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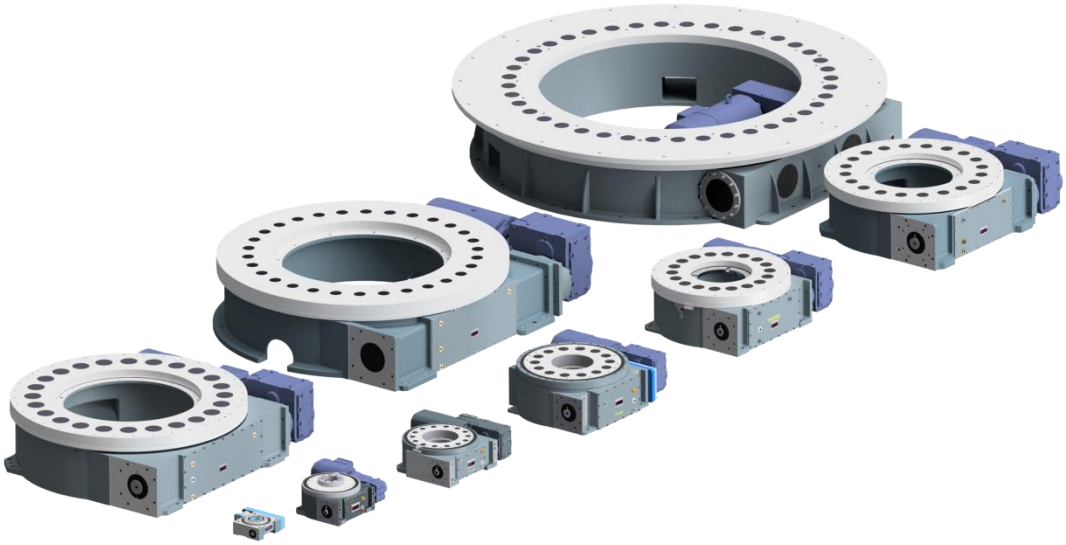

Rotary indexer

Type TMF

Translation of original Operating instruction

Version 2.1.3 |
21.01.2022

Table of content

1 About these Operating Instructions

These Operating Instructions describe the partly completed machinery Rotary indexer. The Rotary indexer is referred to below as the partly completed machinery.

Purpose of these Operating Instructions

The Operating Instructions are intended to help you to:

- work efficiently
- ensure quality
- find information quickly
- avoid danger

Table of contents

The Operating Instructions have a table of contents at the front. This gives you an overview of all the sections in the document.

Headings and page numbers

The chapters are numbered sequentially. The sections within each chapter are numbered sequentially.

Safety information

Any safety information is placed before the descriptions of actions that may pose a risk. You will find a detailed description of the safety information in the chapter entitled Safety.

Text, symbols, figures

Instructions for performing various activities and other information are presented in small, discrete sections.
The information is presented using a combination of text, symbols and figures.
Instructions for performing action are described in the appropriate sequence and numbered accordingly.

Instructions for action

For the sake of clarity the instructions for action have been broken down into individual steps:

▸ Introductory text…
  ⇨ Instruction result

Lists

Any lists which do not include individual operating steps are indicated as follows:

- Lists…
  - Sub-items in lists

Figures

Figures, dimensions and technical data presented in these Operating Instructions may be subject to change.

Cross-references

Cross-references point you to additional descriptions within the Operating Instructions. (Chapter number/page number).

Third-party components

Refer to the Operating Instructions of the relevant manufacturers for information on operation and maintenance of third-party components fitted in the system.

Additional documentation

To complement the information in these Operating Instructions, please read the following regulations and directives:

- safety regulations and accident prevention regulations
- instruction sheets, instruction booklets
- work instructions provided by the statutory accident insurance provider
- generally accepted occupational health regulations

Manufacturer
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Technical information
The technical information, figures and data contained in these Operating Instructions are correct at the time of printing.
Our products undergo continuous further develop.
We therefore reserve the right to make any changes and improvements that we deem appropriate.
However, this does not, imply any obligation to apply such changes retrospectively to equipment already supplied.

1.1.1 Published by

TAKTOMAT GmbH
Rudolf-Diesel-Straße 14
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Printed in the Federal Republic of Germany
Pöttmes, 01/2022

Document revision

Version	Date	Comment
Version 2.1.3	21.01.2022	Additional lubricants information
Version 2.1.2	15.03.2021	Lubrication plan completed
Version 2.1.1	22.05.2019	Dimensional drawings removed
Version 2.1.0	22.05.2019	Update of declaration of incorporation
Version 2.0.4	14.04.2016	Update of declaration of incorporation
Version 2.0.3	19.03.2015	Layout adaption, added excerpt of Atex and declaration of incorporation
Version 1.0.4	20.10.2014	Initial revision

1.2 Continuative documents

Read the following documents according to the provided components before you use these partly completed machinery with Operating instruction.

Designation	Manufacturer	Version / Revision / Date	Number
Assembly and Operating Instructions Gear unit	Every type	-	-
Operating Instructions AC Motors	Every type	-	-
Operating instructions inductive Sensors	Every type	-	-
Operating instructions encoder	Every type	-	-

1.3 Excerpt of Declaration of Incorporation

Translation of Declaration of Incorporation in accordance with the EC Machinery Directive 2006/42/EC, Annex II (1) (B) for partly completed machinery

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Manufacturer:
TAKTOMAT GmbH
Rudolf-Diesel-Straße 14
D-86554 Pöttmes

Description and identification of the partly completed machinery:

Your Order-No.:	-
Our order confirmation:	-
Product:	Rotary indexer TMF
Type:	TMF
Serial number:	-
Commercial designation:	Rotary indexer TMF

The manufacturer declares that the following basic requirements of the Machinery Directive 2006/42/EG applied and complied with:
1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.5.3, 1.5.4, 1.6.1, 1.6.4, 1.7.1, 1.7.4

The reference of the harmonised standard applied to Article 7 (2):
EN ISO 12100.2010 Safety of Machinery – general principles for design

Furthermore, we declare that the relevant technical documentation for this partly completed machinery is compiled in accordance with part B of Annex VII. The manufacturer undertakes to send the relevant documentation for the partly completed machinery electronically to national authorities in case of a duly reasoned request.

This partly-completed machine may be put into operation only if it has been stated, that the machine, into which the uncompleted hast to be incorporated, does comply with the requirement of the machine directive.

Responsible for the documentation:	TAKTOMAT GmbH
Address:	Rudolf-Diesel-Straße 14, D-86554 Pöttmes

Pöttmes, 21.01.2022

Norbert Hofstetter
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2 Safety information

General information

This document contains important information on the safe use of the partly completed machinery. This information is intended to ensure personal safety and prevent damage to the partly completed machinery. The information is intended for the operator and for properly trained, qualified and instructed staff responsible for operating and servicing the partly completed machinery.

Additional task-specific safety information is included in the relevant sections on the different phases during the service life of the system.

2.1 Explanation of the symbols used

2.1.1 Warnings

DANGER

DANGER!
This combination of symbol and alert word indicates an inherently dangerous situation which can be fatal or cause serious injury if it is not avoided.

WARNING

WARNING!
This combination of symbol and alert word indicates a potentially dangerous situation which can be fatal or cause serious injury if it is not avoided.

CAUTION

CAUTION!
This combination of symbol and alert word indicates a potentially dangerous situation which can cause minor injury if it is not avoided.

NOTICE

NOTICE!
This combination of symbol and alert word indicates a potentially dangerous situation which can cause damage to property or harm the environment if it is not avoided.

2.1.2 Prohibition signs

	IT IS NOT PERMITTED TO CARRY METAL PARTS OR WATCHES!
	PROHIBITION FOR PERSONS WITH PACEMAKERS!
	PROHIBITION FOR PERSONS WITH METALL IMPLANTS!
	SWITCHING PROHIBITED!

2.1.3 Warning signs

	WARNING OF HAZARDOUS ELECTRICAL VOLTAGE!
	WARNING DANGER DUE TO HOT SURFACE!
	WARNING MAGNETIC FIELD!
	WARNING CRUSHING OF HANDS!
	WARNING VOR COUNTERROTATING ROLLERS!

2.1.4 MANDATORY SIGNS

REFER TO INSTRUCTION MANUAL/BOOKLET!
This symbol signifies that the instruction manual/booklet of the component supplier must be read.

WEAR HEAD PROTECTION!
This symbol signifies that head protection must be worn.

WEAR EYE PROTECTION!
This symbol signifies that eye protection must be worn.

WEAR SAFETY FOOTWEAR!
This symbol signifies that safety footwear must be worn.

WEAR PROTECTIVE GLOVES!
This symbol signifies that protective gloves must be worn.

2.2 Intended use

The partly completed machinery is intended for installation in a surrounding construction, thus integrating it to form part of an overall system. The partly completed machinery is controlled by the overall system. The functions of the protective equipment are also connected to the partly completed machinery via the controller. The partly completed machinery may only be operated as part of a CE-compliant system.

Customer specific constructions are mounted on the Rotary indexer. They're used as support for different products. The Rotary indexer has a fixed or flexible division (for an exact design see data sheet).). The Rotary indexer is inside a safety enclosure or is installed in another work equipment. The safety enclosure or assembly are realized by the integrator. This also applies to the electrical connection and control.

Any use that deviates from the intended use is regarded as inappropriate use.
This includes:

- any use outside the permitted operating limits
- any use without appropriate monitoring / supervision
- any use with insufficient maintenance
- any use in conjunction with foodstuffs
- any use in conjunction with aggressive materials (such as acids)
- transporting the system using the designated lifting points or eye bolts
-

The manufacturer shall not be liable for any damage resulting from such use. Intended use also includes observance of all the information in these instructions.

2.3 Foreseeable misuse

Any use beyond or other than the intended use is regarded as misuse.

2.3.1 Guarantee conditions

Changes to the structure of the materials used in the partly completed machinery, e.g. the drilling of additional holes, can result in damage to the components. This is not regarded as intended use and may lead to loss of warranty or liability claims as a consequence.

2.4 Directives, statutory provisions and standards

The following statutory provisions and standards were applied:

Machine Directive	2006/42/EG, Annex I
Low Voltage Directive	2014/35/EU
EMC Directive	2014/30/EU
Safety of machinery - basic concepts - risk assessment and risk mitigation	DIN EN ISO 12100

2.5 Technical condition of the partly completed machinery

Do not use the partly completed machinery if it is not in sound condition technically. If the partly completed machinery is used when it is not in a sound condition technically, there is a risk of death or injury to staff and a risk of damage to property.

2.5.1 Make no changes in the safety provisions

The manufacturer has made safety provisions. No liability will be accepted if the operator of the partly completed machinery makes any changes in the safety provisions without express permission.

2.6 General hazards

This section lists risks associated with the partly completed machinery that remain even when it is operated according to its intended use.
In order to reduce the risk of personal injury or damage to property, and to avoid potentially dangerous situations, the safety information provided here and in the other sections of these Operating Instructions must be observed.

Risk of death by electrocution

DANGER

Risk of death by electrocution!

There is an immediate risk of fatal injury due to electric shock if live components are touched. Damage to the insulation or to individual components can cause fatal injury.

- Only allow work on the electrical system to be carried out by qualified electrical engineers.
- In the event of damage to the insulation, immediately shut off the power supply and initiate a repair.
- Before starting work on active parts of the electrical system or equipment, ensure that it is completely powered down and cannot be switched on again.

Risk of injury from moving parts

WARNING

Risk of injury from moving parts!

Moving parts can cause serious injury.

- Do not reach into moving parts or carry out work on moving parts while the system is in operation.
- Never open any covers while the system is in operation.

2.7 Responsibility of the operator

The partly completed machinery is to be used commercially according to its intended use. The operator of the partly completed machinery is therefore subject to statutory occupational health and safety provisions.

In addition to the general safety information contained in this document, any further safety, accident prevention and environmental regulations applicable to the field of application of the partly completed machinery must also be observed.

In particular, operators have the following obligations:

- They must always be fully informed of the most recent occupational safety regulations and perform a risk assessment to identify any additional hazardous locations and places resulting from the specific working conditions at the place of use. They must document any such findings in the form of operating instructions (work instructions, work descriptions, etc.) for use during operation.
- During the entire service life of the partly completed machinery, they must check whether the operating instructions they have written are compliant with current regulations and make any necessary adjustments.
- They must unambiguously regulate and define who is responsible for carrying out installation, operation, maintenance and cleaning.
- They must ensure that the staff deployed have the necessary qualifications for the work they are instructed to perform.
- They must ensure that all staff who work on the partly completed machinery have read and understood all the documents relevant for its operation (Operating Instructions, maintenance regulations, safety guidelines).
- The must provide training for the staff at regular intervals and inform them of potential dangers.
- They must bear the responsibility for personal injury and damage to property arising from manipulation of the partly completed machinery. For this reason, the partly completed machinery and its safety equipment must be inspected at regular intervals to ensure that they are in sound condition and functioning properly, and the results of this inspection must be suitably documented.
- They must ensure that the partly completed machinery is always in a sound condition technically.
-

2.7.1 Preventive measures

It is recommended that the operator take the following preventive measures:

- Only allow qualified, trained and properly instructed staff to work on the partly completed machinery.
- Unambiguously define the responsibilities of operating and service personnel.
- Supplement these Operating Instructions with
  - stipulations deriving from national and regional labor and environmental regulations
  - adjust information covering specific operational aspects (workflows, supervisory obligations, reporting obligations, fire alarm equipment, etc.)
- Occasionally check to confirm that the Operating Instructions are being used and that such use is correct, and when necessary repeat the instruction process.
- Ensure that all documentation is permanently available in a readable form and easily accessible at the point of use.
- Observe any periodic checks and inspections that are required (by law) or specified in this document.
- Replace in good time any components indicated in these documents as being crucial for safety.
- Regularly inspect the partly completed machinery to ensure that the safety equipment operates correctly.
- Make sure that safety information and hazard warnings on the partly completed machinery and in the working area are always legible.
- Take steps to ensure that the partly completed machinery is regularly inspected for visible damage and defects.

2.8 Staff qualification

The various activities described in these Operating Instructions require different qualifications of the staff entrusted with these duties.

⚠WARNING

Danger if staff are insufficiently qualified!

Persons who are inadequately qualified are unable to assess the risks associated with working on the partly completed machinery and expose themselves and others to the risk of serious or fatal injury.

- Ensure that all work is performed only by suitably qualified persons.
- Keep insufficiently qualified persons at a safe distance from the working area.

2.8.1 Qualified staff

For the purposes of these Operating Instructions, qualified staff are understood to be

- Operators who have been specially trained and instructed in working with the partly completed machinery.
- Installation and service staff who have appropriate expertise in setting up and maintaining the partly completed machinery and who are familiar with the safety information.
- The qualified staff must have read and understood the contents of the Operating Instructions before the partly completed machinery is taken into service and must have been informed of the risks associated with working with the partly completed machinery by the partly completed machinery operator.
- A knowledge of first aid is required.

2.8.2 Competent specialists

Competent specialists are persons whose specialist training and experience have given them sufficient knowledge with respect to using this partly completed machinery and who are sufficiently familiar with the relevant statutory occupational health regulations, accident prevention regulations, directives, and generally approved technical practice that they are able to assess whether the condition of the partly completed machinery allows it to be used safely.

2.8.3 Auxiliary staff

Work on or in the vicinity of this partly completed machinery which is not associated with the actual operation of the partly completed machinery (e.g. cleaning, transport, material provisioning, etc.) can be performed by other persons. Before the partly completed machinery is taken into service, the qualified staff of the partly completed machinery operator must instruct such persons with regard to the nature of the work to be performed and the risks associated with working on the partly completed machinery. Take special care when instructing persons who cannot read or write, and instruct them separately!

2.8.4 Servicing, repairing and maintaining the partly completed machinery

Service, repair and maintenance work on the partly completed machinery may only be carried out by service engineers of the manufacturer or by qualified staff authorized by Taktomat GmbH. When carrying out such work, always cordon off the working area carefully!

2.9 Personal protective equipment

Personal protective equipment is intended to protect individuals from safety and health risks at work.
When performing certain tasks on and with the partly completed machinery, staff must wear personal protective equipment. This is explicitly indicated in the relevant sections of these Operating Instructions.

⚠WARNING

Risk of injury from moving parts!

Exposed jewellery and long hair can be trapped by moving parts and lead to serious injury.

- Always remove exposed jewellery such as chains, rings and watches before starting work.
- Protect long hair with a hair net.

2.10 Nameplate

Fig. 1 Example of a nameplate

There is a nameplate attached to the partly completed machinery:

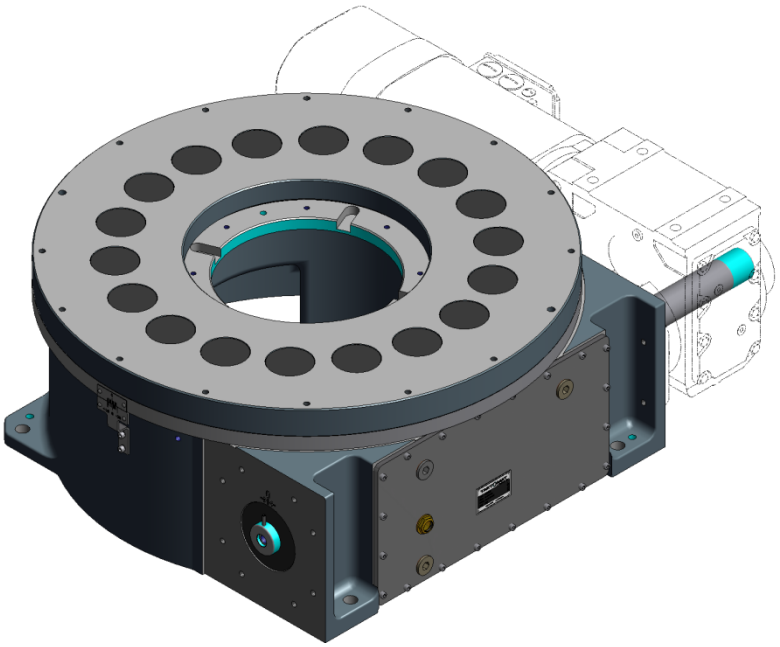

Fig. 2 Position nameplate

(1) Position nameplate

3 Construction and function

3.1 Construction Rotary indexer type TMF

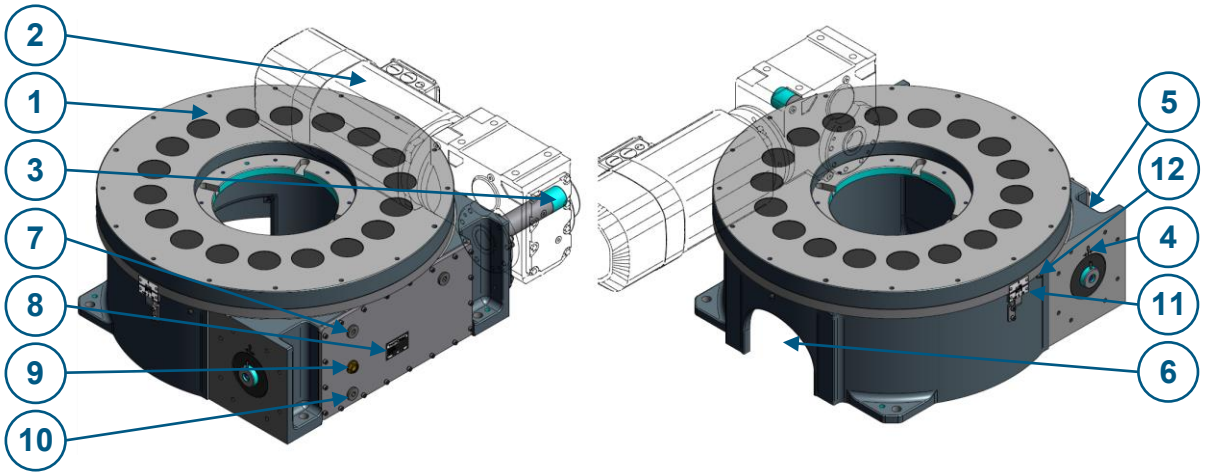

Fig. 3 Construction Rotary indexer TMF

Item	Designation	Item	Designation
1	Star wheel / Abtriebsflansch (Abtrieb)	9	Oil sight glass
2	Drive	10	Oil drain plug
3	Input shaft (drive)	11	Vernier
4	Position indicator	12	Grease nipple
5	Housing		
6	Cable aperture		
7	Service apertures		
8	Nameplate		

3.2 Function

The drive unit (**2**) drives the star wheel / output flange (**1**) via the input shaft (**3**) and the cylinder cam. The output plane is perpendicular to the drive plane. The machine converts a uniform radial movement on the drive side to a uniform, reduced output movement. The accessories are mounted on the star wheel / output flange (**1**).
The position indicator (**4**) shows the current position of the cylinder cam.
The vernier (**11**) is used to set the zero position of the star wheel / output flange.
The housing (**5**) of the Rotary indexer has a cable aperture (**6**). The rating plate (**8**) is attached to the housing. The oil sight glass (**9**) is used to check the oil level. The bearing is lubricated via the grease nipples **(12)**. The number of grease nipples **(12)** differs in terms of quantity and position.

3.3 Operating modes

The partly completed machinery has the following operating modes:

- Normal operational
  - Intermittent operation
  - Continuous operation
  - Reversing operation (Oscillating operation)
- Inching mode
- Emergency-Stop

NOTICE

Damage arising from operation without an appropriate machine controller!
Improper control of the partly completed machinery can cause serious material damage.

- Do not operate in inching mode without an appropriate universal machine controller.
- Use an appropriate universal machine controller.

3.3.1 Normal operation

Normal operation is regarded as the movement of the output flange in a direction from one position to the next. The rotational direction of the output flange is determined by the rotational direction of the drive. With a three-phase motor this can easily be reversed by swapping two phases of the supply voltage.

3.3.2 Reversing operation (reciprocating operation)

The drive of the partly completed machinery is always decelerated to the reverse position and accelerated after the reverse phase. In this mode of operation, the output flange shuttles back and forth between two positions.

3.3.3 Inching mode

In inching operation, the output flange moves in small increments between two positions. The cylinder cam cannot gently accelerate and decelerate the accumulated load. This puts the hardware under stress, since any acceleration that occurs during the inching operation exceeds that of normal operation many times over. No inching operation is permitted if there are no suitable machine controller (TIC) that allow gentle acceleration and braking of the load.

3.3.4 Emergency-Stop

Emergency stop is comparable with the stopping in inching operation. Frequent emergency-stop situations should be avoided.

3.4 Technical Data Rotary indexer

NOTICE

Deviating ambient conditions can cause material damage.
Do not operate in deviating ambient conditions.

- Adhere to the given operating – and storage conditions.
- Other ambient condition only in consultation with Taktomat.

3.4.1 Operating conditions

Area of application	**Inside**
Temperature range [°C]	**+10 to + 40**
Relative humidity [%]	**max 40 to 70**
Media	**do not expose the system to any aggressive agents**

3.4.2 Storage conditions

Area of application	**Inside**
Lighting [Lux]	**min. 300**
Temperature range [°C]	**-22 to + 50**
Relative air humidity [%]	**max. 40 to 70**
Media	**do not expose the system to any aggressive agents**
Storage period > 6 month	**coat the partly completed machinery with corrosive protection**

3.4.3 Noise emission

The direct noise emission from the partly completed machinery depends upon the ambient conditions. Deduced from these conditions there must be further acoustic pressure measurements performed on the installation location of the partly completed machinery.

3.4.4 Rotary indexer type TMF350

Primary dimensions

Star wheel / Drive flange Ø [mm]	140
Height (mounting surface of drive flange) [mm]	84
Internal diameter Ø [mm]	50
Internal transmission ratio [i]	10
Precision at absolute positioning in angular seconds ["] *	± 6
Precision at relative positioning in angular seconds [´´]	± 40
Overall dimensions lenght x width x height [mm]	187 x 200 x 84
Approx. weight of Rotary indexer without drive ca. [kg]	13,5
Direction	cw, ccw, reversing
Installation orientation	horizontal, vertical

3.4.5 Rotary indexer type TMF1000

Primary dimensions

Star wheel / Drive flange Ø [mm]	438
Height (mounting surface of drive flange) [mm]	195
Internal diameter Ø [mm]	165
Internal transmission ratio [i]	14
Precision at absolute positioning in angular seconds ["] *	± 6
Precision at relative positioning in angular seconds [´´]	± 40
Overall dimensions lenght x width x height [mm]	461,5 x 656 x 195
Approx. weight of Rotary indexer without drive ca. [kg]	120
Direction	cw, ccw, reversing
Installation orientation	horizontal, vertical

3.4.6 Rotary indexer type TMF1000 adapted

Primary dimensions

Star wheel / Drive flange Ø [mm]	450
Height (mounting surface of drive flange) [mm]	240
Internal diameter Ø [mm]	138
Internal transmission ratio [i]	14
Precision at absolute positioning in angular seconds ["] *	± 6
Precision at relative positioning in angular seconds [´´]	± 40
Overall dimensions lenght x width x height [mm]	467,5 x 656 x 256
Approx. weight of Rotary indexer without drive ca. [kg]	170
Direction	cw, ccw, reversing
Installation orientation	horizontal

3.4.7 Rotary indexer type TMF2000

Primary dimensions

Star wheel / Drive flange Ø [mm]	560
Height (mounting surface of drive flange) [mm]	285
Internal diameter Ø [mm]	190
Internal transmission ratio [i]	14
Precision at absolute positioning in angular seconds ["] *	8
Precision at relative positioning in angular seconds [´´]	688,5 x 877 x 285
Overall dimensions lenght x width x height [mm]	350
Approx. weight of Rotary indexer without drive ca. [kg]	cw, ccw, reversing
Direction	horizontal

3.4.8 Rotary indexer type TMF3000

Primary dimensions

Star wheel / Drive flange Ø [mm]	800
Height (mounting surface of drive flange) [mm]	330
Internal diameter Ø [mm]	280
Internal transmission ratio [i]	18
Precision at absolute positioning in angular seconds ["] *	8
Precision at relative positioning in angular seconds [´´]	800 x 1028 x 330
Overall dimensions lenght x width x height [mm]	480
Approx. weight of Rotary indexer without drive ca. [kg]	cw, ccw, reversing
Direction	horizontal

3.4.9 Rotary indexer type TMF4000

Primary dimensions

Star wheel / Drive flange Ø [mm]	1030
Height (mounting surface of drive flange) [mm]	355
Internal diameter Ø [mm]	450
Internal transmission ratio [i]	20
Precision at absolute positioning in angular seconds ["] *	8
Precision at relative positioning in angular seconds [´´]	1055 x 1318 x 355
Overall dimensions lenght x width x height [mm]	800
Approx. weight of Rotary indexer without drive ca. [kg]	cw, ccw, reversing
Direction	horizontal

3.4.10 Rotary indexer type TMF5000

Primary dimensions

Star wheel / Drive flange Ø [mm]	1360
Height (mounting surface of drive flange) [mm]	405
Internal diameter Ø [mm]	750
Internal transmission ratio [i]	24
Precision at absolute positioning in angular seconds ["] *	8
Precision at relative positioning in angular seconds [´´]	1385 x 1632 x 405
Overall dimensions lenght x width x height [mm]	1275
Approx. weight of Rotary indexer without drive ca. [kg]	cw, ccw, reversing
Direction	horizontal

3.4.11 Rotary indexer type TMF8000

Primary dimensions

Star wheel / Drive flange Ø [mm]	2300
Height (mounting surface of drive flange) [mm]	440
Internal diameter Ø [mm]	1520
Internal transmission ratio [i]	40
Precision at absolute positioning in angular seconds ["] *	8
Precision at relative positioning in angular seconds [´´]	2300 x 2310 x 440
Overall dimensions lenght x width x height [mm]	3800
Approx. weight of Rotary indexer without drive ca. [kg]	cw, ccw, reversing
Direction	horizontal

4 Transport

Safety information

NOTICE

Damage arising from improper transport!
Improper transport can cause significant damage to property.

- Take care and take note of the symbols on the packaging when unloading the partly completed machinery on delivery and when transporting it on the premises.

4.1 Transport inspection

Immediately on receipt, check to make certain that the delivery is complete and has not been damaged during transport:

Proceed as follows if there are visible signs of damage during transport:

- Do not accept the delivery or only do so conditionally.
- Record the extent of the damage on the transport documentation or on the associated delivery note.
- Immediately report any damage to the manufacturer of the partly completed machinery.

⚠DANGER

Risk of fatal injury from suspended loads and falling parts!
Parts can fall during transport and cause serious or fatal injury.

- Do not walk under suspended loads.
- Keep people clear of the danger zone.
- Always use lifting gear with a sufficient load capacity.
- Always use forklift trucks or pallet trucks with a sufficient load capacity and fork length.
- Do not leave the load suspended if you leave the working area.

4.2 Packaging, handling, unpacking

The partly completed machinery is packed in plastic sheeting or cardboard packaging and secured to a pallet for transportation.

NOTICE

Damage arising from improper transport!
Improper transport can cause significant damage to property.

- The partly completed machinery must not be allowed to become wet while it is being transported.
- Take the partly completed machinery out of the packaging just before installation

- Remove the packaging carefully and dispose of it with due regard to environmental considerations.

4.2.1 Transport using sling equipment

Staff	Protective equipment
Qualified staff	

- The sling equipment (see figure) must be attached to the attachment points (see table and dimensions sheet) in the positions shown in the figure and checked to ensure that it is working correctly (see the instructions for the sling equipment).

Transport the partly completed machinery as follows if you are using sling equipment:

Lifting instructions:
The angle between the perpendicular and the sling chain must lie between 0° and 45°.

⚠WARNING

Risk of injury from falling or sinking Load!
Too weak dimensioned sling equipment can break.
Transport vehicles can fail or topple if they are not designed for the weight of the partly completed machinery.
Falling or toppling machines may lead to serious personal injury.

- Lifting equipment, industrial trucks and sling equipment have to comply and designed to the rules for the weight of the machine including
- It is prohibited to stand under suspended loads or raised machine parts.

NOTICE

Damage arising from improper transport!
Improper transport can cause significant damage to property.

- Take care and take note of the symbols on the packaging when unloading the partly completed machinery on delivery and when transporting it on the premises
- Use slinging equipment with sufficient load capacity
- Align slinging equipment in load direction.
- If the recommended angle between perpendicular and the sling chain or sling strap exceeds 45° the load capacity of the sling equipment is reduced.

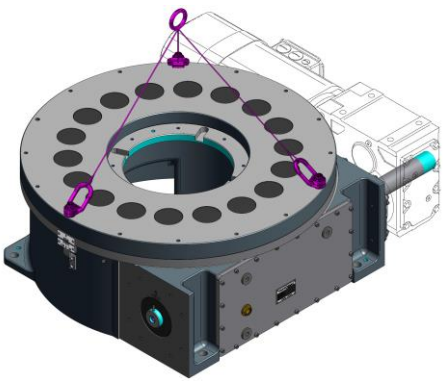

Fig. 4 Transport with sling equipment

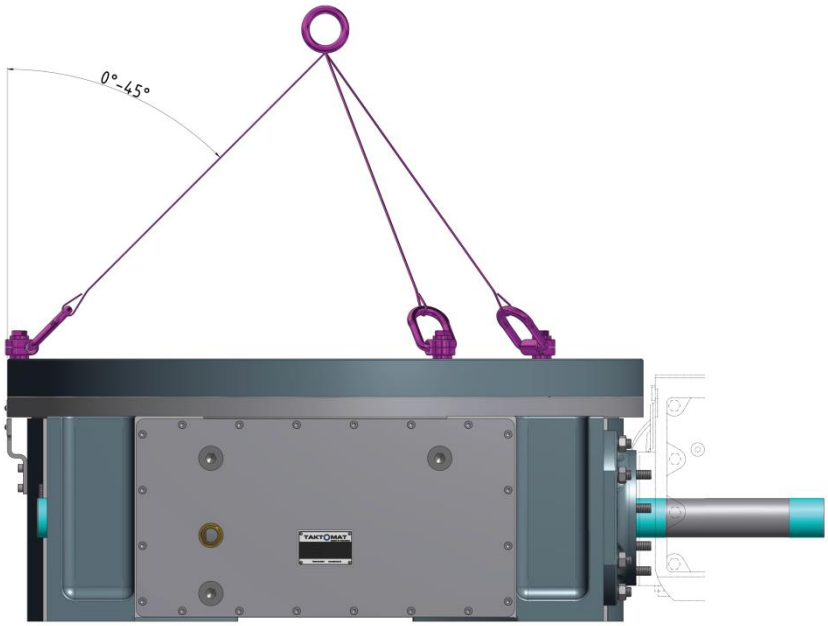

Fig. 5 Lifting instruction

Thread table for screw attachment points:

Suitable threaded holes are provided on Rotary indexer type TMF to accommodate slinging equipment. Please refer to the dimensions sheet in the technical data for the thread sizes.

Recommendation Sling equipment:

Type	Number of sling points	Recommendation Sling equipment:	Thread
TMF1000	3	VLBG 0,63t	M10
TMF2000	3	VLBG 1t	M12
TMF3000	3	VLBG 1t	M12
TMF4000	4	VLBG 1t	M12
TMF5000	4	VLBG 1t	M12
TMF8000	3	VLBG 8t	M36

5 Mechanical installation

5.1 Installation orientation

Possible Installation orientations.

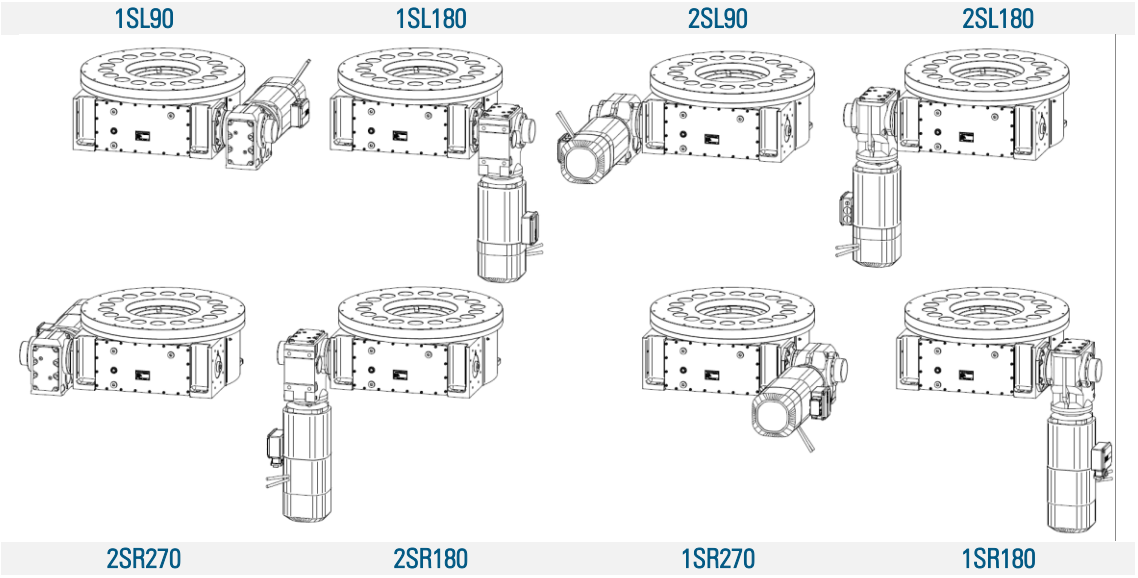

Fig. 6 Drive installation orientation TMF1000 – TMF5000

NOTICE

Damage arising from improper installation of the drive!
Improper installation of the drive can cause significant damage to property and material.

- Always follow the original operating instructions of the drive manufacturer on mounting the drive (Standard SEW) to the machine.
- Oil control – and drain bolts as well as air escape valves must be freely accessible without mechanical intervention.
- Check spatial positions of the drive

5.2 Securing the drive

Staff	Protective equipment
Qualified staff	

NOTICE

Damage arising from improper installation of the drive!
Improper installation of the drive can cause significant damage to property and material.

- Always follow the original operating instructions of the drive manufacturer on mounting the drive (Standard SEW) to the machine.
- Oil control – and drain bolts as well as air escape valves must be freely accessible without mechanical intervention.
- Check spatial positions of the drive

The drive must be secured with bolts at the specified points. The type of drive, servo motor or asynchronous motor has to be agreed by TAKTOMAT.
On request, TAKTOMAT can supply an adapter flange for use between the drive and the TMF housing. The input shaft must not be remachined. The diameter and length of the hollow shaft of the drive are determined by the dimensions of the input shaft (refer to the dimensions sheet for information).

- Secure the drive with the specified bolts at the specified points (see figure: Drive assembly sequence)
- Fasten the bolts with the appropriate torque (see torque table)
- Check tightening torque after fastening

Mount the drive on the Rotary indexer as follows:

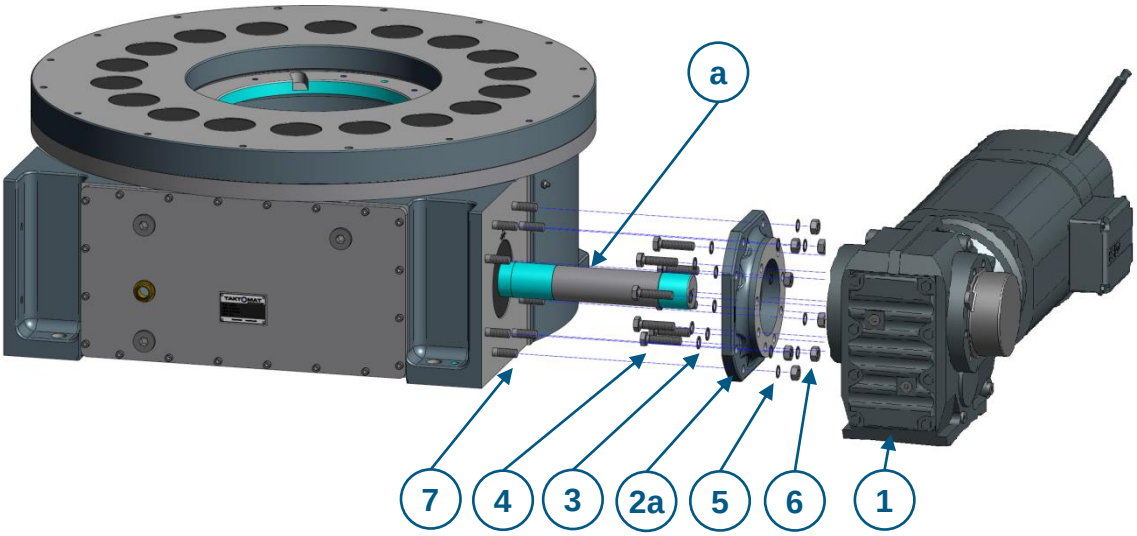

Fig. 7 Drive unit assembly sequence for casted drive flange

Item	Designation	Item	Designation
1	Drive unit	5	Schnorr washer
2a	Drive flange	6	Nut
3	Schnorr washer	7	Stud
4	Hexagon screw		

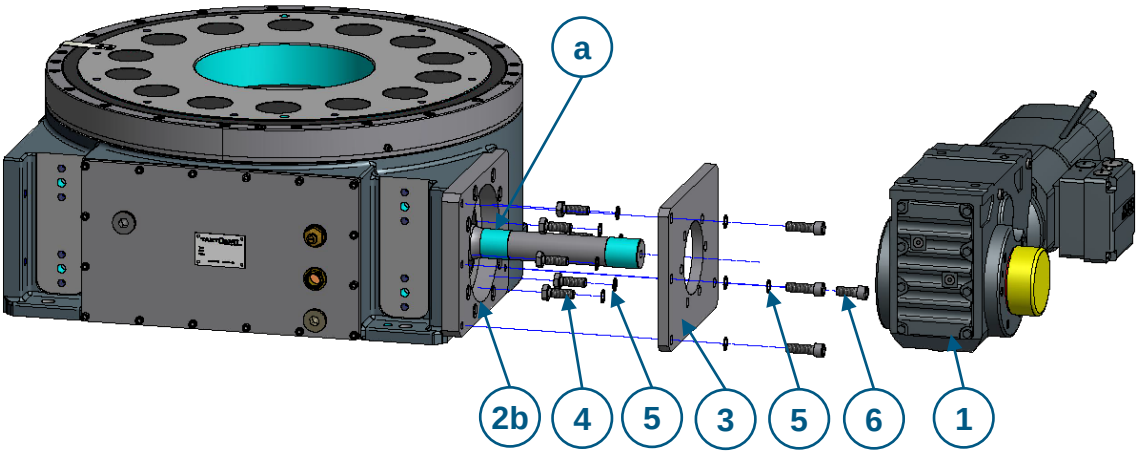

Fig. 8 Drive unit assembly sequence for drive flange with plate

Item	Designation	Item	Designation
1	Drive unit	5	Schnorr washer
2b	Drive flange	6	Allen screw
3	Drive flange plate		
4	Hexagon screw		

5.2.1 Mount drive unit with hollow shaft

Required tools					
Type	Clearance hole	Designation	Quantity	Dimension	Item
Drive flange	**Ø9 mm**	Assembly screw TMF1000	2	M8	332104
Drive flange	**Ø13,5 mm**	Assembly screw TMF3000	2	M12	332101
Drive flange	**Ø17,5 mm**	Assembly screw TMF5000	2	M16	332103

Recommended tools	
Designation	**Dimension**
Allen key	-
Ring wrench	-
Open end wrench	-
Torque wrench	

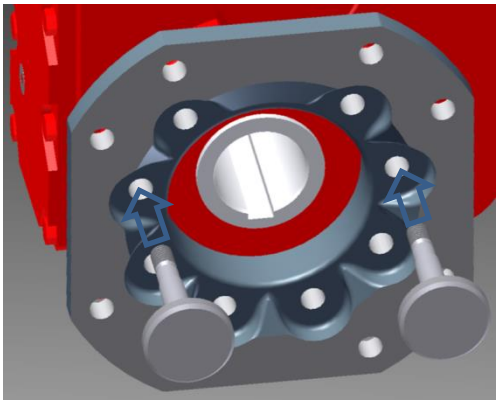

Fig. 9 Drive flange centering procedure with assembly screws

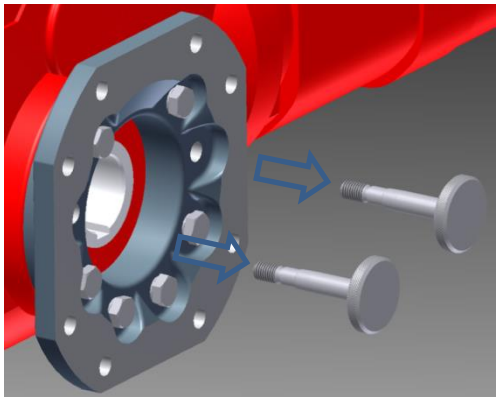

Fig. 10 Drive flange after centering procedure with assembly screws

Step	Action
1	 For secure assembly of drive unit from component suppliers the instruction manual/booklet of the component supplier must be read
	▸ Degrease input shaft with customary solvent
2	▸ Applicate a suitable assembly fluid (e.g. NOCO®-Fluid) on the (**a**) marked area
3	▸ Secure cast – drive flange (**2a**) with appropriate threaded stud of strength class 10.9 on housing with torque wrench according to the torque table ▸ Secure drive flange (**2b**) with appropriate Allen screws of strength class 10.9 (Schnorr washer included) on housing with torque wrench according to the torque table
4	▸ Center drive flange (**2a**) with appropriate assembly screws ▸ Assemble drive flange (**2a**) with appropriate hexagon screws of strength class 10.9 (Schnorr washer included) on gear flange of drive unit (**1**) ▸ Assemble drive flange-plate (**3**) with appropriate hexagon screws of strength class 10.9 (Schnorr washer included) on gear flange of drive unit (**1**)
5	▸ Secure screws crosswise with torque wrench according to the torque
6	▸ Take the mounting position of the drive unit from technical data of the manufacturer

Step	Action
	▸ Slide the drive unit with given mounting position on the input shaft until it adjoins at the housing
7	▸ Secure cast – drive flange (**2a**) with appropriate nuts (Schnorr washer included) on threaded studs crosswise with torque wrench according to the torque table ▸ Secure drive flange-plate (**3**) with Allen screw of strength class 10.9 on drive flange (**2b**) with torque wrench according to the torque table

5.3 Installation and commissioning

Safety information

DANGER

Risk of death by electrocution!

There is an immediate risk of fatal injury due to electric shock if live components are touched. Damage to the insulation or to individual components can cause fatal injury.

- Only allow work on the electrical system to be carried out by qualified electrical engineers.
- In the event of damage to the insulation, immediately shut off the power supply and initiate a repair.
- Before starting work on active parts of the electrical system or equipment, ensure that it is completely powered down and cannot be switched on again.

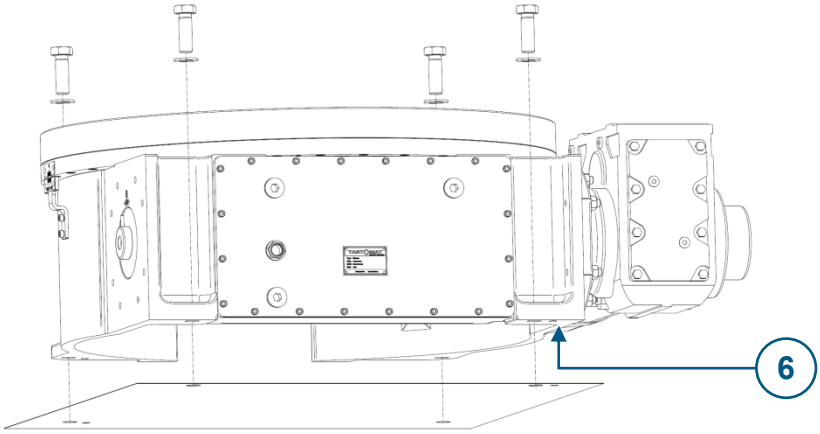

Fig. 11 Installation orientation TMF1000 horizontal –TMF8000

5.3.1 Installation

Staff	Protective equipment
Qualified staff	

- The surface on which the partly completed machinery is to be installed must be level.
- Clean the installation surface and apply a film of oil.
- Place the Rotary indexer TMF on the installation surface.
- Secure the Rotary indexer TMF with screws and studs according to requirements.
- Compare the power supply with the details on the nameplate.
- Connect the drive
- The housing of the Rotary indexer TMF has to be earthed consistently according to the VDE regulations with adequate width.

Setting the zero point using the vernier

The vernier is used to set the zero point.
The star wheel / output flange can always be set to the factory zero position of the cylinder cam rotary indexing table using the vernier. This is necessary for applications which have a zero position or a reference point.

Accessories on the star wheel / output flange

Observe the following constraints when attaching accessories to the star wheel / output flange:

- Maximum weight moved (as per Taktomat project planning)
- Minimum positioning time (as per Taktomat project planning)
- Maximum overhang (tipping moment) (as per Taktomat project planning)
- Maximum tightening torque for securing holes, see torque table

5.4 Maintenance task

5.4.1 Maintenance plan

Interval	Maintenance activity	Staff
Daily	General visual and acoustic inspection	Operator
Monthly	Check that no oil is escaping from the Rotary indexer TMF	Operator
Monthly	Check oil level	Operator
Semi - annual	Lubricate the Rotary indexer type TMF2000 on, see chapter. Lubrication	Operator
Semi - annual	• Visual inspection for damage • Remove any dust deposits (especially on ventilation grills of the drive units) • Inspect electric cables for damage	Qualified staff
Semi - annual	TMF8000 Visiual inspection of the belt drive ▸ Change Belt drive if required	Qualified staff
Annual	Control if Rotary indexer TMF is without play	Qualified staff
Annual	Rotary indexer TMF lubricate bearings	Qualified staff

5.5 Checking the oil level

Staff	Protective equipment
Operator	

The Rotary indexer of type TMF on are equipped with an oil sight glass an must be serviced according to the maintenance plan.

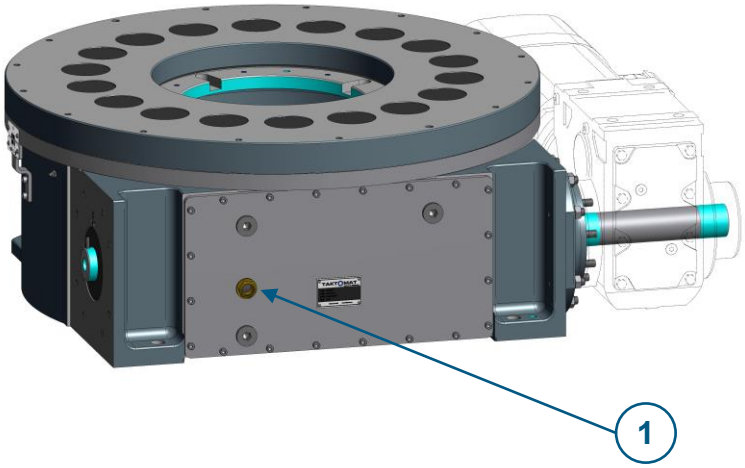

Fig. 12 Checking the oil level

(**1**) Oil sight glass

NOTICE

Damage arising from improper oil check!
Improper oil check can cause injury to staff and material.

- Power off the machine and secure it to prevent it from being switched on inadvertently!
- Wait until the machine has 30 minutes of downtime!
- Only check oil level after the machine has stopped!
- The oil level must, by no means rise over the top mark of the oil sight glass!

Checking oil level:

The specified oil level of the machine (**1**) is the mid marking of the oil sight glass.

- Top up oil as required.

5.5.1 Oil fill quantities

Type	Fill quantity [l] [dm³]	Type	Fill quantity [l] [dm³]
TMF1000 horizontal	1,0	TMF1000 vertical	1,1
TMF2000	4,5	TMF7000	
TMF3000	6,0	TMF8000	
TMF4000	6,0		
TMF5000	14,0		

5.6 Lubrication

5.6.1 Requirements for lubricants

General

To ensure safe operation and a long service life, it is necessary to lubricate the machine carefully. The specified oil and grease must be applied to all lubrication points.
Carefully clean dirty lubrication points using a suitable agent and then lubricate them with new lubricant. After lubrication, any excess lubricant must be removed and properly disposed of.
The oil and grease used must be silicone-free.

Lubricating oil (not provided for TMF1000 and TMF2000)

Use only lubricating oil compliant with DIN 51 517 (ISO VG 460)

Recommended gear oil (not provided for TMF1000 and TMF2000)

Manufacturer	Designation
Mobil	Mobilgear 600 XP 460
BP	Energol GR-XP 460
SHELL	Omala 460
LIQUI MOLY	meguin Getriebeöl CLP 460
Zeller+Gmelin	Divinol ICL ISO 460
Klüber	Klüberoil GEM 1 N

Lubricating grease (not intended for TMF1000 and TMF2000)

Use only lubricating grease compliant with DIN 51 825-KP 2K.

Recomended lubricating grease:

Manufacturer	Designation	Specification
Mobil	Mobilux EP2	KP2 K-30
BP	Energrease LS-EP 2	KP2 K-20
Aral	Aralub HLP 2	KP2 N-30
Fuchs-DEA	Renolit MP	KP2 K-40
Klüber	Centoplex 2	KP2 K-20
SHELL	Alvania G2	KP2 N-20

Note:

Only use lithium soap based grease for lubrication. The use of greases based on different materials causes gummy deposits, decomposes the grease and destroys its lubricating properties.

Overview relubrication TMF series

Product	Relubrication distribute to respective number of grease nipples
TMF1000	–
TMF2000	–
TMF3000	26 g
TMF4000	34 g
TMF5000	49 g
TMF8000	128 g

5.7 Replacing cam follower

5.7.1 Saftey information

DANGER

Risk of death by electrocution!

There is an immediate risk of fatal injury due to electric shock if live components are touched. Damage to the insulation or to individual components can cause fatal injury.

- Only allow work on the electrical system to be carried out by qualified electrical engineers.
- In the event of damage to the insulation, immediately shut off the power supply and initiate a repair.
- Before starting work on active parts of the electrical system or equipment, ensure that it is completely powered down and cannot be switched on again.

Staff	Protective equipment
Qualified staff	

Check the machine for play. Cam followers have to be changed if there is play in one or more positions.

The following assembly sequence must be strictly adhered to.

The cylinder cam rotary indexing table must first be isolated from the power supply to allow the Taktomat cam follower (TKR) to be removed and maintained safely and efficiently. Any external accessories that obstruct access to the cam follower must be removed correctly.

The following tools are required to remove the TKR cam follower:

- Clip hooks, flat-blade screwdriver
- Internal circlip pliers
- Internal extractor
- Hexagonal socket set

The following replacement parts and consumables are recommended:

- Cap plug
- Retaining ring
- Schnorr locking washer
- TKR Taktomat cam follower

5.7.2 Assembly sequence replacing cam follower of type TMF

NOTICE

Damage arising from improper securing the rotary indexing table against dirt during the repair!
Improper securing the machine against dirt can cause injury to material.

- Steps must be taken to ensure that no foreign bodies can get inside the cylinder cam rotary indexing table.
- It is therefore recommended that the holes from which the idler bushes have been withdrawn should be covered!

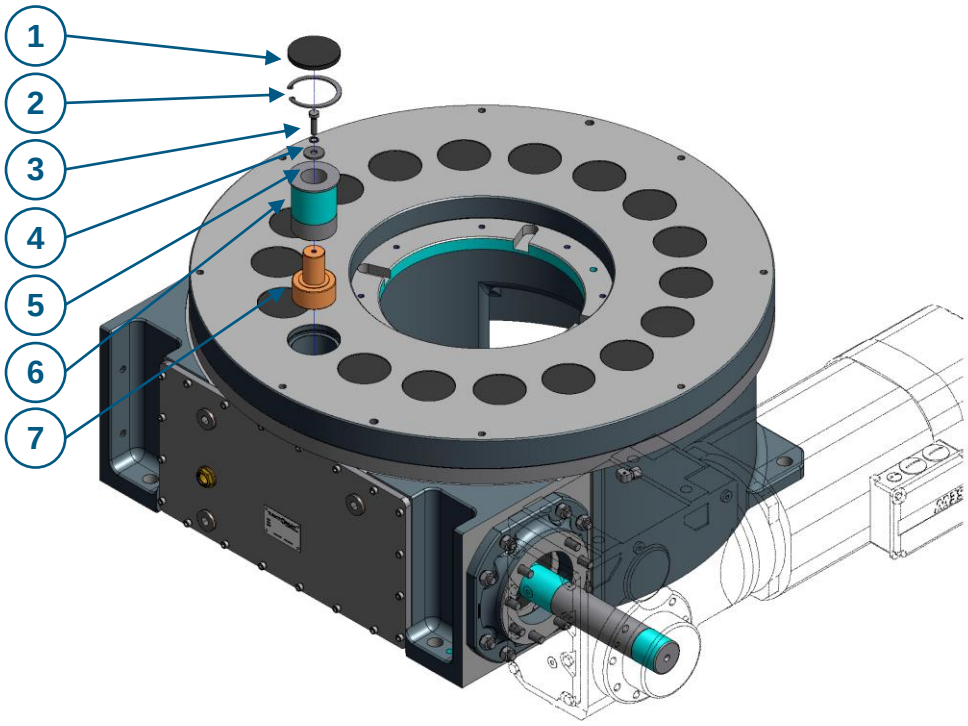

Fig. 13 Assembly sequence cam follower TMF2000 - TMF8000

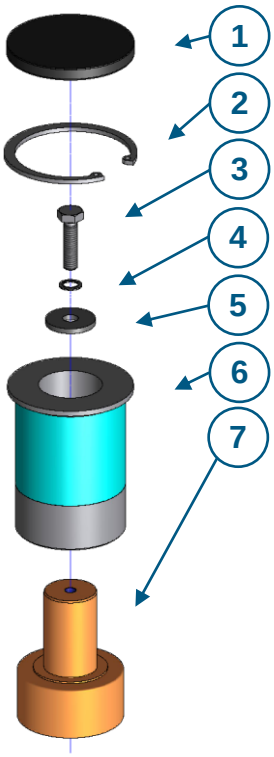

Fig. 14 Detail assembly sequence cam follower

Pos.	Designation
1	Cap plug
2	Cir clip
3	Hexagonal bolt
4	Schnorr locking washer
5	Washer
6	Idler bush
7	Cam follower
8	Star wheel / output flange

5.7.3 Removing the Taktomat cam follower

Step	Action
(1)	▸ Start by removing the cap plug with clip hook (item **1**).
(2)	▸ Use the circlip pliers to remove the retaining ring (item **2**)
(3)	▸ After the hexagonal bolt (item **3**, including **4** and **5**) has been removed, together with the two washers, an internal thread becomes accessible in the idler bush.
(4)	▸ Screw the internal extractor into the internal thread of the idler bush (item **6**)
(6)	▸ After applying a lubricant, the idler bush (item **6**) is then carefully pulled from the star wheel / output flange using the internal extractor.
(7)	▸ It is easier to remove the Taktomat cam follower (item **7**) if the cylindrical surface of the idler bush (item **6**) is heated. As soon as this has been done, a suitable bolt can be used to press the Taktomat cam follower (item **7**) out.

5.7.4 Installing the Taktomat cam follower:

Step	Action
(1)	▸ The idler bush (item **6**) is heated in order to facilitate insertion of the Taktomat cam follower (item **7**) ▸ Press the Taktomat cam follower (item **7**) home into the idler bush (item **6**) ▸ Wait for a short time for the bush to cool before continuing assembly
(2)	▸ Fit the washer (item **5**), the Schnorr locking washer (item **4**) and the hexagonal bolt (item **3**).Remove center column. ▸ Tighten the bolt to the maximum torque (see torque table)
(3)	▸ To facilitate installation of the idler bush (item **6**) with the Taktomat cam follower (item **7**), cool the idler bush. ▸ Once cooling is complete, press the idler bush (item **6**) home into the correct hole in the star wheel / output flange (item **8**) without canting.
(4)	▸ The idler bush (item **6**) is held in position by the circlip (item **2**).
(6)	▸ Press cap plug (item **1**) into the corresponding hole so that it is approximately 0.5 mm below flush. ▸ The cap plugs must not protrude from the star wheel / output flange.
(7)	▸ Check the positions of the cap plugs (item **1**) again before the Rotary indexer is taken into operation.

5.7.4.1 Torque table

Steel screws Quality grade 8.8	Torque (Nm)
M4	3,3
M5	6,5
M6	11,3
M8	27,3
M10	54
M12	93
M14	148
M16	230

6 Troubleshooting

DANGER

Risk of death by electrocution!

There is an immediate risk of fatal injury due to electric shock if live components are touched. Damage to the insulation or to individual components can cause fatal injury.

- Only allow work on the electrical system to be carried out by qualified electrical engineers.
- In the event of damage to the insulation, immediately shut off the power supply and initiate a repair.
- Before starting work on active parts of the electrical system or equipment, ensure that it is completely powered down and cannot be switched on again.

WARNING

Risk of injury from improper troubleshooting!

Improper troubleshooting can cause serious injury to staff and material.

- Before starting work ensure that there is sufficient room to carry out the work.
- Pay attention to tidiness and cleanliness in the working area! Loose parts and tools which are piled up or lying around are sources of accidents.

Fault	Possible cause	Remedy
Drive does not turn	• No supply voltage • Drive contactor malfunction • Drive protection switch triggered • Brake not released	▸ Check power supply ▸ Change contactor ▸ Let the drive cool down; latch the protection switch of the drive ▸ Incorrectly connected or worn brake ▸ Check sensor settings at the switching cam. ▸ Check sensor cable at the sensor
Drive turns, but the mounting plate does not move	• Worm gear malfunction • Safety coupling overload / disengaged • Cam followers tear off due to massive overload • Levers broken • Cone clamping element not correctly mounted	▸ Contact TAKTOMAT ▸ Remove outside blockade / latch the safety coupling ▸ Contact TAKTOMAT ▸ Contact TAKTOMAT ▸ Mount cone clamping element correctly according to operating instruction of manufacturer
Drive turns, but mounting plate does not move, mounting plate is not free of play	• Cam follower tear off due to overload	▸ Contact TAKTOMAT

Fault	Possible cause	Remedy
Drive turns with strong humming noise	• Drive operates on 2 phases	▸ Check fuse or drive contactor ▸ Measure current on all 3 phases; voltage measurement is not enough
No signal from sensor	• Sensor not activated / not fully activated • Cable defective • Sensor defective • No supply voltage	▸ Remove blockage ▸ Check cable, exchange if necessary ▸ Exchange sensor ▸ Check supply voltage

7 Disposal

WARNING

Risk of environmental damage caused by improper disposal!
Improper disposal of components can cause environmental damage to persons and environment.

- Disposal of the components in accordance with the applicable local rules
- Environmentally compatible disposal of auxiliary substances such as chemicals, paints, acids, alkalis, adhesives
- Essentially components of the machine consists of following materials: copper (drive unit, electrical lines) Steel, aluminium and grey cast iron (housing, structures, shaft, bearings,…) Plastics (tooth belt. isolation, components of bearings).

DANGER

Risk of death by electrocution!
There is an immediate risk of fatal injury due to electric shock if live components are touched.
Damage to the insulation or to individual components can cause fatal injury.

- Only allow work on the electrical system to be carried out by qualified electrical engineers.
- In the event of damage to the insulation, immediately shut off the power supply and initiate a repair.
- Before starting work on active parts of the electrical system or equipment, ensure that it is completely powered down and cannot be switched on again.

Before starting disassembly:

- Disconnect all power supplies to the partly completed machinery, ensure that it cannot be reconnected and verify that the circuit is de-energized
- Wait 15 Minutes, until all live parts are full discharged
- Disassemble assemblies and components, observing any local environmental protection regulations

8 Spare part and wear part TMF

Spare part must meet the manufacturer's technical specifications. This is always ensured if original Spare parts are used.

Spare part and wear part of the product Rotary indexer are basically order specific. To accelerate the order process of the Spare part and wear part, we need the following information which is located on the nameplate: Serial number of the Rotary indexer TMF (see chapter nameplate).

NOTICE

Damage arising from contamination with silicon!
Improper handling of spare parts and wear parts can cause significant damage to property.

- Keep spare parts and wear parts free from silicon!

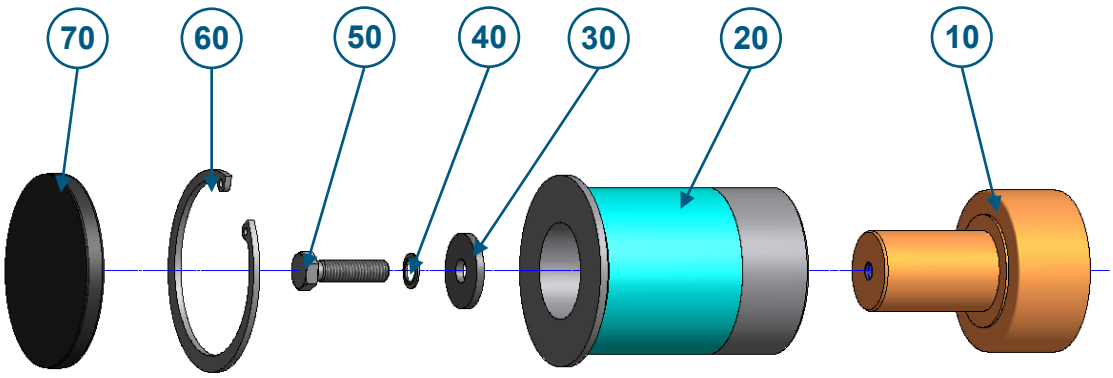

Fig. 15 Overview of replacement parts and consumables TMF2000-TMF8000

8.1.1 Replacement parts and consumables for type TMF1000

Number	Quantity	Designation	Spare part (SP)	Wear part (WP)	Item no.
10	14	Cam follower TKR 35		WP	308800
40	14	Retaining disk	SP		304704
50	14	Bolt	SP		300427
60	14	Retaining ring	SP		323997
70	14	Cap plug	SP		305566

8.1.2 Replacement parts and consumables for type TMF2000

Number	Quantity	Designation	Spare part (SP)	Wear part (WP)	Item no.
10	14	Cam follower TKR		WP	305590
20	14	Idler bush		WP	321606
40	14	Retaining disk	SP		304705
50	14	Bolt	SP		300460
60	14	Retaining ring	SP		318615
70	14	Cap plug	SP		322684

8.1.3 Replacement parts and consumables for type TMF3000

Number	Quantity	Designation	Spare part (SP)	Wear part (WP)	Item no.
10	18	Cam follower TKR		WP	305820
20	18	Idler bush		WP	322237
30	18	Disk	SP		330281
40	18	Retaining disk	SP		304705
50	18	Bolt	SP		305339
60	18	Retaining ring	SP		300793
70	18	Cap plug	SP		319436

8.1.4 Replacement parts and consumables for type TMF4000

Number	Quantity	Designation	Spare part (SP)	Wear part (WP)	Item no.
10	20	Cam follower TKR		WP	305820
20	20	Idler bush		WP	322237
30	20	Disk	SP		330281
40	20	Retaining disk	SP		304705
50	20	Bolt	SP		305339
60	20	Retaining ring	SP		300793
70	20	Cap plug	SP		319436

8.1.5 Replacement parts and consumables for type TMF5000

Number	Quantity	Designation	Spare part (SP)	Wear part (WP)	Item no.
10	24	Cam follower TKR		WP	317275
20	24	Idler bush		WP	321569
40	24	Retaining disk	SP		304707
50	24	Bolt	SP		300406
60	24	Retaining ring	SP		307211
70	24	Cap plug	SP		313986

8.1.6 Replacement parts and consumables for type TMF8000

Number	Quantity	Designation	Spare part (SP)	Wear part (WP)	Item no.
10	40	Cam follower TKR		WP	317275
20	40	Idler bush		WP	323344
40	40	Retaining disk	SP		304707
50	40	Bolt	SP		330335
60	40	Retaining ring	SP		300791
70	40	Cap plug	SP		306920

9 Annex

9.1 Saftey data sheets

Number	Designation
1	EP 2 Grease Data Sheet HI
2	MOBILGEAR 600 XP 460