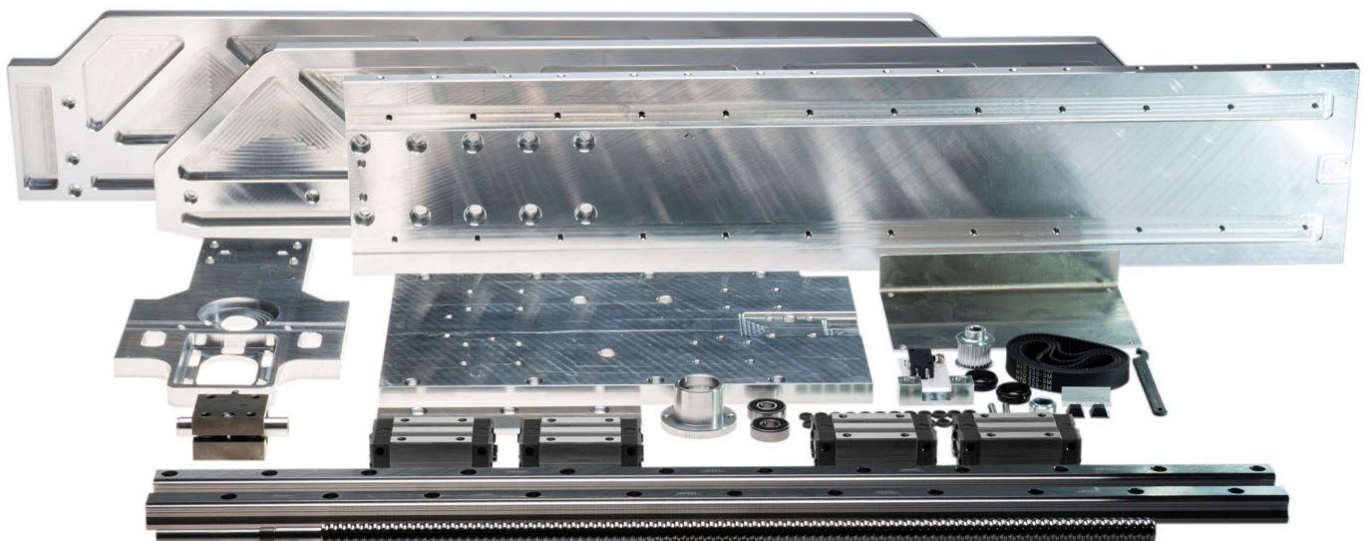


Fig. 1: The Z-axis 420 mm Alu-Line kit

## Scope of delivery

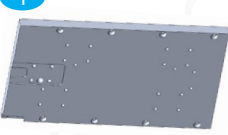

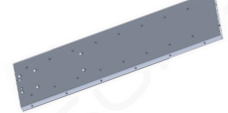



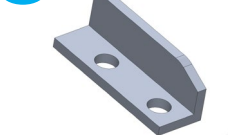
















Illustration	Designation	Num.
	guide plate	1
	motor plate	1
	plate	1
	bracing on the left	1
	bracing on the right	1
	stop plate	1
	end stop	1
	switch plate for reference switch	1
	timing belt cover	1
	linear guide rail 486 mm	2

Illustration	Designation	Num.
	slide block	4
	ball screw	1
	recirculating ball nut	1
	Fixed bearing housing with 2 ball bearings	1
	shaft nut	1
	dirt wiper	2
	toothed belt wheel 24 teeth	2
	timing belt 75 teeth	1
	straight pin	2
	device foot	2

Illustration	Designation	Num.
	cover cap for linear rail	16
	reference switch with insert film	1
	hook wrench 16 ... 20 mm	1
	cylinder head screw DIN 912	
	M3 x 16 	2
	M3 x 20 	2
	M4 x 20 	4
	M5 x 14 	34
	M5 x 20 	22
	M6 x 14 	4
	M6 x 16 	8

Illustration	Designation	Num.
	cylinder head screw DIN 6912 M6 x 20	4
	flat headed screw DIN 7380	
	M4 x 6 	2
	M6 x 12 	3
	washer DIN 125	
	Ø M4 	4
	Ø M5 	2
	hex nut DIN 934	
	M4 	4
	M5 	2

## Preparation of the ball screw

- Pull the circlips (Fig. 1, red arrow) off the assembly sleeve and press a dirt wiper  into the recirculating ball nut  on both sides.
- Screw the recirculating ball nut onto the recirculating ball screw  in such a way that the lubricating nipple points to the fixed bearing side of the recirculating ball screw (Fig. 1).
- Press the fixed bearing unit  onto the end of the ball screw and secure it by screwing on the shaft nut .
- To adjust the clearance, tighten the locknut until the ballscrew becomes stiff in the bearings. Then carefully loosen the shaft nut slightly (approx. 5°) until the ball screw can be turned easily again.

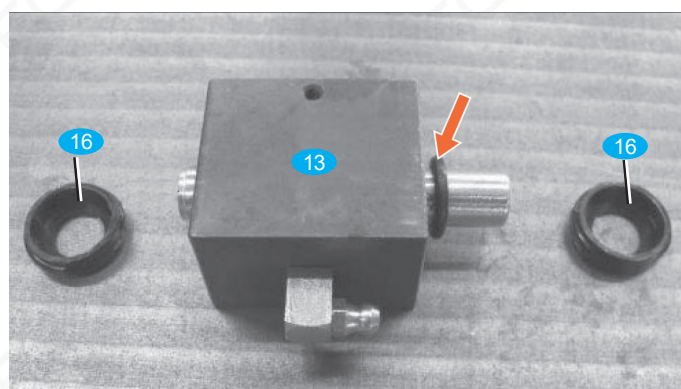


Fig. 1: Assembly of the ball screw

## Assembly

- Knock the cylinder pins **19** into the guide plate **1** until they protrude about 3 ... 4 mm on the underside.
- Screw the slide block **11** to the guide plate **1** with cylinder screws; **27** the following should be noted:

- ground, blank surfaces on the long sides of the carriage point to the center or to the ball screw

- the lubricating nipples on the carriages point towards each other and outwards. If necessary, turn the lubricating nipples or screw them to the opposite end

- Slightly tighten the screws.
- Attach the recirculating ball nut **13** to the guide plate **1** with cylinder head screws **29**.
- Slightly tighten the screws.
- Screw the end stop **7** to the guide plate **1** with cylinder head screws **31**. Tightening torque: 10 Nm
- Degrease the adhesive surfaces and attach two device feet **20** to the end stop **7**.
- Mount the switching plate **8** for the reference switch on the guide plate **1** with flat headed screws **31**.

- Align the left linear guide **10** flush with the lower edge of the plate **3** and screw it on with cylinder screws **28**; the edge (red marking in Fig. 3) of the linear guide must lie against the milled stop edge of the plate **3** over its entire length. Tightening torque: 6 Nm

- Align the right linear guide **10** flush with the lower edge of the plate **3** and screw as described for the left side.

- Only tighten the screws of the right guide lightly.

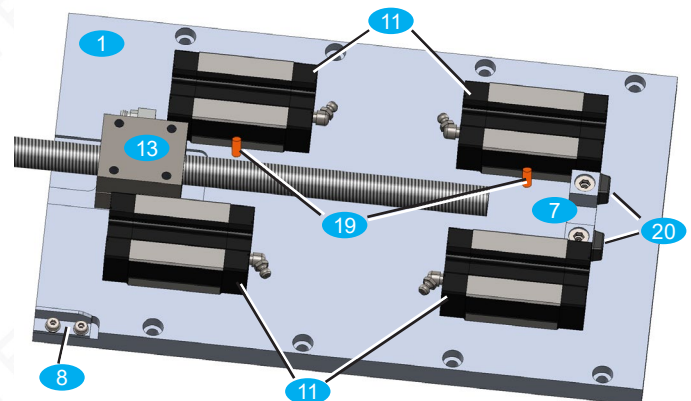


Fig. 2: Assembly of guide carriage and recirculating ball nut

### **Note**

The fastening screws of the right linear guide are only tightened during the final alignment.

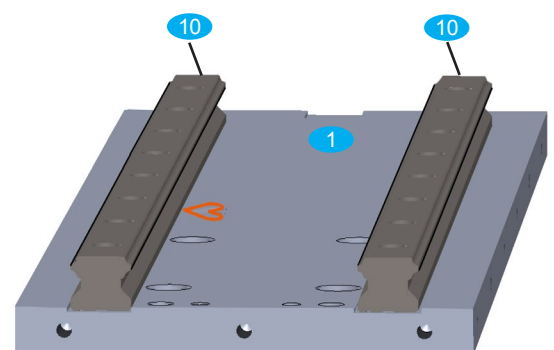


Fig. 3: Align the reference edge



- Slide the carriage of the guide plate **1** onto the linear guides of the plate **3**. Push the guide plate **1** to the side so that the left-hand carriage rests against the cylindrical pins (picture 4, red arrows). Screw the left carriage in this position. Tightening torque: 6 Nm

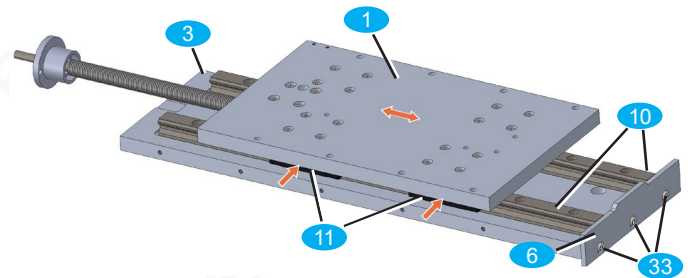


Fig. 4: Assembly of the guide

- Slide the guide plate **1** back and forth several times over the entire travel on the linear guides; while doing so, gradually tighten the fastening screws of the two right-hand carriages. Tightening torque: 6

- Slide the guide plate **1** back and forth several times over the entire travel on the linear guides; while doing so, gradually tighten the fastening screws of the right-hand linear guide. Tightening torque: 6 Nm

- Seal the holes in the linear rails with cover caps **21**.

- Screw the stop plate **6** to the plate **3** with pan head screws **33**.

- Screw motor plate **2** to the plate **3** with cylinder screws **31**; Tighten screws slightly.

- Mount the fixed bearing unit **14** on the motor plate **2** with cylinder screws **28**; Tighten screws slightly.

- Screw the Z reinforcements **4** / **5** to the plate **3** with cylinder screws **27**. Tightening torque: 6 Nm

### **Note**

If one of the Z reinforcements **4** / **5** cannot be slid onto the panel **3** with light pressure, the corresponding groove of the Z reinforcement must be reworked with a file.

- Tighten the engine plate Z fastening screws to the plate **3**. Tightening torque: 6 Nm

- Move the guide plate **1** as far as possible towards the motor plate **2** by turning the ball screw.

- Tighten the fixing screws of the fixed bearing unit. Tightening torque: 6 Nm

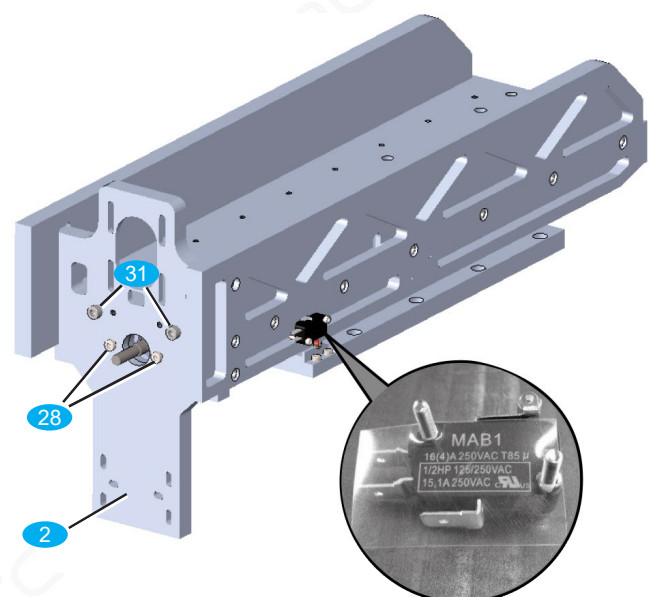


Fig. 5: Mounting of motor plate and reference switch

- Place the insert film between the reference switch **22** and the Z reinforcement and screw on the reference switch as shown in Fig. 5.
- Screw the complete Z-axis assembly to the Y-guide of your machine with cylinder screws **30**; Tighten screws slightly.

To align the Z-axis, a dial indicator must be attached to the moving part of the Z-axis and a stop bracket must be attached to the base frame. Rotating the ball screw of the Z-axis moves it up and down.

- Align the Z-axis on the Y-guide in such a way that the dial gauge does not deflect when the Z-axis moves up and down. In this position, tighten the fastening screws. Tightening torque: 10 Nm.

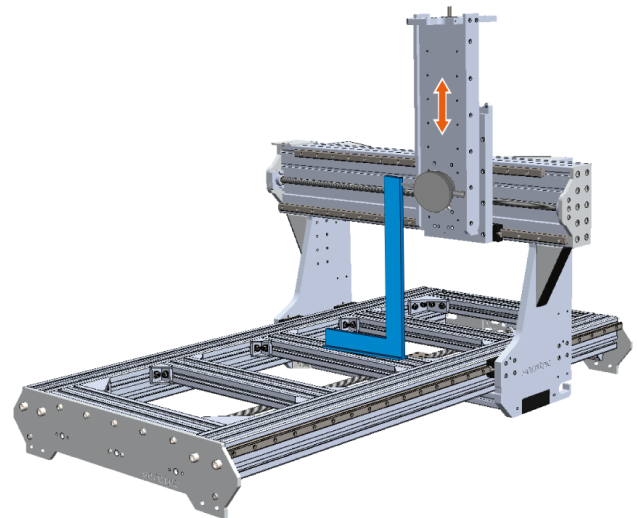


Fig. 6: Aligning the Z axis on the machine.

- Push the toothed belt wheel **17** so far as possible onto the shoulder of the ball screw **12** and fix it with the locking screw.
- Mount the stepper motor\* with cylinder screws **26**, washers **34** and hex nuts **36**; tighten screws slightly.

### **i** \*Note

*The stepper motor required at this point is not included in the scope of delivery.*

- Push the toothed belt wheel **17** onto the output shaft of the stepper motor, align it with the toothed belt wheel on the ball screw and fix it with the locking screw.
- Put on the timing belt **18** and tension it by moving the stepper motor; Tighten the stepper motor mounting screws.
- Screw the timing belt cover **9** (not shown) to the stiffeners **4** and **5** with flat-head screws **32** (red arrows in Figure 7).

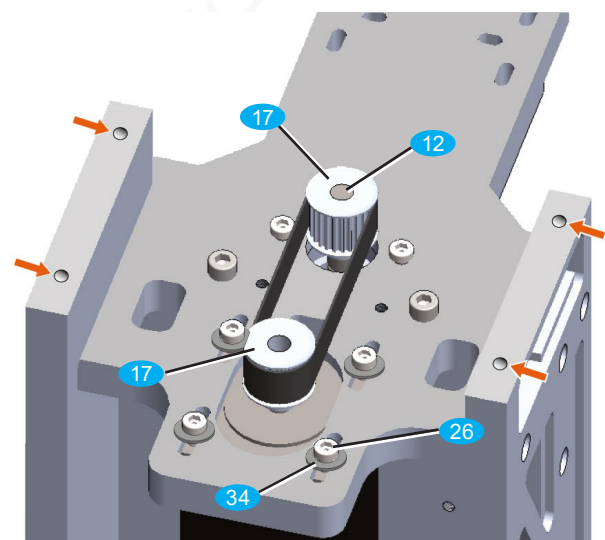


Fig. 7: Assembly of the axis drive

## Constructive interfaces

The constructive integration into a machine takes place via two mounting surfaces, the exact dimensions and other properties of which are described in Figs. 9 to 12.

### Mounting on the portal slide

Fig. 11 shows the mounting points for screwing the Z-axis to the portal slide. The Y-axis carriages are not directly connected to the Z-axis.

An adapter plate is to be constructed, which is screwed to the guide carriage on the one hand and which creates the connection to the Z-axis screwed on from the front on the other hand (see also front view, Fig. 9).

### Mounting the milling spindle

Figure 12 shows the spindle mounting points on the Z-axis. An adapter plate is to be constructed to accommodate the respective spindle. Ready-made holders are available in the Sorotec shop for the popular round spindles (but also for others):  
ZSP.HFSH65IS.AL für Ø 65 mm  
ZSP.HFSH80.1IS.AL für Ø 80 mm



Fig. 8: The Z-axis of the Alu-Line as a 3D drawing



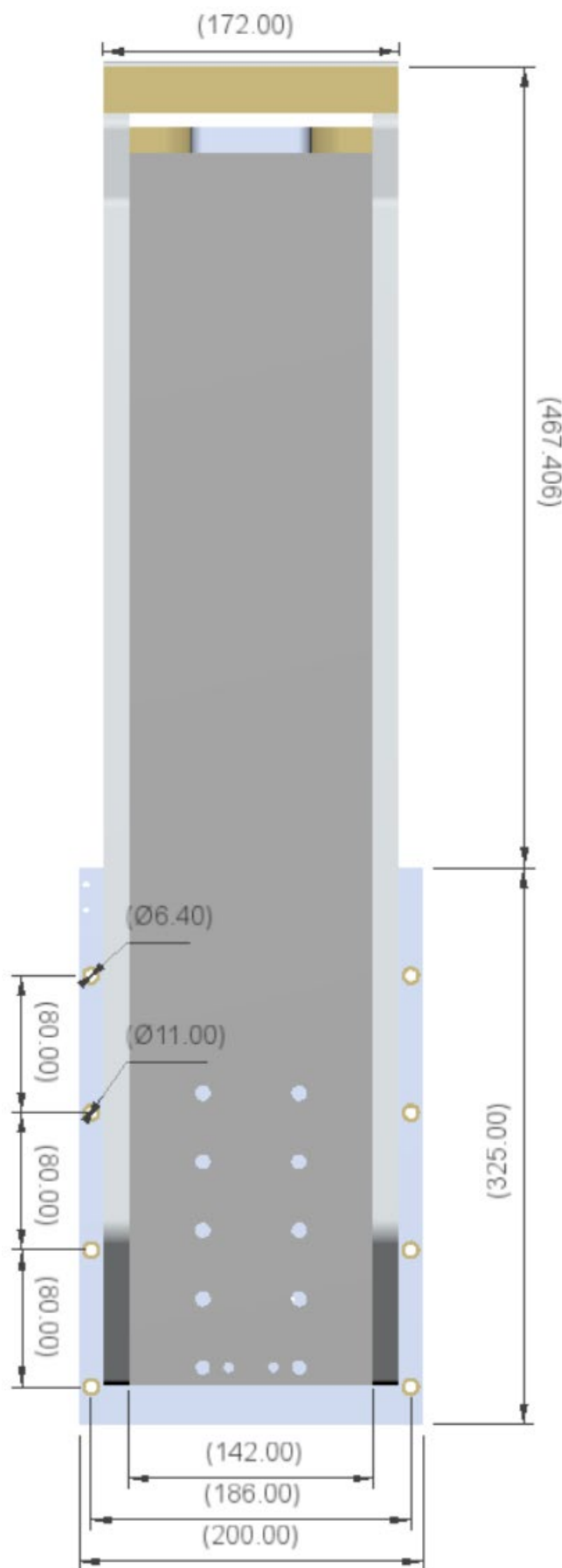


Fig. 9: Front view

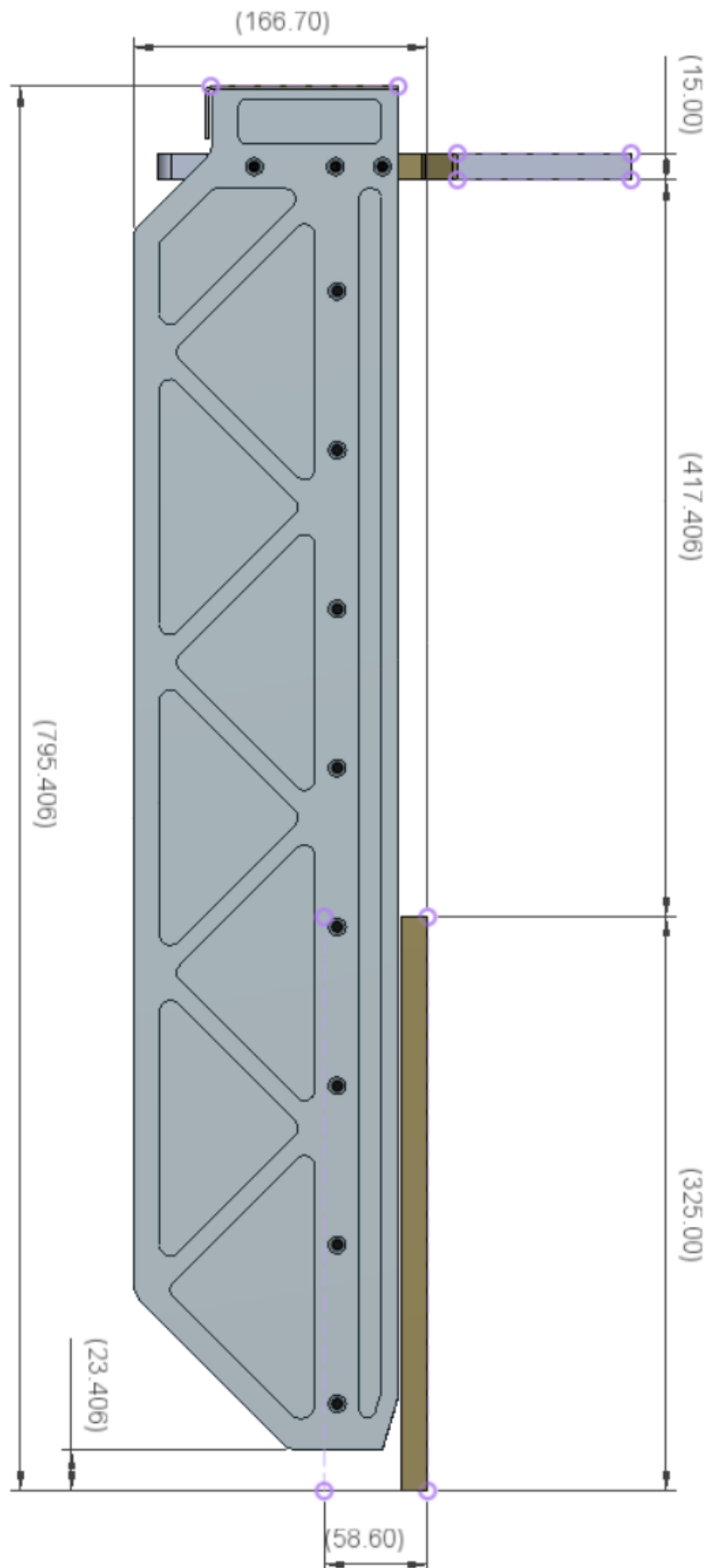


Fig. 10: Side view

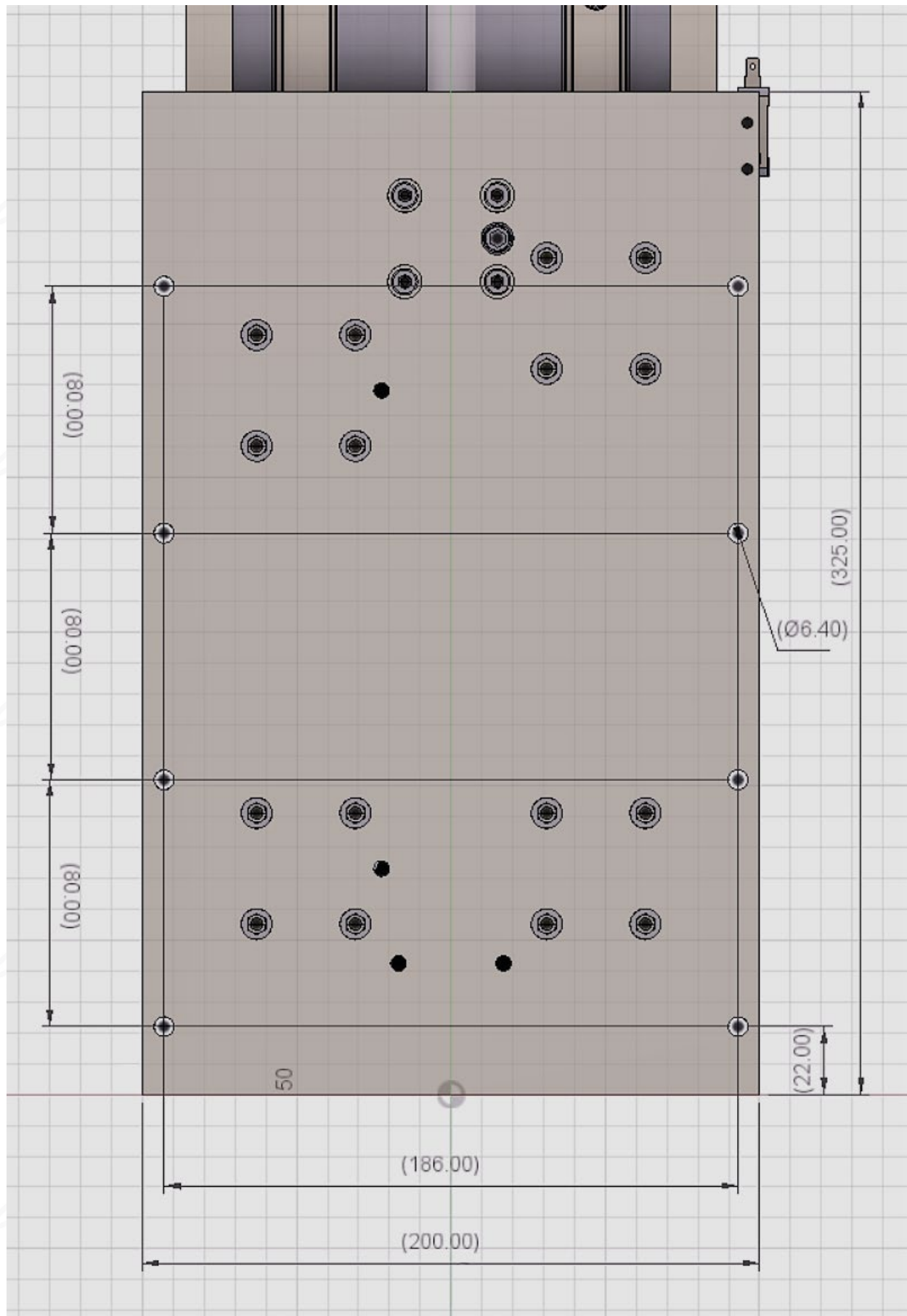


Fig. 11: Mounting points for screwing to the portal slide

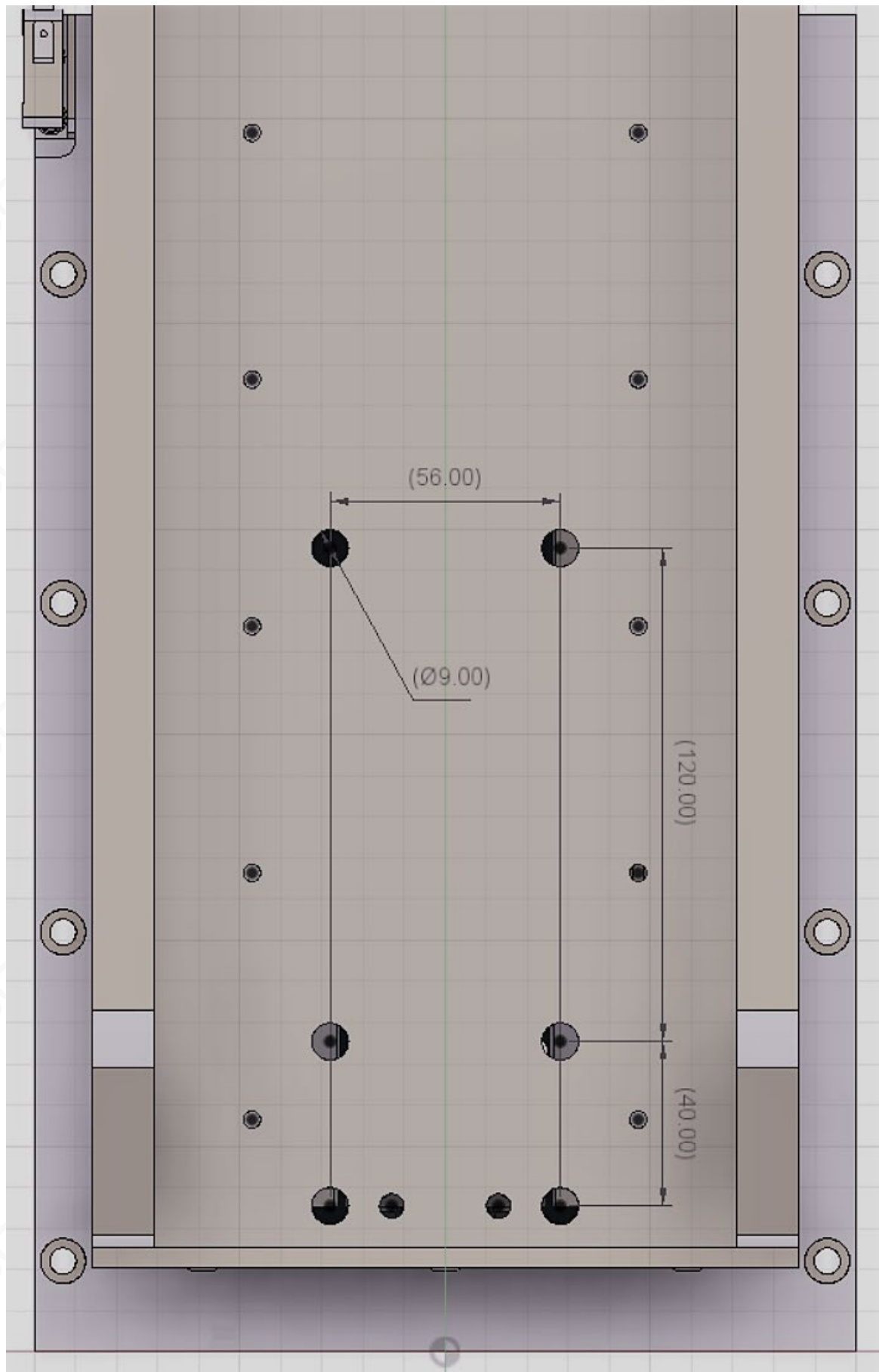


Fig. 12: Spindle mount