

PICK-O-MAT PM



ASSEMBLY AND INSTRUCTIONS MANUAL

Mechanical system documentation
Pick-O-Mat PM1100 / PM1500



Document: Assembly and instructions manual

Document version: Mechanical system documentation

Valid for: Pick-O-Mat

Type: PM1100 / PM1500

Revision R02-2014

Revisions			
Date	Revision	Chapter	Reason
15.02.2014	R02-2014	All	Created

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1 Introduction

1.1 Definition

The Pick-O-Mat is an automatic assembly machine. The axes carry out cycled movements.

Devices for handling loads are mounted to the axes by the customer.

In the following text of the document, the assembly machine will be referred to as "module".

1.2 Intended use

The assembly is an incomplete machine in terms of Directive 2006/42/EC, Article 1g and 2g.

The assembly is designed for integration into other machines, into other incomplete machines or equipment or for connection to them.

It may only be used within the limitations defined in the order characteristics.

Commissioning is prohibited until it has been established that the machine into which the aforementioned product should be installed is conform with Directive 2006/42/EC and all other applicable directives governing its use.

Intended use also requires the observance of the included documentation and compliance with the maintenance provisions.

1.3 Non-intended use

Any use of the assembly other than intended is considered non-intended use and is not permitted.

The assembly should not be subject to loads beyond its maximum capacity.

The assembly is not suitable for use:

- in wet or damp environments of any kind (water, oils, acids, steam or vapours, etc.).
- in an environment with gases or radiation.
- in potentially-explosive atmospheres.
- in environments that contain swarf.

1.4 Laws / EC Directives / Standards

The assembly is designed and constructed to conform to:

- applicable laws
- Directive 2006/42/EC (Machinery Directive)
- Low Voltage Directive, 2006/95/EC
- EMC Directive 2004/108/EC
- and the harmonised standards that we have cited

and meets state-of-the-art technological standards in terms of its construction.

1.5 Further applicable documents

In addition to this manual, further documents are required to ensure safe operation of this machine. The specifications stated in these documents must to be observed.

- TC0320T rotary indexing table, operating instructions
- TR1100A rotary indexing table, operating instructions

For control system by WEISS-GmbH:

- Operating manual of the employed controller

1.6 Assembly and instructions manual

1.6.1 Definition

Installation and operating manual

Translation of original German version

In the following text of the document, the Assembly and instructions manual will be referred to as manual.

We reserve the right to undertake modifications because of technical developments to the data and illustrations contained in these instructions.

The operating manual and the associated valid documentation are not subject to an automatic revision service.

Information on the respective current edition can be obtained from the manufacturer.

Local regulations must be observed.

This manual describes handling of the assembly and contains important instructions and information to assist you in using the assembly.

This manual is intended for trained technical personnel or persons who have been instructed.

Safety instructions in individual chapters should be observed.





1.6.2 Explanation of safety instructions in this manual

This manual contains instructions that you should observe for your personal safety and to avoid material damage.

Safety instructions for your personal safety are highlighted by a sign containing a warning triangle and signal word. The associated text describes the hazard involved, avoidance options and the consequences which may result from failure to observe the safety instruction.

General instructions or instructions relating to possible material damage are highlighted by a sign without a warning triangle.

They are, depending on the degree of risk involved, illustrated as follows:


	<i>A warning triangle with the signal word DANGER indicates an immediate hazardous situation, which, if not avoided, will lead to fatalities or severe injuries.</i>
	<i>A warning triangle with the signal word WARNING indicates a potential hazardous situation, which, if not avoided, can lead to fatalities or severe injuries.</i>
	<i>A warning triangle with the signal word CAUTION indicates a potential hazardous situation, which, if not avoided, can lead to light or medium injuries.</i>
	<i>A sign with the signal word NOTICE indicates potential material damage or provides additional information, which should be observed when operating the machine.</i>

1.6.3 Legend

Symbols and abbreviations with the following meaning are used in this manual to make its content more clear:

1. Indicates a numbered list.
 - a) Indicates the second level of a numbered list.
- Indicates a list.
 - ▶ Indicates the second level of a list.

 The book symbol before a section of text indicates further applicable documents.

 The information symbol before a section of text indicates an additional note or an important tip for use.

1.6.4 Figures

The figures shown are examples. There may be differences between the illustrations and the actual delivery.

1.6.5 Directory of valid pages

Pages of this manual including the title page: 44

1.7 Warranty and liability

The machine is covered by a guarantee of 24 months from the date of delivery without shift limitations.

2 Safety

2.1 Fundamental safety instructions

2.1.1 Operator's obligation to exercise diligence

This machine conforms to state-of-the-art technological standards and ensures a maximum level of safety.

However, this level of safety can only be attained under operating conditions if all measures necessary for this have been taken. The operator's obligation to exercise diligence includes planning of these measures and the inspection of their realisation.

The operator must ensure that

- the machine is only used as intended.
- the machine is only operated in faultless, functional condition and mechanical and electrical safety devices are present.
- required personal protective clothing is provided for and used by operating, maintenance and repair personnel.
- the operating manual and all other applicable documentation is maintained at all times in legible condition and is accessible at the implementation site of the machine. Ensure that all personnel who has to execute activities tasks on the machine can access the operating manual at all times.
- only adequately qualified and authorised personnel maintain and repair the machine.
- such personnel are instructed regularly in all questions concerning occupational safety and environmental protection, including the operating manual and safety instructions contained therein.
- all safety instructions and warnings affixed to the product are not removed and must remain legible.
- national accident prevention guidelines and company-internal guidelines are complied with.
- VDE regulations are complied with.
- the EMC legislation is complied with during installation.

2.2 Safety equipment for the machine

2.1.2 Requirements to be met by personnel

It is imperative that the following safety instructions be observed during all operations involving the machine. This ensures avoidance of life-threatening injuries, machine damage, other material damage and environmental damage.

The personnel must ensure that

- trainees are initially permitted to only work on the machine under the supervision of an experienced person.
- all personnel who maintain the machine read the operating manual and confirm with their signature that they have understood the operating manual.
- unauthorised persons are not in the vicinity of the machine when tasks are being performed.
- supplemental to the operating manual the operating instructions as specified in labour protection legislation and work equipment use legislation are complied with.
- the operator or supervisory personnel are informed in the event of malfunction.
- required personal protective clothing is used.

The following work described in this operating manual should only be realised by qualified personnel:

- Transport
- Installation
- Commissioning
- Maintenance

2.2 Safety equipment for the machine

The operating company is responsible for ensuring that a suitable safety concept is developed and applied for the safe operation of the machine.

The operating company must take all measures to protect his personnel against injury by the machine.

These include:

- Safety housing with monitored safety door
- Emergency-stop circuit
- Light barriers or switch mats
- Warning signs

2.3 Residual hazards



Employing of technicians is required

Tasks such as assembly, commissioning, troubleshooting, maintenance and disassembly require special qualifications of the personnel. Such work may be carried out only by technicians that have been authorised by the operator to do so. Injuries can be caused due to mistakes by unauthorised personnel being employed.

Missing safety equipment

Operation without safety equipment is dangerous. The realisation of a suitable The operator is responsible for the safety concept. The operator must provide for sufficient safety measures such as protective grating, light grids, emergency stop button, covers, warning notices, etc. Operation without safety equipment is prohibited. Injuries caused by squeezing, impact, magnetism.

Missing danger signs

Damaged or illegible danger signs no longer fulfil their purpose. Make sure the danger signs are complete and legible. Replace damaged danger signs.

Danger of explosion

Danger of explosion during operation in a potentially explosive atmosphere. Operation in a potentially explosive atmosphere is prohibited according to correct use. Only correct use is permitted. Injuries caused by an explosion.

Incorrect spare parts / mounting of ancillary equipment

The use of incorrect spare parts or the mounting of unauthorised ancillary equipment can lead to subsequent damage with the risk of injury. Only use spare parts from our spare parts list or spare parts we have approved. The mounting of ancillary equipment must be coordinated with us. Injury of persons due to subsequent damage.

Impermissible modifications

Impermissible modifications can lead to subsequent damage with risk of injury. Modifications on the machine are prohibited. Injury of persons due to subsequent damage.

Electric shock

Power and control connections may still conduct electricity after the machine has been deactivated and is stationary. Energised capacitors inside the servo drive may still be charged, despite the power supply being deactivated. Work on electrical equipment should only be realised by skilled electrical personnel and under observance of specifications in the electrical operating manual. Electrical connections for the machine should only be loosened or plugged in when the power supply is deactivated and secured against reactivation. The status of capacitor charging should be measured prior to working on machine electrical equipment. The procedure for measuring charges is described in the electrical operating manual. Touching energised components can lead to serious or even fatal injuries.

Squeezing or pulling in


There are components on the module that carry out rotating and linear movement at high speeds and great dynamics. Implementing suitable protection measures is imperative for the safe operation of the module. Implementing these protection measures is the responsibility of the vendor of the machine into which the module was built. Commissioning and operating the module without safety equipment is prohibited. Risk of severe injuries and death due to moving module parts.

3 Product description

3.1 Structure

The module is a combination of various mechanical and electromechanical components. The assembly consists of:

- A Kinematics
 - 1 Handling modules
 - 2 Central drive for the kinematics
Lift modules (not shown)
Press modules (not shown)
- B Rotating device
 - 3 On PM1100: Rotary indexing table TC0320T with rotary disc
 - 4 On PM1500: Ring rotary indexing table TR1100A with rotation swivel

 For construction and function of the rotating device, refer to the supplied documentation of the respective rotary indexing table.

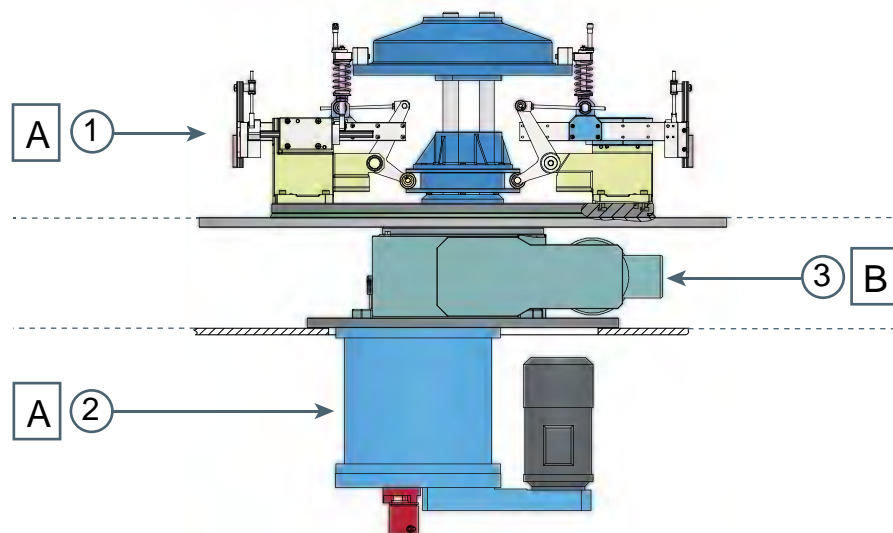


Fig. 1: Components PM1100

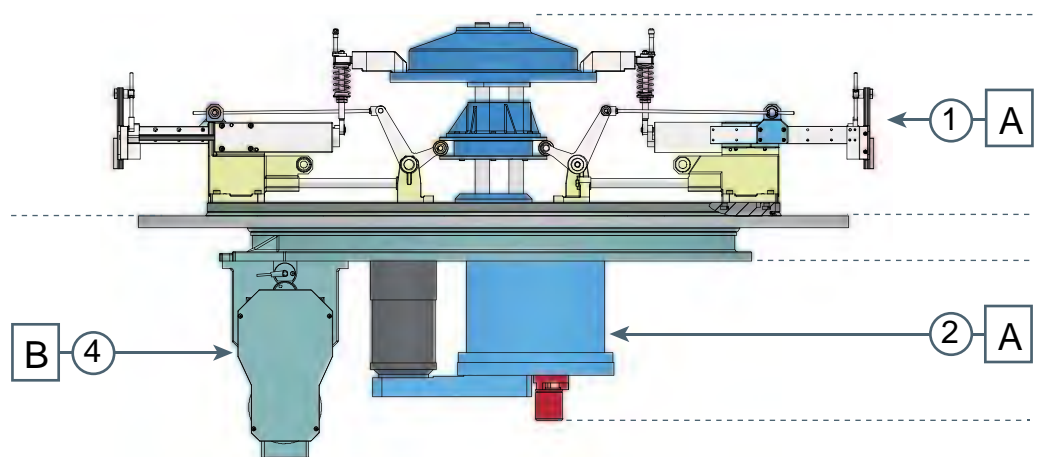


Fig. 2: Components PM1500

3.2 Function

3.2.1 Complete module

The kinematics converts the rotation of a double curve driven by the central drive and creates the horizontal and vertical movements of the handling modules.

A three-phase motor with attached closed-circuit brake (braked without voltage) drives the double curve via a toothed belt segment and reduction gear.

NOTICE The direction of rotation of the three-phase motor has to be clockwise because the double curve is not symmetrical.

The rotating device on the PM1100 is a rotary indexing table and on the PM1500 it is a ring rotary indexing table.

The motors of the central drive and the rotating device are synchronised electrically by a position encoder placed on the control cam of the central drive.

The plate or the ring of the rotating device should cycle with the shortest possible switch time (see combination indexing, moment of inertia and switch time in the brochure "Electro mechanical rotary indexing tables type TC-T" or "Ring rotary indexing tables TR").

The speed of the central drive can be adapted to the slowest part infeed.

The ratio short cycle time to long standstill time has the advantage that more time is available for time intensive operations such as mounting, screwing or checking with the same cycle time.

The insertion movements can be smooth and harmonic however, and ideally run without stop.

If procedural stops due to faults become necessary, then the handling modules have to be stopped in initial position (outside top).

3.2.2 Lift module

The lift module is intended to place a test head from above onto the part to be checked. To avoid crash situations, this test head has to be equipped with a spring-borne follow-up system that permits a maximum of 50 N spring force and at least 70 mm spring deflexion.

The lift module operates in parallel with the horizontal stroke of the insertion module.

The downwards movement of the lift module is done synchronously to the inward drive of the insertion module.

This function mode is independent of the frame size.

The maximum mass to be moved is 1.5 kg.

Stroke dependencies, see chapter 3.5.6 „Strokes“ on page 15

3.2.3 Press module

The press module is intended to place a press head from above onto the part to be pressed. To avoid crash situations, this press head has to be equipped with a spring-borne follow-up system that permits a maximum of 300 N spring force and at least 51 mm spring deflexion.

The press module operates in parallel with the horizontal stroke of the insertion module.

The downwards movement of the press module is done synchronously to the insertion module.

This function mode is independent of the frame size.

The maximum pressing force is 200 N.

Stroke dependencies, see chapter 3.5.6 „Strokes“ on page 15

3.3 Movement sequence

To control the Pick-o-Mat, all other switch and query points such as "start rotary indexing table", "gripper open", "gripper closed", "query round table in pos." need to be controlled in coordination with the insertion movements.

The position of the handling modules is signalled by a position encoder on the control cam. Depending on the encoder type (absolute or incremental), absolute values (angle) or increments are provided that need to be processed further by the controller.

The speed of the central drive is determined by the gear stage. The fine adjustment of the number of cycles is determined by the frequency converter.

To control the gripper pneumatics, it is necessary to switch the pneumatic valves already before the bottom dead centre because the dead time of the mechanism is too great at the bottom compared to the dwell time. We recommend employing an absolute (standard) or incremental rotary encoder.

Figure 3 on page 13 displays the angle-time ratios at the central drive. The rotary indexing table should be started at A. A query should be made at B whether the rotation is ended. In case of a negative feedback, the central drive has to be stopped at about C to stop the handling modules at D.

* Before the BACK position is reached, the central drive has to be stopped to avoid collisions.

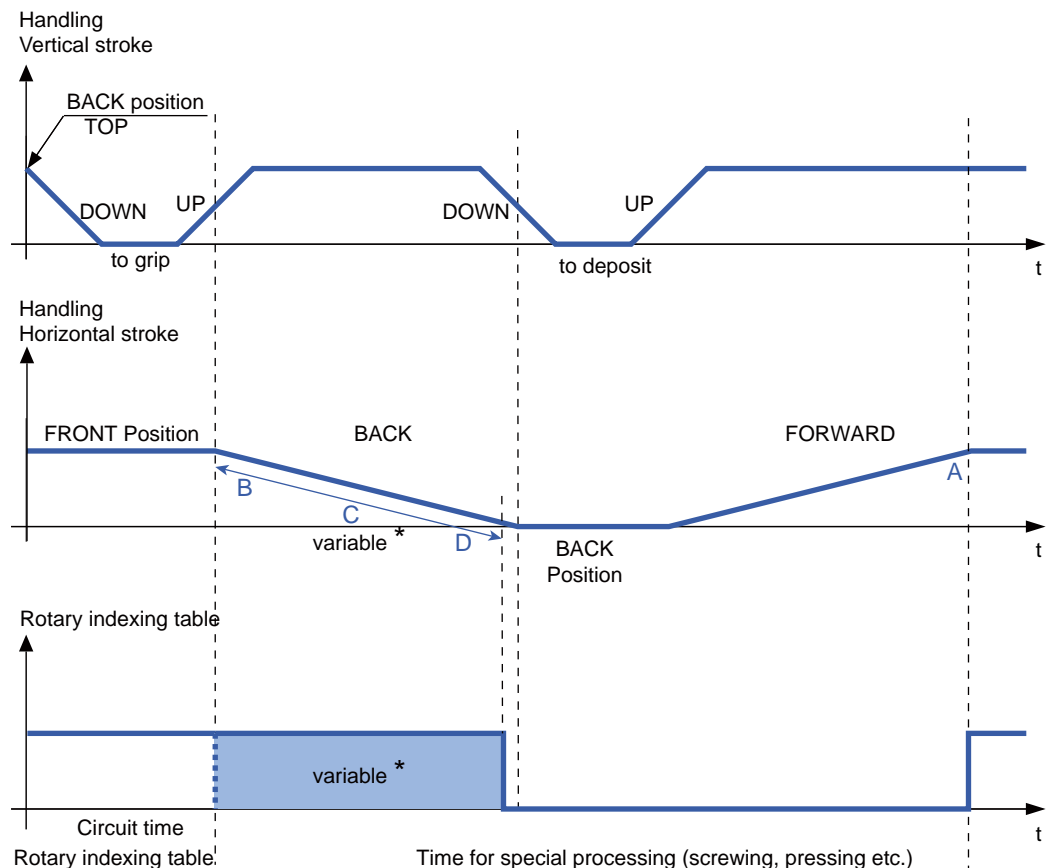


Fig. 3: Cycle diagram

3.4 Crash safety

During transport and joining of parts, crash situations may occur when the grippers are lowered. These are secured by a spring mechanism at the drive point of the levers for the vertical stroke.

The lever can lift off the lift plate if a specified mating force is exceeded.

This lifting off is detected by inductive proximity sensors and signalled as an error by the customer's controller.



Fig. 4: Crash safety

3.5 Technical data

3.5.1 General technical data

3.5.2 Type plate

The type plate is fitted to the housing of the machine and contains the details described in the illustration.

NOTICE *The illustrated type plate is only an example of a machine and is not identical to the actual type plate of the described product.*

A second type plate is included in the scope of delivery. The second plate can be mounted at a clearly-visible location on the machine to allow viewing of performance data if the type plate fitted by the manufacturer is concealed by any other structures.

Additional barcode serial number

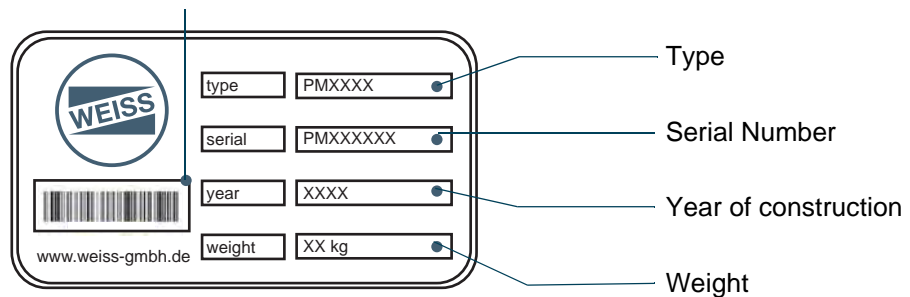


Fig. 5: Example of a type plate

3.5.3 Scope of delivery

The scope of delivery of the machine depends on the order involved. Please refer to the order information or order specifications for individual components.

3.5.4 Weight

Weight of the Pick-o-Mat assembly machine: < 1000 kg

3.5.5 Sound level

The A-weighted emission sound pressure level does not exceed the allowable peak.

3.5.6 Strokes

Vertical stroke / Module	PM1100		PM1500	
	Version 1	Version 2	Version 1	Version 2
Vertical stroke insertion modules	30 mm	≥ 40 mm	30 mm	≥ 40 mm
Of those, linear without overlap about	25 mm	30 mm	25 mm	30 mm
Vertical stroke, lift module	58.3 mm	70 mm	58.3 mm	70 mm
Vertical stroke, press module	40.5 mm	49.5 mm	41.5 mm	50.5 mm
PM1500: Stroke position can be adjusted by a threaded rod				

Horizontal stroke / Module					
Horizontal stroke, insertion modules	80 mm	90 mm*	100 mm	120 mm	140 mm
Of those, linear without overlap about	65 mm	75 mm	85 mm	100 mm	115 mm
* The horizontal stroke 90 mm can be realised only in combination with the vertical strokes 40 mm and 50 mm.					

3.5.7 Ambient conditions

Humidity	5 % to 95 %, non-condensing
Allowable temperature range	Storage: +5 °C to +55 °C Operation: +15 °C to +45 °C
Environment	It is not permissible to use the machine in environments that contain abrasive dusts.

3 Product description

3.5 Technical data

3.5.8 Installation positions

Approved installation position:

- horizontal

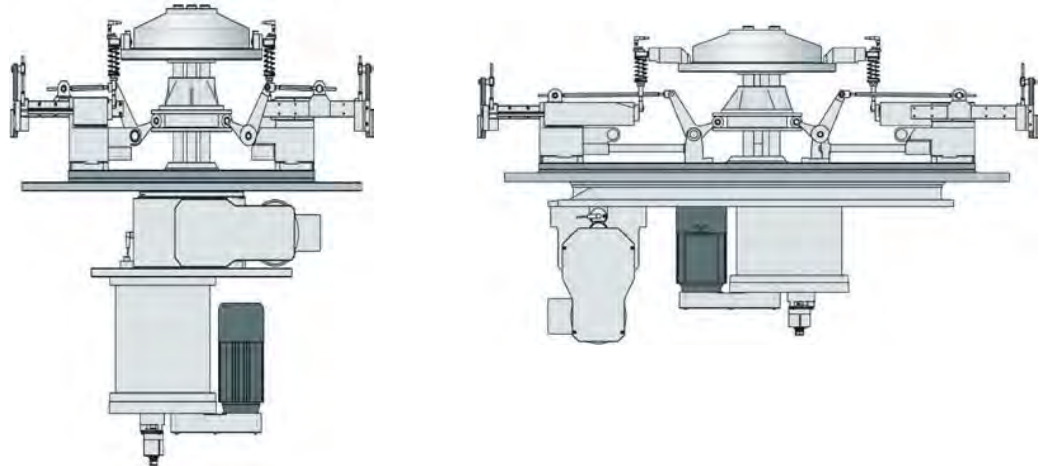


Fig. 6: Installation position PM1100 / PM1500

3.5.9 Dimensions

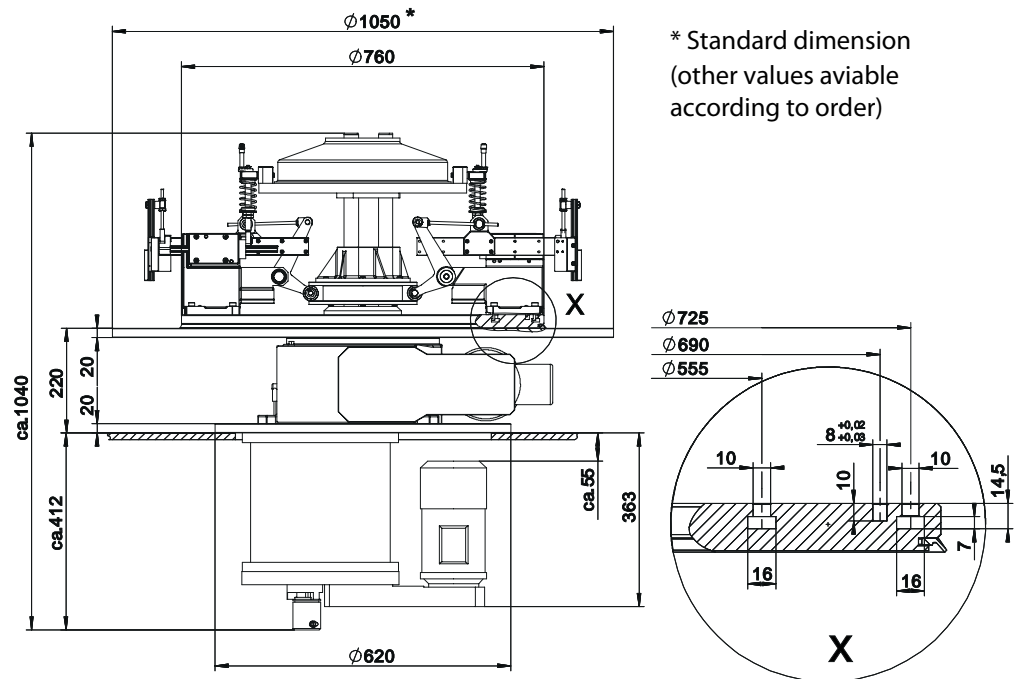


Fig. 7: Dimensions PM1100

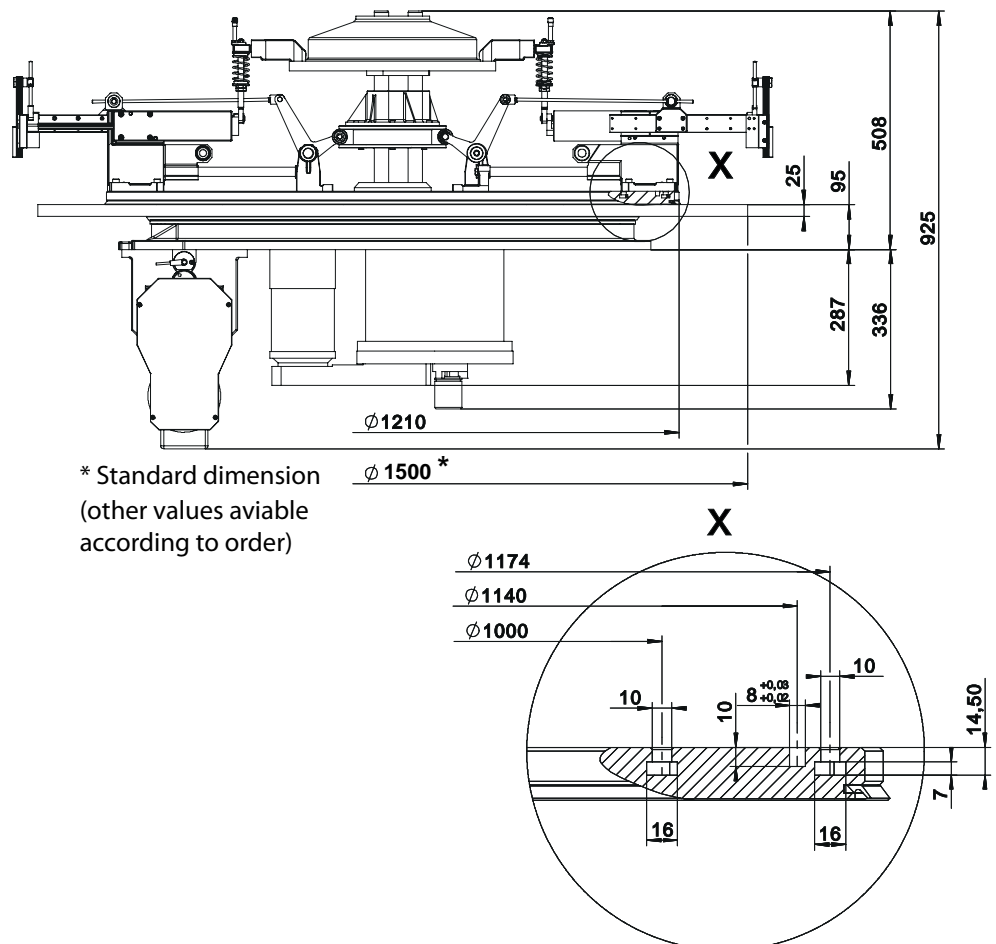


Fig. 8: Dimensions PM1500

4 Transport

⚠ WARNING

Falling or sagging loads can lead to grievous injuries. Inadequately dimensioned load bearing equipment can break. Transport vehicles not designed to support the weight of the machine may fail or topple over.

Lifting devices, conveyor vehicles (pallet trucks) and load carrying equipment should conform to regulations and be designed to support the weight of the machine including packaging. It is forbidden to stand or be present under suspended or lifted loads. A falling or toppling machine can cause grievous or fatal injuries.

- Transport work may only be conducted by specialised personnel and the safety instructions must be observed.
- Note that projecting sharp edges can cause injuries.
- The transport path must be cordoned off and safeguarded in such a manner that unauthorised personnel cannot enter the danger zone.
- The parts must be safeguarded against tipping or falling.

4.1 Appliances and auxiliary equipment approved for transportation

4.1.1 Transporting of the packed machine

⚠ WARNING *Falling packaging unit.*

The hoisting cables can slip if they are not fitted correctly. The package unit can tilt, slip out of the slings and fall.

Only lifting equipment with crossbeam trusses should be used. The lifting slings should be fitted outside the supporting timbers. A falling package unit can cause severe to fatal injuries.

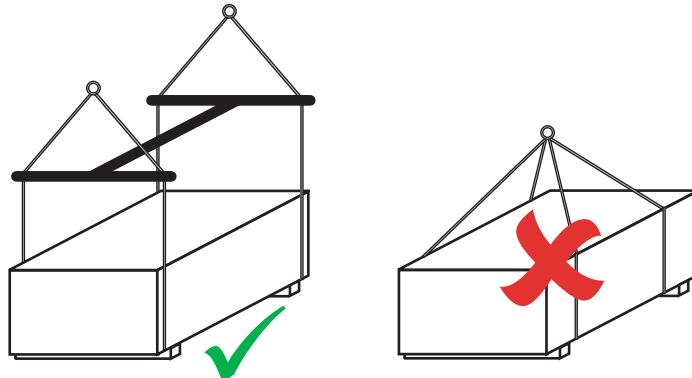


Fig. 9: Transporting the packed machine

4.1.2 Transporting of the unpacked machine

⚠ WARNING Risk of injury emanating from falling machine.

Shackles need to be used for transporting the unpacked machine. The shackles are screwed onto the standing middle part. The hoisting cables can be fastened to the eyes of the shackles.

A packaging insert provides information on the position of the permissible thread and the dimensions of the bolts.

- ① The three covering screws need to be removed beforehand so that the shackles can be fastened. The processing modules may have to be moved aside because they may be partially covering the threads.

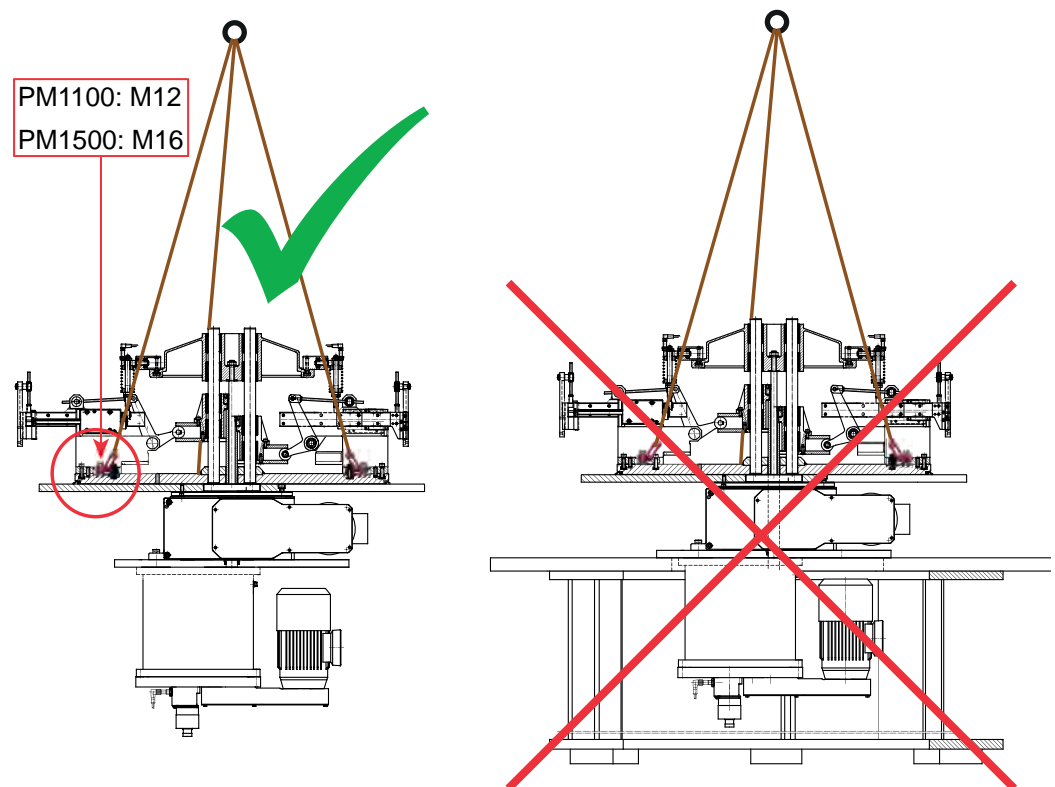


Fig. 10: Transporting the unpacked machine

4.2 Transport damage

The delivery should be inspected for damage immediately after it is received. The contents of the delivery should be checked for damage if damage to the packaging is detected which could indicate damage to the contents. Details of the scope of delivery are provided in Chapter 3.5.3.

Detected damage should be immediately reported to the transportation company and confirmed.

4.3 Intermediate storage

Observe the storage conditions listed in the following table, if intermediate storage is planned for a longer period of time.

Climatic zone	Packaging	Storage location	Storage duration
All	Packed in containers With moisture absorbers and humidity indicator sealed in film Protect against insect damage and mould formation by treating chemically	Roofed over Protected against rain Not exposed to vibrations	Max. 3 years with regular inspection of packaging
	Open	Roofed over and sealed at a constant temperature and air humidity (5 °C < T < 60 °C, 50% relative humidity) No sudden temperature fluctuation and controlled ventilation with filter (free of dirt and dust) No aggressive vapours and no vibrations Protected against insect damage	2 years and longer with regular inspection. Check for cleanliness and machine damage during inspection. Check that anticorrosion protection is unspoiled.

5 Installation

5.1 Safety during installation



Injuries caused by incorrect installation.

The dimensions of the supporting ground and fastening equipment must be sufficient, so that they can withstand the stresses produced during operation.

Auxiliary personnel may only perform work which is assigned to them by plant technicians.

Electric shock

Improperly executed work on the electrical equipment or touching lines with live voltage can cause electrical shocks. Work on the machine's electrical equipment may only be carried out by qualified electricians. Make sure there is no voltage in the supply cables before connecting them. The connection of the power supply has to be carried out according to the circuit diagrams. Serious injuries or death resulting from electric shock.

Missing protection circuit

The design of a suitable controller is the responsibility of the vendor or the operating company. An RCD needs to be installed between the supply mains and drive regulator in the design of the controller.

Incorrect shielding

If the motor shield is not connected at both ends with PE, then life-threatening voltages can occur on the motor shield. Attach the motor shield according to the specifications in the drive documentation when connecting the motor cable to a drive. Serious injuries or death resulting from electric shock.

Particularly ensure that:

- only authorised persons are in the work area and that no other persons are endangered by the assembly work.
- no components are damaged and are only installed in a clean, functional condition.
- all components are installed according to the described instructions.
- specified starting torques are adhered to.
- the key aspect of the structural components is taken into consideration.
- The direction of rotation indicated by an arrow on the motor is taken into account when connecting the supply voltage.

5.2 Installation prerequisites

Check prior to installation whether the dimensions of the installation site and building conditions correspond to the necessary prerequisites and measurement specification in the drawing documents.

Particularly ensure that:

- The supporting floor is level and rigid.
- The dimensions of the supporting structure at the installation location must be sufficient to withstand the dynamic forces that occur.
- The drives for carrying out maintenance tasks are easily accessible and the motor ventilations have a distance of at least 100 mm to other modules.

5.3 Assemble machine

5.2.1 Installation preparation

- Open the packaging unit prior to the assembly and remove the machine from the packaging unit.
- The attachment screws must be at hand.

5.2.2 Operating media / Auxiliary media / Tools

The following are required for installation of the machine:

- One set of spanners
- One torque wrench
- One set of screwdrivers
- Screw securing agent (e.g. Loctite ® 243)
- Screws which are at least have a property class of 8.8

5.3 Assemble machine

5.3.1 Assembly with base body

- ① The Pick-o-Mat assembly machine is delivered, fully assembled mechanically, on a base frame. Assembly only entails setting up and screwing the base frame to the floor at the installation site.

The module needs to be aligned horizontally with the levellers during the setup.

5.3.2 Assembly without base body

- ① The Pick-o-Mat assembly machine is delivered fully assembled mechanically. Assembly only entails setting up and screwing the base frame to the floor at the installation site.
Installation conditions:

- Drill pattern and installation perforations of the base plate according to catalogue specifications
- Evenness of the base plate < 0.1 mm

1. Place the module on the base plate while observing the transport regulations and align according to the boreholes and pin holes.
2. Precentre both parallel pins and then drive in the first parallel pin 1/3 of its length.
3. Screw in the fixing screws and tighten slightly.
4. Drive in the second parallel pin completely, followed by the first parallel pin.
5. Tighten the fixing screws firmly in a diagonal pattern with a torque wrench.
6. Remove the yellow closing plug of the gear ventilation.

5.3.3 Mounting the adapter plate

In order to work on the adapter plate for the installation of a customer's gripper, the adjustment spindle needs to be loosened completely and the entire gripper rail needs to be pulled up out of the vertical guide.

For this, the Pick-o-Mat needs to be in initial position (outside, top).

Unpinning and pinning of the gripper rail with the adapter plate is only possible in this disassembled condition.

Disassembly of the gripper plate:

1. Pull the locating pins
2. Loosen the screws

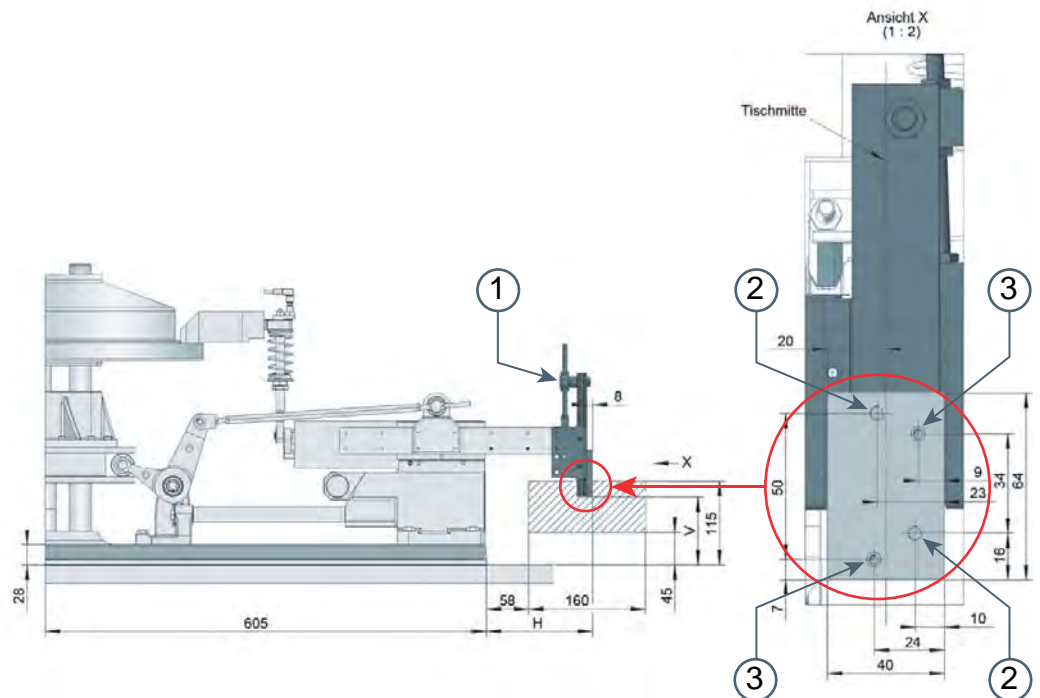


Fig. 11: Disassembly of the gripper plate on the PM1100

- (1) Adjustment spindle
- (2) Screws
- (3) Locating pins


i The disassembly of the gripper plate on the PM1500 is done in like manner.

5.4 Instructions on disposal of packaging material

5.3.4 Electrical installation

NOTICE *Incorrectly-laid cables (e.g. where the bending radius is too small) can cause cable scorching and burning. Electronic components can be damaged by electrostatic influences.*

The superordinate controller has to check the rotation of the central drive using a time-out monitoring of the rotary encoder signal. If there is no movement, then the motor has to be switched off immediately. Otherwise there is a risk of the motor overheating.

 Information on connecting the rotary indexing table motors and the optional rotary indexing table controller EF can be found in the attached operation manuals "Rotary indexing table TC-T or TR" and "Rotary indexing table controller EF xxx".

Connection of motors and optional EF rotary indexing table controller

NOTICE *The following measures are absolutely necessary to avoid EMC problems:*

- A shielded cable has to be used for the motor connection. The brake line must not be carried in this cable.
- The brake of the motor has to be connected with a separately laid out cable.
- The motor shield has to be connected on both sides (in the control cabinet as well as on the motor housing).

5.3.5 Installing the safety equipment

The operator is responsible for providing for safety equipment and emergency stop buttons. The machine may not be operated without suitable safety equipment.

5.4 Instructions on disposal of packaging material

Packaging materials should be reused or disposed of properly in compliance with national regulations.

6 Commissioning

6.1 Safety during commissioning



Risk of injuries emanating from unexpected start-up.

Connections which were not established correctly or external influences on the electrical equipment can cause the machine to start unexpectedly and uncontrolled movement. Activate and check all safety equipment and emergency-stop circuits prior to commissioning.

- Ensure that the machine is only commissioned by qualified personnel in compliance with the safety instructions.
- Ensure that only authorised personnel are in the work area, and that others cannot be injured due to the commissioning process.

The following prerequisites must be met prior to commissioning the machine:

- The machine is correctly mounted.
- The electrical equipment for the power supply is available and correctly fitted.
- All cables are laid properly and correctly connected in compliance with valid electrical circuit documents.
- The shielding of the motor wires is in place.
- The static discharge must be conducted properly.
 - ▶ The shunt resistance must be measured and have a value of $< 10 \text{ MOhm}$.
 - ▶ The measurement must be recorded in a log.
- The required safety equipment and emergency-stop circuits are available and functioning correctly.

Prior to commissioning the machine, check whether

- the drive is undamaged and not blocked.
- no other hazard sources are present.
- no foreign materials, tools or other objects are lying in the operating area of the machine.

The following should be checked during commissioning

- the machine runs smoothly.
- no excessive noise development is detected.
 - ▶ A strong development of noise may indicate improper assembly or incorrect control parameters.

6.2 Initial commissioning

- i** The Pick-o-Mat is controlled by the customer's controller. The speed of the drive of the TC-T rotary indexing table or the TR ring rotary indexing table can be regulated using the EF rotary indexing table controller (option). The speed of the central drive can be regulated using the frequency converter (option).
The startup depends on the selected control type.

6.2.1 Configuring the machine zero point

Procedural stops of the central drive have to take place in the "**outside, top**" position of the gripper plate.

Procedural stops are

- stops for maintenance of the part infeeds
- stops to fix malfunctions
- switching off, etc.

- i** In emergency-off situations, the mechanics may be stopped in all positions.

The "**outside, top**" position of the gripper plate corresponds to the 0° angle of the handling cycle. In this position, the measuring system attached at the bottom end of the curve is also zeroised.

The following steps are necessary to approach this position mechanically by hand:

1. Unscrew the fan flap of the motor on the central drive.
2. Apply 24 VDC to the brake coil to open the brake. Please note that in the area of the vertical stroke the handling devices move downwards by themselves due to gravity. Observe the safety provisions!
3. Prevent the unintended startup of the three-phase motor. Observe the safety provisions!
4. Turn the fan wheel by hand until the gripper plate is in the outside top position.
5. Mark the beginning and the end of the range on the fan wheel at which neither horizontal nor vertical movement can be detected at the gripper plate.
6. Turn the fan wheel to the middle between the start and end marks.

- i** This point is the mechanical zero point or also the 0° position of the mechanism.

6.2.2 Fine adjustment

NOTICE When working on a handling module, the spline shaft must not be removed under any circumstances. If removed, the balls would fall out and make the spline shaft useless. Replacement only as a complete component.

The handling modules can be finely adjusted along all 3 axes.

Adjusting the adjustment spindles X and Z

1. Open the nuts at the point clamp.
2. Fine adjustment by setting the nuts.
3. Tighten nuts.

Adjusting the radial axis

1. Loosen the fastening screws in the cast foot of the handling module.
2. Turn the handling module radially within the T-slot field so that the gripper plate middle is always aligned towards the machine's middle.
3. Tighten fastening screws.

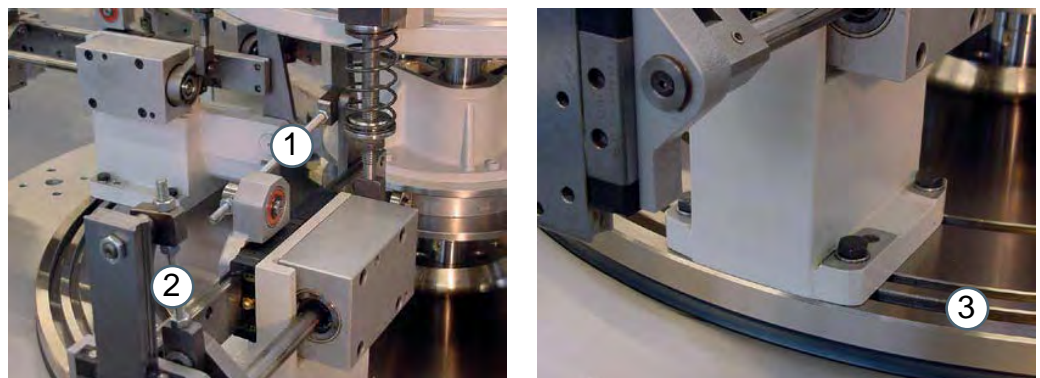
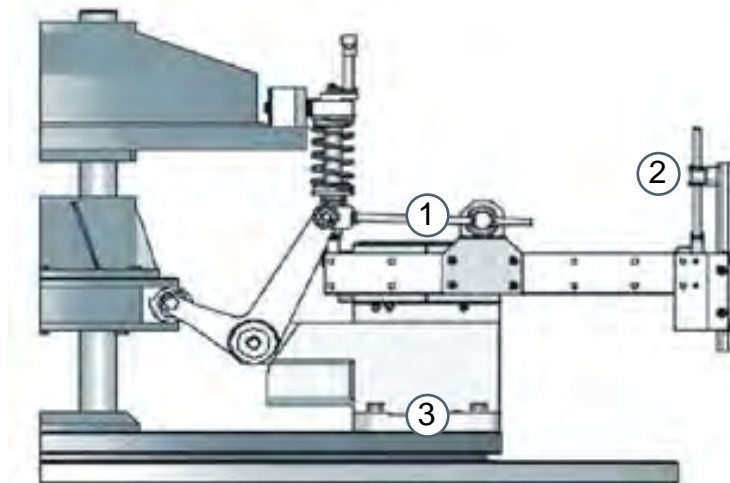


Fig. 12: Fine adjustment of the handling modules

- (1) Adjustment spindle X
- (2) Adjustment spindle Z
- (3) T-slot field

6.2.3 Adjusting the lift module

The lift module can be adjusted radially.

1. Loosen the clamps.
2. Loosen the fastening screws in the cast foot of the lift module.
3. Turn the lift module radially within the T-slot field so that the holder middle is always aligned towards the machine's middle.
4. Tighten fastening screws.
5. Tighten the clamp's screw.

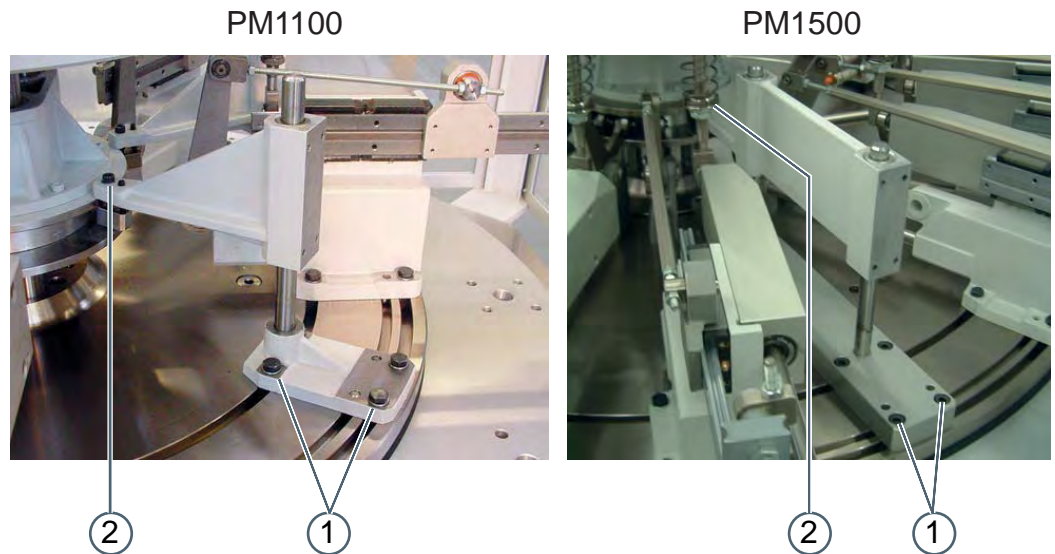


Fig. 13: Adjusting the lift module

- (1) Four fastening screws
 (2) Clamp

Lift dependencies

Vertical stroke of the handling module	PM1100		PM1500	
	30.0 mm	≥ 40 mm	30.0 mm	≥ 40 mm
Stroke of the lift module	58.3 mm	70.0 mm	58.3 mm	70.0 mm
Bottom position (dimension A)*	100.0 mm	94.0 mm	100.0 mm	94.0 mm

* Dimension, see catalogue

6.2.4 Adjusting the press module

The press module can be adjusted radially.

1. Loosen the fastening screws in the cast foot of the press module.
2. Turn the press module radially within the T-slot field so that the holder middle is always aligned towards the machine's middle.
3. Tighten fastening screws.

The lift position can be adjusted radially on the PM1500 press module.

1. Loosen the counternuts on the threaded rod.
2. Adjust the stroke position turning the threaded rod.
3. Tighten counternuts.

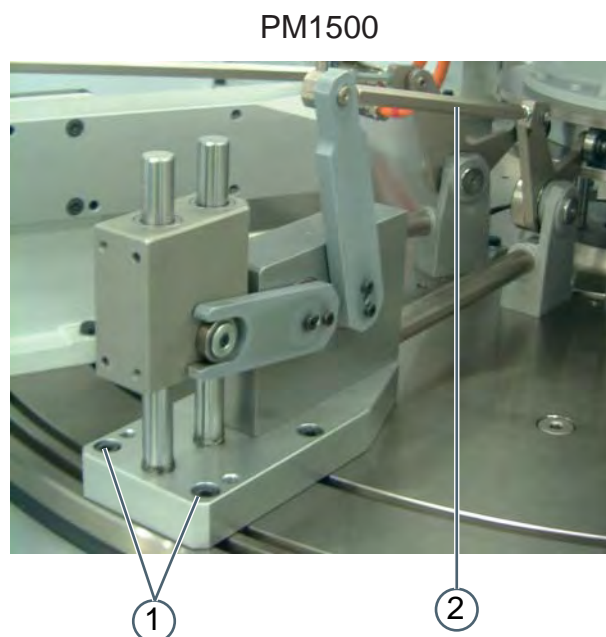


Fig. 14: Adjusting the press module

- (1) Four fastening screws
- (2) Threaded rod

Lift dependencies

Vertical stroke of the handling module	PM1100		PM1500	
	30.0 mm	≥ 40 mm	30.0 mm	≥ 40 mm
Stroke of the press module	40.5 mm	49.5 mm	41.5 mm	50.05 mm
Bottom position (dimension A)*	79.3 mm	75.0 mm	75-95 mm**	75-95 mm**
* Dimension, see catalogue				
** The lift position can be set using a threaded rod.				

6.3 Recommissioning

⚠ WARNING *Risk of injury emanating from an operationally unsafe machine. An operationally unsafe machine can cause injuries and material damage. Recommissioning should only be realised after it has been ascertained that the machine is in a functionally reliable condition and no risk emanates from it during operation.*

A visual inspection of the machine should be conducted prior to re-commissioning. The following should be checked and ensured in this regard:

- No damage is present on the machine.
- No foreign materials, tools or other objects are lying in the operating area of the machine.
- All supply units are connected and operating.
- Safety equipment is ready for operation.

7 Operation

7.1 Safety during operation



Risk of injury due to incorrect alteration of operating parameters.

Improper changes of operating parameters can cause unforeseeable system behaviour. Operating parameters should only be changed by authorised personnel. Altered operating parameters should be checked in a test. Incorrect parameters can cause consequential damage and thus injuries.

7.2 Operating the machine

The machine is designed for integration into other machines, into other incomplete machines or equipment or for connection to them.

Safe operation and control are the responsibility of the operator.

7.3 Operating personnel workstations

The operating personnel workstations are determined by the operator of the plant or product in which the machine is integrated.

8.1 Safety when remedying malfunctions

8 Malfunctions

8.1 Safety when remedying malfunctions

***Injury of non-authorized personnel.***

Malfunctions should only be remedied by instructed personnel provided by the operator who are trained and authorised to perform these tasks. The machine should be deactivated with the main switches and secured against unintentional reactivation prior to remedy. The radius of action of moving machine parts should be secured.

8.2 Errors / Cause / Remedy



When employing the EF2 rotary indexing table controller from WEISS GmbH, the instructions on malfunctions and their rectification must be observed as explained in the operating manual of the EF2 rotary indexing table controller.

8.3 Customer Service

Please provide the following details if you require the assistance of our Customer Service:

- Serial number of the machine
- Description of the malfunction that has occurred
- Time and attendant circumstances of the malfunction that has occurred
- Assumed cause

You can contact our Customer Service from Monday to Friday between 08:00 and 17:00 at the

Service number +49 (0) 6281 - 5208-0

or at service@weiss-gmbh.de

An answering machine will provide you with information outside of the hours listed above.

9 Maintenance

9.1 Safety during maintenance

WARNING

Injuries caused by the power supply and residual energy.

All power sources should be deactivated prior to carrying out maintenance work, and secured against unintentional reactivation and marked with a sign indicating that maintenance work is in progress. All moving parts should be stationary. Loads should be secured against sagging or slipping. All components energized with electrical power should be de-energized (Extinguished LED's on the servo drive do not mean that all components have been completely de-energised). Check by measuring to ensure that all components are de-energised. Work on electrical equipment may only commence if the voltage is less than 42 VDC.

Injury of non-authorized personnel.

Maintenance work should only be realised by instructed personnel who have been authorised to perform these tasks. The operating instructions laid down by the operator must be rigidly adhered to.

Injuries resulting from maintenance work that has not been announced.

The working area should be secured over a wide area prior to realising maintenance work and marked with warning signs. Operating personnel must be informed that maintenance work is being carried out.

Injuries caused by the use of incorrect components or incorrect operating media.

Only spare parts, which are listed in our spare parts list, may be used. Subsequent modifications on the machine are prohibited. Only the specified operating materials may be used.

- Ensure that only qualified electricians perform all tasks on the electrical equipment.
- Ensure that all work steps for maintenance are performed in the specified sequence.
- Ensure that specified tightening torques are observed.
- Ensure that all foreign objects are removed from the work area after the maintenance.

9.2 Maintenance work

Maintenance includes tasks for the purpose of:

- Inspection
- Maintenance
- Repair

9.3 Inspections

9.3.1 Visual checks

Perform weekly visual inspections

- ▶ Mobility of the vertical guide on a handling module

i The vertical guide of a handling module can be adjusted to improve mobility. (Adjustment, see chapter 9.4.4 „Vertical guide, handling module“ on page 37).

Perform semi-annual visual inspections

- ▶ loose bolt or pin connections.
- ▶ damage to wires and compressed-air hoses.
- ▶ Excess grease. Wipe off excess grease with a soft cloth.

9.4 Maintenance

9.4.1 Rotary indexing tables

The TC0320T rotary indexing table requires no maintenance. The backlash-free precision gear runs in an oil bath, which makes it lubricated for life.

Utilised oil: Shell Omala 680 (CLP 680 conforming to DIN 51517)
Oil volume: 1.5 litres

The TC1100A rotary indexing table requires no maintenance. The backlash-free precision gear runs in an oil bath, which makes it lubricated for life.

Utilised oil: Shell Omala 680 (CLP 680 conforming to DIN 51517)
Oil volume: 2.5 litres

9.4.2 Central drive

The guides of the central drive need to be cleaned once a week with a slightly oiled cloth. Lubricating oil according to code CLP32-100 (DIN EN 51517 part 3 / ISO VG 32-100)

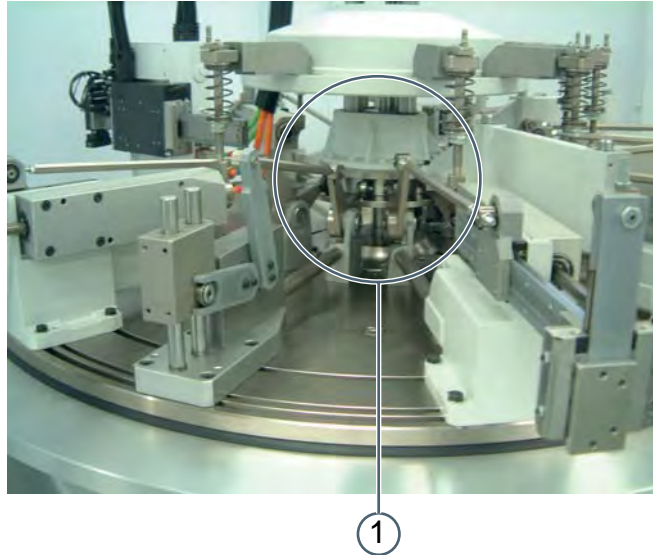


Fig. 15: Cleaning/Lubricating the guides of the central drive

(1) Guides

The gears of the central drive require no maintenance. The backlash-free precision gear runs in an oil bath, which makes it lubricated for life.

Utilised oil: Shell Omala 680 (CLP 680 conforming to DIN 51517)
Oil volume: 5.0 litres

9.4.3 Linear guides

The linear guides in the vertical stroke and in the horizontal stroke need to be cleaned once a week with a slightly oiled cloth.

Lubricating oil according to code CLP32-100 (DIN EN 51517 part 3 / ISO VG 32-100)

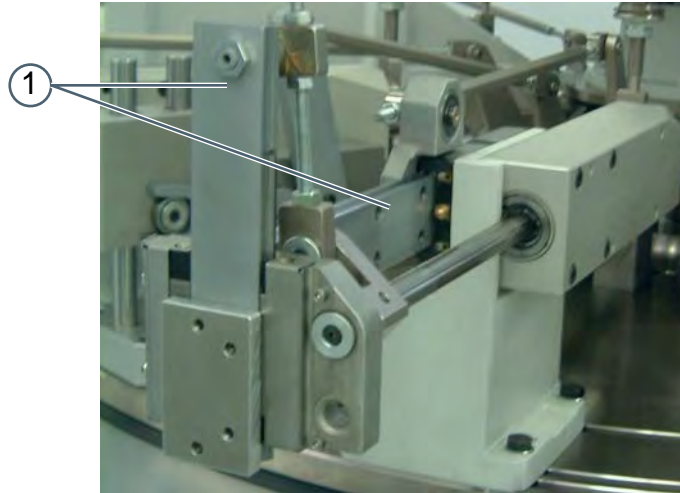


Fig. 16: Cleaning the guides in the vertical stroke and horizontal stroke

(1) Guides

The linear guides in the vertical stroke and in the horizontal stroke need to be greased semi-annually or after 600,000 cycles.

The relubrication can also be done using a standard hand-held grease gun.

Lithium soap grease according to code KP2-K (DIN EN 51502 / DIN 51825)

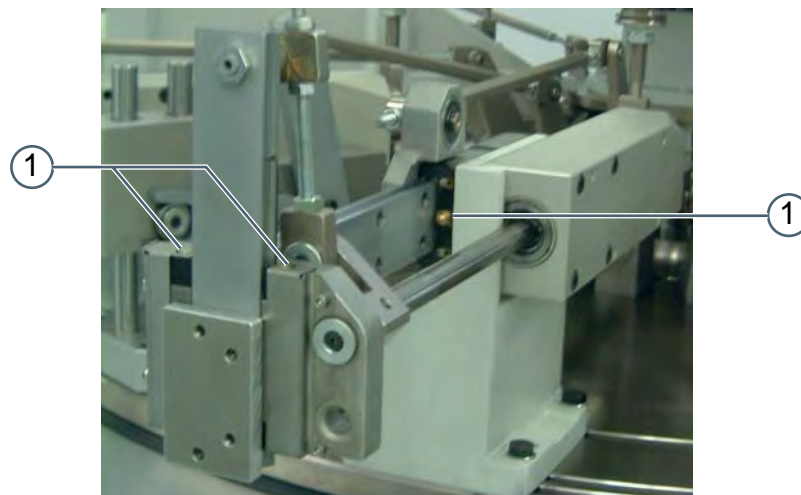


Fig. 17: Lubricating the guides in the vertical stroke and horizontal stroke

(1) Grease nipple

9.4.4 Vertical guide, handling module

- ① The vertical guide of a handling module can be adjusted to improve mobility.
1. Remove the fixing nut.
 2. Loosen the fastening screws.
 3. Loosen the counternut of the setting screws.
 4. Using the setting screws, set the vertical guide so that it is backlash-free.
 - ▶ Keep the contact pressure as minimal as possible.
 5. Tighten the counternut of the setting screws.
 6. Tighten fastening screws.

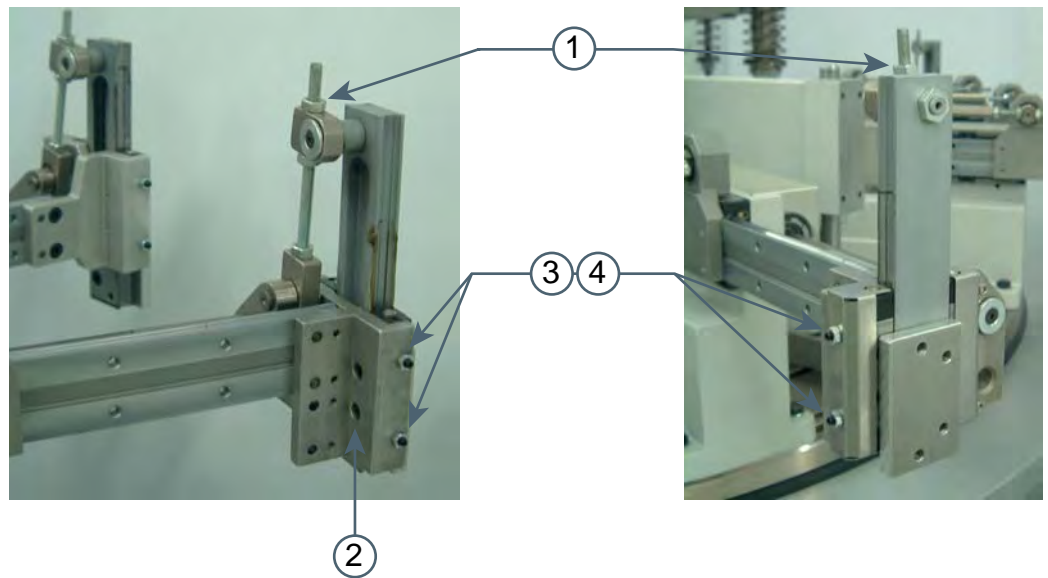


Fig. 18: Adjusting the vertical guide

- (1) Fixing nut
- (2) Two fastening screws
- (3) Counternuts
- (4) Setting screws

- ① Retrofitting the lift position at the vertical axis from the bottom position (see Figure 18 on page 37) to the top position only after consultation with WEISS GmbH.

9.5 Repair

The operator should not perform any maintenance or repair work on the machine. Should maintenance or repair work become necessary, the customer service of WEISS GmbH is to be contacted.

10 Decommissioning / Dismantling / Disposal

10.1 Safety during decommissioning and dismantling

WARNING

Injury of unauthorised persons.

When dismantling and during removal transport parts can tip or fall over. Ensure that decommissioning and dismantling are only executed by personnel who have been trained, instructed and authorised for this purpose. The safety instructions for transport must also be complied with for removal transport. Failure to comply with these instructions can result in serious injuries.

- Wear personal protective clothing and protective equipment.
- When dismantling and for transport removal, the safety instructions for transport and the transport guidelines must be complied with.

10.2 Decommissioning

10.2.1 Temporary decommissioning

The machine should be deactivated for decommissioning and secured against unintentional reactivation.

Workpieces which are still present on the rotary table should be removed.

The machine should be fitted with a sign that clearly indicates that it is temporarily decommissioned.

NOTICE *For recommissioning, comply with the instructions in chapter 6.3.*

10.3 Dismantling and disposal

WARNING *Injuries can be caused during dismantling by falling components and by swinging or falling loads during transportation with lifting equipment*

The following points must be observed to avoid injuries and/or environmental damage during dismantling and disposal:

- Ensure that the correct tools and adequately-dimensioned load lifting equipment are used and the stationary safety of dismantled machine components is assured to avoid injuries.
- Note that emerging lubricant, solvent, preserving agents, etc. can cause cauterizing and burns if they come into direct contact with skin.

10.3.1 Disposal of components

NOTICE *Subassemblies should be disposed of properly! Improper disposal of subassemblies can cause environmental damage and will be prosecuted!*

Dispose of subassemblies in compliance with valid local regulations. Ensure that auxiliary operational media are disposed of in compliance with environmental protection regulations. Local regulations governing the correct recycling and disposal of waste should be observed.

The machine consists of:

- steel and soft cast iron (housing, shafts, gears, bearings)
- copper (servo motor and electric cables)
- plastic (electric cables)
- electronic components (servo amplifier)

11 Service and spare parts

11.1 Ordering spare parts

Please supply us with the following details when ordering spare parts:

- Serial number of the machine
- Order number of the spare part obtained from the spare parts list
- Number of spare parts required


Please send your spare parts order to

WEISS GmbH
Siemensstraße 17
D-74722 Buchen/Odw.

Tel: +49 (0) 6281 - 5208-0
Fax: +49 (0) 6281 - 5208-99
E-mail: service@weiss-gmbh.de
Internet: <http://www.weiss-gmbh.de>

A complete list of the addresses of our sales representatives is available on our website..

11.2 Spare parts list

 A spare parts list is included in the supplied documentation. The exact name and order number of the required spare part can be found in this list.

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