Assembly and instruction manual

Ring Indexing Tables NR

Mechanical system documentation

R11-2011

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List of contents

Illustration index

1 Introduction

1.1 Definition

Ring Indexing Table

An NR series ring indexing table is a circular electromechanical indexing table with a very large centre diameter.

In the following, the rotary indexing table will be referred to as "machine".

1.2 Correct use

The machine is a incomplete machine as specified in Directive 2006/42/EC, Article 1g and 2g.

The machine is designed for integration in other machines, in other incomplete machines or equipment or for connection to these.

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

Commissioning is prohibited until conformity with Directive 2006/42/EC, and all other applicable directives has been determined and confirmed for the facility in which the machine is installed.

Observance of the accompanying documentation and adherence to maintenance regulations are also component parts of correct use.

1.3 Incorrect use

Any use of the machine above or beyond the directions for correct use is regarded as incorrect and prohibited.

The machine should not be subject to loads beyond its stress limitations. Possible additions to the rotary table are defined in the order characteristics and must be adhered to. Additions to the table housing are prohibited. Drilling and welding to add additional components is prohibited.

Do not operate the machine without supplemental protective devices. Integration within a suitable safety concept is the responsibility of the owner.

The machine 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.

1.4 Laws / EC Directives / Norms

The machine 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 EC Declaration

An EC Declaration as specified by Directive 2006/42/EC (Machinery Directive) is included with each machine at delivery.

The text of this EC Declaration is as follows:

WEISS GmbH

Siemensstrasse 17

D-74722 Buchen, Germany

Declaration of incorporation of partly completed machinery
in accordance with EC Machinery Directive 2006/42/EC, Annex II B

Prohibition of commissioning

We hereby declare that the machine called Ring Indexing Tables NR is intended for the installation into another machine or is to be assembled with other machines to a machine in terms of the directive 2006/42/EC.

Commissioning is prohibited until it has been established that the machine into which the aforementioned product should be installed satisfies the provisions of the EC Machinery Directive, and that a Declaration of Conformity in accordance with EC Machinery Directive 2006/42/EC, Annex II A has been issued.

1.6 System-dependant documentation

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

- Information brochure "Electromechanical indexing rings TR + NR"

For control system by WEISS-GmbH:

- Operating manual WAS.handling Windows programme

1.7 Operating manual

This operating manual is a translation of the original operating manual and is part of the scope of delivery.

We reserve the right to undertake modifications resulting from further technological development which diverge from the data and illustrations contained in this operating manual.

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 heeded.

This operating manual describes handling of the machine and contains important instructions and information to assist you in correct use of the machine.

The operating manual is designed for trained technical personnel and instructed persons. It should be kept at the location of use of the machine at all times and read, understood and applied by all persons entrusted with work on or with the machine.

Safety instructions in individual chapters should be observed.

1.7.1 Explanation of safety instructions in this manual

This manual contains instructions which 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 of a failure to heed 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:

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

1.7.2 Legend

In these manual images, symbols and abbreviations with the following meaning are used for clarity:

1. Marks a numbered list.
   a) Marks the second level of a numbered list.

- Marks a list.
  - Marks the second level of a list.

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

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

1.7.3 Figures

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

1.7.4 Index of valid pages

Pages of this operating manual including the title page: 48

1.8 Guarantee

The machine is covered by a guarantee of 24 months 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 must 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.

2.1.2 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.

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:

- Installation
- Commissioning
- Operating
- Maintenance

2.2 Safety equipment for the machine

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

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

These include:

- Protective grid with monitored safety door
- Emergency stop circuit
- Light barriers or switch mats
- Warning indicators

2.3 Residual hazards

2.3.1 General residual hazards

WARNING

Risk of injury due to absent safety equipment.
Realisation of the safety concept is the responsibility of the operator.The operator must provide for adequate safety measures (e.g. safety grid, light barriers, emergency stop circuits, covers, warning indicators, etc.).

A rotating plate can collide with the loading device, if the machine is not operated properly during loading. The inertia of workpieces and the high torque can force the rotary indexing table out of its anchoring. The owner must ensure a proper supply of workpieces. Failure to comply with this instruction can result in severe or fatal injury.

Risk of explosion during operation in a potentially-explosive environment.
Due to constraints governing the correct used of the machine, the machine is not designed for use in a potentially-explosive atmospheres. The operator must take all measures to ensure that the machine is only operated in a correct manner.

Risk of injuries through burning.
Motor and the brake can reach temperatures of up to 100 °C during operation. Prior to carrying out any work on these components, the machine must first cool down sufficiently to avoid any risk of burning through contact. Burn injuries will occur if there is contact with hot components.

Use of spare parts / attachment of supplemental devices
If spare parts are used, or if supplemental devices are attached that are not approved by the manufacturer, consequential damages can occur. Only use spare parts that are cited in our spare parts list or spare parts that we have approved. You must consult with us prior to attaching supplemental devices. Failure to comply with these instructions means that the possibility of personal injury cannot be excluded.

Danger of crushing injuries due to impermissible changes
Injuries can occur as a consequence of impermissible changes. Do not make any changes to the machine. Failure to comply with these instructions means that the possibility of personal injury cannot be excluded.

2.3.2 Residual hazards due to mechanical causes

WARNING

Risk of injuries due to crushing or collision.
The rotary table of the machine rotates at a very high torque. The spring-loaded brake integrated in the motor is a holding brake and not an approved safety brake. The brake is not a redundant design. Consequently never reach into the working area of the rotary table. Possible injury caused by further travel of the rotary table as a result of brake failure should be prevented with suitable safety equipment.

2.3.3 Residual hazards due to electrical causes

Electric shocks can cause serious to fatal injuries.
Power and control connections can still conduct electricity even if the machine is at a standstill. Work on electrical equipment should only be performed by qualified electricians in compliance with the instructions in the operating manual for the electrical system documentation. Electrical connections for the machine should only be disconnected or plugged in when the power supply is deactivated and secured against reactivation. Touching energised components can lead to serious or fatal injuries.

A failure or malfunction of the control system can lead to injuries caused by uncontrolled system behaviour or automatic startup.
The operator must take all measures to ensure that the machine is only operated in compliance with regulations.

3 Product description

3.1 Structure

The standard equipment indexing table consists of the table housing [1], rotary table [2] and reduction gearbox [3] preloaded free of play.

A servo motor [4] provided by the customer (or a servo motor from the WEISS GmbH scope of delivery) can be premounted, depending on the order.

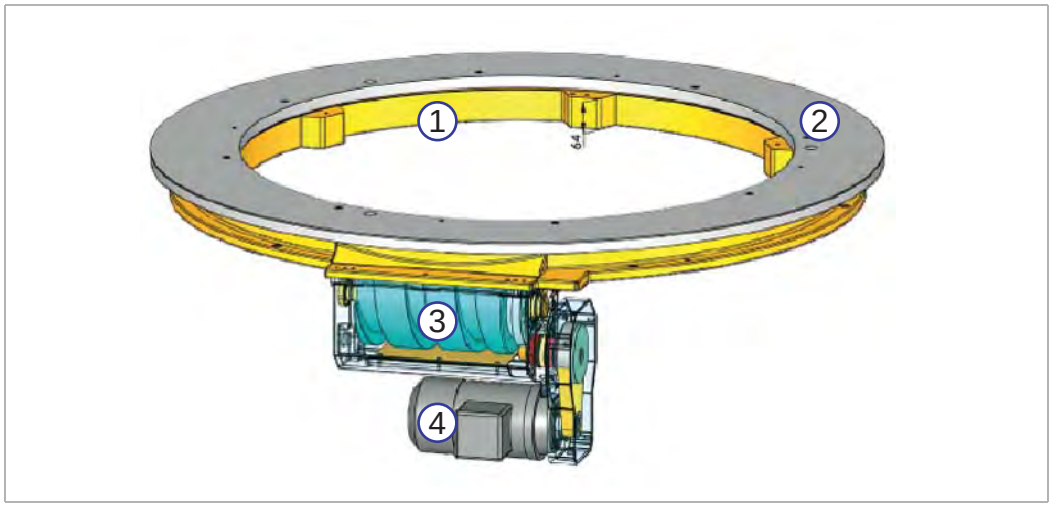


Abb. 1: Machine modules

3.2 Function

The machine travel profile is freely programmable. The distance from one stopping point to the next is captured by an absolute measuring system.

The servo motor is actuated by the servo amplifier in compliance with the programmed motion profile and rotates, accelerates or decelerates the rotary table on the machine. The rotary table can be operated as an anticlockwise rotating, clockwise rotating or oscillating component.

Force flows from the motor over a toothed belt stage and a one- or two-stage pinion gear directly to the stroke curve of the WEISS gear unit.

The combination of the zero-backlash and precision of the WEISS gear unit and the rotary encoder mounted on the servo motor enable exact positioning of the rotary table.

The rotary table is held in its position by the holding brake integrated in the servo motor when the machine is stationary. Brake pressure is generated by springs. The brake is triggered electromagnetically and activates automatically if the motor power is switched off or in the case of a power failure.

3.3 General technical data

3.3.1 Scope of delivery

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

3.3.2 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 merely an example of any 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. This 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.

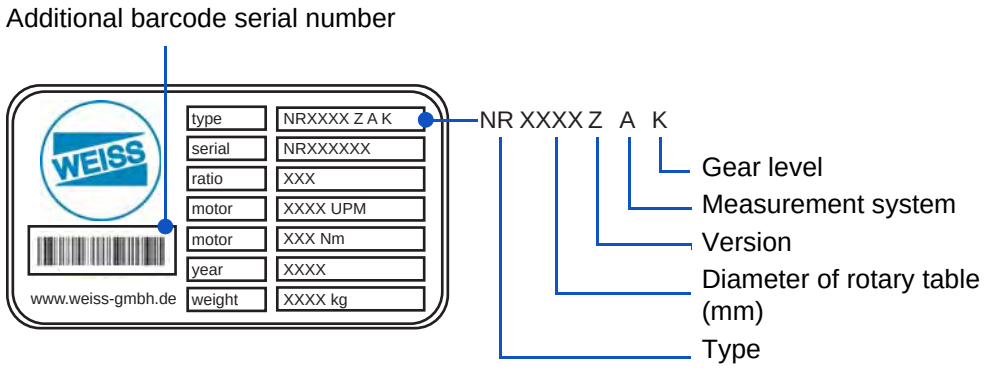


Abb. 2: Example of a type plate

3.3.3 Sound level

The A-weighted emission sound pressure level do not exeed the allowable peak.

3.3.4 Electrical connections

Operating voltage	Data for electrical connections is governed by the order in question. 400...480 VAC ±10%, 48...62Hz
Brake voltage	24 VDC ± 10%, residual ripple <10%
Power input max.	NR 0750: 10 kVA NR 1100: 17 kVA NR 1500: 17 kVA NR 2200: 17 kVA

The wiring diagram in the motor terminal box indicates how to make the connections for the respective operating voltage and brake voltage.

3.3.5 Rotary encoder

Rotary encoder data is governed by the motor.

The standard version uses the following rotary encoder:

Type	Heidenhain EQN 1325
Resolution	4 million increments on the motor shaft
Precision	60" on the motor shaft

3.3.6 Load data for drive unit, motor and brake

NOTICE ***Property damage if limits are exceeded.***

Exceeding the approved load data may result in damage or failure of the drive unit. The approved motor data refer to the indexing table input shaft. When selecting an input transmission other than the standard the approved load data must be redetermined.

	Drive unit	Motor		Brake
	i_{ttl}	n_{max}	M_{max}	M_{max}
NR 0750ZAK	90	2000 rpm	30 Nm	15 Nm
NR 1100ZAK	88	2000 rpm	50 Nm	32 Nm
NR 1500ZAK	112	2000 rpm	55 Nm	32 Nm
NR 2200ZAK	220	2000 rpm	80 Nm	32 Nm
Standard toothed belt ratio 1:1				

See details on type plate for special versions.

3.3.7 Ambient conditions and weight

Ambient temperature	between +10 °C and +40 °C	
Weight	NR0750	230 kg
	NR1100	310 kg
	NR1500	500 kg
	NR2200	950 kg

3.3.8 Installation positions

The machine does not have an additional hole for offsetting the bleed screw.
It should therefore only be mounted in a horizontal position at the installation location.

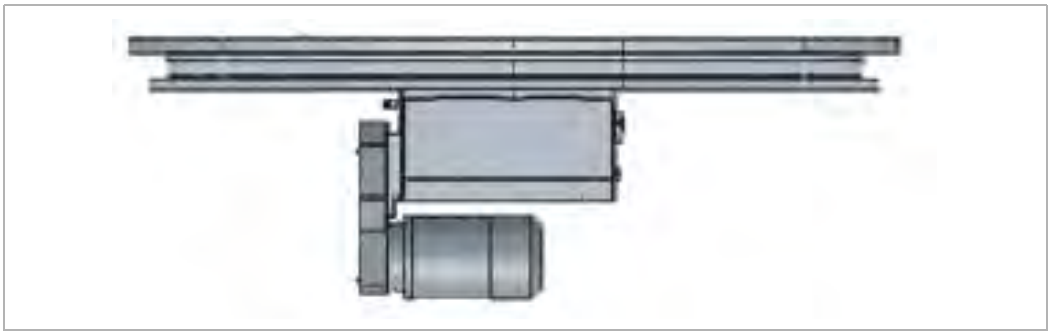


Abb. 3: Installation positions

3.3.9 Drive positions

NOTICE ***Pivoting the gear case into the required position allows the position of the motor to also be changed later (see chapter 5.3.4).***

In addition to the standard model with servo motor [A] below the following drive positions may be used:

- Drive unit pivoted inward by 90° [B].
- Drive unit pivoted outward by 90° [C].

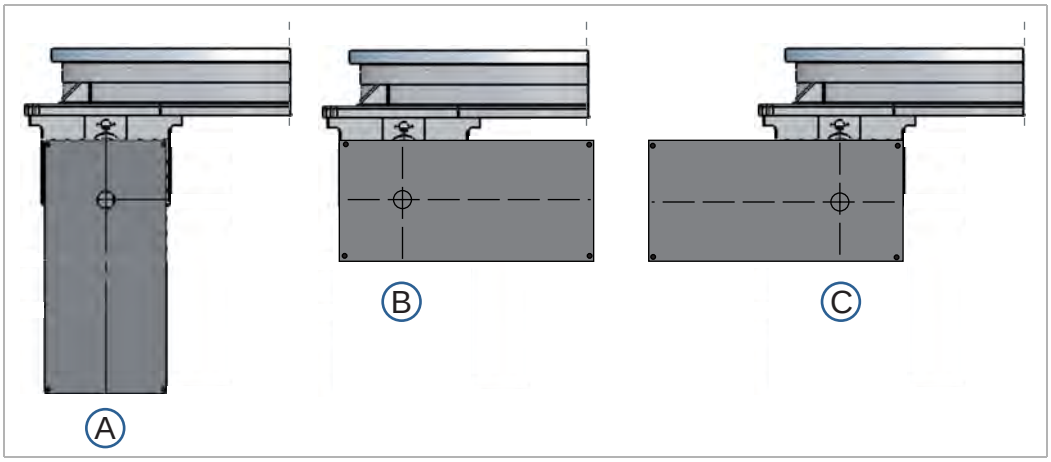


Abb. 4: Drive positions

3.4 Specific technical data

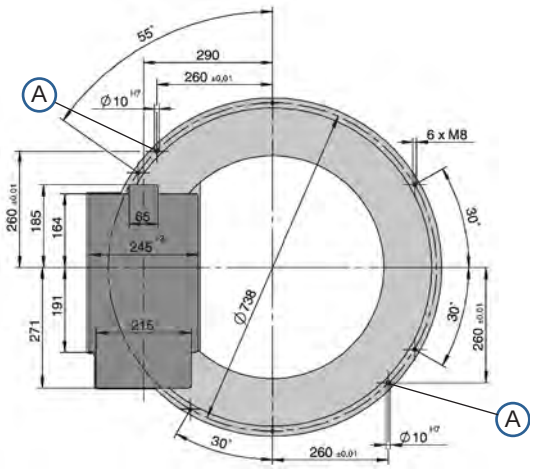
3.4.1 Table type NR 750

Ring diameter, inner:	Max. 490 mm
Ring diameter, outer:	Min. 750 mm
Surface of the ring:	Anodised
Direction of rotation:	left, right or alternating
Switching frequency	Up to 120 cycles/min, dependent on the moment of inertia and the angle of rotation
Pitch accuracy (arc seconds):	± 18"
Pitch accuracy (arc length):	± 0.033 mm (for Ø 750 mm)
Repeatability	5"
Max. axial run-out of the ring	*0.05 mm (for Ø 750 mm)
max. Excentricity:	* 0.03 mm
Max. plane-parallelity of the ring surface relative to the housing support:	*0.05 mm (for Ø 750 mm) * The specified concentricity and axial run-out tolerances can only be achieved with precise support surfaces.

3.4.1.1 Load data NR 750

For the rotating ring		
F_N	**3500 N** *** 35000 N**	Permissible machining force acting vertically on the locked ring within the nominal diameter * Maximum centred load on the ring at $M_K \approx 0$ Nm and $F_R \approx 0$ N
M_T	**2180 Nm**	Permissible tangential moment on the locked ring
M_K	**750 Nm**	Permissible overturning moment on the locked ring
F_R	**7000 N**	Permissible radial force on the locked ring

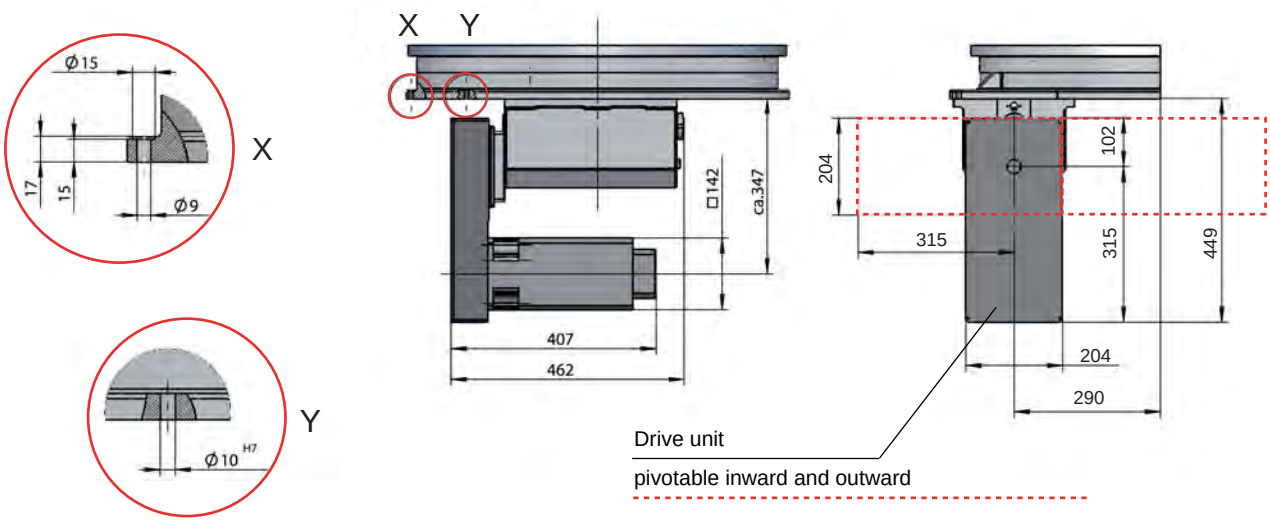
3.4.1.2 Installation opening and contact hole pattern

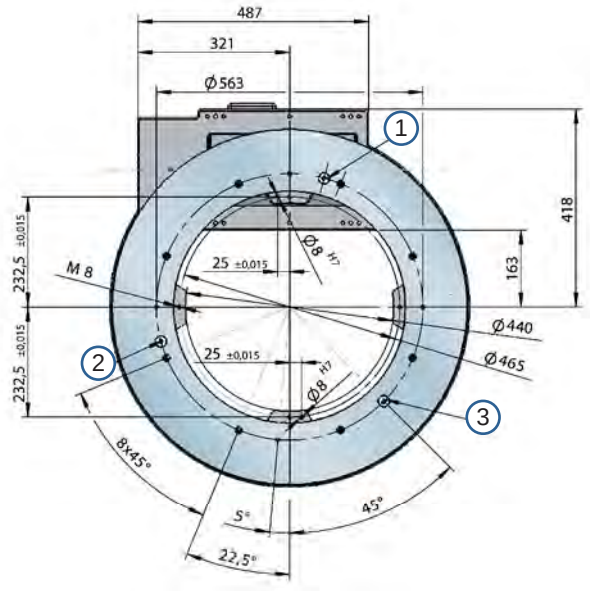


If using an elevation for the ring, request the drawing for the installation opening.

Ⓐ Two preformed holes for pinning the cast-iron ring on the base plate.

3.4.1.3 Dimensions NR 750





In the event of subsequent planned drilling work, please contact us to ascertain the permissible hole depths.

The position of the rotating ring shown in the figure corresponds to the standard position of the rotary indexing table (position at time of delivery).

①②③ Manufacturing-related auxiliary bores:

Table diameter 750 - 880 mm: R = 281.5 mm; M12

Sealed by dummy plugs M18 x 1.5.

For supplemental indexing tables with greater outer diameter the position of the auxiliary thread is provided in the quotation or the order confirmation, or can be requested from WEISS-GmbH.

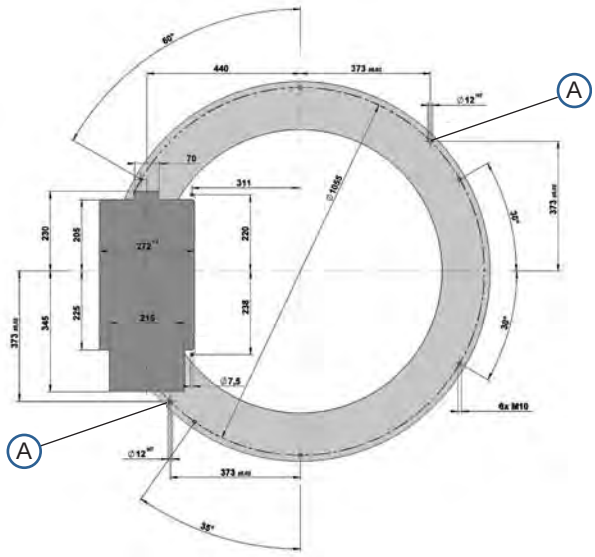
3.4.2 Table type NR 1100

Ring diameter, inner:	Max. 800 mm
Ring diameter, outer:	Min. 1100 mm
Surface of the ring:	Anodised
Direction of rotation:	left, right or alternating
Switching frequency	Up to 120 cycles/min, dependent on the moment of inertia and the angle of rotation
Pitch accuracy (arc seconds):	± 18"
Pitch accuracy (arc length):	± 0.048 mm (for Ø 1100 mm)
Repeatability	5"
Max. axial run-out of the ring	*0.06 mm (for Ø 1100 mm)
max. Excentricity:	* 0.04 mm
Max. plane-parallelity of the ring surface relative to the housing support:	*0.06 mm (for Ø 1100 mm) * The specified concentricity and axial run-out tolerances can only be achieved with precise support surfaces.

3.4.2.1 Load data NR 1100

For the rotating ring		
F_N	**6000 N** *** 50000 N**	Permissible machining force acting vertically on the locked ring within the nominal diameter * Maximum centred load on the ring at $M_K \approx 0$ Nm and $F_R \approx 0$ N
M_T	**3500 Nm**	Permissible tangential moment on the locked ring
M_K	**2500 Nm**	Permissible overturning moment on the locked ring
F_R	**12000 N**	Permissible radial force on the locked ring

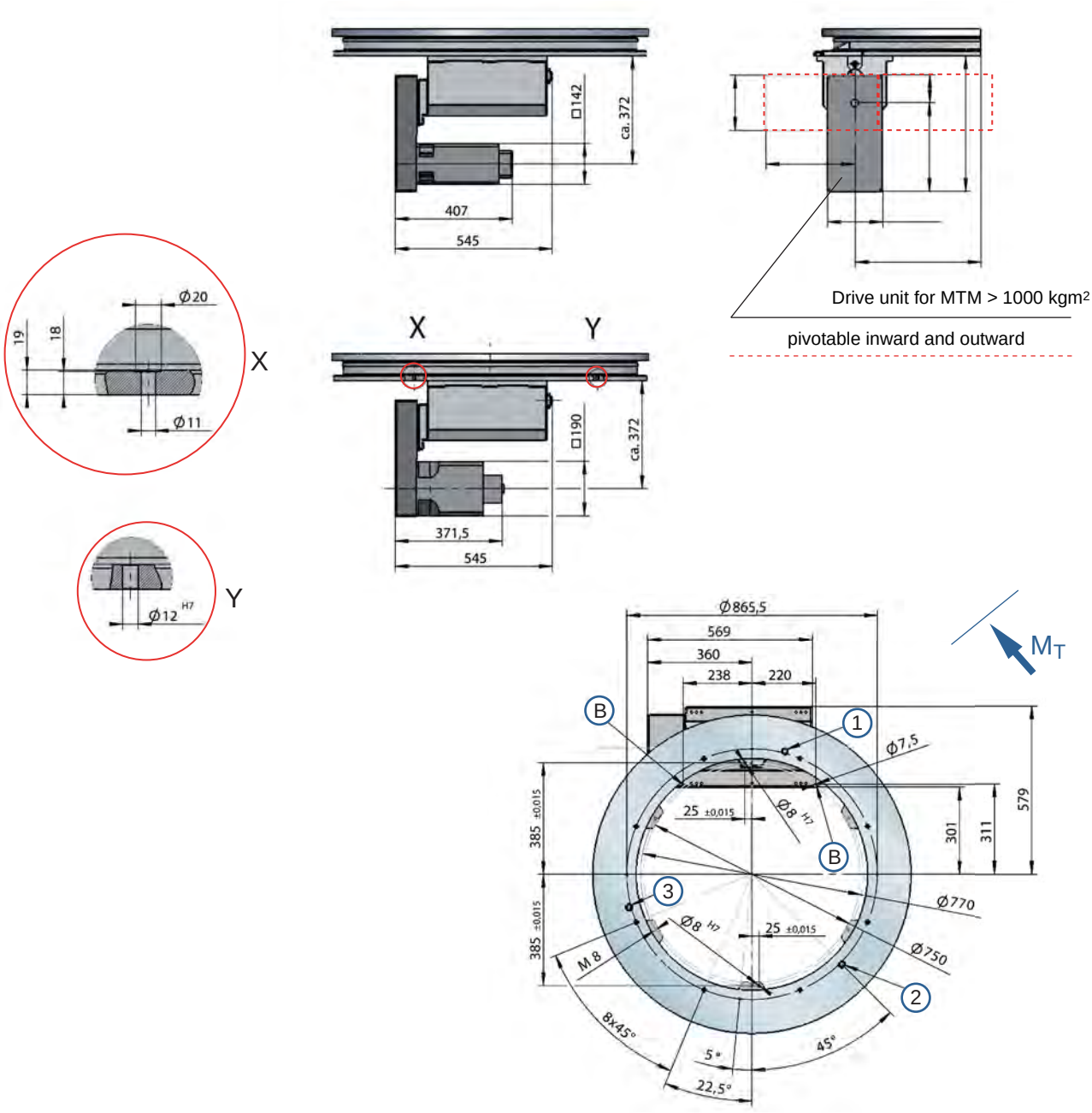
3.4.2.2 Installation opening and contact hole pattern



If using an elevation for the ring, request the drawing for the installation opening.

Ⓐ Two preformed holes for pinning the cast-iron ring on the base plate.

3.4.2.3 Dimensions NR 1100



In the event of subsequent planned drilling work, please contact us to ascertain the permissible hole depths.

The position of the rotating ring shown in the figure corresponds to the standard position of the rotary indexing table (position at time of delivery).

① ② ③ Manufacturing-related auxiliary bores:

Plate diameter 1100 mm: P = 475 mm; M16

Sealed by dummy plugs M18 x 1.5.

For supplemental indexing tables with greater outer diameter the position of the auxiliary thread is provided in the quotation or the order confirmation, or can be requested from WEISS-GmbH.

Ⓑ If for structural reasons the two fitting bores A for pinning the cast-iron ring on the base plate cannot be used, then the bores B can be used for centring.

The casting must be bored together with the base plate. The holes must be rubbed out before pinning.

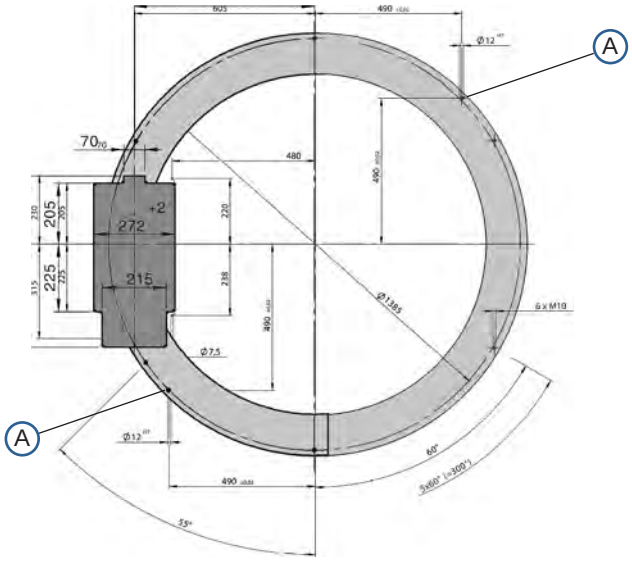
3.4.3 Table type NR 1500

Ring diameter, inner:	Max. 1135mm
Ring diameter, outer:	Min. 1500 mm
Surface of the ring:	Anodised
Direction of rotation:	left, right or alternating
Switching frequency	Up to 120 cycles/min, dependent on the moment of inertia and the angle of rotation
Pitch accuracy (arc seconds):	± 15"
Pitch accuracy (arc length):	± 0.055 mm (for 1500 mm diameter)
Repeatability	5"
Max. axial run-out of the ring	*0.08 mm (for 1500 mm diameter)
max. Excentricity:	* 0.04 mm
Max. plane-parallelity of the ring surface relative to the housing support:	*0.08 mm (for 1500 mm diameter) * The specified concentricity and axial run-out tolerances can only be achieved with precise support surfaces.

3.4.3.1 Load data NR 1500

For the rotating ring		
F_N	**8000 N** *** 70000 N**	Permissible machining force acting vertically on the locked ring within the nominal diameter * Maximum centred load on the ring at $M_K \approx 0$ Nm and $F_R \approx 0$ N
M_T	**4500 Nm**	Permissible tangential moment on the locked ring
M_K	**3200 Nm**	Permissible overturning moment on the locked ring
F_R	**16000 N**	Permissible radial force on the locked ring

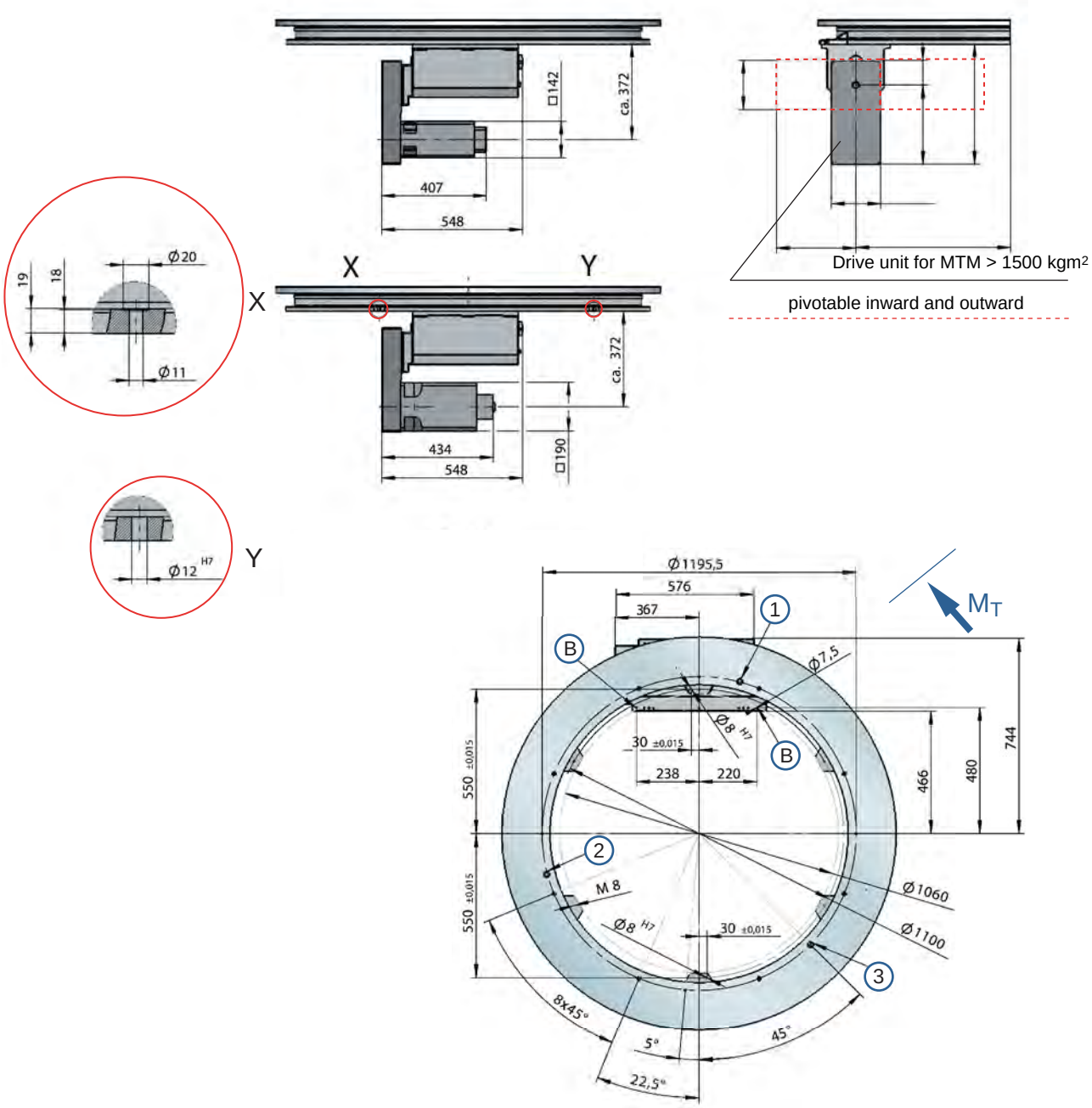
3.4.3.2 Installation opening and contact hole pattern



If using an elevation for the ring, request the drawing for the installation opening.

Ⓐ Two preformed holes for pinning the cast-iron ring on the base plate.

3.4.3.3 Dimensions NR 1500



In the event of subsequent planned drilling work, please contact us to ascertain the permissible hole depths.

The position of the rotating ring shown in the figure corresponds to the standard position of the rotary indexing table (position at time of delivery).

①②③ Manufacturing-related auxiliary bores:

Plate diameter 1500 mm: R = 700 mm; M20

Only use dummy plugs to seal.

For supplemental indexing tables with greater outer diameter the position of the auxiliary thread is provided in the quotation or the order confirmation, or can be requested from WEISS-GmbH.

Ⓑ If for structural reasons the two fitting bores A for pinning the cast-iron ring on the base plate cannot be used, then the bores B can be used for centring.

The casting must be bored together with the base plate. The holes must be rubbed out before pinning.

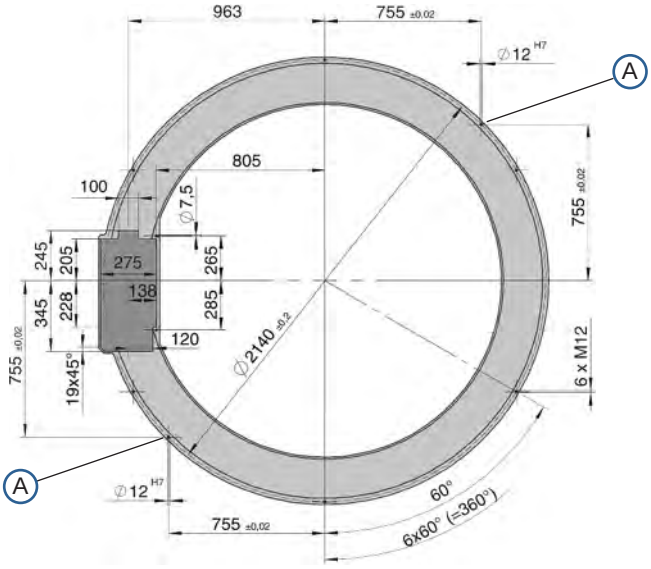
3.4.4 Table type NR 2200

Ring diameter, inner:	Max. 1750 mm
Ring diameter, outer:	min. 2200 mm
Surface of the ring:	Anodised
Direction of rotation:	left, right or alternating
Switching frequency	Up to 120 cycles/min, dependent on the moment of inertia and the angle of rotation
Pitch accuracy (arc seconds):	± 12"
Pitch accuracy (arc length):	± 0.064 mm (for 2200 mm diameter)
Repeatability	5"
Max. axial run-out of the ring	*0.08 mm (for 2200 mm diameter)
max. Excentricity:	* 0.05 mm
Max. plane-parallelity of the ring surface relative to the housing support:	*0.08 mm (for 2200 mm diameter) * The specified concentricity and axial run-out tolerances can only be achieved with precise support surfaces.

3.4.4.1 Load data NR 2200

For the rotating ring		
F_N	**15000 N** *** 100000 N**	Permissible machining force acting vertically on the locked ring within the nominal diameter * Maximum centred load on the ring at $M_K \approx 0$ Nm and $F_R \approx 0$ N
M_T	**10000 Nm**	Permissible tangential moment on the locked ring
M_K	**4500 Nm**	Permissible overturning moment on the locked ring
F_R	**30000 N**	Permissible radial force on the locked ring

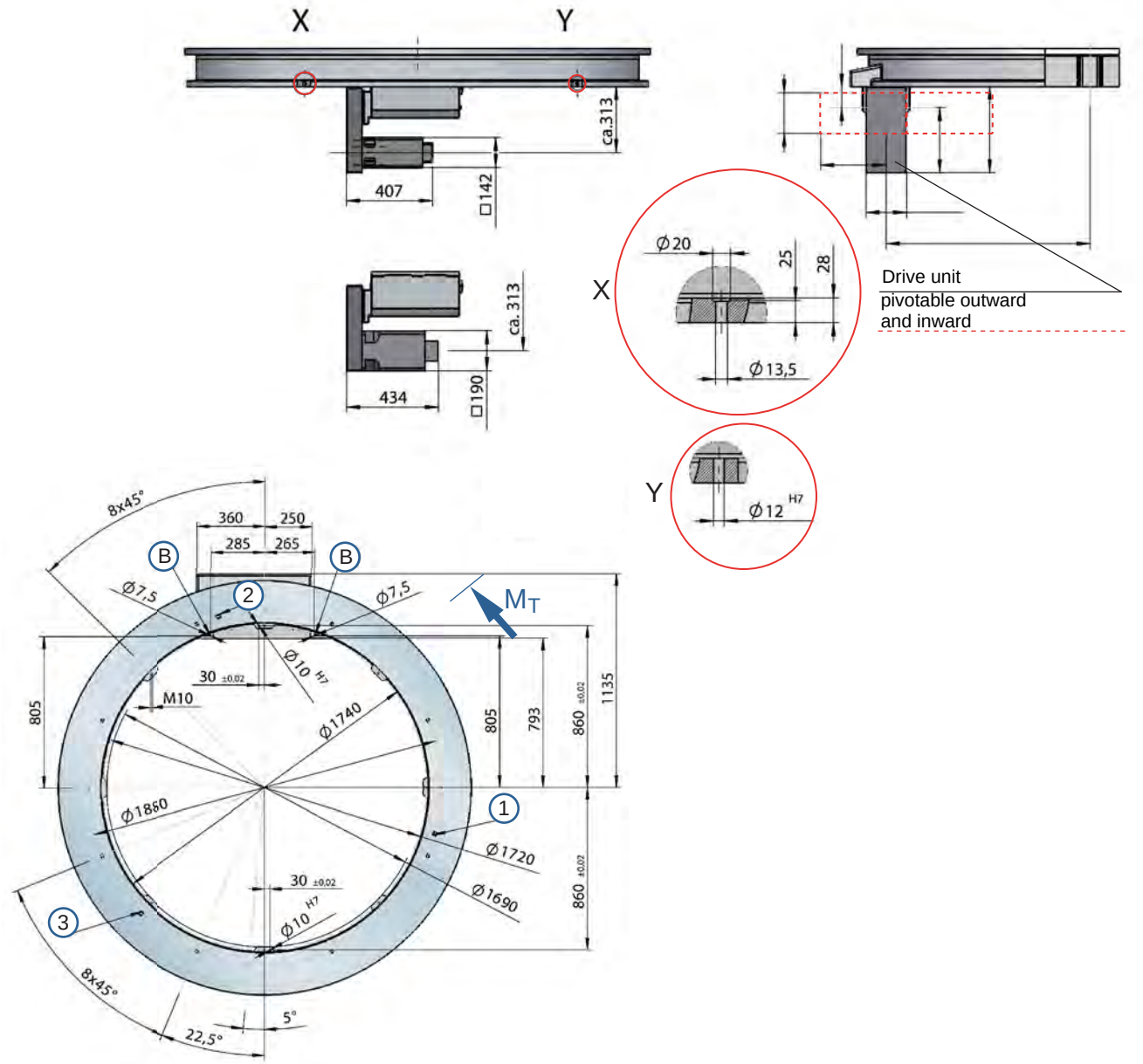
3.4.4.2 Installation opening and contact hole pattern



If using an elevation for the ring, request the drawing for the installation opening.

Ⓐ Two preformed holes for pinning the cast-iron ring on the base plate.

3.4.4.3 Dimensions NR 2200



In the event of subsequent planned drilling work, please contact us to ascertain the permissible hole depths.

The position of the rotating ring shown in the figure corresponds to the standard position of the rotary indexing table (position at time of delivery).

① ② ③ Manufacturing-related auxiliary bores:

Plate diameter 2200 mm: R = 940 mm; M18

Sealed by dummy plugs M20 x 1.5.

For supplemental indexing tables with greater outer diameter the position of the auxiliary thread is provided in the quotation or the order confirmation, or can be requested from WEISS-GmbH.

Ⓑ If for structural reasons the two fitting bores A for pinning the cast-iron ring on the base plate cannot be used, then the bores B can be used for centring.

The casting must be bored together with the base plate. The holes must be rubbed out before pinning.

3.5 Control unit

WEISS-GmbH offers an optimised control assembly for controlling NR series indexing table, the W.A.S (WEISS APPLICATION SOFTWARE) control system.

📖 When using this control assembly please observe the specifications in the control instructions “WAS.indexer”.

When using a manufacturer implemented control with the indexing table the information in the control instructions “WAS Commissioning and Service Software” may be used as reference values.

4 Transportation

4.1 Safety during transportation

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 tasks should only be performed in compliance with the safety instructions
- 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.

4.2 Appliances and auxiliary equipment approved for transportation

Eye bolts of a suitable dimension should be used for transporting the unpacked machine. The eye bolts are screwed into the external thread of the rotating plate. The lifting slings can be attached to the eyelets of the eye bolts.

Abb. 5: Transporting the unpacked machine

4.3 Transportation damage

The delivery should be inspected for damage immediately after receipt. The contents of the delivery should be checked for damage if damage to the packaging is detected, which might also indicate damage to the contents. Details of the scope of delivery are provided in Chapter 3.3.1.

Damage detected should be immediately reported to and confirmed by the transportation company.

4.4 Intermediate storage

NOTICE ***The machine must not be stored in such a way that the bleed screw is pointing down, since otherwise oil may leak out.***

The storage conditions detailed in the table should be observed if intermediate storage over a longer period of time is planned.

Climatic zone	Packaging	Storage location	Storage duration
Moderate Europe USA Canada China Russia (except tropical areas)	Packed in containers	Roofed over Protected against rain and snow 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	2 years and longer with regular inspection Check for cleanless and machine damage during inspection Check that anticorrosion protection is unspoiled
Tropical Asia Africa Central and South america Australia New Zealand (except moderate areas)	Packed in containers With moisture absorbers and humidity indicator sealed in film Protect against insect damage and mould formation through chemical treatment	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 cleanless and machine damage during inspection Check that anticorrosion protection is unspoiled

5 Installation

5.1 Safety during installation

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.

Injuries caused by falling loads.

Parts stacked on top of each other can slip and fall. Do not loosen any fixing elements and transportation securing devices without the express instructions of the company installation personnel. Wear personal protective clothing.

Injuries caused by incorrect installation.

Improper installation can cause consequential damage. Work should only be assigned to auxiliary personnel by the company's installation personnel. The fastening material must be adequately dimensioned so that it can withstand the stresses produced during operation. The consequence of improper installation is the possibility that operating and maintenance personnel can be injured.

Injuries caused by sharp-edged machine parts which are still uncovered and accessible.

Wear personal protective clothing.

Electric shocks can cause serious to fatal injuries.

Improperly performed maintenance tasks on the electrical equipment or contact with energised lines can cause an electrical shock with severe to fatal injuries. Work on electrical equipment should only be performed by qualified electricians and in compliance with the specifications in the operating manual for electrical systems. The supply cables must be checked to ensure that they are de-energised, prior to connection. The connection to the supply energy must be established in accordance with the information in the circuit diagrams.

Danger due to missing covers

To connect the electrical components to the power supply the covers must be removed or the junction boxed must be opened. It is possible to touch energised parts. After concluding the installation tasks the covers that have been removed must be re-mounted and junction boxes must be re-closed. Failure to comply with this safety instruction result in severe or fatal injuries.

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.***

- Ensure that only authorised personnel are in the work area of the machine and that no one could be injured due to the installation work.
- Ensure that no components are damaged and that they are only installed in clean, functional condition. Improperly placed or improperly fastened system parts can fall or tip over.
- Ensure that all components are installed in accordance with the described arrangement.
- Ensure that specified tightening torques are observed.

5.2 Installation prerequisites

📖 Diagrams indicating the dimensions and the fastening bore for the individual table types are included in the supplied information brochure “Electromechanical indexing rings TR + NR”.

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.
  - Maximum permissible flatness error: 0.1 mm.
  - Maximum permissible roughness: Rz 6.3
- The substructure of the installation site must be statically measured to an adequate degree to ensure that it can support the operating weight of the machine.
- The drive unit remains easily accessible for maintenance work and the distance between the motor ventilation system and any other sub-assembly is at least 100 mm.
- The shaft seals are protected against wear in case of abrasive ambient conditions.

5.3 Installation of the rotary indexing table

5.3.1 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)
- Commercially-available solvents
- Drift for fitting parallel pins
- Quality 8.8 screws

Thread	M8	M10	M12	M16	M20
Tightening torque	25 Nm	50 Nm	80 Nm	200 Nm	400 Nm

5.3.2 Installation preparation

In order to ensure that the machine is deactivated safely and to protect against overloading, the following parts for the power supply of the drive motor must be available:

- main switch that can be locked
- suitable emergency stop devices in accordance with EN 60204-1

Prior to installation, open the packaging unit, unpack the machine so that it is accessible from all sides and unscrew it from the transportation pallet.

Prior to installation, all components must be free of anti-corrosion agents and dirt and a commercially-available solvent should be used for this purpose.

NOTICE ***Do not bring the sealing lips of the oil seals in contact with the solvent, as this could cause damage to the material.***

5.3.3 Fastening the rotary indexing table

1. Place the rotary indexing table (in compliance with the transportation regulations) at the assembly position and align it with the bore holes and pin holes [1].
2. Pre-centre both cylinder pins [2] and then drive in the first pin one third of the way.
3. Screw in fastening screws [3] and slightly tighten.
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. Make electrical connections in accordance with the circuit diagrams.
7. Perform a trial run.

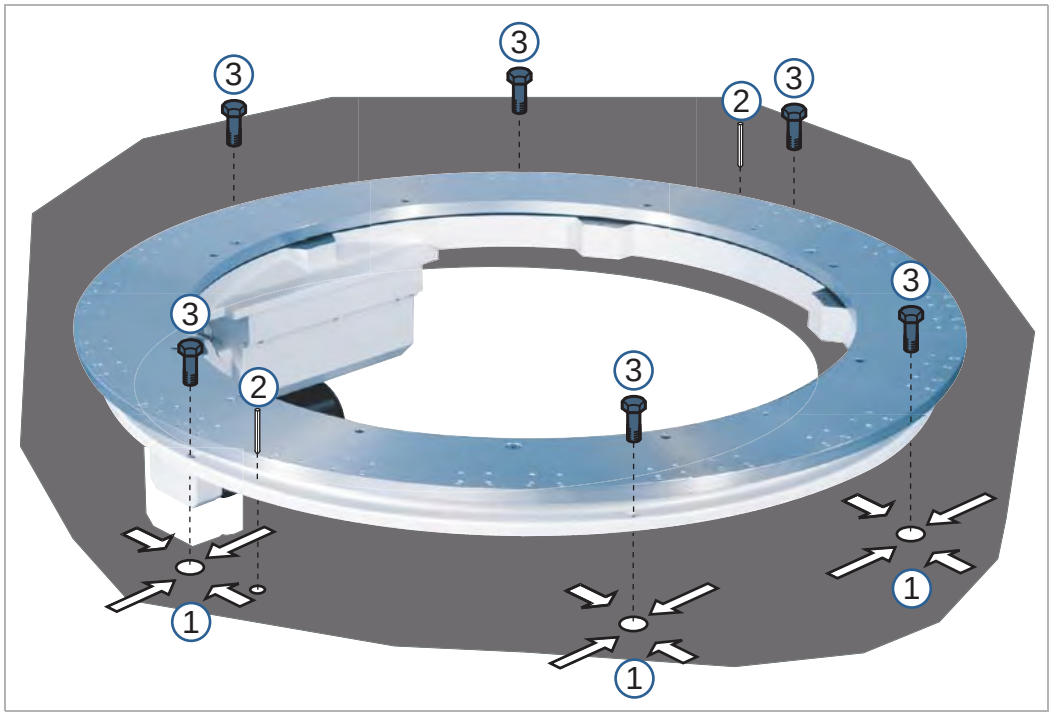


Abb. 6: Securing the indexing table

5.3.4 Displacing the drive housing

The drive housing is factory installed in the drive position ordered. The drive housing can later be moved to the approved drive positions (see chapter 3.3.9).

1. Remove the cover of the toothed belt box.

⚠ WARNUNG *When removing the fastening screws of the toothed-belt boxed enclosure the drive unit could tip, resulting in crushing injuries. Before loosening the screws the drive unit must be secured to prevent tipping.*

2. Remove the four fastening screws [1] of the toothed-belt boxed enclosure.
3. Swivel the drive unit round to the required drive position [2].
4. Insert the four fastening screws [1] of the toothed-belt boxed enclosure and tighten firmly in a crosswise manner.
5. Cover plate of the toothed belt box

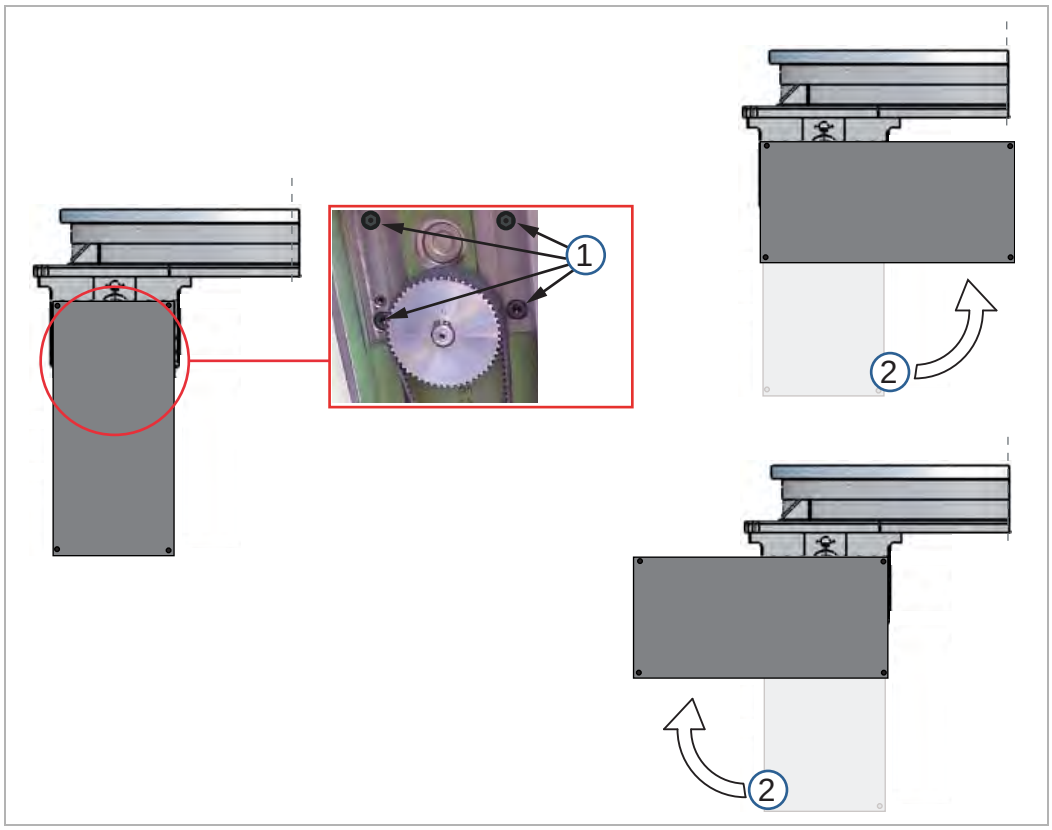


Abb. 7: Displacing the drive housing

5.3.5 Installation of additional components

NOTICE ***Use only those holes provided.***
The holes provided should be used to install additional components. Extra holes should under no circumstances be drilled in the machine or parts welded to it.

5.3.5.1 Fitting of additional indexing plates

An additional indexing plate may only be mounted with the tolerance holes, centring holes and threads provided to ensure concentricity and the accuracy of parts.

NOTICE ***At the time of delivery the indexing plate is always in the first possible locking position.***
The axis of the stud holes in the indexing plate is parallel to the toothed belt axis.
If there is a centring collar on the fixed central part of the rotary indexing table, this must not be used for fastening an additional indexing plate.

For this reason, the central bore hole of an additional indexing plate must be chosen to be approx. 2 mm larger than the centring collar.

NOTICE ***Possible blockage of the rotary table caused by penetrating dirt.***
A suitable lip seal should be installed between the rotating plate and fixed plate of the machine (or between the rotating plate and optionally-mounted fixed plate) to prevent blocking of the gear unit caused by dirt penetrating the gap (WEISS recommends a gap dimension of 1mm) caused by the mounting of additional indexing plates.
Ensure when mounting the lip seal that it does not interfere with existing hole patterns.

1. Lightly polish the centring pins on the insertion side.
2. Mount the lip seal
3. Grease the lip seal all around
4. Bring the additional indexing plate into position.
5. Attach the centring plate and knock in evenly using a small hammer.
6. Fastening the additional indexing plate.

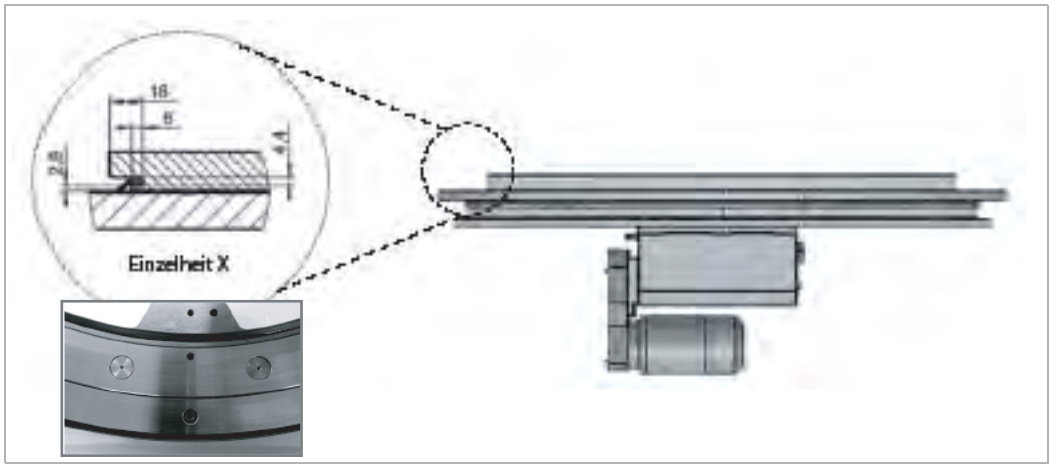


Abb. 8: Fixed plate with integrated lip seal

5.3.5.2 Pinning the mounting plates

1. Set up the mounting plate at the installation site, in compliance with the transportation guidelines, and align it to correspond to the bores and pin holes.
2. Pre-centre 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.

5.3.6 Installing the safety equipment

Fitting of safety equipment and emergency stop buttons is the responsibility of the operator. The machine may not be operated without safety equipment suitable for the intended purpose.

5.4 Electrical connections

Always observe the specifications in chapter 3.5 when connecting the motor and brake and when using controls.

5.5 Instructions on disposal of packaging material

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

6 Commissioning

6.1 Safety during commissioning

WARNING

Injuries emanating from unexpected activation.
Incorrectly-established connections or external influences on electrical equipment can cause unexpected activation of the machine or uncontrolled movement. Ensure that nobody is present in the hazardous zone around the machine. 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 no one could 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 of the drive motor and motor brake is available and correctly fitted.
- All cables are laid properly and correctly connected in compliance with valid electrical circuit documents.
- 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.
- all connections have been correctly established.
- all tools and external parts have been removed.
- all safety covers are correctly installed.
- no other hazard sources are present.

The following should be checked during commissioning

- The drive motor should run without difficulties (no overloading, no speed fluctuations).
- no excessive noise development is detected.
  - Excessive noise development can be a sign of incorrect installation if, for example, the rotary table is subjected to tension, due to an uneven supporting floor.
- the gear unit limit values (e.g. input torque and speed) should be adhered to.
  - Compare with the type plate.

6.2 Initial commissioning

After switching on the power supply at the main switch, the machine is ready for operation.

6.2.1 Configuring the machine zero point

A zero point marking [1] is applied to both the fixed and rotating part of the machine by the manufacturer to aid configuration of the machine zero point.

1. Activate the main switch.
2. Rotate the rotary table in jog mode until both marks are opposite each other.

NOTICE ***Alternatively, the machine zero point can also be freely selected.***
The freely-selected zero point should in this case be permanently marked on the machine (in the same manner as the marks applied by the manufacturer) to enable rapid teaching of the zero point after repair work.

3. Save the settings.

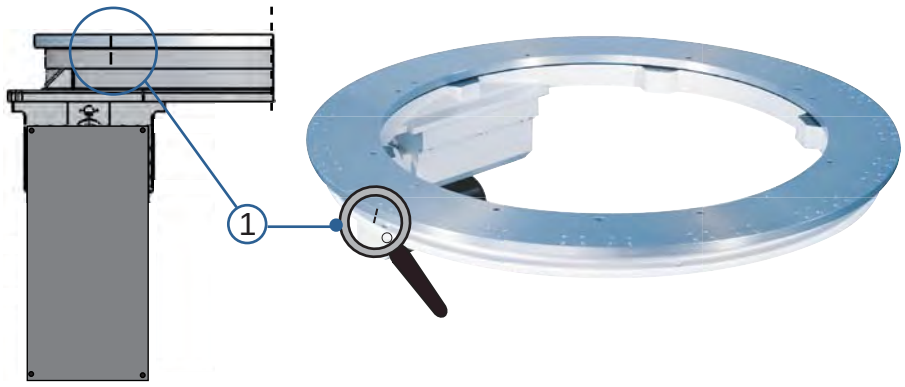


Abb. 9: Marking the zero point

NOTICE ***Invalid machine zero point.***
The machine zero point is rendered invalid if the machine is removed and remounted again, the servo motor or coupling has been replaced or the servo drive or battery for the control has been renewed!

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 emanate from it during operation.

Following a temporary shutdown, a visual inspection of the machine should be conducted prior to starting up the machine again. The following should be checked and ensured in this regard:

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

7 Operation

7.1 Safety during operation

WARNING

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.

Impact and crush hazards
In the event of motor brake failure, the rotary table may continue to rotate even though the motor has stopped. Do not intervene manually unless the rotating plate is stationary. If the rotating plate is still moving, then any manual intervention may lead to impact or crush injuries.

- Operating personnel must inform themselves of the proper behaviour in the event of malfunction, before switching on the machine.
- Ensure that the machine is only operated by personnel who have been trained, instructed and authorised to do so. Such personnel must be familiar with the operating manual and follow the instructions therein.
- The machine should only be used for its intended purpose (see chapter "Intended use").
- Comply with the warnings. Do not reach into moving parts.
- No one should be in the danger zone of the machine when it is being turned on and operated.
- The operating instructions issued by the owner must be complied with.

7.2 Rotary indexing table operation

The machine is designed for integration in other machines, in other incomplete machines or equipment or for connection to these.

Safe operation and control are the responsibility of the operator.

7.3 Operating personnel workstations

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

8 Malfunctions

8.1 Safety when remedying malfunctions

WARNING

Injury of non-authorised personnel.
Malfunctions should only be remedied by instructed personnel provided by the operator who have been trained in and are 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

8.2.1 Faults due to mechanical causes

Error	Cause	Remedy
The rotary table does not rotate.	The toothed belt between drive motor and gear unit is torn.	Replace toothed belt (see chapter 9.5.1).
	Motor voltage is missing	Measure the voltage Check fuses Check motor protection switch
	Drive motor is defective.	Replace drive motor
	The rotary table is mechanically blocked.	Check the top and bottom of the rotating plate for mechanical blockage. Remove the reason for the blockage.
		Check the gap between the fixed and rotating plate for foreign objects. Remove any foreign objects.
	There is dirt between the additional rotating plate and the fixed central plate or tension disc.	Take off rotating plate and central plate, clean them and then perform a test run without them attached.
	Initial commissioning: The rotary table is under mechanically tension.	Check that the location site is level and the machine correctly installed. Check the machine structure.

📖 Faults or malfunctions that are caused by the control unit can be localised and eliminated in accordance with the information in the control unit documentation.

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 abovementioned hours.

9 Maintenance

9.1 Safety during maintenance

WARNING

Injuries caused by the power supply and residual energy.
When opening junction boxes or when removing covers live terminals and cables are accessible. All power sources must be deactivated prior to performing maintenance tasks, secured against unintentional reactivation and marked with a sign indicating that maintenance work is in progress. Work on electrical systems or equipment should only be performed by a qualified electrician or instructed personnel under the guidance and supervision of a qualified electrician according to the principles of electrical engineering. The trade-specific safety regulations must be complied with. Do not touch any open cable ends. All components with electric power supplies must be de-energized. Touching energised components can lead to serious or fatal injuries.

Injury of non-authorised 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 which 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.
Exceeding the permissible limit values can cause damage or failure of the zero-play precision gearing mechanism. The drive unit must conform with the approved specifications regarding torque, speed and brake torque. Only spare parts included in our spare parts lists are to be used. Subsequent modifications to the rotary indexing table are not permitted. Only the specified process materials are to be used. Self-locking screws and nuts are to be continually replaced. All specified screw tightening torques are to strictly observed.

Injuries caused by the absence of safety equipment.
No safety equipment or safety components should be removed. Where dismantling of individual safety equipment is unavoidable for maintenance purposes, the parts removed should be refitted immediately after maintenance work is completed and tested to ensure that the integrity of their safety functions is assured.

- 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

WARNING ***Risk emanating from unexpected activation.***
There is a risk of unexpected start-up if the power supply has not been deactivated or is inadvertent reactivated. The power supply to the machine has to be deactivated and secured against reactivation, prior to commencing maintenance work. Unexepected start up can cause severe injuries.

Impermissible changes and the use of spare parts and supplemental devices that are not approved by the manufacturer can cause injuries.

CAUTION ***Burns***
Motor and the brake can reach temperatures of up to 100 °C during operation. Prior to carrying out any work on these components, the machine must first cool down sufficiently to avoid any risk of burning through contact. Burn injuries will occur if there is contact with hot components.

9.3 Inspections

9.3.1 Checking the drive motor annually

NOTICE ***Replace damaged drive motor.***
Do not carry out any repairs to the drive motor independently. The drive motor has to be replaced if it is damaged (see chapter 9.5.2).

The drive motor has to be checked for

- firm seat,
- running noise and
- fouling and damage.

9.3.2 Check the toothed belt every 2 million switching operations

1. Unscrew the cover of the toothed belt box.
2. Visually inspect the toothed belt for mechanical damage, crack formation, and to determine whether teeth have been sheared off. A damaged toothed belt must be replaced.
3. Check tension of toothed belt and adjust if necessary.

NOTICE *The toothed belt is correctly tensioned if - depending on the belt length - it can easily be turned by 45° to 90° at the middle.*

4. Bolt on the cover plate of the toothed belt box

9.4 Maintenance

The machine requires no maintenance. The gears run in an oil sump, thus ensuring they are lubricated for their entire service lives.

Utilised oil:	Shell Omala 680 (CLP 680 conforming to DIN 51517)	
Oil volume:	NR 0750	1.8 l
	NR 1100	2.5 l
	NR 1500	2.8 l
	NR 2200	4.2 l

9.5 Repair

9.5.1 Replacing the toothed belt

⚠WARNING ***Crushing hazard***

The uncoupling of the drive unit and the rotating plate can cause the rotating plate to move independently. Never reach into the area around rotating parts. Secure the rotating plate so that it cannot move independently prior to carrying out any servicing task. Reaching into the area around rotating parts can lead to crush injuries.

1. Remove the cover of the toothed belt box.
2. Only loosen the four fixing screws [1] for the motor flange.
3. Slacken the toothed belt [2] by moving the motor in the slots [-], and remove.
4. Install new toothed belt.
5. Tighten the toothed belt by moving the motor in the slots [+] and firmly tighten the four fastening screws [1] for the motor flange.

NOTICE *The toothed belt is correctly tensioned if - depending on the belt length - it can easily be turned by 45° to 90° at the middle.*

6. Cover plate of the toothed belt box

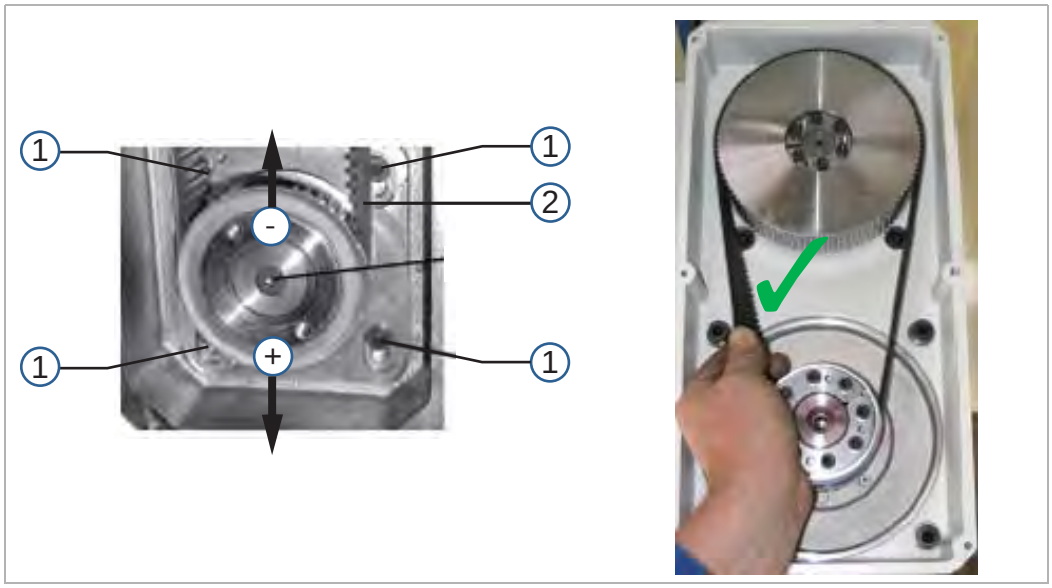


Abb. 10: Replacing the toothed belt

9.5.2 Replacing the drive motor

WARNING ***Crushing hazard***
The uncoupling of the drive unit and the rotating plate can cause the rotating plate to move independently. Never reach into the area around rotating parts. Secure the rotating plate so that it cannot move independently prior to carrying out any servicing task. Reaching into the area around rotating parts can lead to crush injuries.

1. Disconnect the motor and brake.
1. Remove the cover of the toothed belt box.
2. Only loosen the four fixing screws [1] for the motor flange.
3. Slacken the toothed belt [2] by moving the motor in the slots [-], and remove.
4. For standard version [A]: Remove screw from cover plate [3] and pull toothed belt pulley [4] off the motor shaft.
5. For custom adjustment [B]: Loosen clamping set [5] screws and remove clamping set with toothed belt pulley [6].
6. Unscrew the four fixing screws [1] for the motor flange and take off the motor.
7. Place the new motor on and screw in the four fixing screws [1] for the motor flange, but do not tighten them yet.
8. Install toothed belt pulley [4] with cover plate [3] or clamping set and tighten screws criss-cross using 15 Nm.
9. Pull on the toothed belt [2].
10. Tighten the toothed belt by moving the motor in the slots [+] and firmly tighten the four fastening screws [1] for the motor flange.

NOTICE *The toothed belt is correctly tensioned if - depending on the belt length - it can easily be turned by 45° to 90° at the middle.*

11. Connect the motor and brake.
12. Perform a trial run.
13. Check tension of toothed belt and adjust if necessary.
14. Cover plate of the toothed belt box

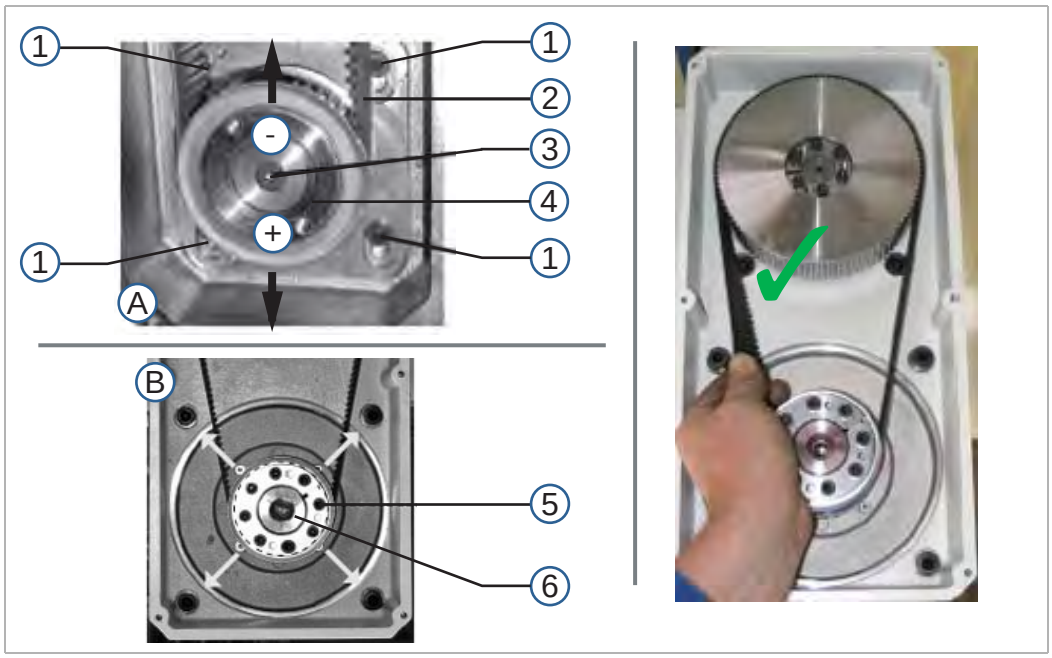


Abb. 11: Replacing the drive motor

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 cause 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 ***Modules should be disposed of correctly!***
Incorrect disposal of modules can cause environmental damage and will be prosecuted!
Dispose of modules 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
eMail: service@weiss-gmbh.de
Internet:http://www.weiss-gmbh.de

All our representative addresses can be obtained 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.

12 Appendix

12.1 Index

12.2 Personal notes


1
2

Weiss GmbH | Siemensstraße 17 | D-74722 Buchen
Telefon +49(0)6281-5208-0 | Fax +49(0)6281-520899 | info@weiss-gmbh.de | www.weiss-gmbh.de