ROTARY INDEXING TABLE
TC

ASSEMBLY AND INSTRUCTION MANUAL

Mechanical system documentation
Rotary indexing tables TC

EN 01-2014

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15.10.2011	R10-2011	All	Revision Safety
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1 Introduction

1.1 Definition

A rotary indexing table of the TC series is an electromechanical rotary indexing table.

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

1.2 Intended use

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

The machine 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 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.

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

1.3 Non-intended use

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

The machine should not be subject to loads beyond its maximum capacity. Possible additions to the rotary table are defined in the order specifications and must be adhered. 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 / Standards

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 described below with the serial number TCXXXXXX is designed to be installed in another machine, or to be combined with other machines to form a larger machine in accordance with 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 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.

- “Electromechanical TC rotary indexing tables” information brochure
- Operating manual for the control card used
  - TS 004E control card
  - EF control card

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 that 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 observed.

This operating manual describes handling of the machine and contains important instructions and information to assist you in using the machine as intended.

These operating instructions are intended for trained technical personnel or persons who have been instructed. The operating manual must always be stored at the site of installation, and must be read, understood and observed by all persons who work with or on the machine.

Safety instructions in individual chapters should be observed.

1.7.1 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:

DANGER	***A warning triangle with the signal word DANGER indicates an immediate hazardous situation, which, if not avoided, will lead to fatalities or severe injuries.***
WARNING	***A warning triangle with the signal word WARNING indicates an potential hazardous situation, which, if not avoided, can lead to fatalities or severe 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

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.

1.7.3 Figures

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

1.7.4 Directory of valid pages

Pages of this operating manual including the title page: 84

1.8 Guarantee

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

In application of a WEISS control the guarantee extends to 4 years.

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.

2.1.2 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:

- Installation
- Commissioning
- Operating
- 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:

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

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 use of the machine, the machine is not designed for use in a potentially-explosive atmosphere. The operator must take all measures to ensure that the machine is only operated as intended.

Risk of injuries due to burning.
The servo motor and the brake can reach temperatures of up to 100 °C during operation, and the (optionally) installed brake resistor can reach a temperature of up to 200 °C. 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 arise from 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 result of impermissible changes. Do not make any changes to the machine. Failuire to comply by these instructions can lead to personal injury.

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

2.3.2 Residual hazards due to electrical causes

WARNING

Electric shocks can cause serious or 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 rotary indexing table fundamentally consists of the table housing [1], the rotating plate [2], a step-by-step cam gearing mechanism [3] and the drive unit [4].

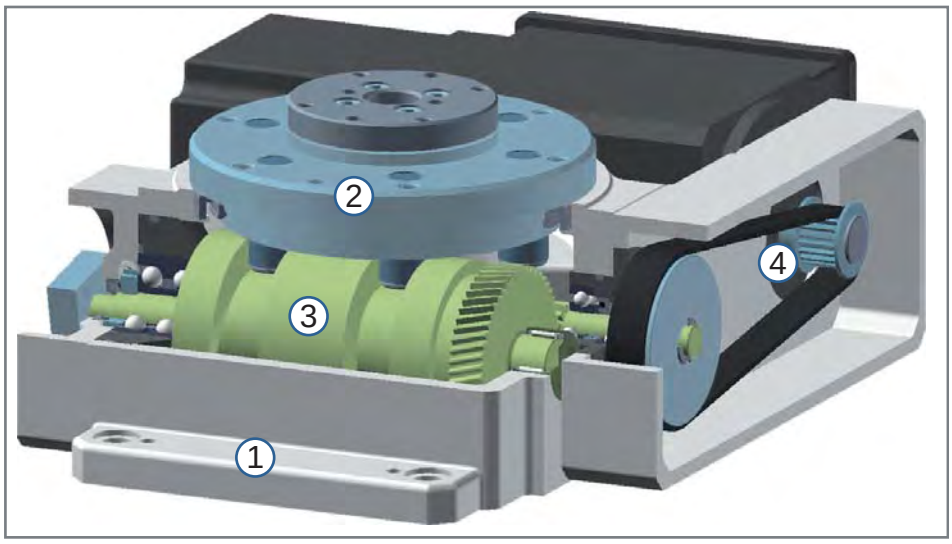


Fig. 1: Machine modules

3.2 Function

The machine is used to convey payloads to predetermined positions via clocked rotational motion.

A three-phase brake motor drives a step-by-step cam gearing mechanism with sinusoidal acceleration and braking properties. This enables a very gentle start-up and stopping of the rotational motion.

The force flows from the motor via toothed belts and a one- or two-stage gearing mechanism directly to the drive cam.

The motor only runs for the duration of the rotary phase of the machine and is shut off on reaching the locking mechanism.

During the locking phase, a dual-surface brake designed for dry running holds the rotating plate in position via spring tension.

Activating the brake voltage causes the brake to be bled electromagnetically.

During the rotational phase, the cam rolls (with needle bearings) follow the curved path of the drive cam.

During the locking phase, two pre-tensioned cam rolls are in contact with the drive cam.

The position cam attached to the drive cam is scanned by a proximity switch.

If the proximity switch is on, then the rotating plate is securely locked in one of the available positions. A corresponding message is issued by the control unit.

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 order information or order specifications 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 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

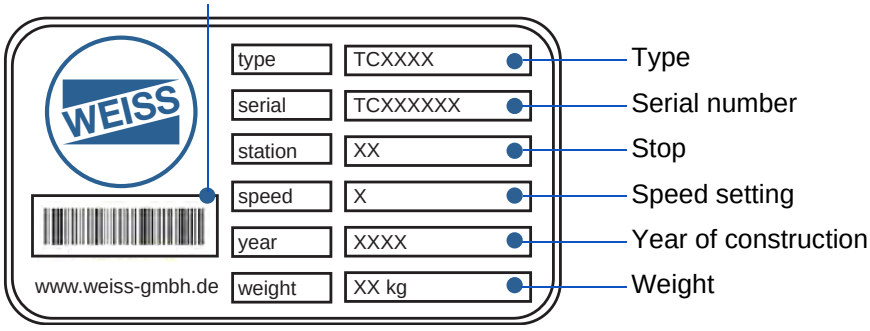


Fig. 2: Example of a type plate

3.3.3 Sound level

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

3.3.4 Electrical connections

Operating voltage	Data for electrical connections is governed by the order in question. 230/400 VAC, 50 Hz or 277/480 VAC, 60 Hz (Non-standard voltages can be accommodated upon request.)
Brake voltage	24 VDC ± 10%
Cooling fan (only for TC 1000 machines)	230 VAC, 50/60 Hz, 0.075 A The motor connection has to have a moderately-quick-action fuse (0.1 A).

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 Proximity switch

Type	M12x1, non-flush installation
Switch function	PNP, normally open contact
Voltage	10 - 30 VDC

3.3.6 Response times

There is a minimum response time, which is dependent on the moment of inertia and the number of stops.

NOTICE ***The response time must always exceed this value.***

If the response time has to be altered subsequently, then this can be achieved by using a different toothed-belt transmission or fitting a 4-, 6- or 8-pole motor.

Suitable transmissions will be calculated by us. We can supply the required parts.

3.3.7 Ambient conditions and weight

Ambient temperature	between +10 °C and +40 °C	
Weight	TC120	22 kg
	TC150	23 kg
	TC220	44 kg
	TC320	112 kg
	TC500	305 kg
	TC700	660 kg
	TC1000	1530 kg

3.3.8 Installation positions

Permissible installation positions for the machine are:

- horizontal [1]
- vertical with drive on right-hand side [2]
- vertical with drive below [3]
- overhead [4]

NOTICE ***The bleed screw is fitted by the manufacturer according to the ordered installation position. If the installation position according to the order specification is subsequently altered, the bleed screw has to be adjusted (see chapter 5.3.3).***
An installation position must never be selected where the bleed screw is pointing down. Otherwise, gear oil will escape from the bleed aperture.
An installation position must never be selected where the housing of the toothed-belt drive is facing upwards. Otherwise, lubrication can no longer be ensured.

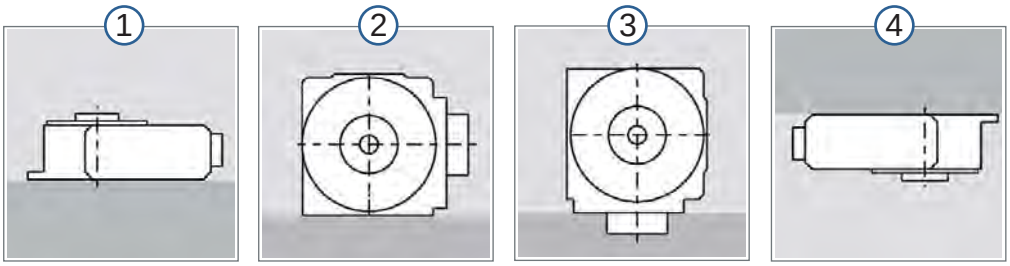


Fig. 3: Installation positions

3.3.9 Drive positions

Permissible motor drive positions for table types TC120 to TC700:

- lateral, inside [A]
- lateral, outside [B]
- below, inside [C]
- below, outside [D]

NOTICE ***These drive positions are permissible for all installation positions (see chapter 3.3.8).***

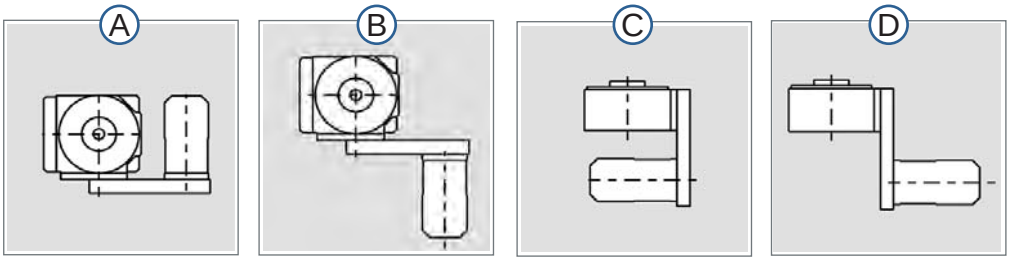


Fig. 4: Drive positions

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).***
For the TC1000 rotary indexing table, the motor is fitted inside the table housing It is not possible to alter the drive position for a table of this type.

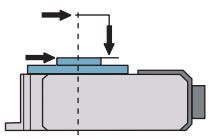
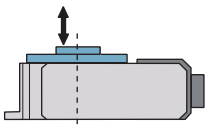
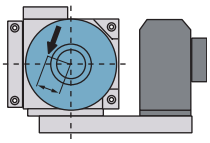
3.4 Specific technical data

3.4.1 Table type: TC 120G

Recomm. max. structural diameter:	Approx. 600 mm
Table diameter:	120 mm
Direction of rotation:	left, right or alternating
Number of stops:	2, 4, 5, 6, 8, 10, 12, 16, 20 (Alternative numbers of stops available on request.)
Switching frequency	Up to 200 cycles/min, dependent on the moment of inertia and the angle of rotation
Drive power:	0.045 - 0.12 kW; BG 56
Pitch accuracy (arc seconds):	Stop 2-10: ± 45" Stop 12-20: ± 55" (Increased pitch accuracy on request)
Pitch accuracy (arc length):	Stop 2-10: ± 0.013 mm (for 120-mm diameter) Stop 12-20: ± 0.016 mm (for 120-mm diameter)
max. axial run-out of the plate:	0.02 mm (for 120-mm diameter)
max. excentricity:	0.02 mm
Max. plane parallelism of the table surface to the housing surface	0.04 mm (for 120-mm diameter)

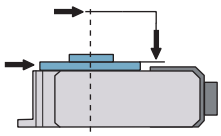
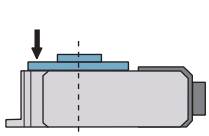
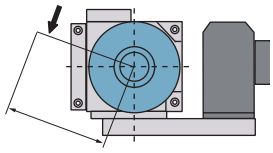
3.4.1.1 Load data for the TC 120G

Fixed centre plate

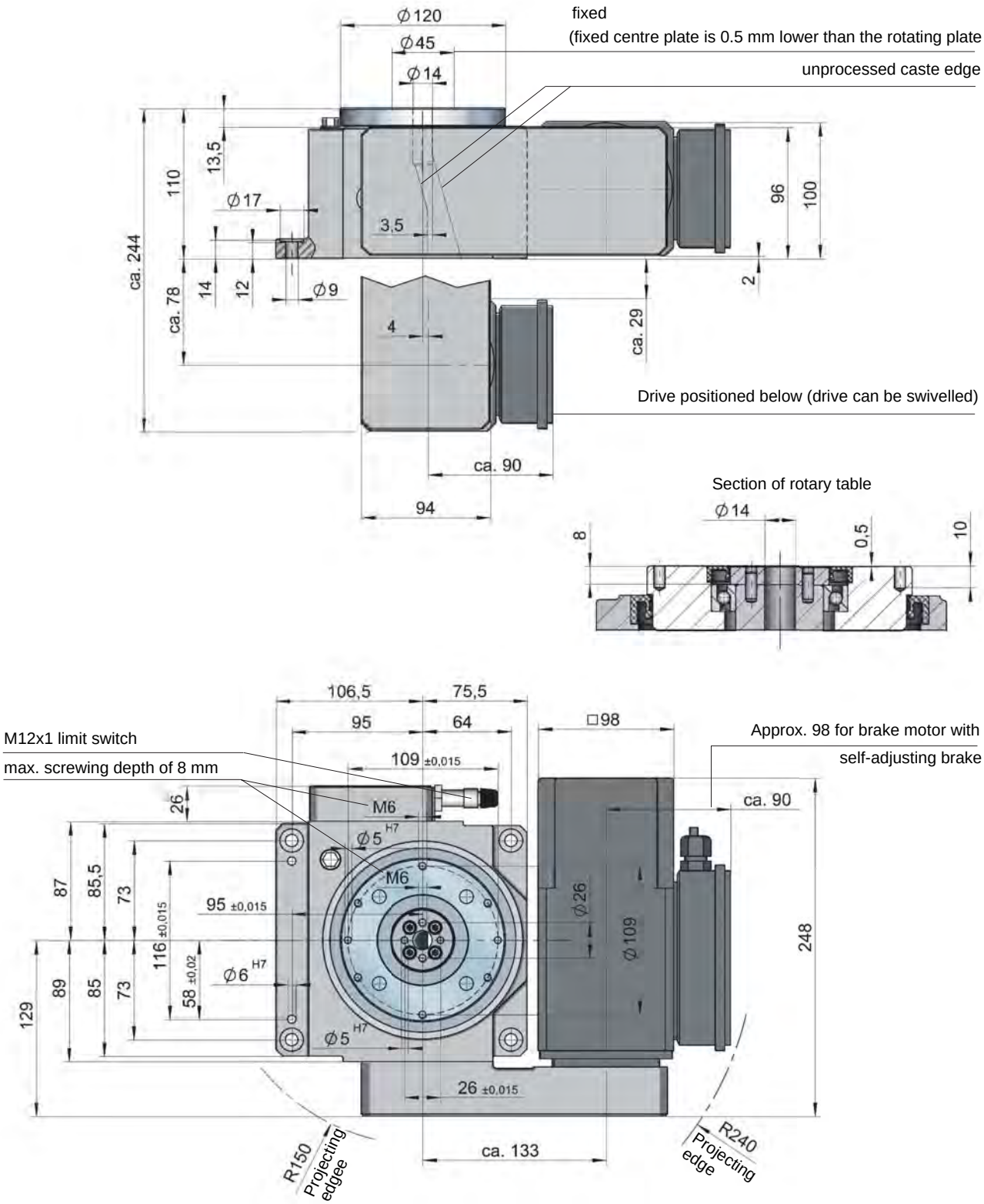
permissible pull-out torque	**150 Nm**	permissible down-force	**3000 N**	permissible tangen-tial torque	**120 Nm**
permissible radial force	**2000 N**				

Rotating plate

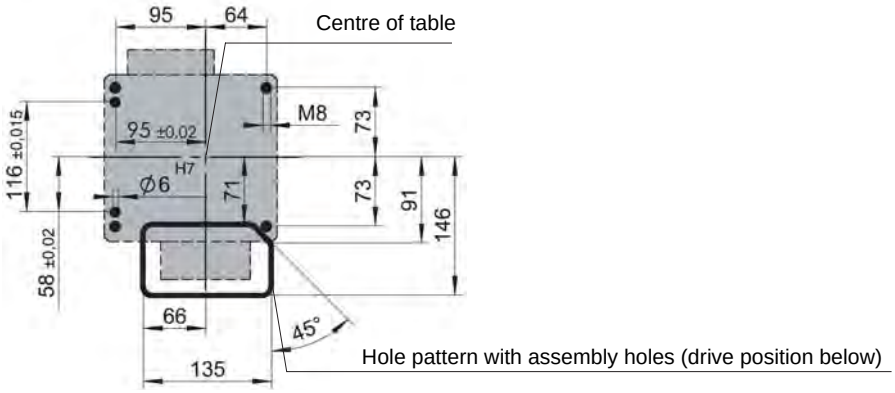




permissible pull-out torque locked rotary plate	**200 Nm**	permissible working force acting vertically at the locked rotating plate and within the nominal diameter	**3300 N**	Permissible tangen-tial moment at the lok-ked rotating plate	**120 Nm**
permissible pull-out torque with locked rotary plate	**2000 N**				

3.4.1.2 Dimensions for the TC 120G



3.4.1.3 Hole pattern for the TC 120G



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

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

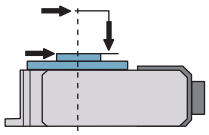
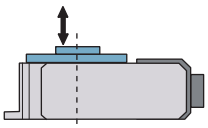
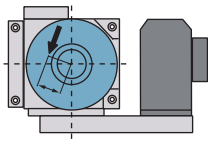
Max. torsional tolerance between the fixed central plate and the rotating plate: +/- 250".

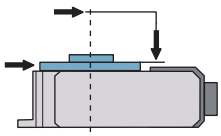
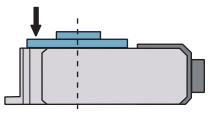
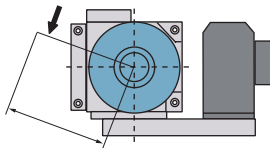
Max. torsional tolerance between the rotating plate and the table housing: +/- 130".

3.4.2 Table type: TC 150T

Recomm. max. structural diameter:	Approx. 800 mm
Table diameter:	150 mm
Direction of rotation:	left, right or alternating
Number of stops:	2, 3, 4, 6, 8, 10, 12, 16, 20, 24 (Alternative numbers of stops available on request.)
Switching frequency	Up to 210 cycles/min, dependent on the moment of inertia and the angle of rotation
Drive power:	0.045 - 0.12 kW; BG 56
Pitch accuracy (arc seconds):	Stop 2-12: ± 30" Stop 16-24: ± 45" (Increased pitch accuracy on request)
Pitch accuracy (arc length):	Stop 2-12: ± 0.011 mm (for 150-mm diameter) Stop 16-24: ± 0.016 mm (for 150-mm diameter)
max. axial run-out of the plate:	0.01 mm (for Ø 150 mm)
max. excentricity:	0.01 mm
Max. plane parallelism of the table surface to the housing surface	0.03 mm (for Ø 150 mm)
Mounting plate:	80 mm

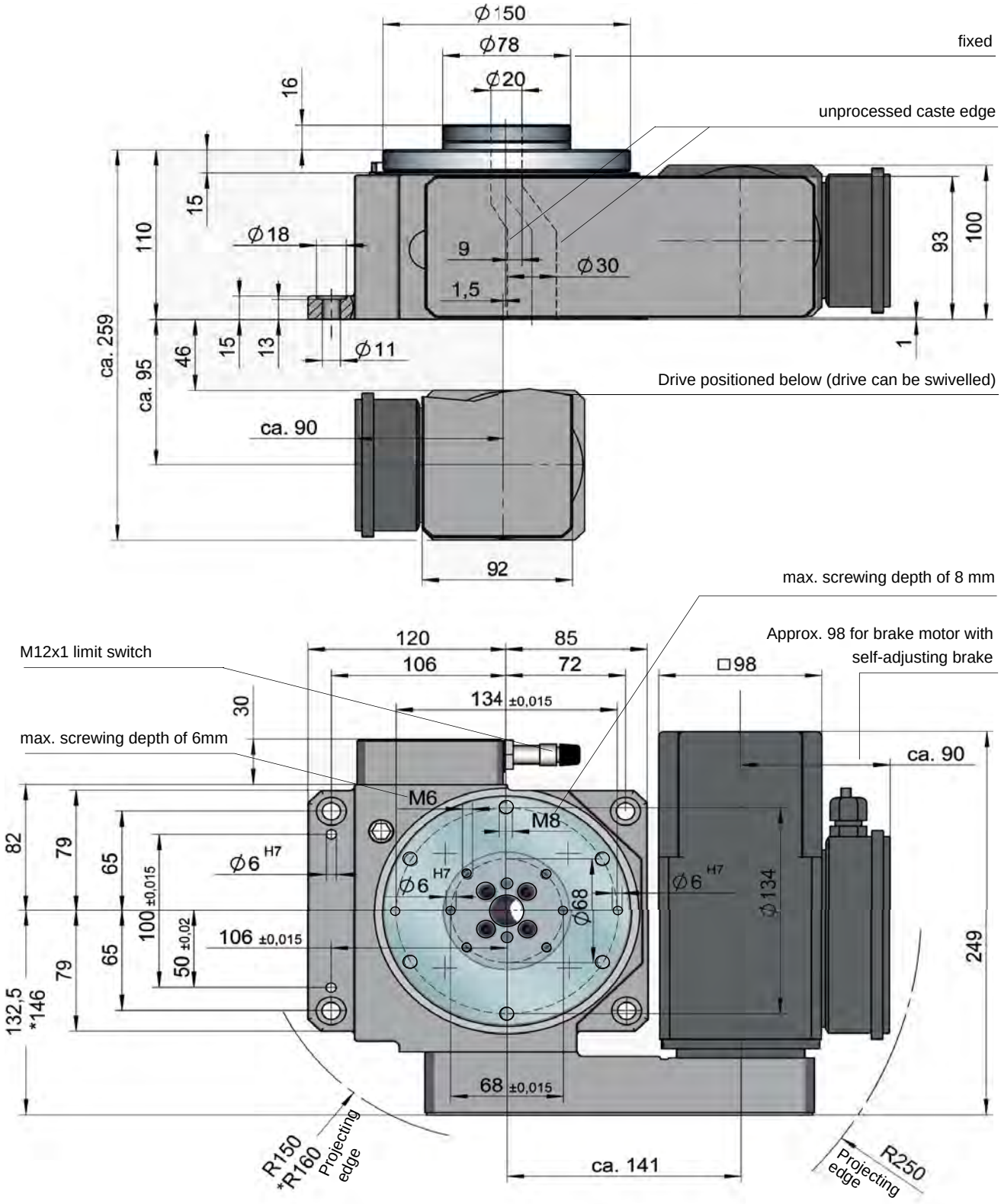
3.4.2.1 Load data for the TC 150T

Fixed centre plate					
					
permissible pull-out torque	**200 Nm**	permissible down-force	**3500 N**	permissible tangen-tial torque	**150 Nm**
permissible radial force	**2500 N**				

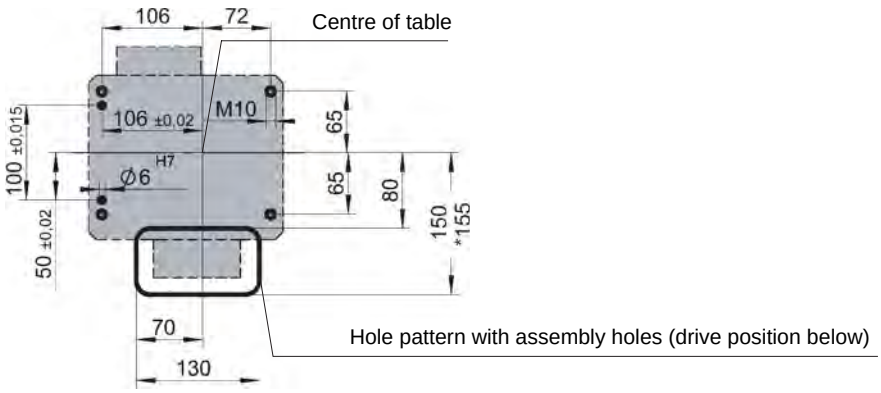
Rotating plate					
					
permissible pull-out torque locked rotary plate	**500 Nm**	permissible working force acting vertically at the locked rotating plate and within the nominal diameter	**5500 N** **16500 N***	Permissible tangen-tial moment at the lok-ked rotating plate	**150 Nm**
permissible pull-out torque with locked rotary plate	**6000 N**				

* stronger plate bearings available on request

3.4.2.2 Dimensions for the TC 150T



3.4.2.3 Hole pattern for the TC 150T



* only for speed levels h - j

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

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

Max. torsional tolerance between the fixed central plate and the rotating plate: +/- 180".

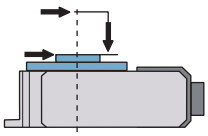
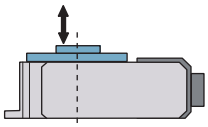
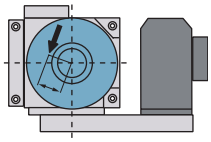
Max. torsional tolerance between the rotating plate and the table housing: +/- 120".

3.4.3 Table type: TC 220T

Recomm. max. structural diameter:	Approx. 1100 mm
Table diameter:	220 mm
Direction of rotation:	left, right or alternating
Number of stops:	2, 3, 4, 6, 8, 10, 12, 16, 20, 24, 30, 36 (Alternative numbers of stops available on request.)
Switching frequency	Up to 220 cycles/min, dependent on the moment of inertia and the angle of rotation
Drive power:	0.06 - 1.1 kW; BG 63/71
Pitch accuracy (arc seconds):	Stop 2-12: ± 20" Stop 16-24: ± 30" Stop 30-36: ± 40" (Increased pitch accuracy on request)
Pitch accuracy (arc length):	Stop 2-12: ± 0.011 mm (for 220-mm diameter) Stop 16-24: ± 0.016 mm (for 220-mm diameter) Stop 30-36: ± 0.021 mm (for 220-mm diameter)
max. axial run-out of the plate:	0.01 mm (for 220-mm diameter)
max. excentricity:	0.01 mm
Max. plane parallelism of the table surface to the housing surface	0.03 mm (for 220-mm diameter)
Mounting plate:	96 mm

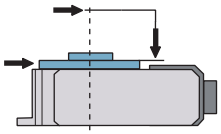
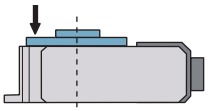
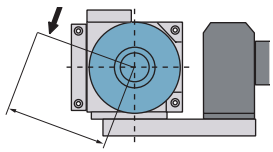
3.4.3.1 Load data for the TC 220T

Fixed centre plate

permissible pull-out torque	**300 Nm**	permissible down-force	**5000 N**	permissible tangen-tial torque	**200 Nm**
permissible radial force	**4000 N**				

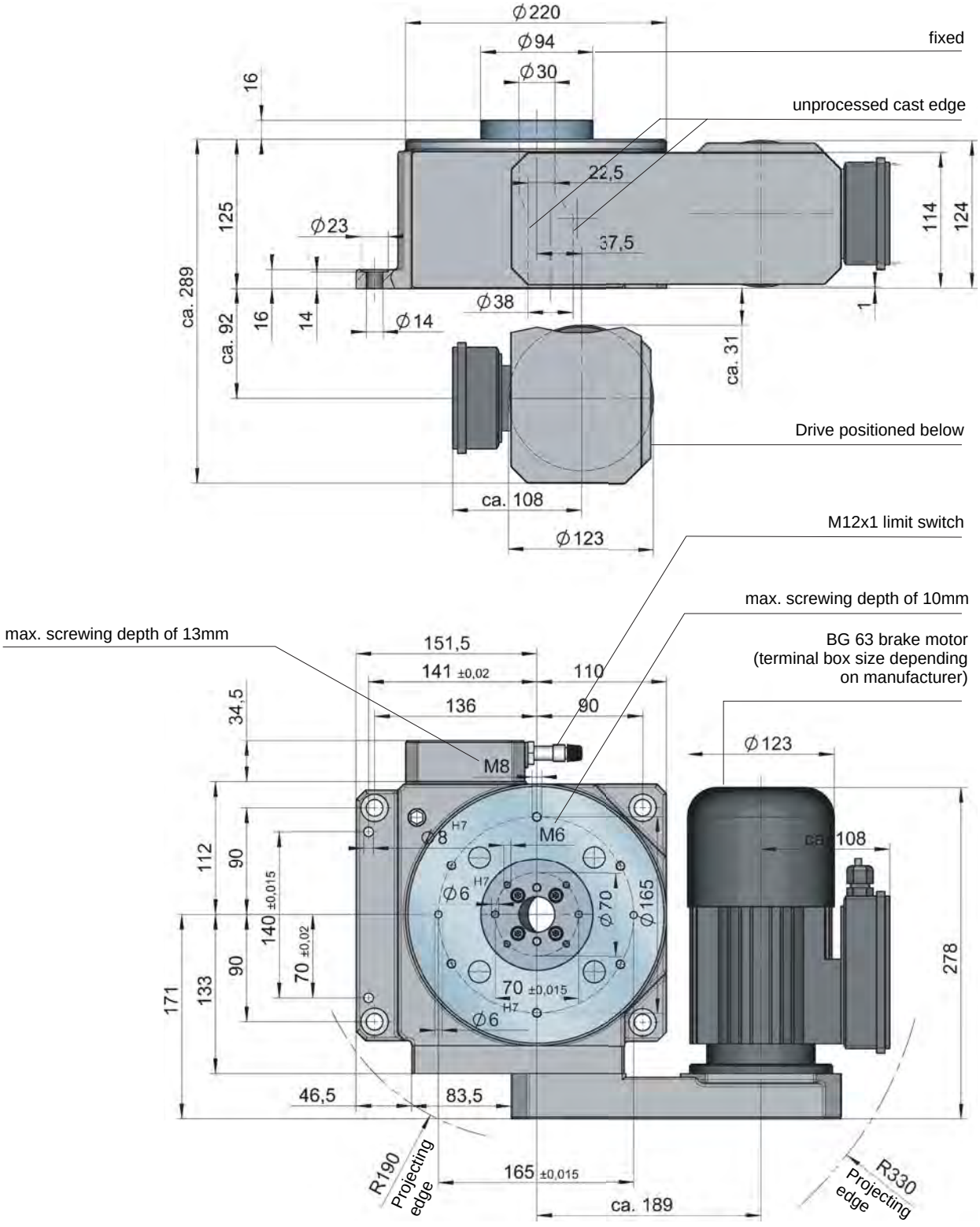
Rotating plate

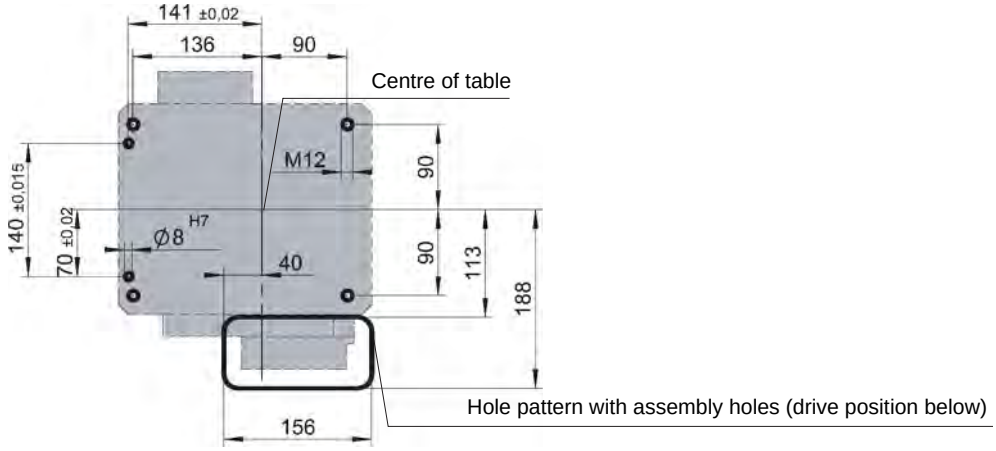
permissible pull-out torque locked rotary plate	**700 Nm** **2100 Nm***	permissible working force acting vertically at the locked rotating plate and within the nominal diameter	**7500 N** **22500 N***	Permissible tangen-tial moment at the lok-ked rotating plate	**200 Nm**
permissible pull-out torque with locked rotary plate	**8000 N**				

* stronger plate bearings available on request

3.4.3.2 Dimensions for the TC 220T



3.4.3.3 Hole pattern for the TC 220T



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

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

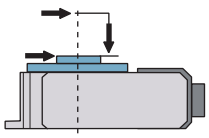
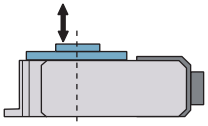
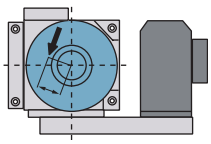
Max. torsional tolerance between the fixed central plate and the rotating plate: +/- 150".

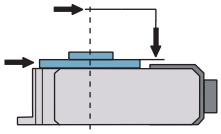
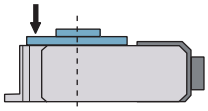
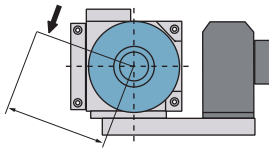
Max. torsional tolerance between the rotating plate and the table housing: +/- 100".

3.4.4 Table type: TC 320T

Recomm. max. structural diameter:	Approx. 1400 mm
Table diameter:	320 mm
Direction of rotation:	left, right or alternating
Number of stops:	2, 3, 4, 6, 8, 10, 12, 16, 20, 24, 30, 36 (Alternative numbers of stops available on request.)
Switching frequency	Up to 200 cycles/min, dependent on the moment of inertia and the angle of rotation
Drive power:	0.12 - 1.1 kW; BG 71/80
Pitch accuracy (arc seconds):	Stop 2-12: ± 20" Stop 16-24: ± 30" Stop 30-36: ± 35" (Increased pitch accuracy on request)
Pitch accuracy (arc length):	Stop 2-12: ± 0.016 mm (for 320-mm diameter) Stop 16-24: ± 0.023 mm (for 320-mm diameter) Stop 30-36: ± 0.027 mm (for 320-mm diameter)
max. axial run-out of the plate:	0.01 mm (for 320-mm diameter)
max. excentricity:	0.01 mm
Max. plane parallelism of the table surface to the housing surface	0.03 mm (for 320-mm diameter)
Mounting plate:	150 mm

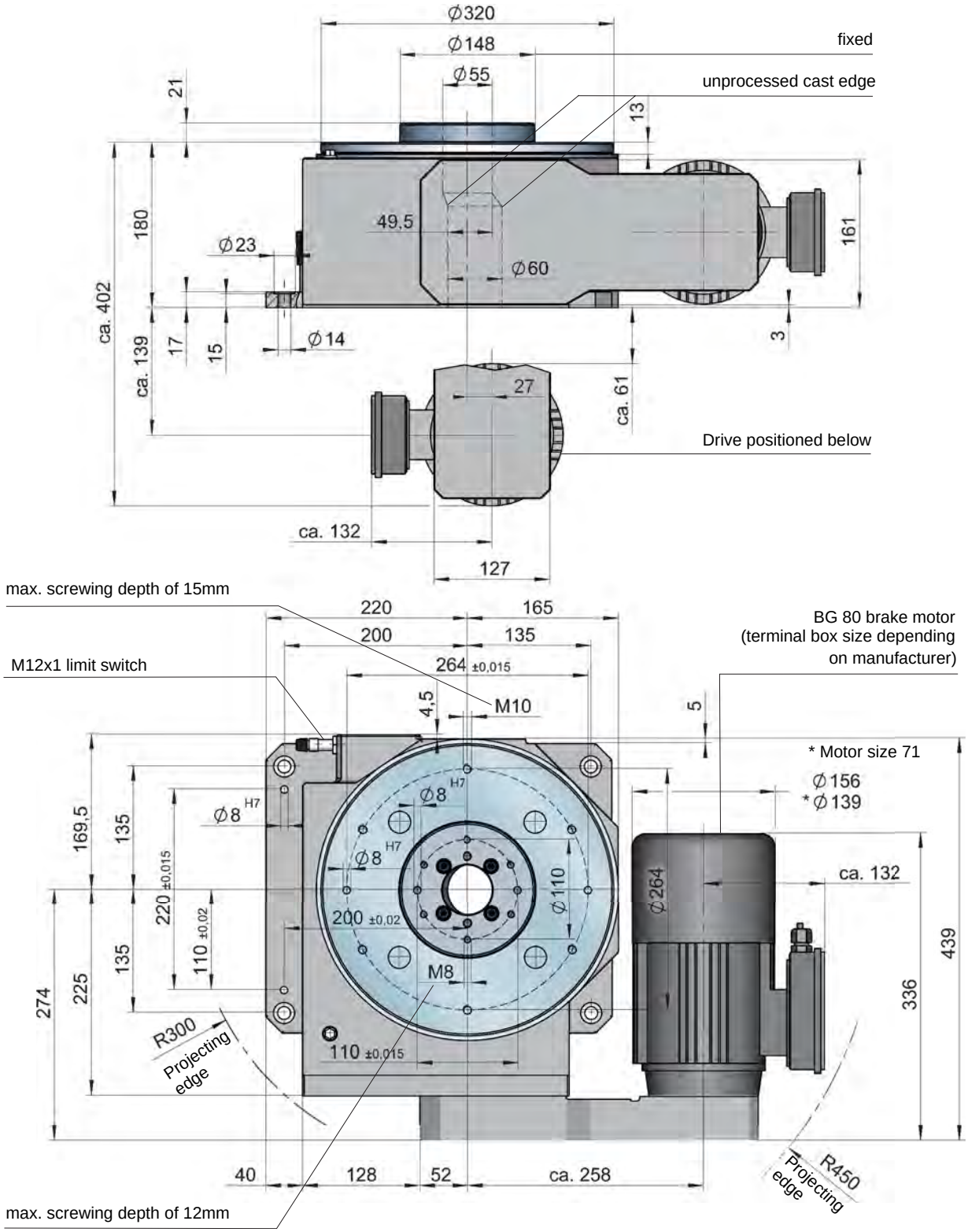
3.4.4.1 Load data for the TC 320T

Fixed centre plate					
					
permissible pull-out torque	**1800 Nm**	permissible down-force	**18000 N**	permissible tangen-tial torque	**800 Nm**
permissible radial force	**10000 N**				

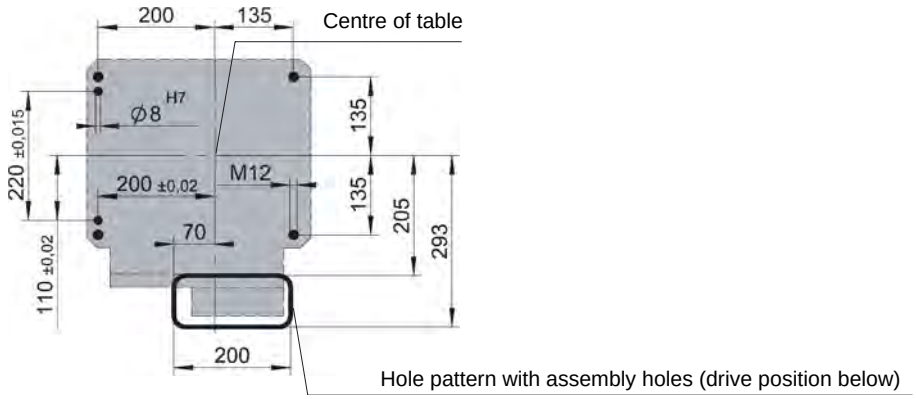
Rotating plate					
					
permissible pull-out torque locked rotary plate	**2250 Nm** **6750 Nm***	permissible working force acting vertically at the locked rotating plate and within the nominal diameter	**15000 N** **45000 N***	permissible tangen-tial torque	**600 Nm**
permissible pull-out torque with locked rotary plate	**15000 N**				

* stronger plate bearings available on request

3.4.4.2 Dimensions for the TC 320T



3.4.4.3 Hole pattern for the TC 320T



* only for speed levels h - j

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

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

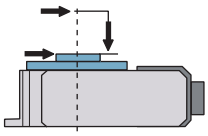
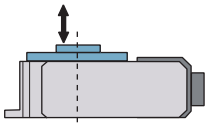
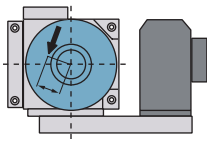
Max. torsional tolerance between the fixed central plate and the rotating plate: +/- 130".

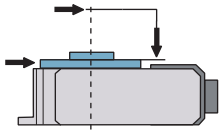
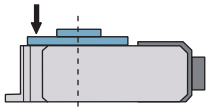
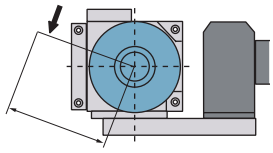
Max. torsional tolerance between the rotating plate and the table housing: +/- 80".

3.4.5 Table type: TC 500T

Recomm. max. structural diameter:	Approx. 2000 mm
Table diameter:	500 mm
Direction of rotation:	left, right or alternating
Number of stops:	2, 3, 4, 6, 8, 10, 12, 16, 20, 24, 30, 36, 48 (Alternative numbers of stops available on request.)
Switching frequency	Up to 180 cycles/min, dependent on the moment of inertia and the angle of rotation
Drive power:	0.25 - 2.2 kW; BG 80/90
Pitch accuracy (arc seconds):	Stop 2-12: ± 15" Stop 16-48: ± 20" (Increased pitch accuracy on request)
Pitch accuracy (arc length):	Stop 2-12: ± 0.018 mm (for 500-mm diameter) Stop 16-48: ± 0.024 mm (for 500-mm diameter)
max. axial run-out of the plate:	0.015 mm (for 500-mm diameter)
max. excentricity:	0.015 mm
Max. plane parallelism of the table surface to the housing surface	0.03 mm (for 500-mm diameter)
Mounting plate:	242 mm

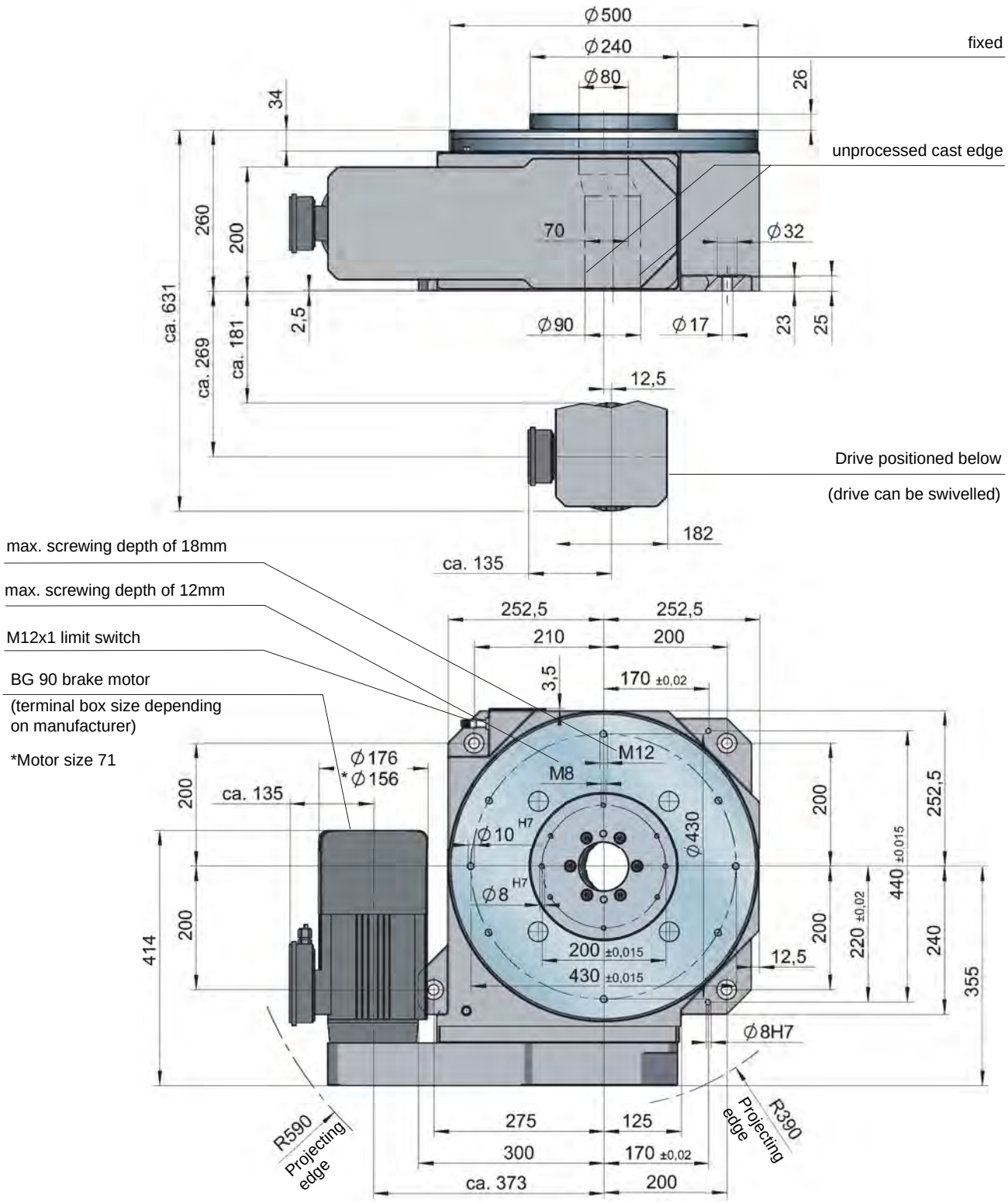
3.4.5.1 Load data for the TC 500T

Fixed centre plate					
					
permissible pull-out torque	**2500 Nm**	permissible down-force	**25000 N**	permissible tangen-tial torque	**1100 Nm**
permissible radial force	**15000 N**				

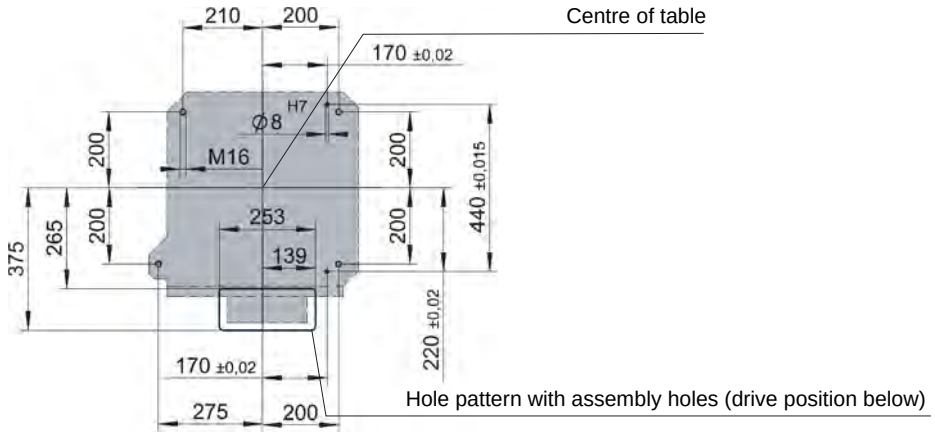
Rotating plate					
					
permissible pull-out torque locked rotary plate	**6000 Nm** **18000 Nm***	permissible working force acting vertically at the locked rotating plate and within the nominal diameter	**25000** **75000 N***	permissible tangen-tial torque	**1000 Nm**
permissible pull-out torque with locked rotary plate	**25000 N**				

* stronger plate bearings available on request

3.4.5.2 Dimensions for the TC 500T



3.4.5.3 Hole pattern for the TC 500T



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

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

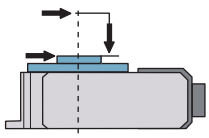
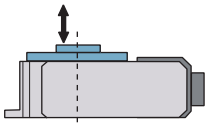
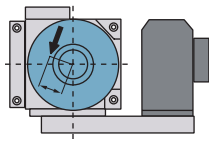
Max. torsional tolerance between the fixed central plate and the rotating plate: +/- 75".

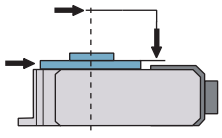
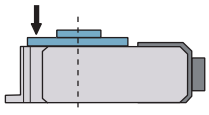
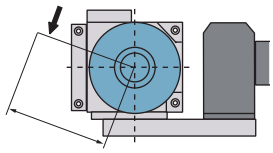
Max. torsional tolerance between the rotating plate and the table housing: +/- 55".

3.4.6 Table type: TC 700T

Recomm. max. structural diameter:	Approx. 3000 mm
Table diameter:	700 mm
Direction of rotation:	left, right or alternating
Number of stops:	2, 3, 4, 6, 8, 10, 12, 16, 20, 24, 30, 36, 48, 60 (Alternative numbers of stops available on request.)
Switching frequency	Up to 120 cycles/min, dependent on the moment of inertia and the angle of rotation
Drive power:	0.37 - 3.0 kW; BG 80/90/100
Pitch accuracy (arc seconds):	Stop 2-12: ± 12" Stop 16-60: ± 16" (Increased pitch accuracy on request)
Pitch accuracy (arc length):	Stop 2-12: ± 0.021 mm (for 700-mm diameter) Stop 16-60: ± 0.027 mm (for 700-mm diameter)
max. axial run-out of the plate:	0.015 mm (for 700-mm diameter)
max. excentricity:	0.015 mm
Max. plane parallelism of the table surface to the housing surface	0.03 mm (for 700-mm diameter)
Mounting plate:	242 mm

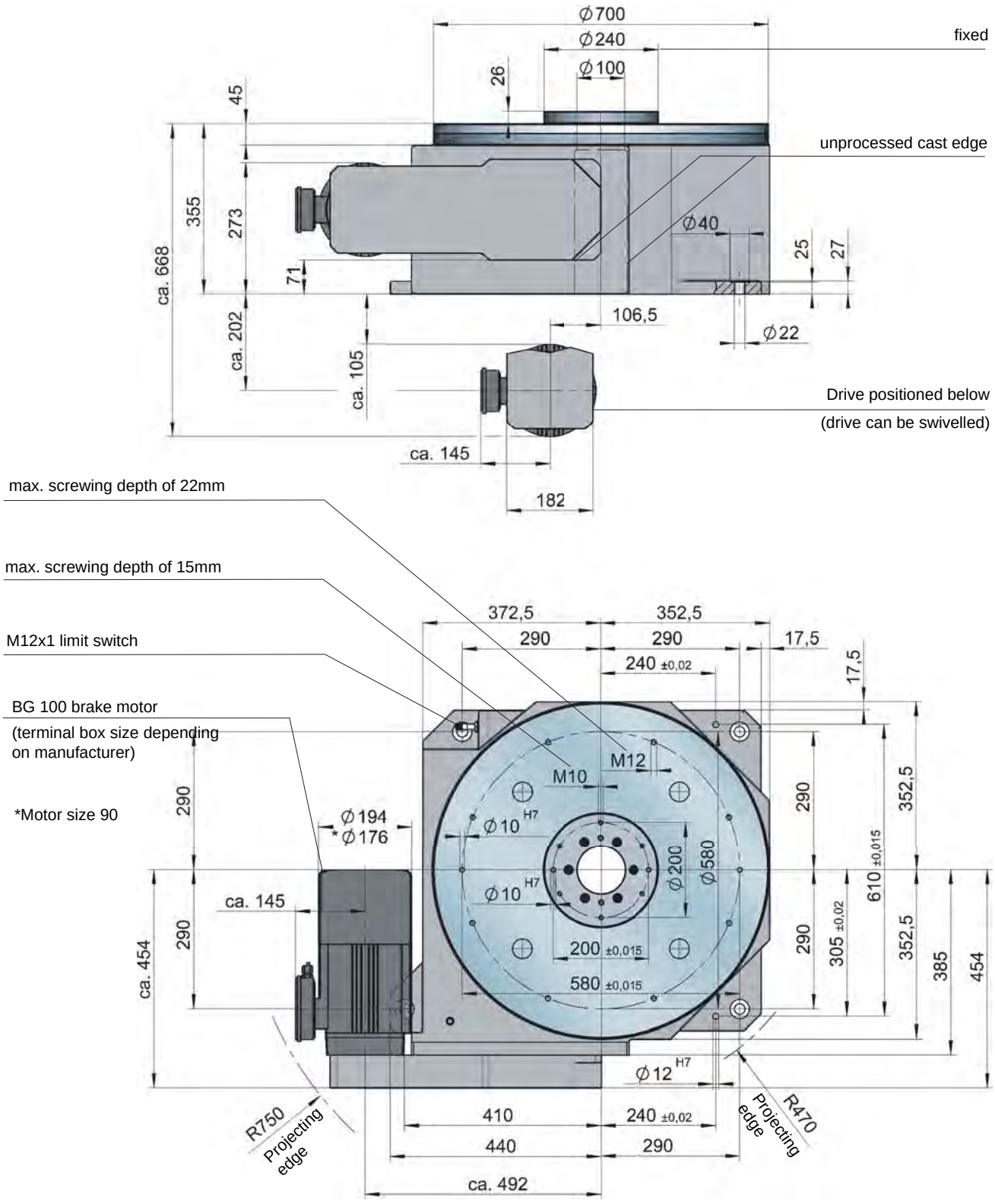
3.4.6.1 Load data for the TC 700T

Fixed centre plate					
					
permissible pull-out torque	**3000 Nm 5000 Nm***	permissible down-force	**30000 N 40000 N***	permissible tangen-tial torque	**1400 Nm**
permissible radial force	**17000 N**				

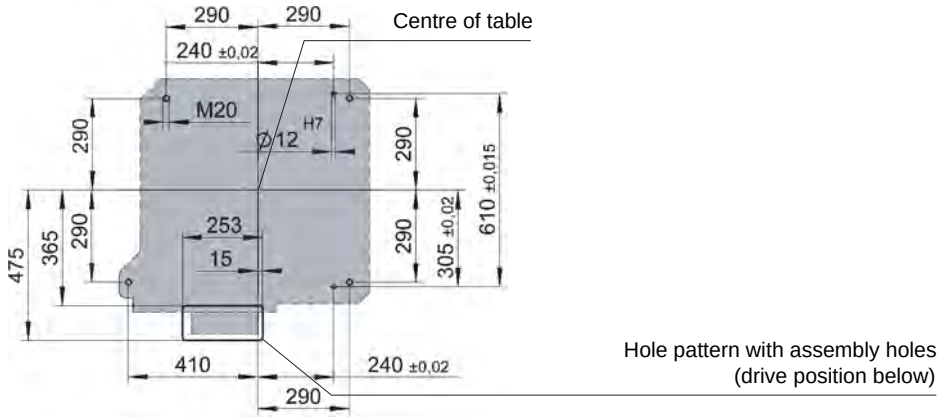
Rotating plate					
					
permissible pull-out torque locked rotary plate	**10000 Nm 30000 Nm***	permissible working force acting vertically at the locked rotating plate and within the nominal diameter	**40000 N 120000 N***	permissible tangen-tial torque	**1700 Nm**
permissible pull-out torque with locked rotary plate	**30000 N**				

* stronger plate bearings available on request

3.4.6.2 Dimensions for the TC 700T



3.4.6.3 Hole pattern for the TC 700T



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

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

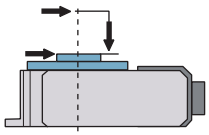
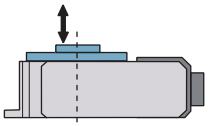
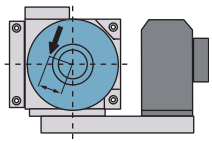
Max. torsional tolerance between the fixed central plate and the rotating plate: +/- 60".

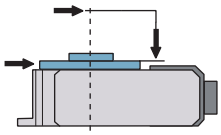
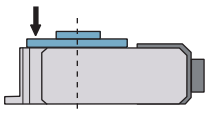
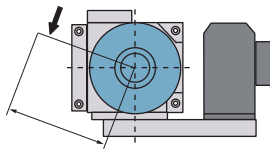
Max. torsional tolerance between the rotating plate and the table housing: +/- 40".

3.4.7 Table type: TC 1000T

Recomm. max. structural diameter:	Approx. 5000 mm
Table diameter:	1000 mm
Direction of rotation:	left, right or alternating
Number of stops:	2, 3, 4, 6, 8, 10, 12, 16, 20, 24, 32 (Alternative numbers of stops available on request.)
Switching frequency	Up to 60 cycles/min, dependent on the moment of inertia and the angle of rotation
Drive power:	0.55 - 3.0 kW; BG 90
Pitch accuracy (arc seconds):	Stop 2-20: ± 12" Stop 24-32: ± 16" (Increased pitch accuracy on request)
Pitch accuracy (arc length):	Stop 2-20: ± 0.029 mm (for 1000-mm diameter) Stop 24-32: ± 0.039 mm (for 1000-mm diameter)
max. axial run-out of the plate:	0.03 mm (for 1000-mm diameter)
max. excentricity:	0.03 mm
Max. plane parallelism of the table surface to the housing surface	0.05 mm (for 1000-mm diameter)
Mounting plate:	522 mm

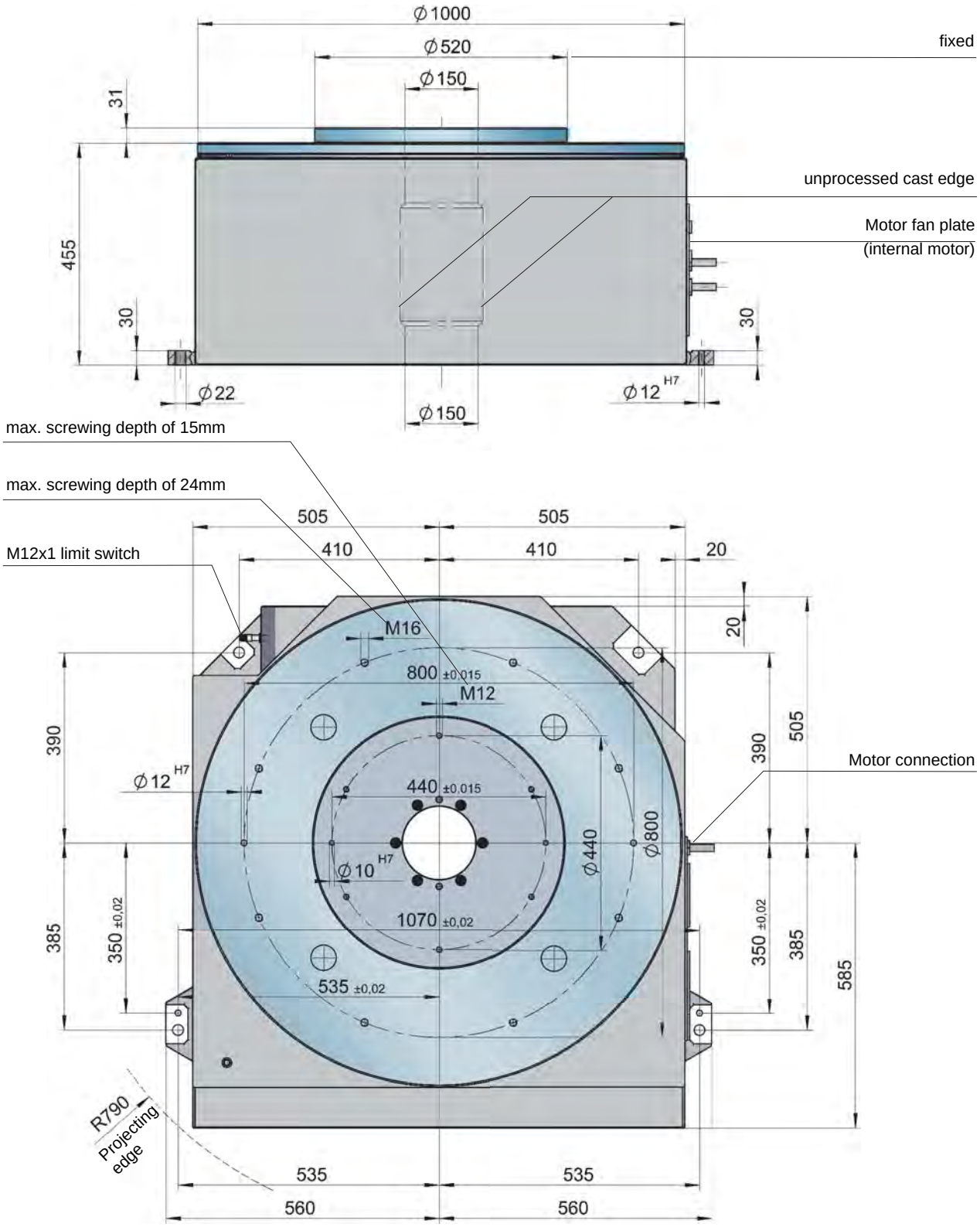
3.4.7.1 Load data for the TC 1000T

Fixed centre plate					
					
permissible pull-out torque	**5000 Nm**	permissible down-force	**40000 N**	permissible tangen-tial torque	**1800 Nm**
permissible radial force	**17000 N**				

Rotating plate					
					
permissible pull-out torque locked rotary plate	**13000 Nm** **39000 Nm***	permissible working force acting vertically at the locked rotating plate and within the nominal diameter	**80000 N** **240000 N***	permissible tangen-tial torque	**2200 Nm**
permissible pull-out torque with locked rotary plate	**45000 N**				

* stronger plate bearings available on request

3.4.7.2 Dimensions for the TC 1000T



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

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

Max. torsional tolerance between the fixed central plate and the rotating plate: +/- 45".

Max. torsional tolerance between the rotating plate and the table housing: +/- 35".

3.5 Control unit

The rotating plate can run in an anticlockwise or a clockwise direction, or can oscillate.

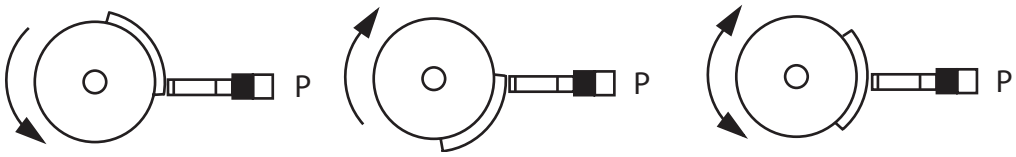


Fig. 5: Anticlockwise, clockwise or oscillatory motion

Simultaneous activation of the motor and brake sets the rotating plate of the rotary indexing table in motion.

Without the use of a control unit, the rotating plate continually moves from one locking phase to another, in a clocked manner. The pattern of motion during the cycle (acceleration - braking - stationary phase) is determined by the gearing mechanism in this case.

In order to bring the rotating plate to a stop, the activation function for the motor and brake has to be disabled.

A suitable control unit can alter the pattern of the motion from one locking phase to another.

To this end, the motor and the brake have to be switched on or off via the control unit, depending on the position cam on the drive cam.

The position cam covers the proximity switch located opposite during the locking phase. A message “P” (table in position) can be generated via the proximity switch, and this can act as the switching signal for the motor and the brake and also as a starting signal for the processing units.

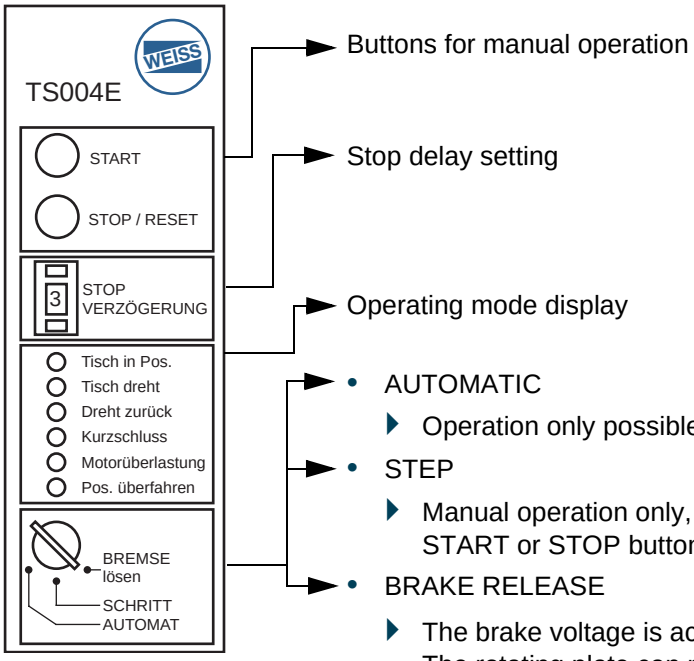
A time-optimised control can be achieved by avoiding the “dead time” associated with passing through the locking phase. Here, a stop delay has to be implemented via the control unit. This has to be set in such a way that the drive first comes to a halt at the end of the locking phase.

NOTICE **The proximity switch has to remain active, however.**

3.5.1 TS 004E control card

If a TS004E control card is used for operation, a key switch can be used to select one of three operating modes (AUTOMATIC - STEP - BRAKE RELEASE).

Operating modes are displayed by indicator lamps.



NOTICE **It is not possible to move the rotating plate into or out of a locking position manually.**

A stop delay can be set to various levels on the TS004E control card. The drive is subsequently not deactivated immediately when the proximity switch is activated (via the position cam), but instead continues to run for the set stop delay duration. This allows an optimal start position for the next cycle to be achieved.

The TS004E control card monitors the standstill during the locking phase. If the stop position is exceeded due to a fault, then this is indicated by the fault message “Pos. overrun” on the control card.

NOTICE If the fault message “Position overrun” appears, all processing stations have to be reset immediately, since the rotating plate will not be in a locked position.

There is a risk of collision.

If the stop position is being exceeded more and more frequently after longer periods of operation, then this is a telltale sign that a brake is worn or a motor contactor is defective. The brake (see chapter 9.3.2) and the motor contactor must be checked.

📖 Further information on operation with the TS004E control card can be found in the operating manual supplied for this control card.

3.5.2 EFxxx control unit

If an EF control unit is used for operation, then the three-phase motor is activated via a frequency converter. With the possibility of providing a stopping ramp, the mechanical brake is no longer necessary in normal operation (no wear). In order to prevent the brake “sticking” to the shaft, this is activated in normal operation every 5000 cycles.

In the event of a fault or an emergency stop, the mechanical fault always engages.

The necessary settings and optimisations are made on an attachable keypad. Possible faults are indicated in the plain text display. There are seven available languages.

Three operating modes (AUTOMATIC - STEP - BRAKE RELEASE) can be selected via the W10 code on the keypad.

- AUTOMATIC
  - Operation is only possible via digital I/Os.
- STEP
  - Manual operation only, achieved by pressing the START or STOP button on the keypad.
- BRAKE RELEASE
  - The rotating plate can now be rotated manually up to the mechanical locking position of the gearing mechanism.

NOTICE **It is not possible to move the rotating plate into or out of a locking position manually.**

The PLC manages three sets of parameters:

- Parameter sets 1 and 2 are freely accessible.
- Parameter set 3 is used for start-up purposes following EMERGENCY STOP situations.

During commissioning, the control unit issues a request for the table type (e.g. TC 500).

Here, default parameter settings are loaded, with which a start-up can be made immediately.

The stopping ramp is subsequently to be optimised, so that the position cam on the drive cam stops just before the end of the of the locking phase. This allows an optimal start position for the next cycle to be achieved.

The main control system issues a rising signal at the “Start slope” (I11) input and waits until the message “Table in position” (O7) is returned.

The PLC thereby automatically determines whether parameter set 3 (starting from an intermediate position) or the customer’s parameter set (1 or 2) should be loaded.

NOTICE If the fault message “Position overrun” appears, all processing stations have to be reset immediately, since the rotating plate will not be in a locked position.

There is a risk of collision.

📖 Further information on operation with the EF control unit can be found in the operating manual supplied for this unit.

3.5.3 External control (PLC)

The following tables indicate the control procedure for activating the motor and brake via an external control unit.

0	The home position is the ideal starting position	
	Motor contactor	OFF
	Brake	OFF
	“P”	Active
⇨	Rotating plate in locked position	

1	Cycle started by PLC	
	Motor contactor	OFF
	Brake	ON
	“P”	Active
⇨	Brake is released, drive cam and rotating plate are still stationary	

2	Approx. 20 ms later (50 ms for V-motors)	
	Motor contactor	ON
	Brake	ON
	“P”	Not active
⇨	Rotating plate turns	

3	Start of the locking process	
	Motor contactor	ON
	Brake	ON
	“P”	Active
⇨	Drive cam still rotating, rotating plate stationary	
⇨	Start signal for processing, start of the stop delay period	

4	Following the stop delay period	
	Motor contactor	OFF
	Brake	OFF
	“P”	Active
⇨	Drive cam stationary, rotating plate stationary in locked position	

NOTICE Following Step 4, the “P” proximity switch has to scanned constantly. If “P” becomes inactive, without a new cycle start via the PLC (“Position overrun”), all processing stations have to be reset immediately, since the rotating plate will not be in a lokked position.

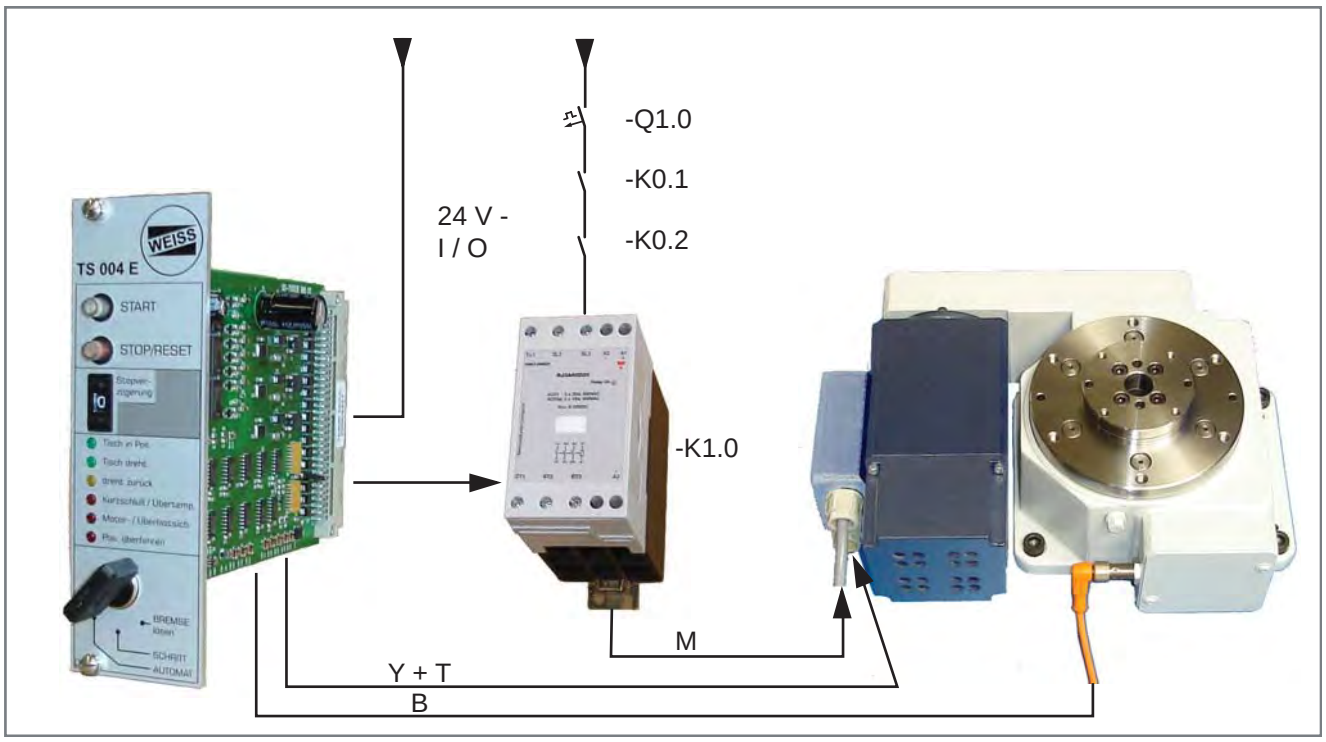
There is a risk of collision.

If the stop position is being exceeded more and more frequently after longer periods of operation, then this is a telltale sign that a brake is worn or a motor contactor is defective. The brake (see chapter 9.3.2) and the motor contactor must be checked.

3.6 Examples of circuits

3.6.1 Wiring for control unit, motor and brake

3.6.1.1 Brake motor, normal operation (24-V brake)



-Q1.0	Motor protection switch
-K0.1 -K0.2	Emergency stop relay
-K1.0	Solid-state relay
Y	Brake
B	“Table in position” sensor
T	Temperature switch
M	Motor for rotary indexing table (△ Delta connection) (Y Star-connection)

Inputs		Outputs	
I1	Direction of rotation (CW / ACW)	O4	Automatic mode active
I2	Enable	O6	Alarm: Position overrun
I3	Start	O7	Alarm: Overload
I5	Stop	O8	Alarm: Checksum fault
-	-	O9	Ready to start
-	-	O10	Table in position
-	-	-	-
-	-	-	-

3.6 Examples of circuits

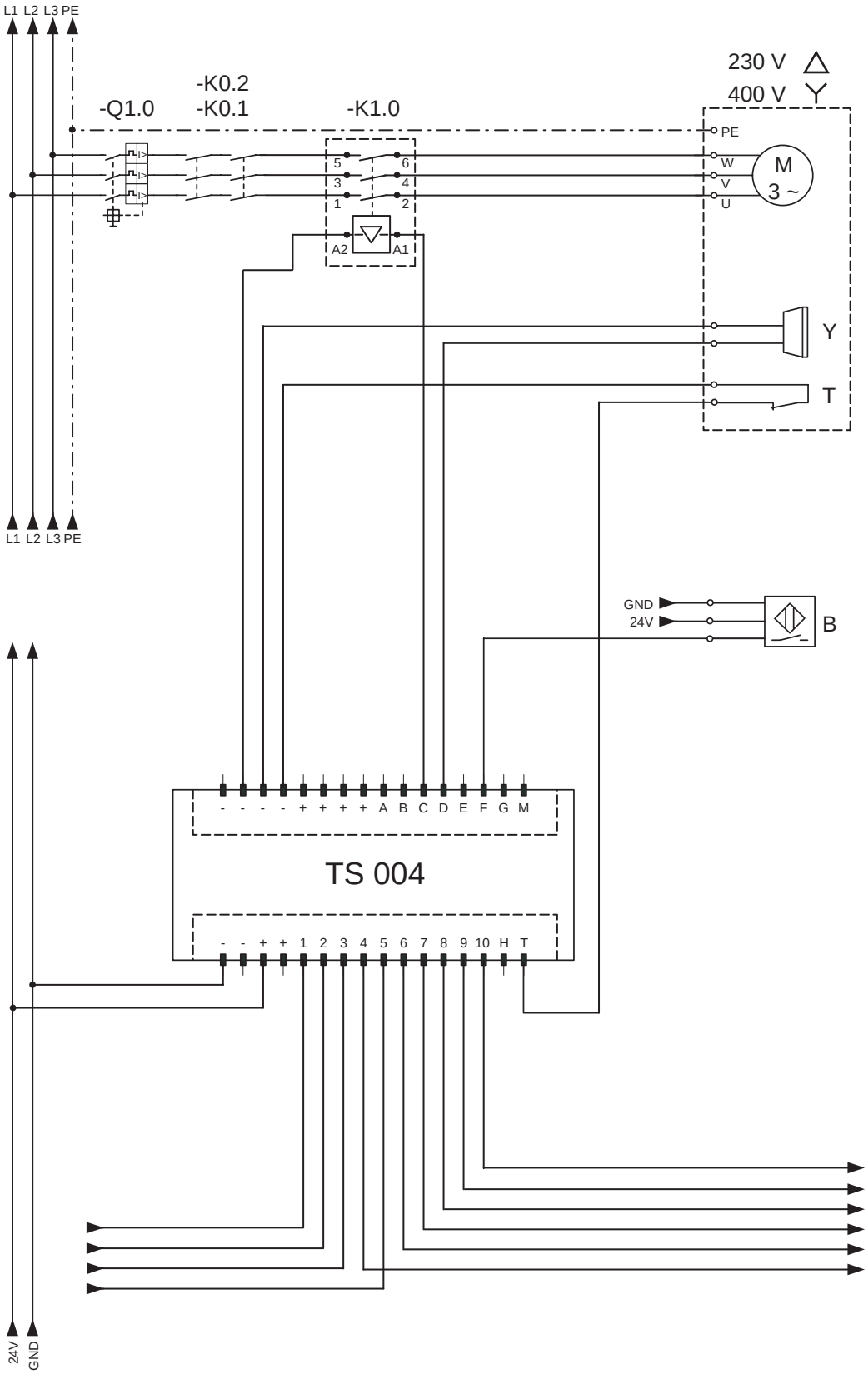
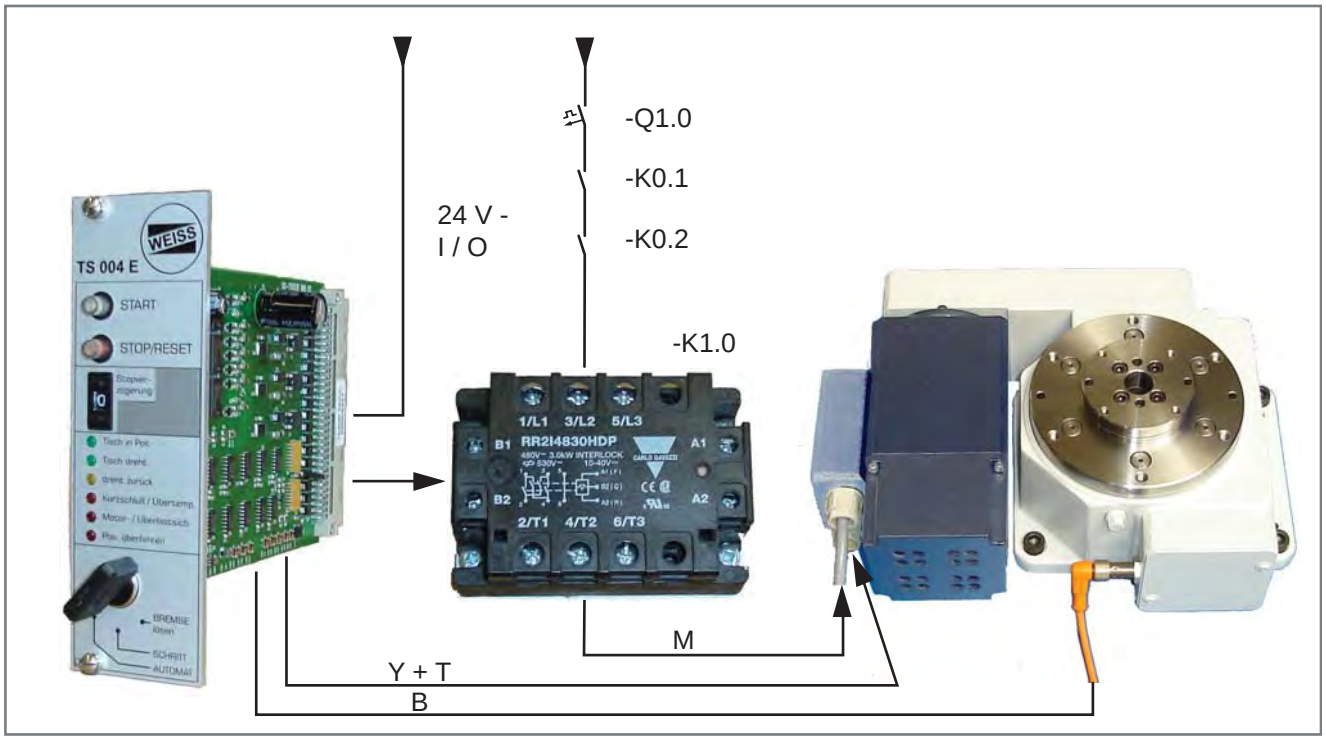


Fig. 6: Circuit diagram for rotary indexing table, normal operation

3.6.1.2 Brake motor, oscillatory operation (24-V brake)



-Q1.0	Motor protection switch
-K0.1 -K0.2	Emergency stop relay
-K1.0	Solid-state relay as reversing contactor
Y	Brake
B	“Table in position” sensor
T	Temperature switch
M	Motor for rotary indexing table (△ Delta connection) (Y Star-connection)

Inputs		Outputs	
I1	Direction of rotation (CW / ACW)	O4	Automatic mode active
I2	Enable	O6	Alarm: Position overrun
I3	Start	O7	Alarm: Overload
I5	Stop	O8	Alarm: Checksum fault
-	-	O9	Ready to start
-	-	O10	Table in position
-	-	-	-
-	-	-	-

3.6 Examples of circuits

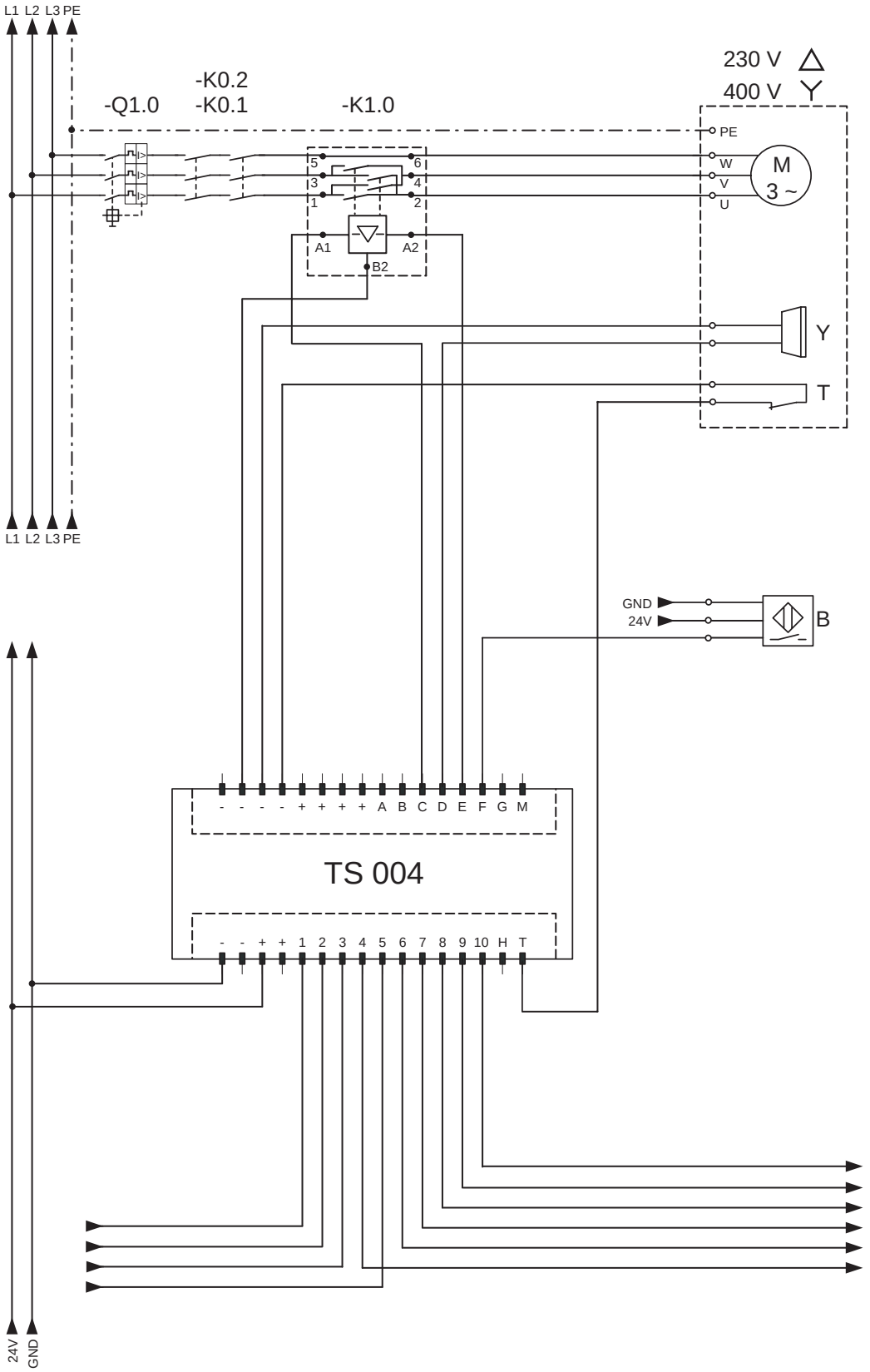


Fig. 7: Circuit diagram for rotary indexing table, oscillatory operation

3.6.1.3 Slow-running rotary indexing table (230-V brake)

NOTICE If using a 230-VAC brake (rectifier in the motor terminal box), the following particular features are to be observed:

- Eliminating the motor inductance leads to a counter-voltage, which briefly keeps the brakes released, even though the motor has been switched off.
- Hence for quick-running rotary indexing tables it is necessary to open the brake circuit via an additional contact at the motor contactor (see circuit example in chapter 3.6.1.1 and chapter 3.6.1.2).
- If using a 230-VAC brake, it is not possible to activate the motor via a frequency converter.

📖 The variant available, i.e. slow-running or fast-running, is noted in the order confirmation, the delivery note or the invoice.

-Q1.0	Motor protection switch
-K0.1 -K0.2	Emergency stop relay
-K1.0	Motor contactor
Y	Brake
T	Temperature switch
-G1	Brake rectifier
M	Motor for rotary indexing table

3.6 Examples of circuits

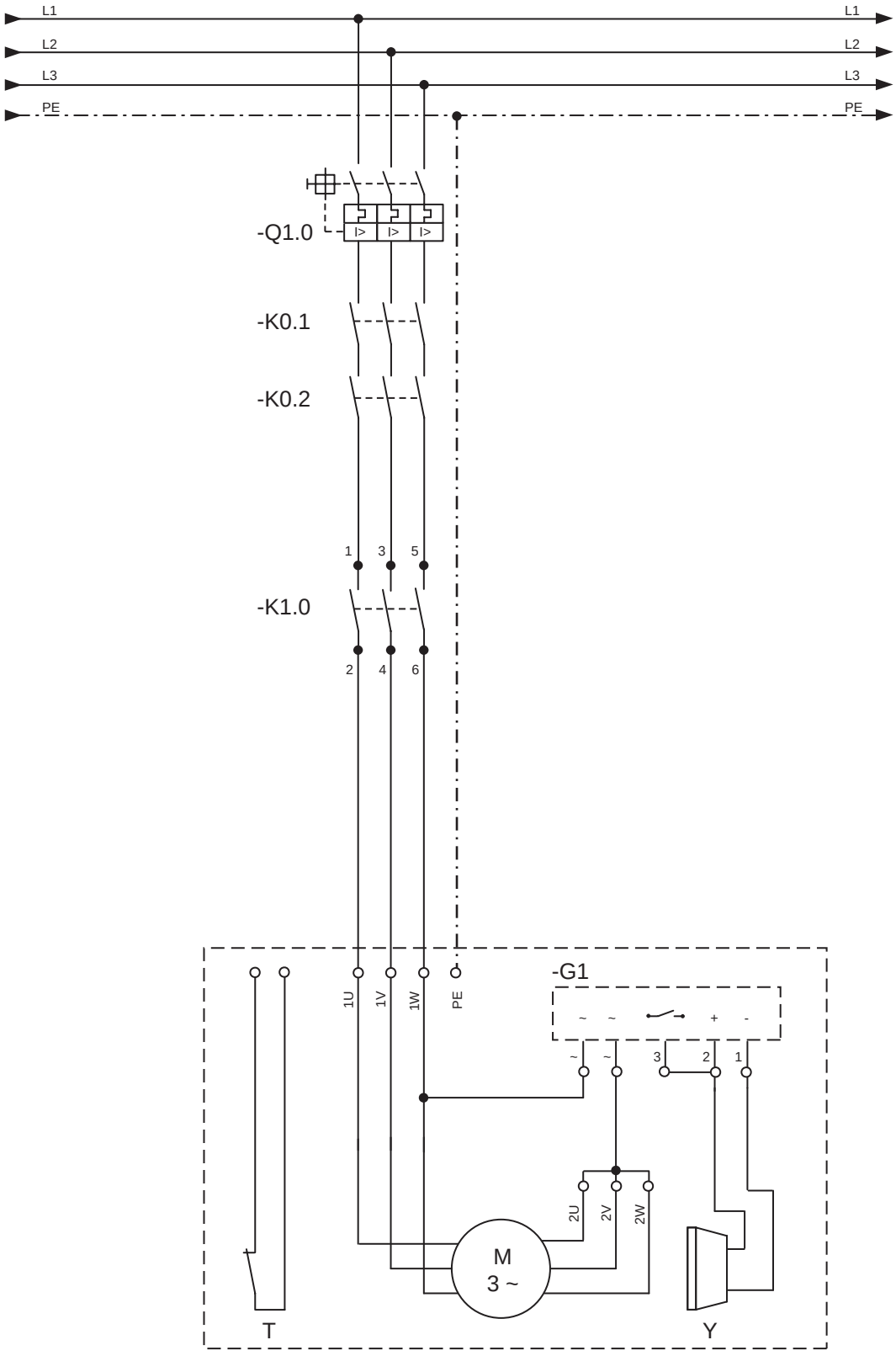


Fig. 8: Circuit diagram for slow-running rotary indexing table

3.6.1.4 Quick-running rotary indexing table (230-V brake)

NOTICE If using a 230-VAC brake (rectifier in the motor terminal box), the following particular features are to be observed:

- Eliminating the motor inductance leads to a counter-voltage, which briefly keeps the brakes released, even though the motor has been switched off.
- Hence for quick-running rotary indexing tables it is necessary to open the brake circuit via an additional contact at the motor contactor (see circuit example in chapter 3.6.1.1 and chapter 3.6.1.2).
- If using a 230-VAC brake, it is not possible to activate the motor via a frequency converter.

The variant available, i.e. slow-running or fast-running, is noted in the order confirmation, the delivery note or the invoice.

-Q1.0	Motor protection switch
-K0.1 -K0.2	Emergency stop relay
-K1.0	Motor contactor
Y	Brake
T	Temperature switch
-G1	Brake rectifier
M	Motor for rotary indexing table

3.6 Examples of circuits

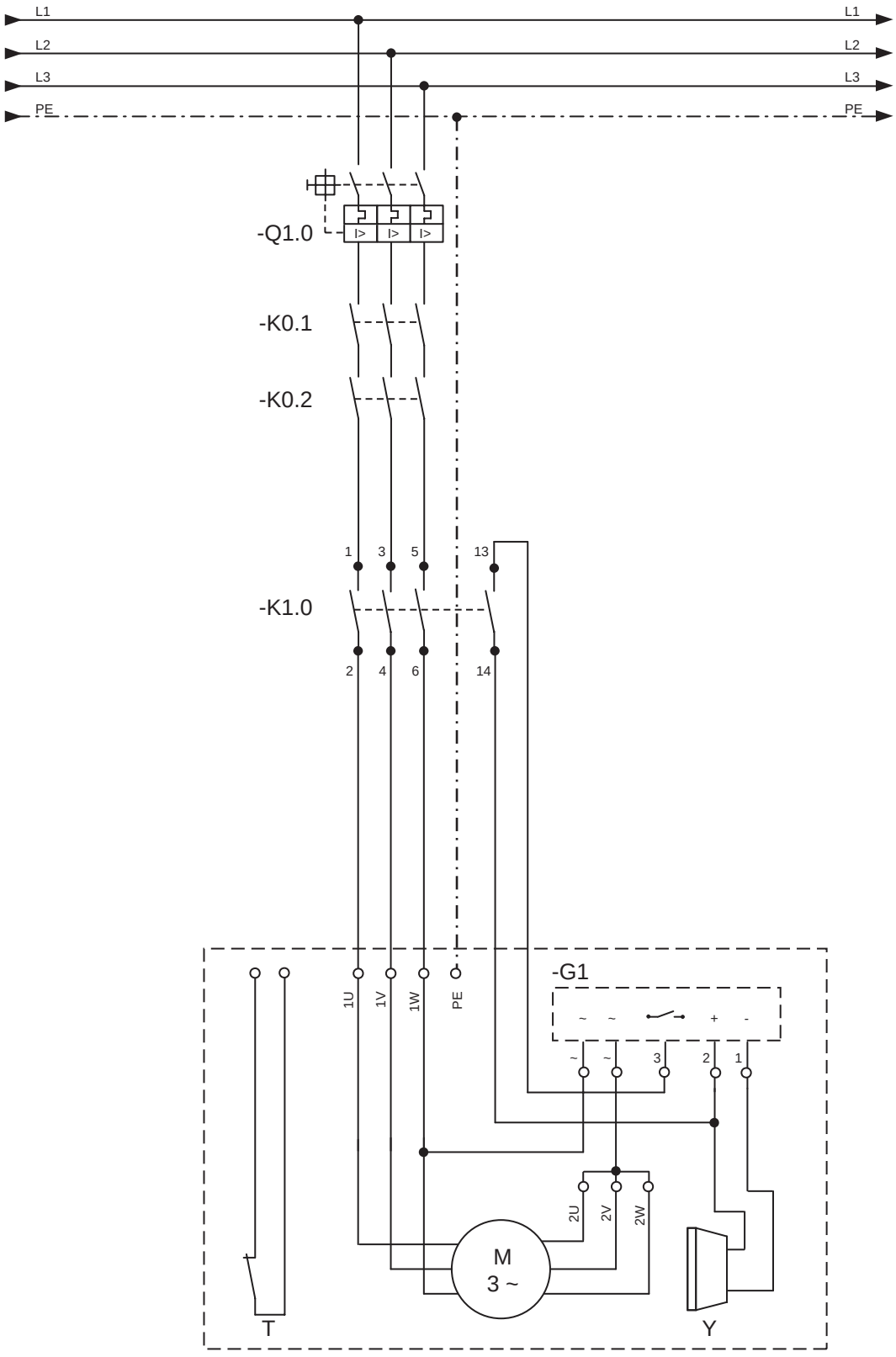
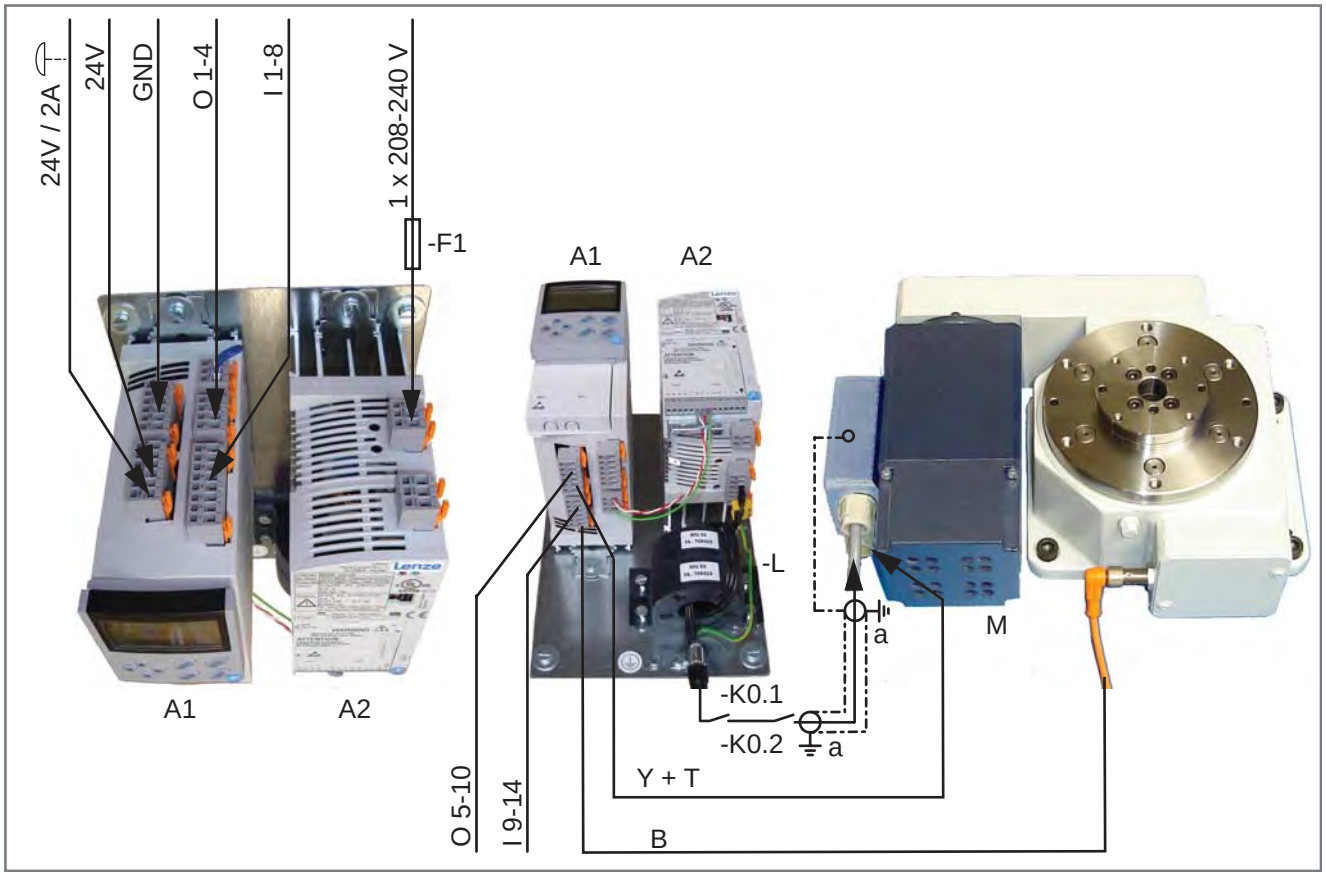


Fig. 9: Circuit diagram for quick-running rotary indexing table

3.6.2 Wiring for EF037/1 control unit

(single-phase design)



			Inputs		Outputs	
A1	PLC		I4	Alarm acknowledgement	O1	Alarm: Checksum fault
A2	Frequency converter		I5	Parameter set 2	O2	Alarm: Position overrun
A3	CAN repeater		I6	Ignore parameter set 3	O3	Alarm: Time out
-F1	Fuse		I8	Mode 2	O5	Automatic
-L1	Ferrite ring (pass the U-V-W motor line once through the ferrite ring)		I9	Enable software	O6	Ready to start
-K0.1 -K0.2	Emergency stop relay		I10	“Table in position” sensor	O7	Table in position
Y	Brake		I11	Start (slope)	-	-
B	“Table in position” sensor		I12	Start (level)	-	-
T	Temperature switch (with Thermoclick for software version 2.08 and higher).		I13	Direction of rotation (CW / ACW)	-	-
M	Motor for rotary indexing table (△ Delta connection)		-	-	-	-
a	Cable, 4 x 1.5 mm²; 25 m maximum; shielded at both ends					

3.6 Examples of circuits

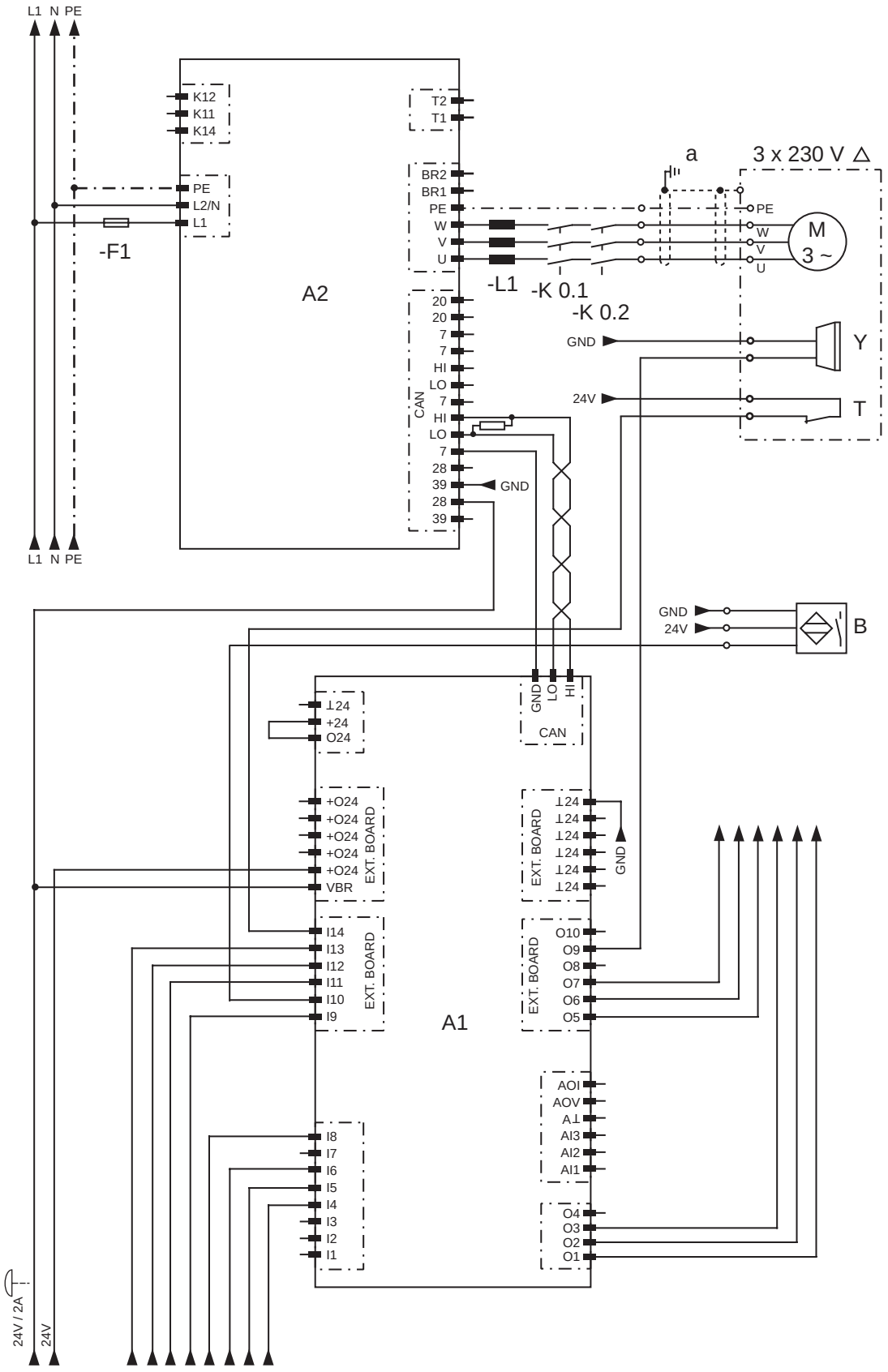
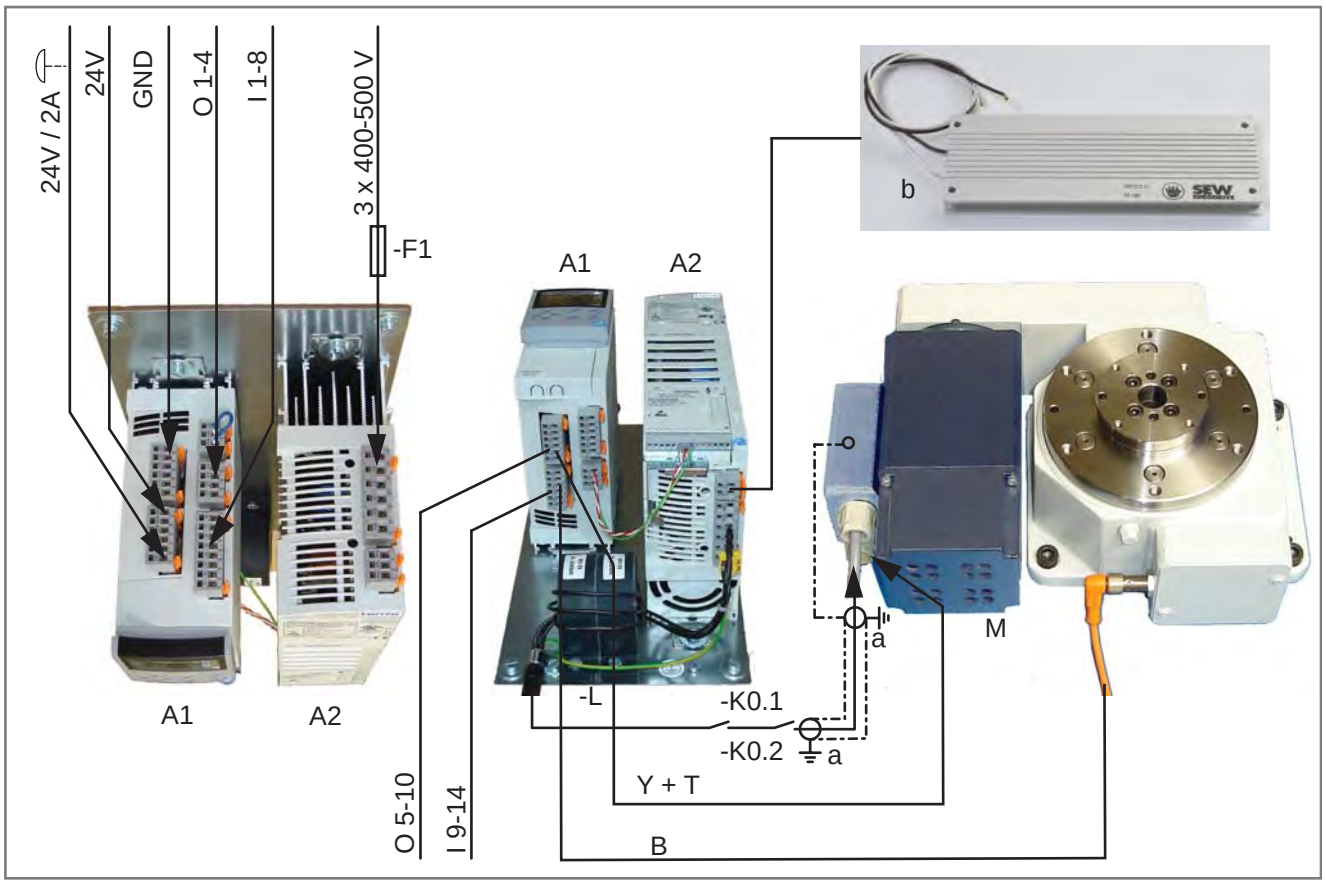


Fig. 10: Circuit diagram for EF037/1 control unit

3.6.3 Wiring for the control units EF 150/3, EF 220/3, EF 300/3

(three-phase design)



A1	PLC
A2	Frequency converter
A3	CAN repeater
-F1	Fuse
-L1	Ferrite ring (pass the U-V-W motor line once through the ferrite ring)
-K0.1 -K0.2	Emergency stop relay
Y	Brake
B	“Table in position” sensor
T	Temperature switch (with Thermoclick for software version 2.08 and higher).
M	Motor for rotary indexing table (Y Star-connection)
a	Cable, 4 x 1.5 mm²; 25 m maximum; shielded at both ends
b	Optional brake resistor 100 Ω / 450 W

Inputs		Outputs	
I4	Alarm acknowledgement	O1	Alarm: Checksum fault
I5	Parameter set 2	O2	Alarm: Position overrun
I6	Ignore parameter set 3	O3	Alarm: Time out
I8	Mode 2	O5	Automatic
I9	Enable software	O6	Ready to start
I10	“Table in position” sensor	O7	Table in position
I11	Start (slope)	-	-
I12	Start (level)	-	-
I13	Direction of rotation (CW / ACW)	-	-
-		-	-

3.6 Examples of circuits

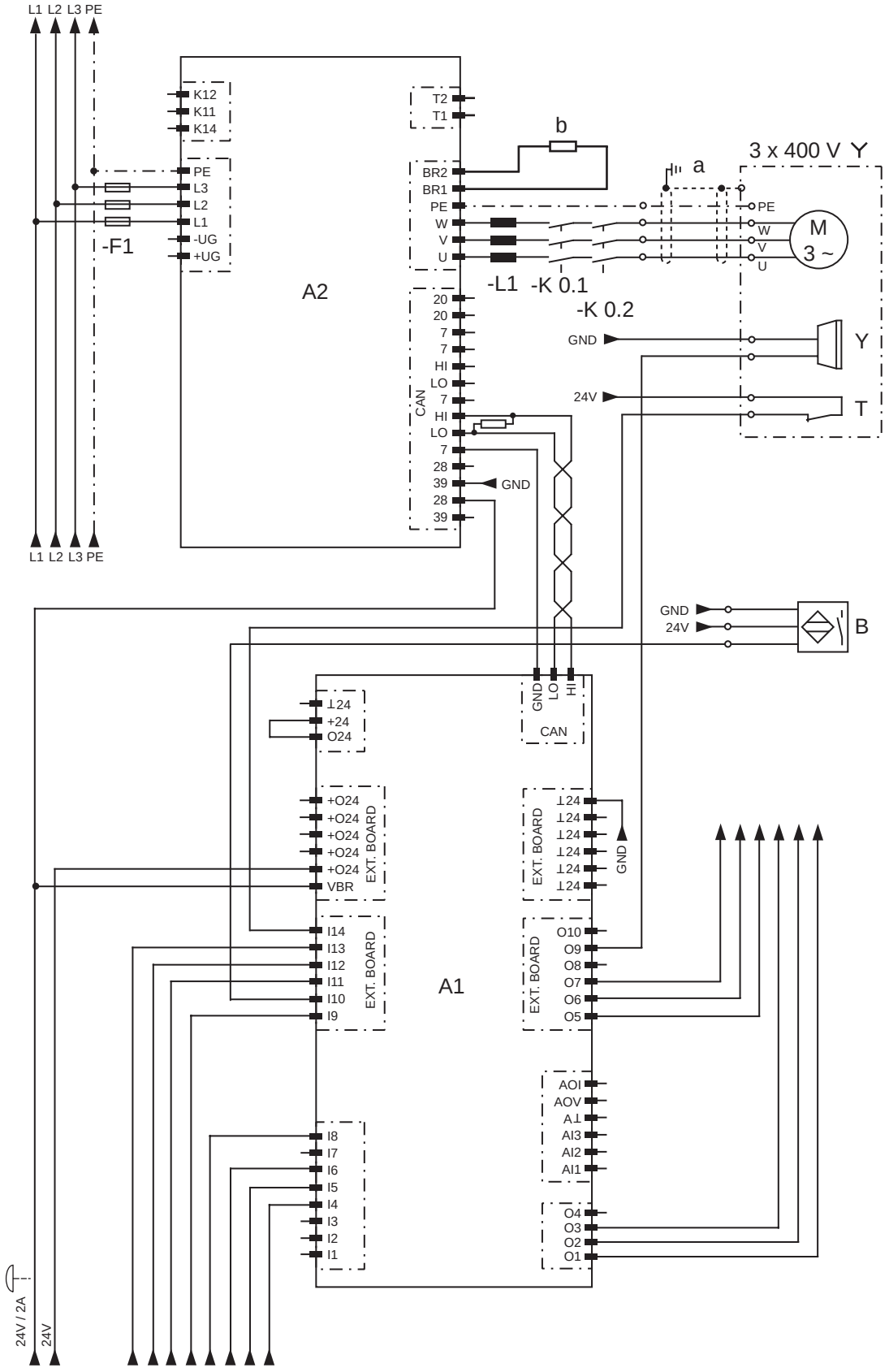


Fig. 11: Circuit diagram for the control units EF 150/3, EF 220/3, EF 300/3

4 Transport

4.1 Safety during 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 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.

For the range of rotary indexing tables TC 120 - TC 320 [1], two eye bolts are sufficient.

For rotary index tables TC 500 [2] and higher, three eye bolts are necessary.

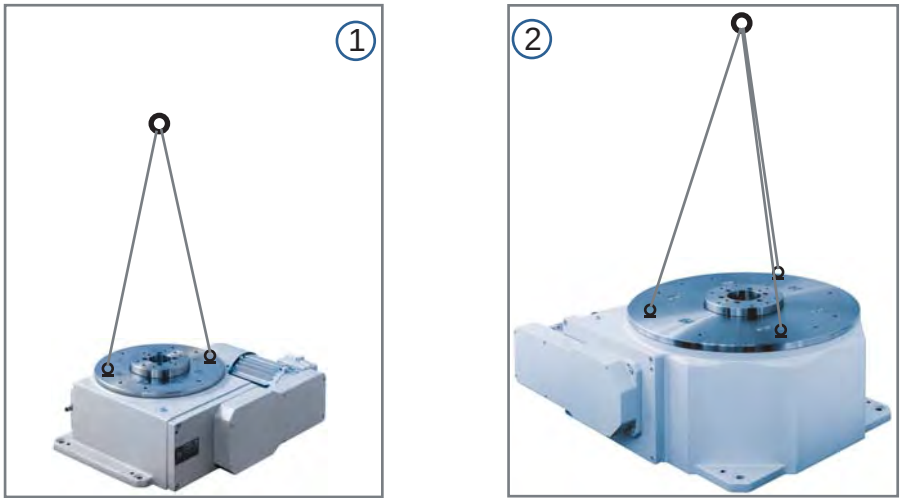


Fig. 12: Transporting the unpacked machine

4.3 Transport 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.

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

4.4 Intermediate storage

NOTICE ***The machine must not be stored with the bleed screw is pointing down, since otherwise oil may leak out.***

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
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 cleanliness and machine damage during inspection Check that corrosion protection is intact
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 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

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.

Risk emanating from rotary table which runs on.
The gearing mechanism is not self-locking. For a vertical installation of the machine (see chapter 3.3.8) gravitational forces acting on unevenly distributed loads can cause the rotating plate to rotate while bleeding the brake, leading to severe or fatal injury. The rotating plate should be supported prior to bleeding the brake, to ensure that it does not continue to rotate subsequently.

Electric shocks can cause serious or 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.

Swapped connections
Swapped connections result in the wrong direction of travel. This causes significant system damage. Incorrectly wired connections can destroy the electrical / electronic components. Electrostatic processes / power malfunctions can damage the electronic components, cause injuries and can also cause software errors.

Danger due to missing covers
To connect the electrical components to the power supply the covers have to be removed or the junction boxes have to be opened. It is possible to touch energised parts. After concluding the installation tasks the covers that have been removed have to be re-mounted and junction boxes have to be re-closed. Failure to comply with this safety instruction can 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 holes for the individual table types are included in the supplied information brochure “Electromechanical TC rotary indexing tables”.

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 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 Preparing installation

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
- motor contactor
- motor protection switch with electromagnetic, quick-release mechanism

NOTICE ***In emergency stop operation, the power supply for the motor and the brake must be interrupted. It is not necessary to interrupt the power supply for the control card.***

If the TS004E control card or the EFxxx control unit is used, then the cycle time will be monitored.

If an external control unit is used for machine operation, then a cycle time monitoring mechanism has to be provided for this unit.

If, following a start signal, there is no ready message after twice the rotational motion period, then the motor must be deactivated via the external control unit.

It must be ensured that the drive motor is sufficiently ventilated.

The motor and brake must be accessible when carrying out servicing tasks.

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 Adjusting the venting screw

NOTICE ***The venting screw is factory-fitted in the ordered installation position. If the installation position is changed from the position which the machine was ordered for, the venting screw must be repositioned.***

A second ventilation bore hole, sealed off with a plug screw, can be found on the underside. If the installation position is changed, then it must be ensured that the ventilation bore hole is always located on the top section of the cast housing.

1. Unscrew the venting screw [1], screw a plug screw [2] into the hole and tighten.
2. Move the rotary indexing table to the desired installation position.
3. Remove the plug screw [3] on the underside.
4. Screw the venting screw [1] into the hole and tighten.

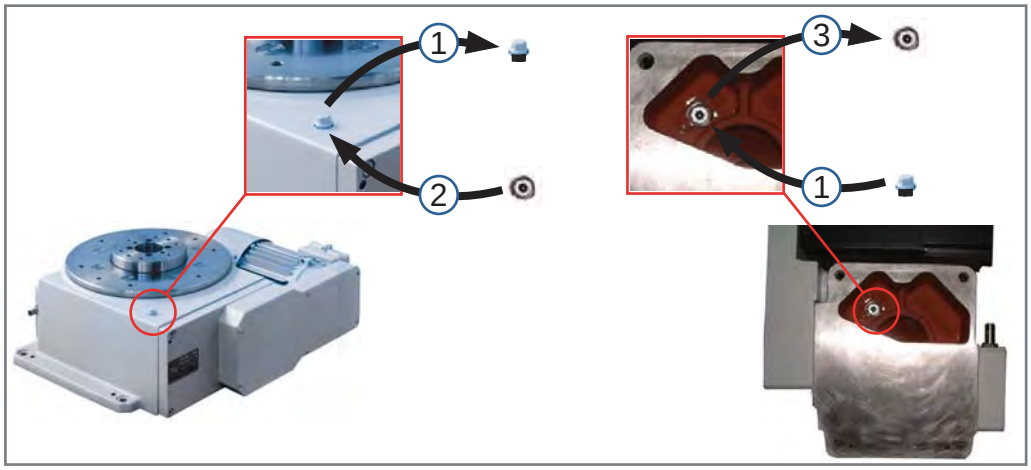


Fig. 13: Adjusting the venting screw

5.3.4 Displacing the drive housing

The drive housing is fitted by the manufacturer according to the ordered drive position. Apart from the TC 1000 model, the drive housing can be subsequently moved to one of the permissible drive positions (see chapter 3.3.9).

1. Remove the cover of the toothed belt box.

WARNING *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

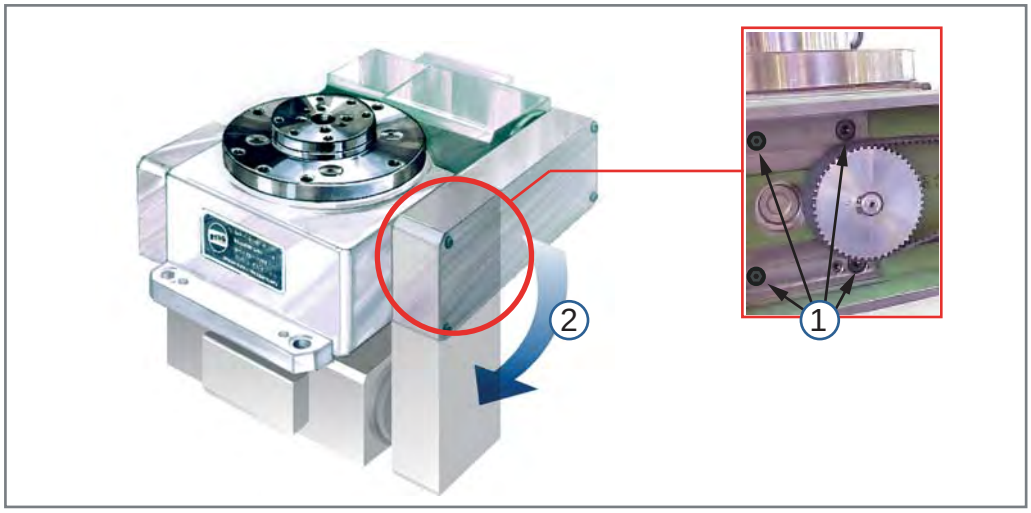


Fig. 14: Displacing the drive housing

5.3.5 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.

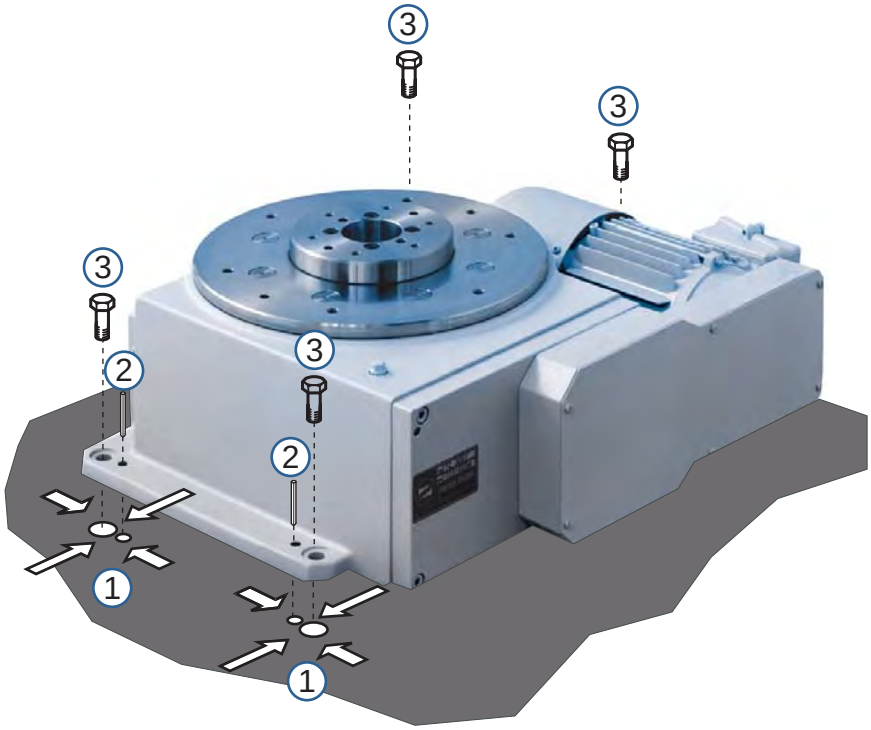


Fig. 15: Fastening the rotary indexing table

5.3.6 Installation of additional components

NOTICE ***Only use the provided holes.***
The provided holes must be used to install additional components. Never drill additional holes in the machine or weld parts to it.

5.3.6.1 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 rotating plate is always in the first possible locking position.***
The pin-hole axes in the rotating plate are 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.

1. Lightly polish the centring pins on the insertion side.
2. Bring the additional indexing plate into position.
3. Attach the centring plate and knock in evenly using a small hammer.
4. Fastening the additional indexing plate.

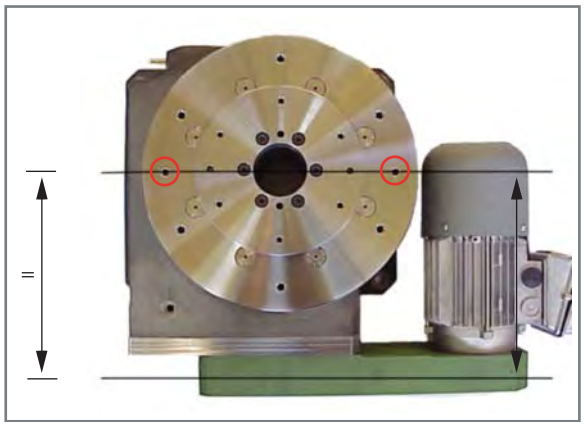


Fig. 16: Pin hole axes

5.3.7 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 which is suitable for the intended purpose.

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

WARNING

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 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.

6.2 Initial commissioning

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

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.

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 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 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 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

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 9.5.4).
	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.

8.2.2 Fault messages for operation with the TS004E control card

NOTICE In order to be able to identify a fault precisely, the location of the position cam at the time the fault message is made has to be known. The location can be determined by removing the cover above the position cam.

The following cases are to be distinguished:

- A: The cam is still at the proximity switch.
- B: The cam location corresponds to the major part of the rotational phase.
- C: The cam has just left the immediate vicinity of the proximity switch.

Fault display	Cause	Remedy
A **“Position overrun”**	Proximity switch is defective	Replace proximity switch (see chapter 9.5.5).
	Distance between proximity switch and trip cam is too large	Set the correct distance (see chapter 9.5.6).
	The cable connections to the proximity switch are loose	Check cabling, replace any defective cables
B **“Position overrun”**	Brief peak emissions at the “F” input of the control card (check with storage oscilloscope)	Lay the cable for the proximity switch in a different way or shield the cable.
C **“Position overrun”**	Brake disc is worn	Replace brake disc (see chapter 9.5.2).
	Air gap is too large	Reduce air gap (see chapter 9.5.1).
	Contacts of contactor are heavily scorched or stuck together	Replace contactor (use solid-state relay if necessary)
“Motor overload”	Motor voltage is missing	Measure the voltage Check fuses Check motor protection switch
	Emergency stop situation during rotation without a signal being sent to the control card (terminal 2)	Emergency stop mechanism has to be connected to terminal 2
	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.
	The toothed belt between drive motor and gear unit is torn.	Replace toothed belt (see chapter 9.5.4).

Fault display	Cause	Remedy
“Short circuit”	One of the letter-labelled outputs on the control card is being statically or dynamically loaded with more than 2 amps of current.	The connections for the control card are to be checked for excessive loads.
	One of the digit-labelled outputs on the control card is being statically or dynamically loaded with more than 200 milliamps of current.	The connections for the control card are to be checked for excessive loads.
	Voltage peaks are occurring for supply voltage wires (+24 V or GND).	Check the voltages, determine the causes for excessive voltage and rectify the problem
	Supply voltage exceeds 30 V (possibly only briefly)	Check the voltages, determine the causes for excessive voltage and rectify the problem

8.2.3 Fault messages for operation with the EFxxx control unit

NOTICE In contrast to the TS 004E control card, the EFxxx control unit displays the faults in plain text via a fault number and a fault message at the keypad.

Number	Fault message	Description
1	Motor overload (timeout for rotation)	After the motor has started, the table does not reach its end position within the prescribed maximum time period. Possible causes: • Table is mechanically blocked / rotates too sluggishly • Sensor is incorrectly set • Sensor signal has been interrupted
2	Limit switch position has been exceeded	After the “STOP motor” command has been executed, the limit switch position is exceeded. Possible causes: • The set stop delay period is too long • The set stopping ramp is too gradual
3	Start not allowed (automatic mode)	In the AUTOMATIC operating mode, a start command was detected, but could not be executed. Possible causes: • Input 9 (/RESET /STOP) set to LOW • A start command was made, although a fault message is present
4	Start not allowed (manual operation)	In the MANUAL operating mode, a start command was detected, but could not be executed.
5	Limit switch provides no signal	Table is stationary, and signal from limit switch has HIGH -> LOW slope
6	U_{min} for brake	Drop below minimum permissible voltage for brake
1000	Frequency converter fault	A fault associated with the frequency converter is present.

8.2.3.1 Resetting of fault messages

Fault messages can be reset in one of the following ways:

- Press the STOP button on the keypad
- Set input 14 on the PLC to HIGH
- Set input I9 on the PLC to LOW (only if configured via W012)

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.
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.

Risk emanating from rotary table which runs on.
The gearing mechanism is not self-locking. For a vertical installation of the machine (see Ch. 3.3.8 gravitational forces acting on unevenly distributed loads can cause the rotating plate to rotate while bleeding the brake or while moving the partition between the drive and the rotating plate. The rotating plate should be supported prior to bleeding the brake or removing the partition between the drive and the rotating plate, to ensure that it does not continue to rotate subsequently. Failure to comply with this instruction can result in severe or fatal injury.

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 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.
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 should be 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 ***Danger 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, first the machine has to cool down sufficiently to avoid any risk of burning due to 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 9.5.3).

The drive motor has to be checked for

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

9.3.2 Check the brakes every 2 million applications

The brake is located between the fan wheel and the bearing bracket of the drive motor.

The brake must be visually inspected after every 2 million applications or after one year, whichever occurs first.

It should be checked for correct functioning, wear, mechanical faults and dirt.

The air gap and brake lining have to be checked again.

1. Remove the screws [1] of the ventilation cap [2] and lift off the cap.
2. Measure the air gap [X] using a feeler gauge. The air gap must not exceed 0.2 mm.
   - If the air gap exceeds the permissible tolerance value, then it has to be reduced subsequently (see chapter 9.5.1).
   - If the nominal air gap of 0.2 mm can longer be set, then the brake lining or the complete brake has to be replaced (see chapter 9.5.2).
3. Reattach the ventilation cap [2].

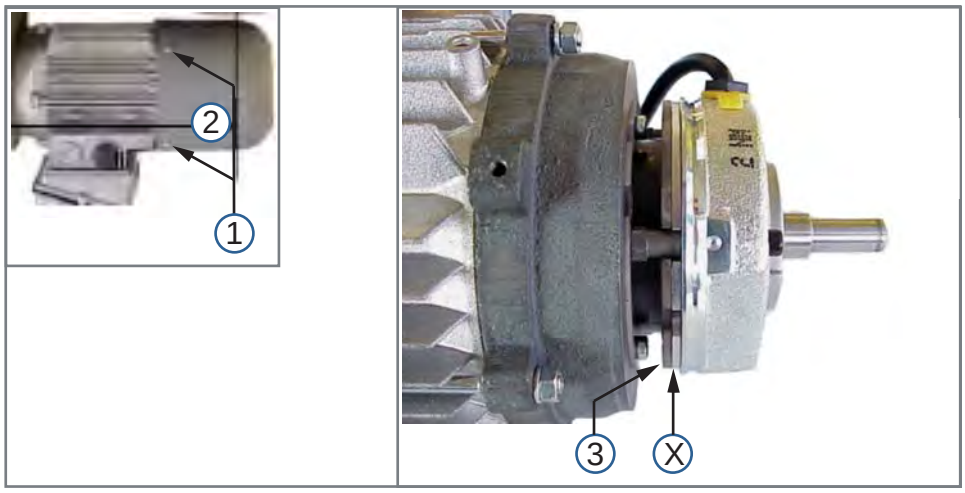


Fig. 17: Checking brake

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:	TC 120G	150 ml
	TC 150T	150 ml
	TC 220T	300 ml
	TC 320T	1.5 l
	TC 500T	7.0 l
	TC 700T	11.0 l
	TC 1000T	15.0 l

9.5 Repair

9.5.1 Adjusting the air gap for the brake

1. Remove the screws [1] of the ventilation cap [2] and lift off the cap.
2. Lift of the fan wheel [3] from inside, at the plastic collar, using two fitting levers.
3. Loosen the fastening screws [4] by a few turns.
4. Set the air gap [X] around the entire circumference to 0.2 mm by twisting the setting pieces [5].
5. Tighten fastening screws [4].
6. Measure the air gap [X] using a feeler gauge. If necessary, repeat the setting procedure.
7. Reattach the fan wheel [3] and the ventilation cap [2].

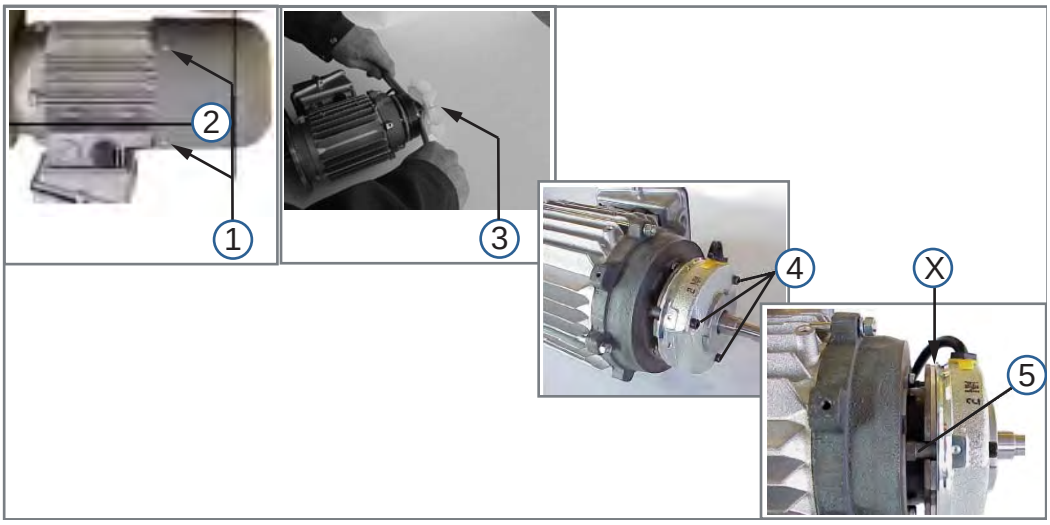


Fig. 18: Adjusting the air gap

9.5.2 Replacing the brake

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 screws [1] of the ventilation cap [2] and lift off the cap.
2. Lift of the fan wheel [3] from inside, at the plastic collar, using two fitting levers.
3. Disconnect the brake cable at the terminal box.
4. Unscrew the fastening screws [4].
5. Remove the brake [5], brake lining [6] and the hub [7].
6. Attach new hub [7], new brake lining [6] and new brake [5].
7. Tighten fastening screws [4].
8. Set the air gap [X] for the brake (see chapter 9.5.1).
9. Reattach the fan wheel [3] and the ventilation cap [2].
10. Connect the brake cable at the terminal box.

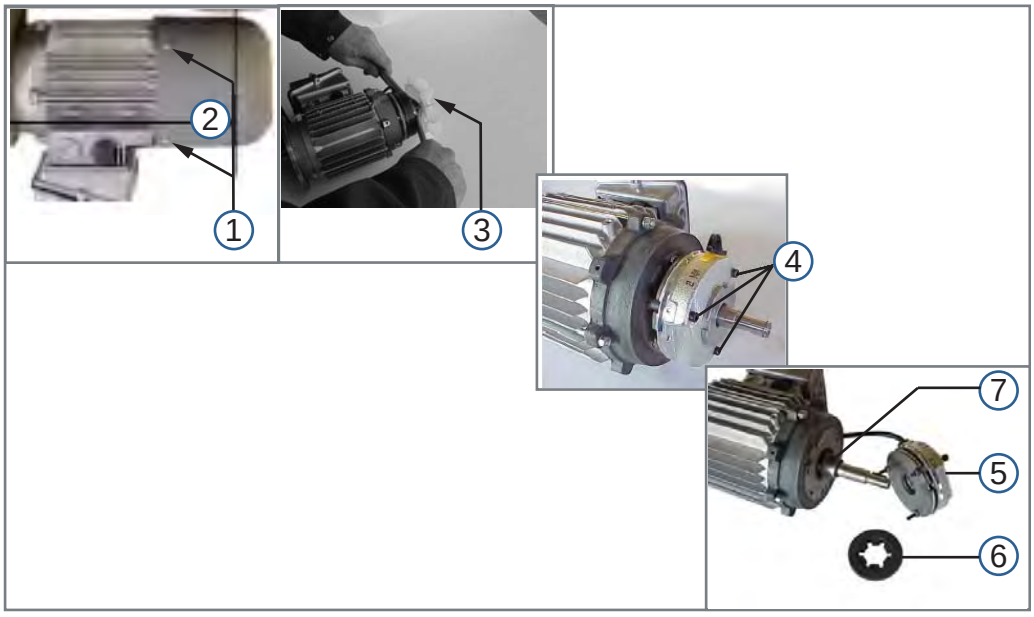


Fig. 19: Replacing the brake

9.5.3 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. Remove the screw on the cover disc [3] and pull toothed-belt pulley [4] off the motor shaft.
5. Unscrew the four fixing screws [1] for the motor flange and take off the motor.
6. Place the new motor on and screw in the four fixing screws [1] for the motor flange, but do not tighten them yet.
7. Attach the toothed-belt pulley [4] to the motor shaft and fit in place using the cover disc [3] and the screw. Tighten the screw firmly.
8. Pull on the toothed belt [2].
9. Tighten the toothed belt by moving the motor in the slots [+] and firmly tighten the four fastening screws [1] for the motor flange.
10. Connect the motor and brake.
11. Perform a trial run.
12. Check tension of toothed belt and adjust if necessary.
13. Cover plate of the toothed belt box

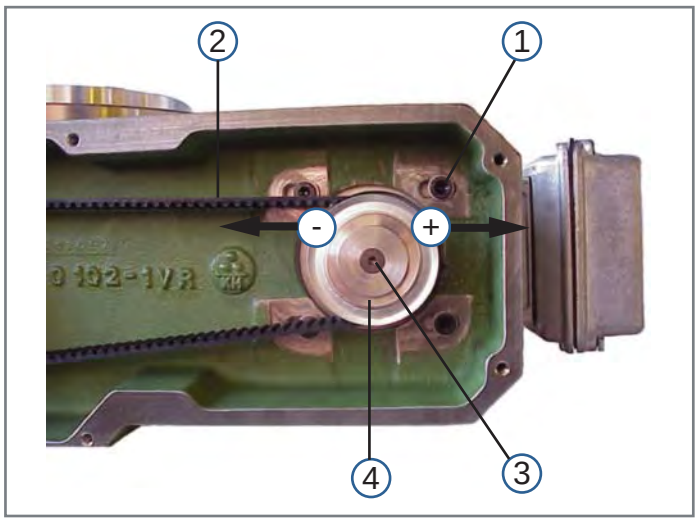


Fig. 20: Replacing the drive motor

9.5.4 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. Pull on 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

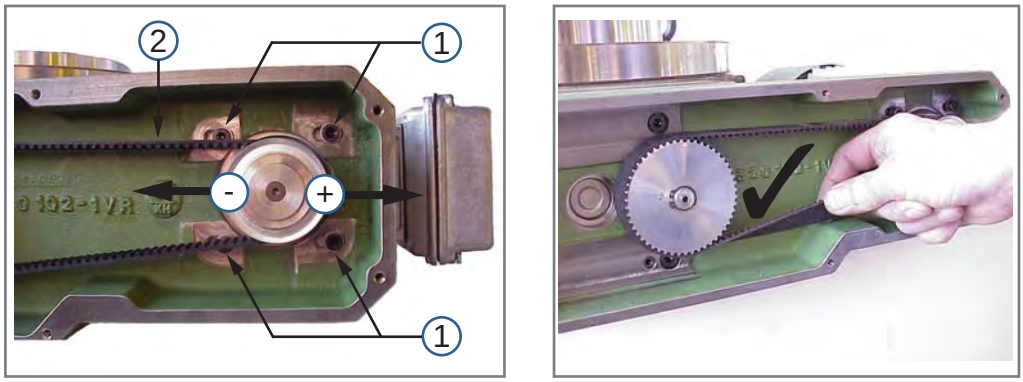


Fig. 21: Replacing toothed belt

9.5.5 Replacing the proximity switch

1. Remove the cover of the toothed belt box.
2. Remove the cover plate located above the proximity switch
3. Ensure that the position cam [1] is at the proximity switch [2].

NOTICE *If the position cam is not at the proximity switch, then the toothed belt has to be pulled until the position cam is precisely at the proximity switch. This is only possible if the brake has been released (connection of the brake voltage).*

4. Detach the cable at the proximity switch.
5. Loosen the lock nut [3] and unscrew and remove the defective proximity switch from the housing.
6. Screw on the new proximity switch up to the limit stop.
7. Set the switching distance between the position cam and the proximity switch (see chapter 9.5.6).
8. Attach the cable.
9. Screw on the cover plate above the proximity switch.
10. Cover plate of the toothed belt box

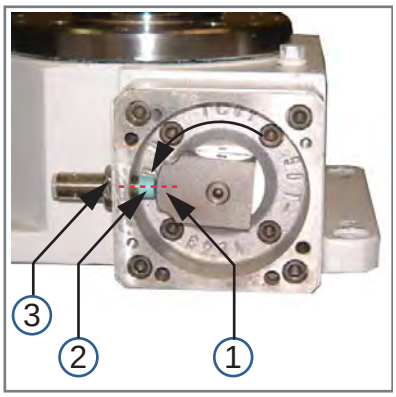


Fig. 22: Replacing the proximity switch

9.5.6 Setting the switching distance for the proximity switch

11. Remove the cover plate located above the proximity switch
12. Loosen the lock nut [1] of the proximity switch.
13. Twist the proximity switch until the switching distance to the position cam, X, is set to 2 mm.
14. Tighten the lock nut [1] of the proximity switch.
15. Screw on the cover plate above the proximity switch.

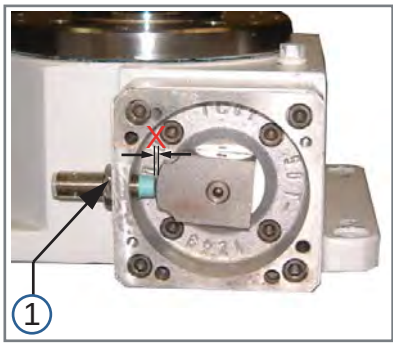


Fig. 23: Setting the switching distance

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.

12 Appendix

12.1 Illustration index

12.2 Index

12.3 Personal notes

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