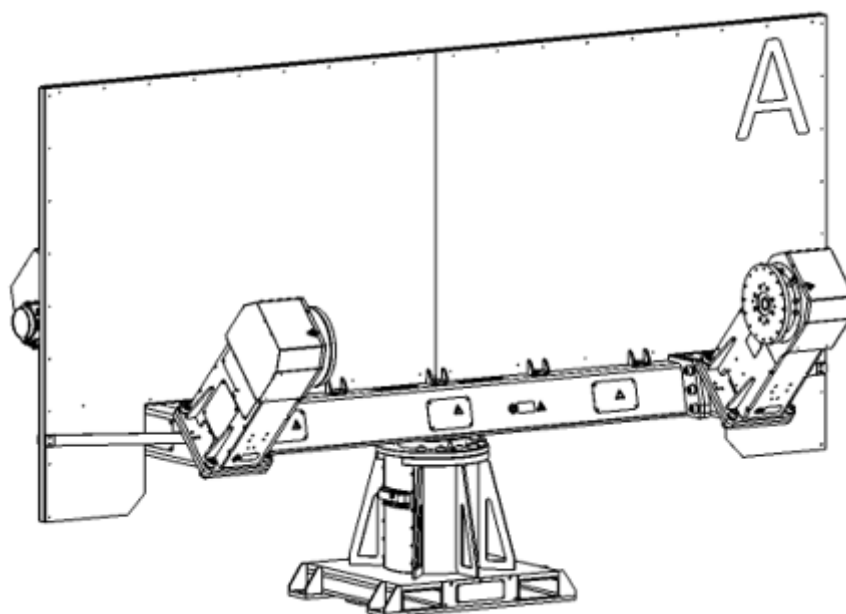


K – Positioner

PST500-M3-H2V1-2500

MULTIPOSITIONER WITH RATED CAPACITY OF 500 KG



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Appendix 1 - Spare parts list

1. Introduction

Three-axis (tilting) PST500-M3-H2V1-2500 positioner is an electrically driven positioner. It is equipped with rotary axes controlled in a continuous manner. It is designed to work in a robotic welding station and is used to rotate and tilt the welded parts. **It is controlled from the KAWASAKI robot controller as additional axes.** Read and understand this manual thoroughly, and take appropriate safety measures in using this product.

-
- I. These instructions do not constitute a guarantee of the system in which the positioner is installed. Accordingly, the Astor company is not liable for any accidents, damages and/or problems related to industrial property rights arising as a result of using the system.
 - II. It is recommended that all personnel assigned to operating, teaching, servicing or maintaining the positioner attend the necessary courses when installing the system before commencing the performance of their duties.
 - III. The Astor company reserves the right to alter, correct or update this manual without prior notice.
 - IV. Keep the following instructions with care and in a place where they can always be available for use. If the positioner is re-installed or relocated, please attach these complete and unaltered instructions. In case the instructions are lost or damaged, please contact the Astor company.
-

2. Technical parameters

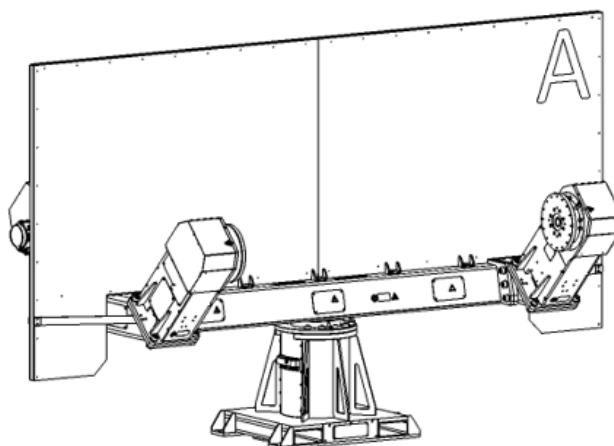
Parameter	PST500-M3-H2V1-2500
Max. Payload	500 kg
Degree of freedom	3
Loading height	1130 mm
Max. diameter of the detail	1350 mm
Distance between flanges	2500 mm
Load ratio between the parties	100:70
Repeatability *	+/-0.05 mm
Installation Position	Floor
Radius of interference	1740 mm
Mass	1380 kg
Emitted acoustic pressure (adjusted by A)	< 70 dB
Emitted acoustic pressure (adjusted by C)	< 63 Pa

*for JT2/JT3 axis, radius R=180mm from the axis rotation JT2/JT3

Axis parameters

Main axis - rotation	
Turning range	±185°
Turning time (180°)	4.6s
Planetary axes	
Turning range	±360° *
Rotating speed JT2	130 °/s
Rotating speed JT3	130 °/s
Nominal torque JT3/JT3	450 Nm
Nominal moment of inertia of the detail	90 kg m ²

* possibility of setup range +/-36000



3. External dimensions

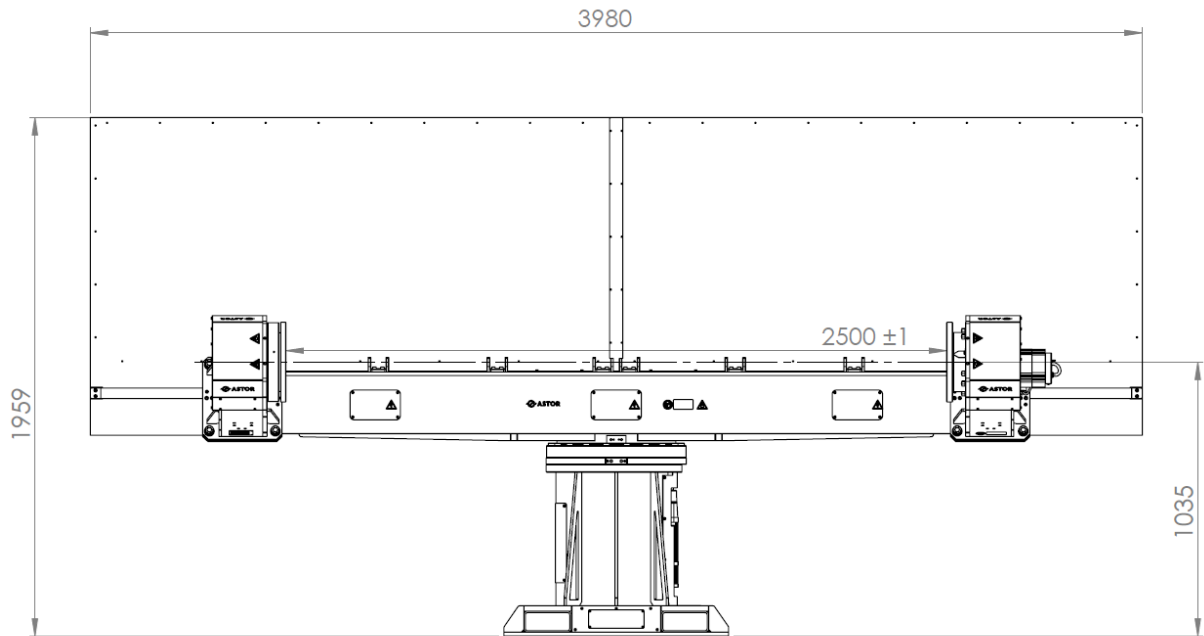


Fig. 1. Basic dimensions of the positioner - height and width

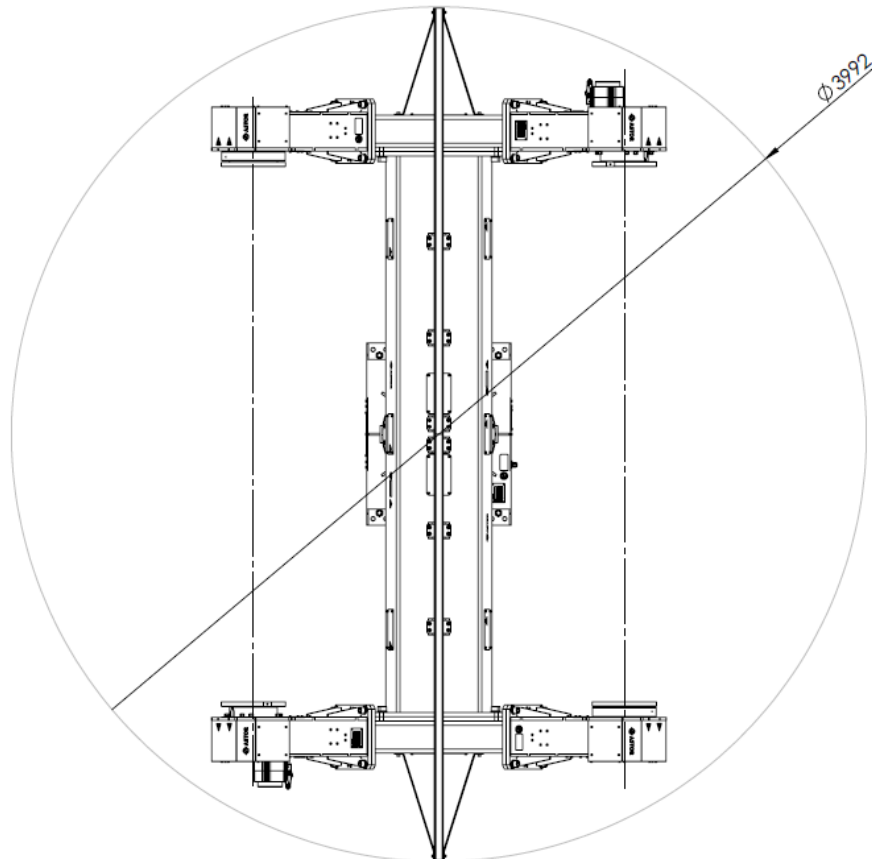


Fig. 2. Basic dimensions of the positioner - interference zone

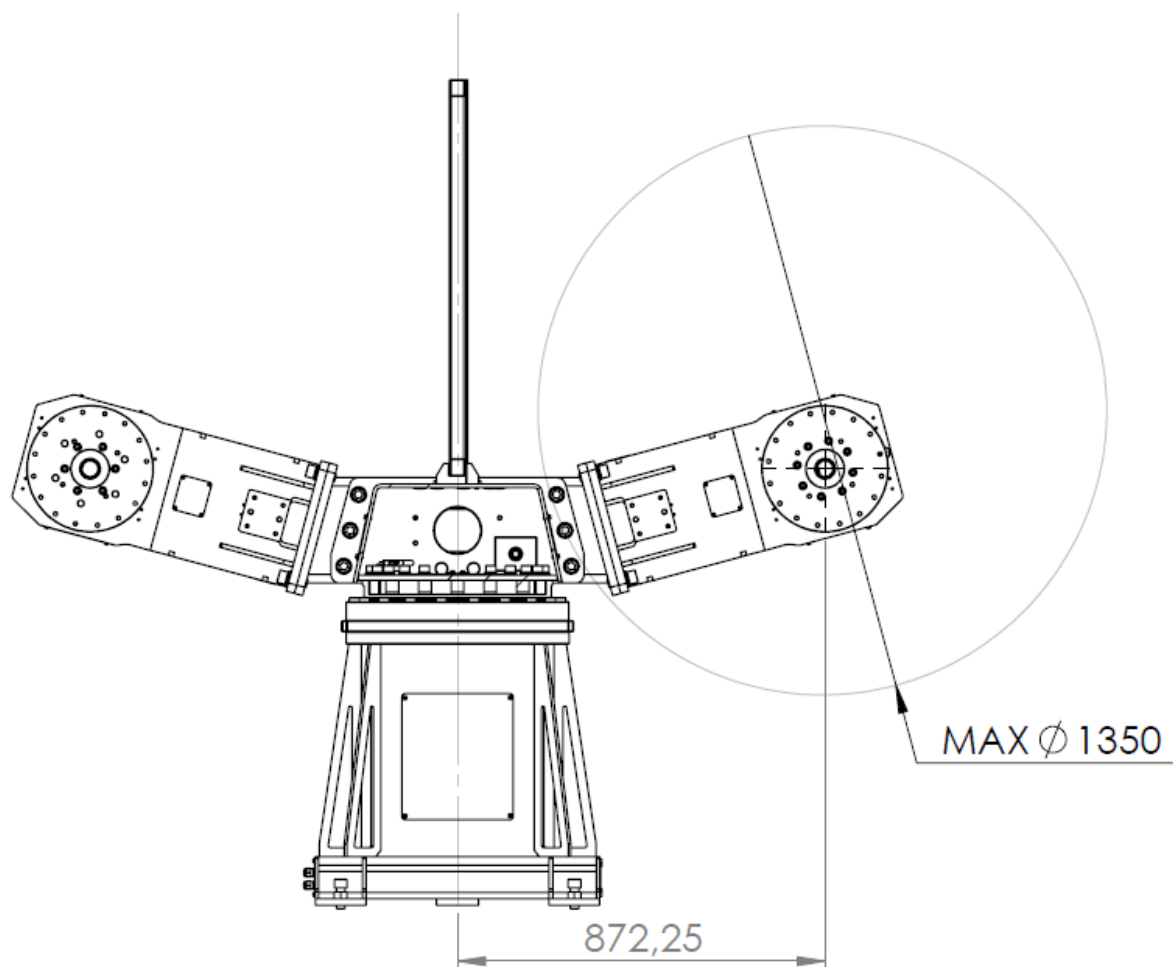


Fig. 3. Basic dimensions of the positioner

4. Assembly dimensions

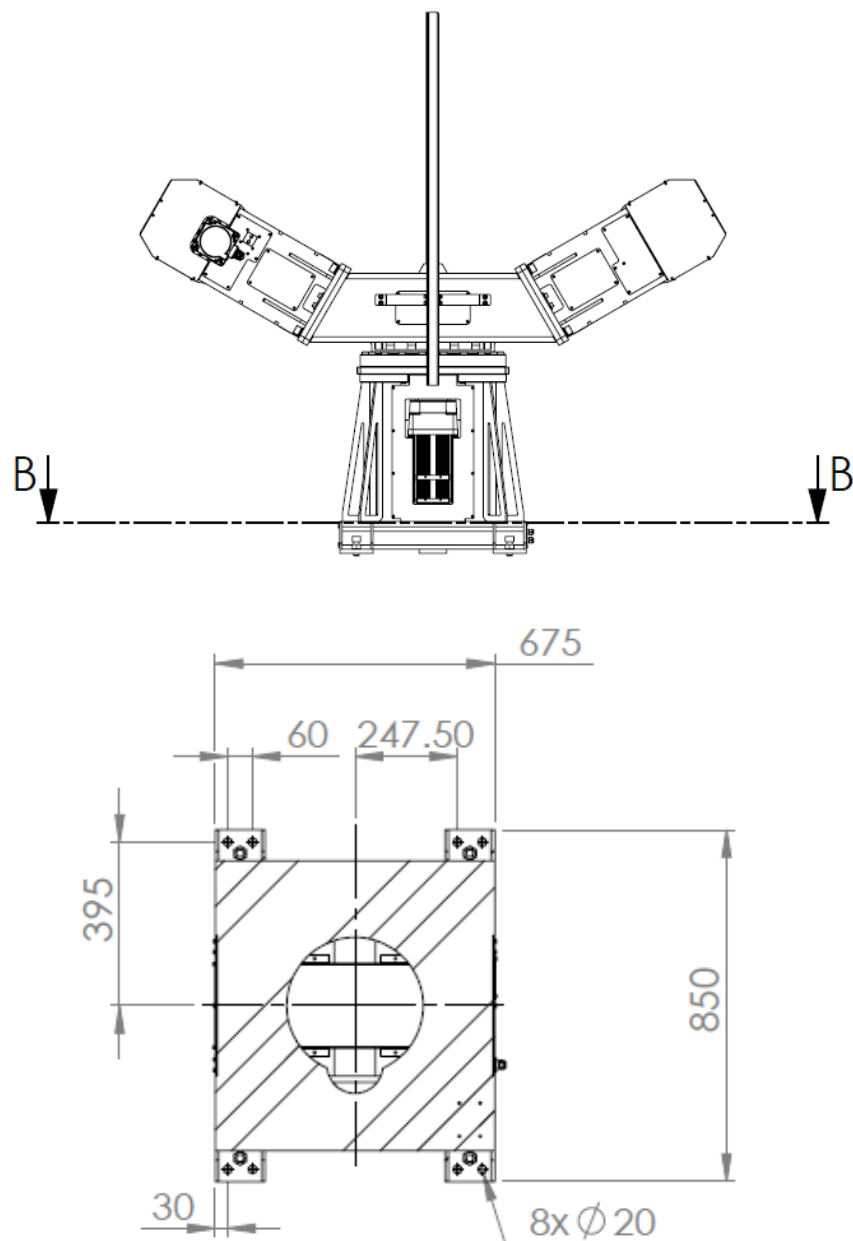
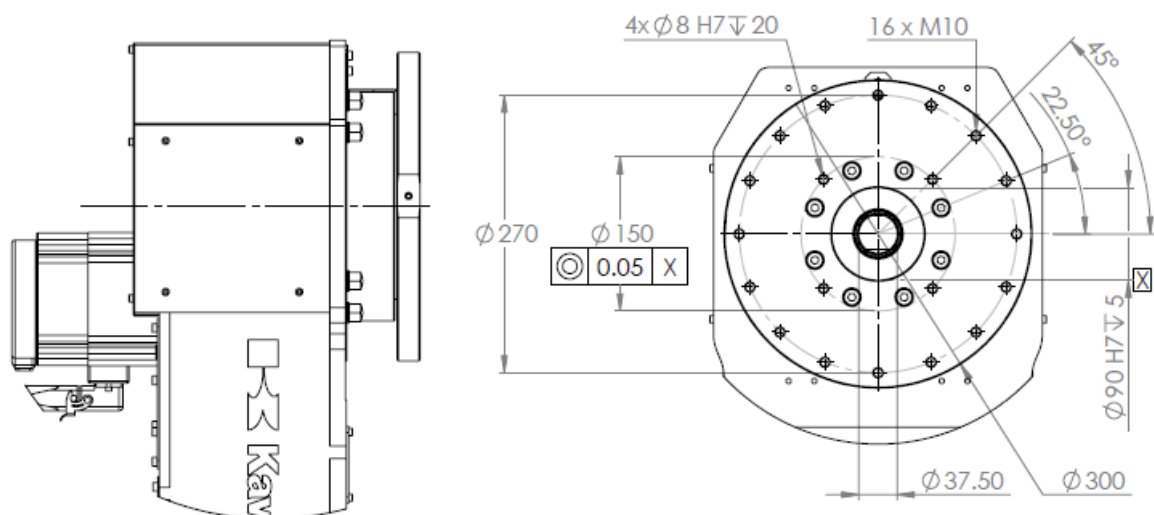
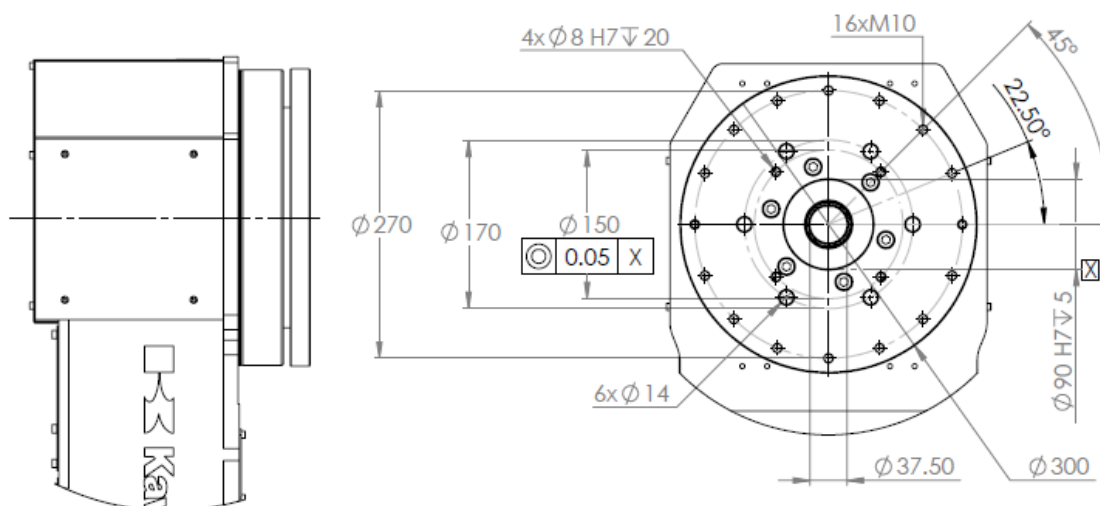


Fig.4. Placement of mounting holes for the floor base



Flange motor



Flange support

Fig. 5. Placement of mounting holes on the dial

5. Markings on the machine

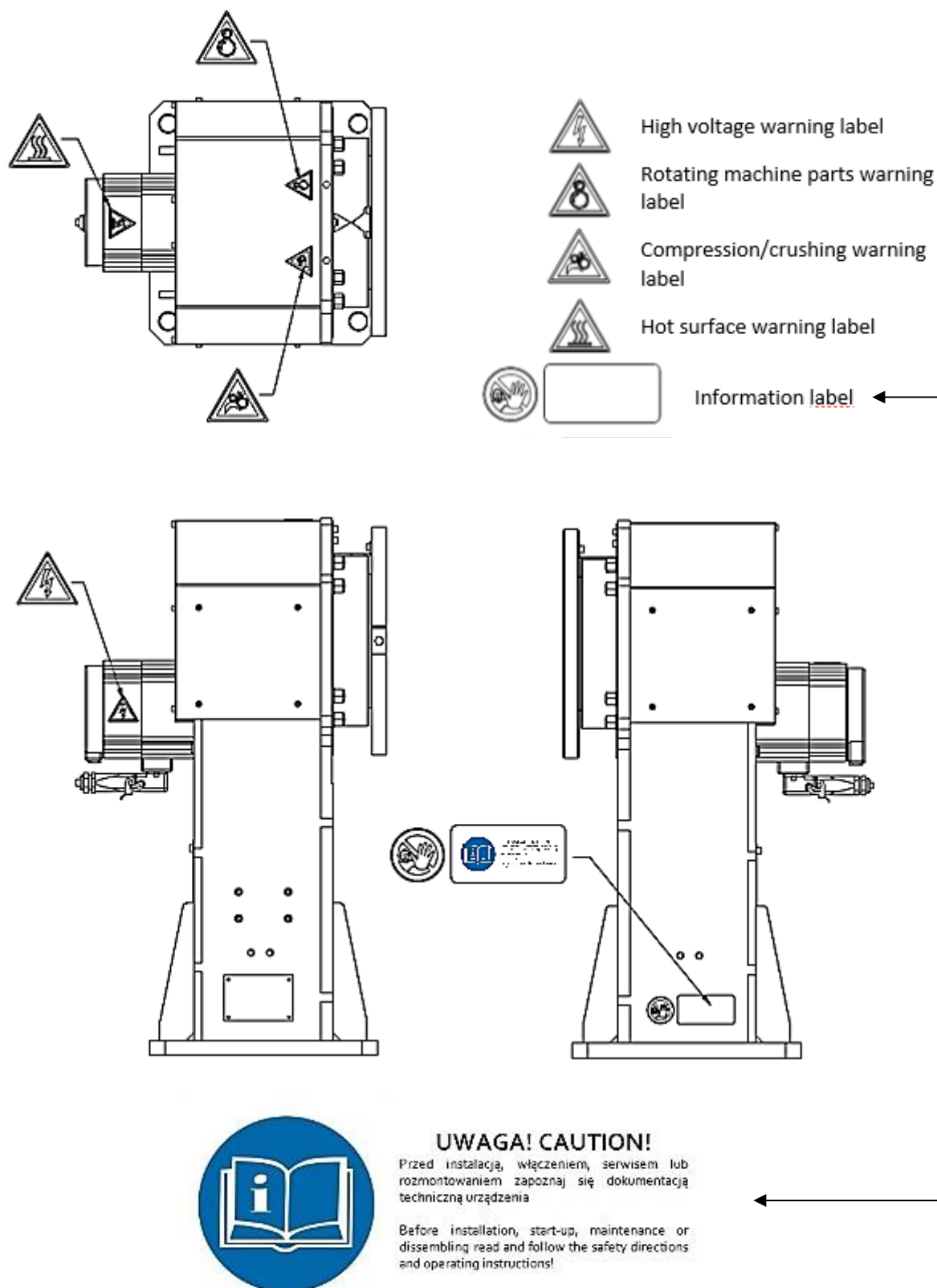


Fig. 6. Warning signs located on the positioner

6. Load charts

6.1. Maximum rated load distances

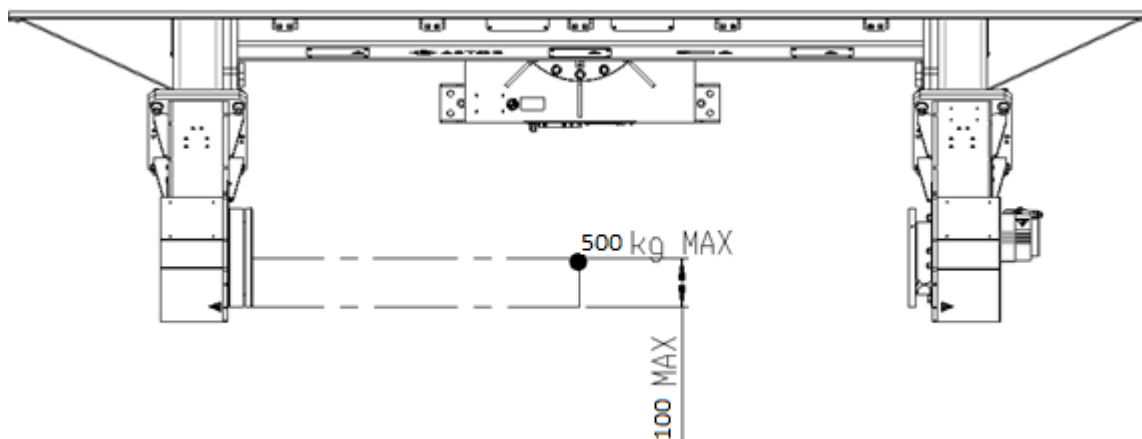


Fig. 7. Maximum position of the nominal load on planetary axes

6.2. Chart of the load relative from the distance from the plate axis

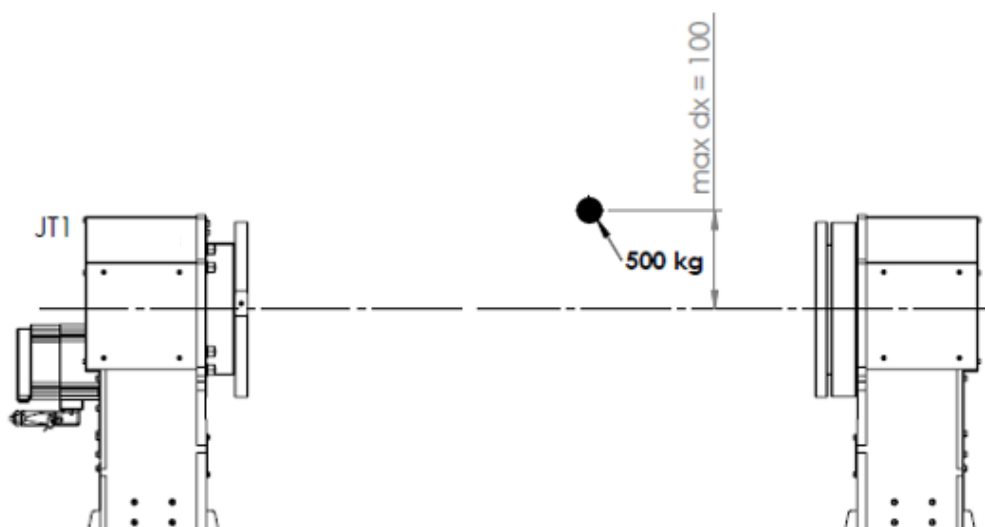
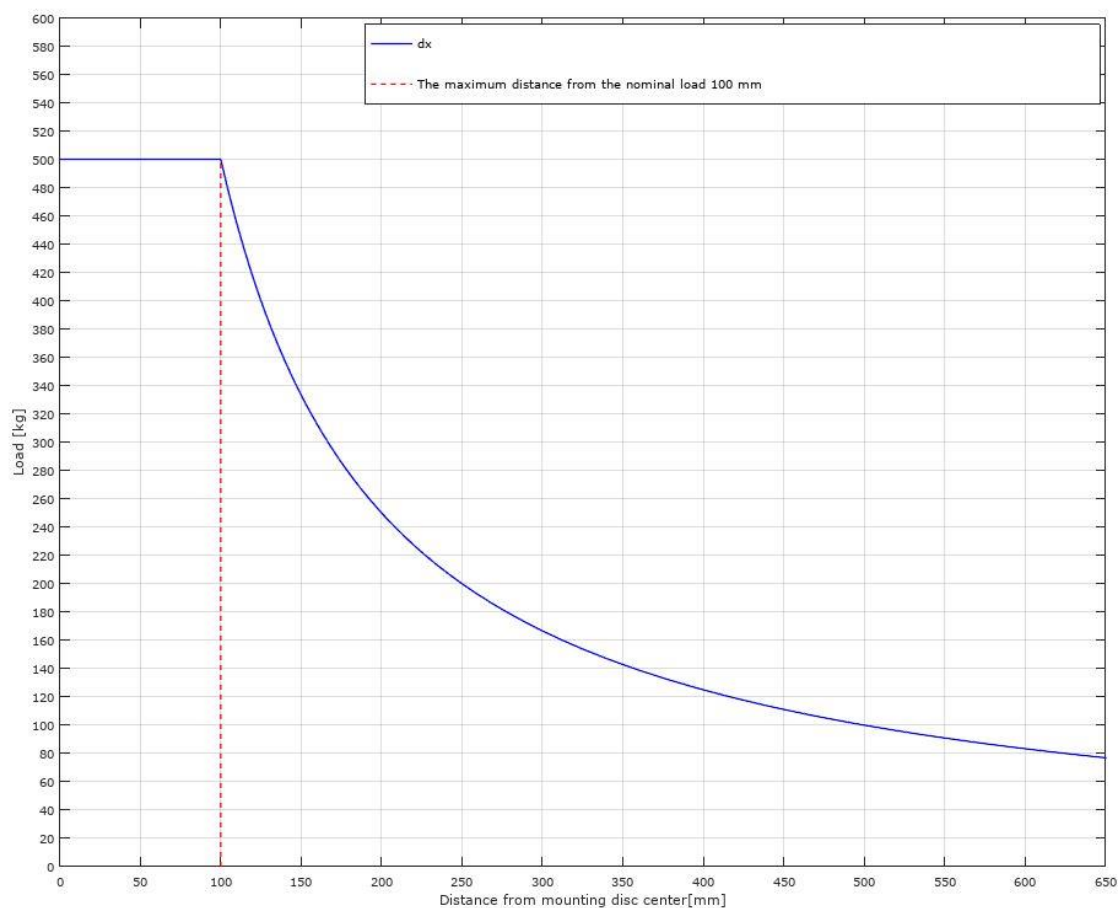


Fig. 8. The driving torque of the JT2 / 3 axis



ATTENTION:

- Mass assumptions include nominal accelerations and rotational speeds of the members

7. Basic units of the positioner PST500-M3-H2V1-2500

7.1. Mechanical system

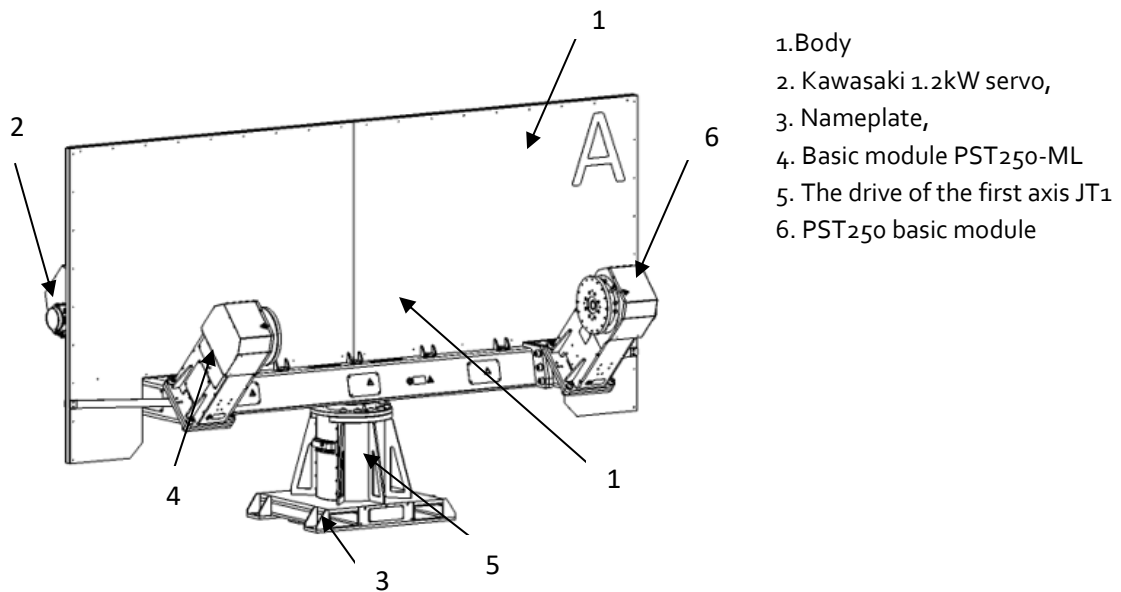


Fig.9. Basic units of the positioner

7.2. Electrical system

The power units consists of:

Axis 1 (Rotation of the plate $\div 180^\circ$) Astraada servo and cycloidal transmission

Axis 2 (Rotation of the plate $-360^\circ \div 360^\circ$) Kawasaki servo motor 1.2kW and cycloidal transmission

Axis 3 (Rotation of the plate $-360^\circ \div 360^\circ$) Kawasaki servo motor 1.2kW and cycloidal transmission

The axes are controlled as external axes from the robot control system. It is not possible to move the positioner without connecting it to the KAWASAKI robot controller.

Standard length of electrical wires connecting the servo with the controller is 15 m, but usable length is 13m.

The ground is transferred to the rotating plate by means of a set of 2 copper blocks located below the bottom of the positioner gear.

8. Assembly and start-up

8.1. Assembly

The PST500-M3-H2V1-2500 is assembled, connected, and pre-commissioned by the personnel appropriately prepared for this task. These persons are assigned by the manufacturer. These persons have the knowledge and skills required to safely and correctly assemble the machine. Connection to the mains must be carried out in accordance with the Polish Standards. It is not allowed to carry out the assembly independently; this will result in loss of warranty. During the warranty period, the user may not interfere in the electronic or mechanical components except as set forth in this maintenance documentation. Failure to comply with the above will result in loss of warranty.

The positioner must be leveled and fixed to the ground using foundation bolts, M16 bolts with a strength class of at least 10.9 or M20 x 260 chemical anchor bolting. The spacing of the mounting holes fixing the positioner to the slab is shown in Figure 4.

When mounting the positioner directly on the floor, place a steel slab of the thickness of at least 29 mm (thread length min. 25 mm); the slab size and the concrete class must withstand the transfer of the torque values given below.

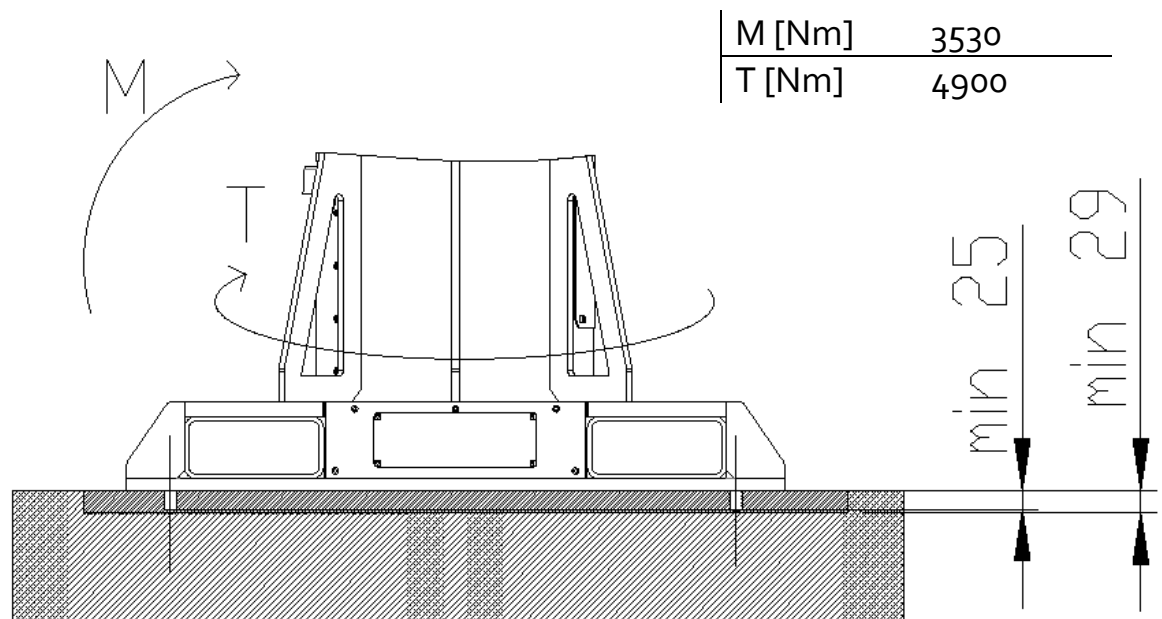


Fig. 10. Mounting the positioner directly on the floor - fixed slab

The second case assumes mounting the positioner on a steel slab anchored to the concrete with M20 chemical anchor bolting. Spacing of the anchor holes for concrete – PCD1100

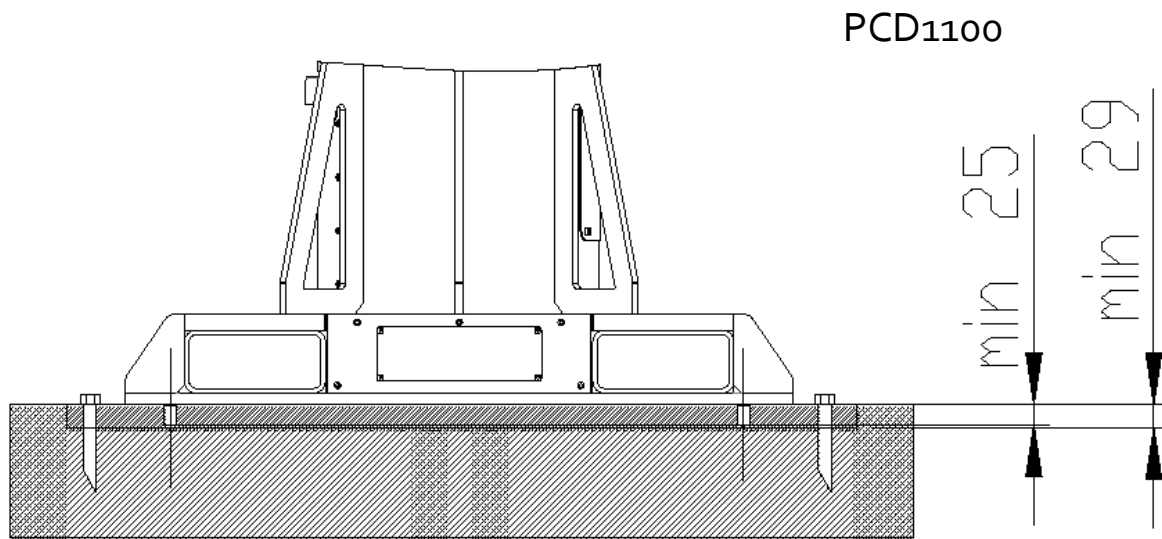


Fig. 11 Mounting the positioner directly on the floor - anchored slab

8.2. JT1 axis control cabinet

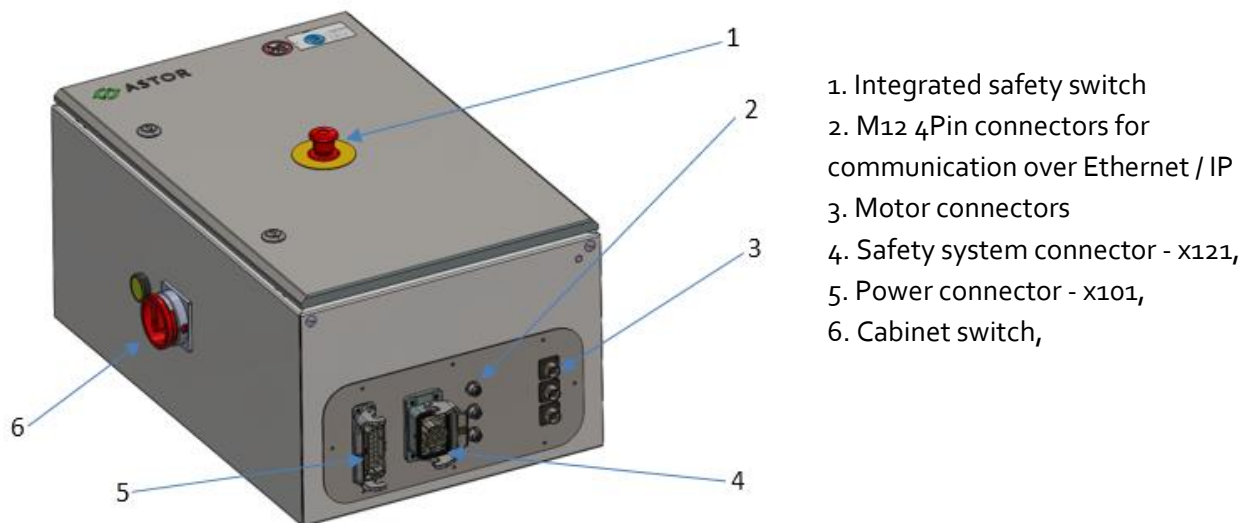


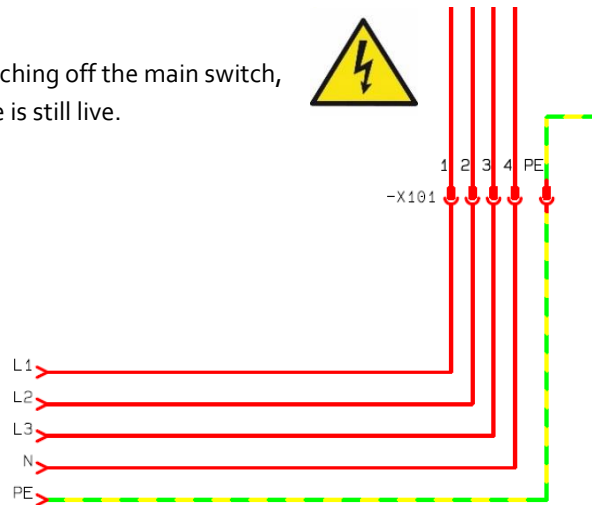
Fig. 12 Control cabinet fo axis JT1

8.3. Power connection to the control cabinet

To connect the power supply, connect the enclosed positioner control cabinet to the 3-phase power supply:

Caution!

After switching off the main switch, the device is still live.

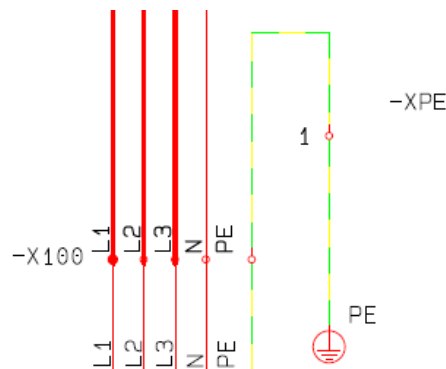


8.4. Getting ready for operation

After completing the installation work on the positioner:

- Perform all the tasks on connecting the robotic station;
- Set up the tool for the positioner;
- Place the part in the tool.

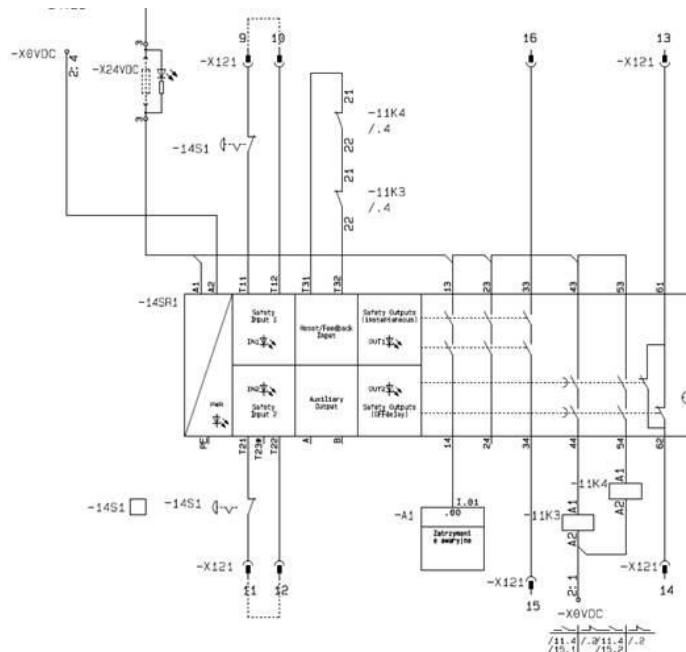
In order to connect the power supply, connect the enclosed positioner control cabinet to the 3-phase power supply:



The definition of the external axis is described in the documentation of the External Axis (90210-1292DEC_External_Axis_Addition_Manual_(EOx-Series)).

8.5. Emergency Stop connection

A controller that controls the positioner's JT1 axis is connected to the positioner. In order to connect safety to the positioner PST500-M3-H2V1-2500, close the contactors and the safety switch to the entire station as shown in the following diagram:



In the absence of an external safety system, the terminals 9-10 and 11-12 must be bridged on the -X121 plug

The machine manufacturer is responsible for setting the time on the safety relay.

Fig. 13 Connection diagram for JT1 axis security

Description of leads:

- 9-10 - first channel of the external safety system (external ESTOP),
- 11-12 - second channel of the external safety system (external ESTOP),
- 8-7 - the first channel of the ESTOP button located on the control cabinet,
- 16-15 - the second channel of the ESTOP button located on the control cabinet,
- 13-14 - confirmation of the JT1 axis servo supply switched on

Safety of the JT2/3 axis is ensured by the robot safety circuits and the circuits must be prepared in accordance with Kawasaki technical documentation.

For proper safety of the JT1 axis of the positioner, two PN_CMD and PN_ON signals must be connected to the robot inputs, the signals come from the safety curtain or the safety controller. The signals in a high state after the axes control group (GROUP) change, cause power cut to the servo which is located close to the operator.

Signals from the safety relay as well as contacts from the contactor are given to the robot inputs on the 1HW board, and then we dedicate them in the robot inputs.

Aux.:Input/Output Signal:Dedicated Input Signals			7/ 8
Signal Name	Set/Reset	Signal Number	
Signals for separate control GROUP 1	☒ DEDICATED ☐ CANCEL		
NEXT		1181	
HS		1000	
Signals for separate control JT7	☒ DEDICATED ☐ CANCEL		
PN_CMD		2255	
PN_ON		2256	

Fig. 14 Ancillary axis off signal declaration

CAUTION!

When the positioner is supplied, the PN_CMD and PN_ON signals are declared as internal signals. This should be changed when the positioner is integrated in the position.

The JT1 axis control is described in the appendix "Control of additional indexing axis"

To move the JT7 or JT8 axis (Kawasaki drives) select the appropriate group. Press the "S" button on TeachPendant and press the icon on the screen as described below.



Fig. 15 Change of the axis control group

- GROUP -1** - no possibility of moving additional axes,
- GROUP 0** - the ability to move axes without cooperation,
- GROUP 1** - moving the JT7 axis in co-operation mode, the JT8 axis has no possibility of movement,
- GROUP 2** - moving the JT8 axis in co-operation mode, the JT7 axis has no possibility of movement

8.5.1. Cubic-S Option

The Cubic-S option can further control the status of the Kawasaki exterior axis. In order to add the axis monitoring, declare axis 7, 8 or 9 as DEVICE 1, 2 or 3.

No.	Classification	Name	Unit	Value1	Value2	Value3	Value4	Value5	Value6	Value7	Value8	Value9
601	Stop Monitoring	Valid/Invalid in Teach Mode/Fast-forward Check	-	Valid								
32		Robot Joint Definition (1-9)	-	0	0	0	0	0	0	0	0	0
38		Device 1 Joint Definition (1-9)	-	0	0	0	0	0	0	0	0	0
39		Device 2 Joint Definition (1-9)	-	0	0	0	0	0	0	0	0	0
40		Device 3 Joint Definition (1-9)	-	0	0	0	0	0	0	0	0	0

Fig. 16 Stop Monitoring Declaration for ancillary axis in the Cubic-S option

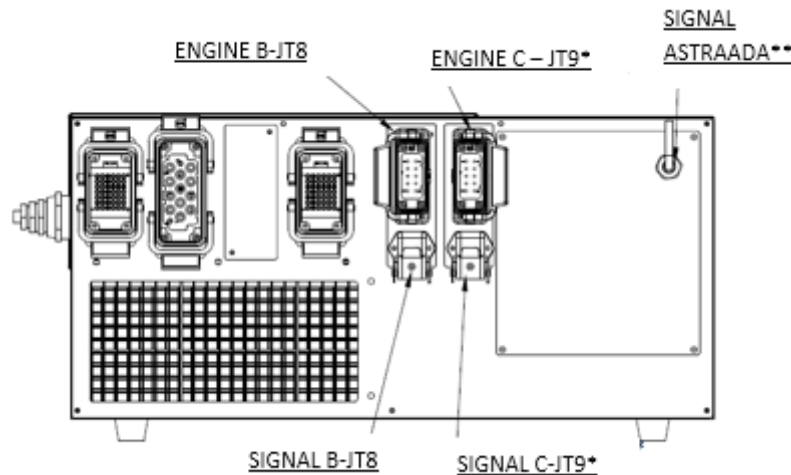
The definition of the dedicated input for monitoring the status of the ancillary axis in CUBIC-S is described in the documentation of the CUBIC-S option (90210-1272DED_Cubic-S_Instruction Manual (E series)).

8.6. Start-up

To start the positioner, connect it to the robot control system.

Connect the 50979-0073L15 with the B marking to the B-JT8 ENGINE in the Kawasaki controller

Connect the 50979-3340L13 with the B marking to the B-JT8 SIGNAL in the Kawasaki controller



* - connecting the second ancillary axis wires - a station with two ancillary Kawasaki axes

** - connection of the control cable with additional indexing axes - stations with additional ASTRAADA axes. M12 plug

Starting the uniaxial positioner is tantamount to starting the robotic position and follows the algorithm of the station's operation. Starting the biaxial positioner is synonymous with starting the robotic station and follows the algorithm of the station's operation.

The JT1 axis control is described in the appendix "Control of additional indexing axis"
To move the JT7 or JT8 axis (Kawasaki drives) select the appropriate group. Press the "ALT" button on TeachPendat with the monitors switched off in the C area of the TP screen.

Starting up the biaxial positioner starts up the robotic station and follows the positioning algorithm.

To move the axis JT7 or JT8 (drives Kawasaki), you should choose the appropriate group. Press the "ALT" key on the TeachPendant off Monitors under (C) of the screen TP.JT7 or JT8.

8.7. Working and safe use conditions

The PST500-M3-H2V1-2500 positioner is suitable for indoor use in the following environmental conditions:

- Air free from condensed steam, dust, corrosive or explosive gases;
- Permissible ambient temperature: +5°C ÷ +40°C;
- Maximum temperature of the positioner's plate: 90°C.

When operating the positioner:

- Observe all the safety rules for safe work at a robotic station;
- Get acquainted with possible health or life hazards due to improper operation of the device;
- An employee handling the robotic station with the PST500-M3-H2V1-2500 positioner must be familiar with the contents of this Operation and Maintenance Manual and the Operation and Maintenance Manual for the industrial robot;
- It is not permitted to carry out maintenance work during the operation of the station
- It is forbidden to leave tools on the housing and servo drives of the positioner.

Detailed health and safety regulations should be developed by the user at the workplace. Observe general health and safety regulations for electrical and mechanical equipment when connecting, starting-up and operating the positioner.

It is not permitted for persons to be present in the operating area of the positioner during the work of the machine (within range of the tilt and working rotation position of the positioner including the tooling) as well as for unauthorized persons to carry out repairs and maintenance.

In addition, the operating crew must know how to attach the tools to the positioner plate and how to place the parts in this equipment.

Secure the robot in the positioner workstation area using fencing and light barriers in accordance with Polish safety standards.

8.8. Maintenance of the positioner

Maintenance procedures include measures aiming at reducing wear on parts and components of the mechanical system and ensuring correct positioner operation. Maintenance should be carried out by trained personnel. The service technician authorized to carry out repairs is the manufacturer or a person designated by the manufacturer. The warranty does not cover mechanical damage resulting from improper use of the station.

Before performing any maintenance work, make sure the equipment is disconnected from the mains

8.9. Maintenance schedule

1. Period of time Action	Daily inspection	Monthly inspection	2500 hours	5000 hours or 1 year
Physical damage	☒		☒	
Gear backlash and abnormal sounds during operation	☒		☒	
* Complement to the copper paste on the shaft of the disc in the ground transfer system		☒	☒	
Replenish gear lubrication and bearings				
Check the positioner brakes			☒	
Refresh transmission lubricants			☒	
Check the internal wires of the positioner			☒	
Battery change			☒	
Check the ground clamps			☒	
** Replacement of ground clamps			☒	
Checking the tightening torque of the assembly screws			☒	
Technical review made by authorized service K-Positioners				☒

* instruction on performing the activity in item 8.9.

** In case of excessive wear and tear.

8.10. Complement to the copper paste in the ground transfer system

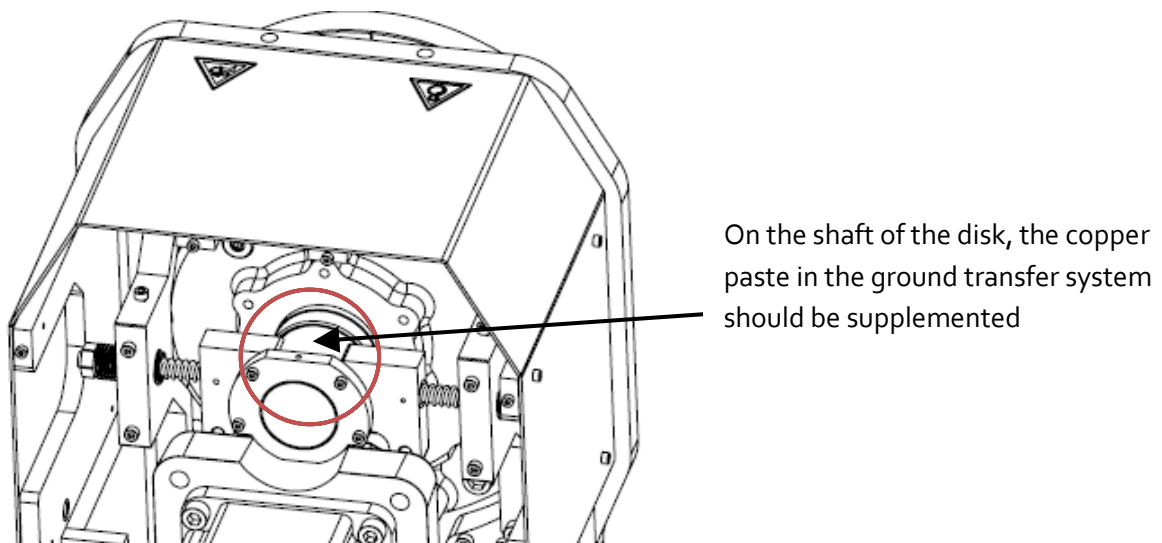


Fig. 17 Place of restoration of copper paste

The recommended measure is the grease or copper paste (WÜRTH CU 800), which as a means of separating, protects the surface against seizing. In order to be completed, you must remove the back cover of keeping any precautions-the device must be disconnected from the power supply. Then clean the old grease length and apply a new one. The action should be performed once a month.

8.11. Adjustment of the clamping force of the ground transferring system

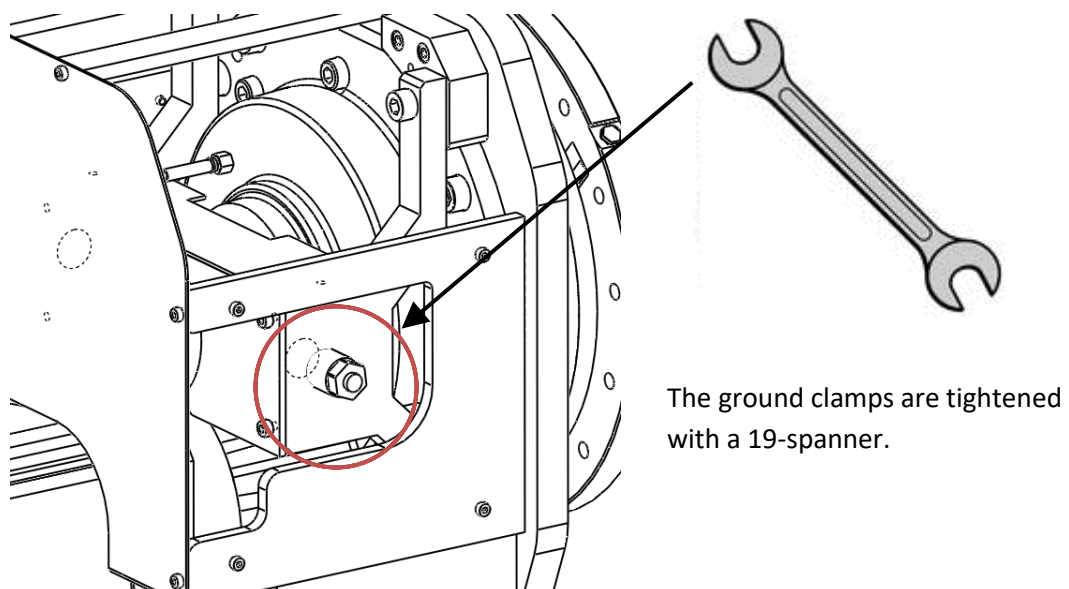


Fig. 18 Tightening place of the ground clamps

9. Lay of user cables inside the structure

The positioner allows laying the user wires through the open gear and the body of the device itself. The diameter of the passage opening is 36 mm. The through hole is provided in the drive and support modules.

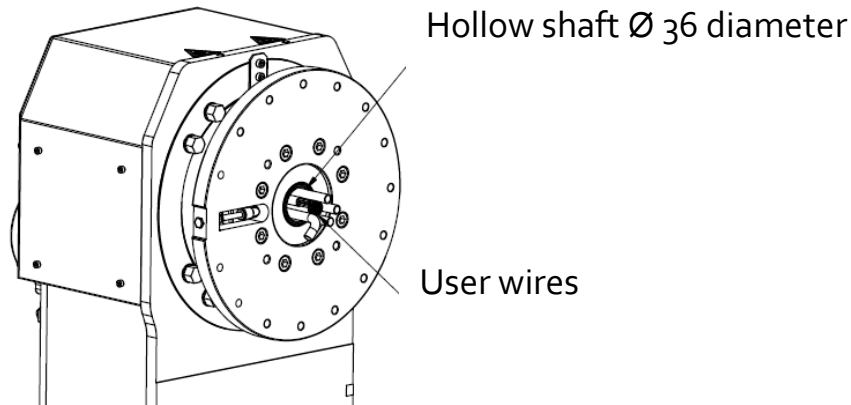


Fig. 19 Lay of wires inside the structure

10. Storage and transport conditions

10.1. Storage

The PST500-M3-H2V1-2500 three-axes positioner should be stored indoors, in rooms free from aggressive corrosive agents. Ambient temperature should range between $+5^{\circ}\text{C}$ ÷ $+40^{\circ}\text{C}$ and humidity should not exceed 80%. The positioner should also be protected against shocks and vibrations.

10.2. Transport

Transport of the positioner should be carried out by clean, dry and covered means of transport, protected against penetration of precipitation into the interior and against exceeding the temperatures of $+50^{\circ}\text{C}$ and -25°C . At the same time the positioner must be protected against sliding.

11. Safety information and residual risk

The PST500-M3-H2V1-2500 has been designed and built for precise positioning of objects attached to it in three axes. It is a prerequisite for the safe use of the device described above that the maximum permissible load shown in this manual is not exceeded.

11.1. Danger due to mechanical construction:

11.1.1. Crushing and cut-offs

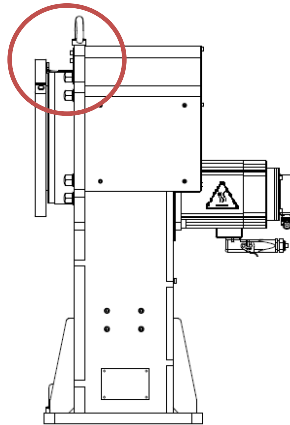
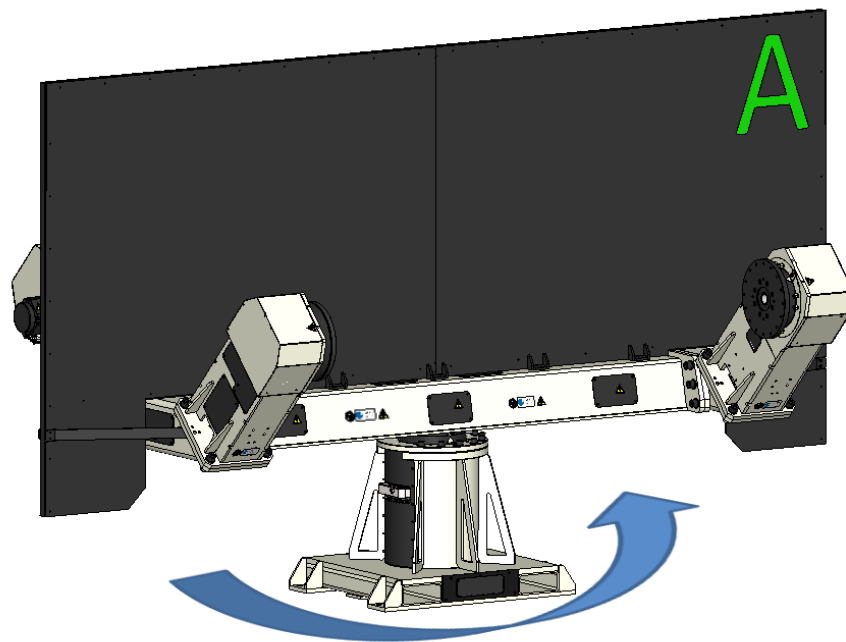


Fig. 20 Areas with the risk of crushing



There is a risk of crushing, cutting fingers or other parts of the body in the marked areas. Do not leave or put any tools or parts of the body or animals in these areas.

During the positioner's work, it is not possible to stay in its working zone defined as the interference radius in sub-point 3.

11.2. Dangers due to the electrical system

After connecting the positioner to the mains, it is forbidden to connect and/or disconnect the wiring of the device; these actions may result in an electric shock.

12. Warranty conditions

Warranty covers only defects arising from causes inherent in the sold product.

The manufacturer's warranty covers 12 months. The basic principle of the maintenance of warranty is to use a table with the timing of the steps preservatives (p. 19) and use the device as intended and technical parameters.

13. Notes

Appendix 1.

Parts of the positioner must be ordered from the ASTOR company. List of branches available at: <http://www.astor.com.pl/kontakt.html>. In order to improve order handling, please specify the positioner model and the part name along with the code.

Spare Parts List:

Name	Product code	Quantity [pcs]
Servo Kawasaki 1.2kW	50601-1465	2
Cycloide transmission	PST-RDS-050c	2
Ground transfer	PST250-MASa	4

14. Manufacturer's data



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