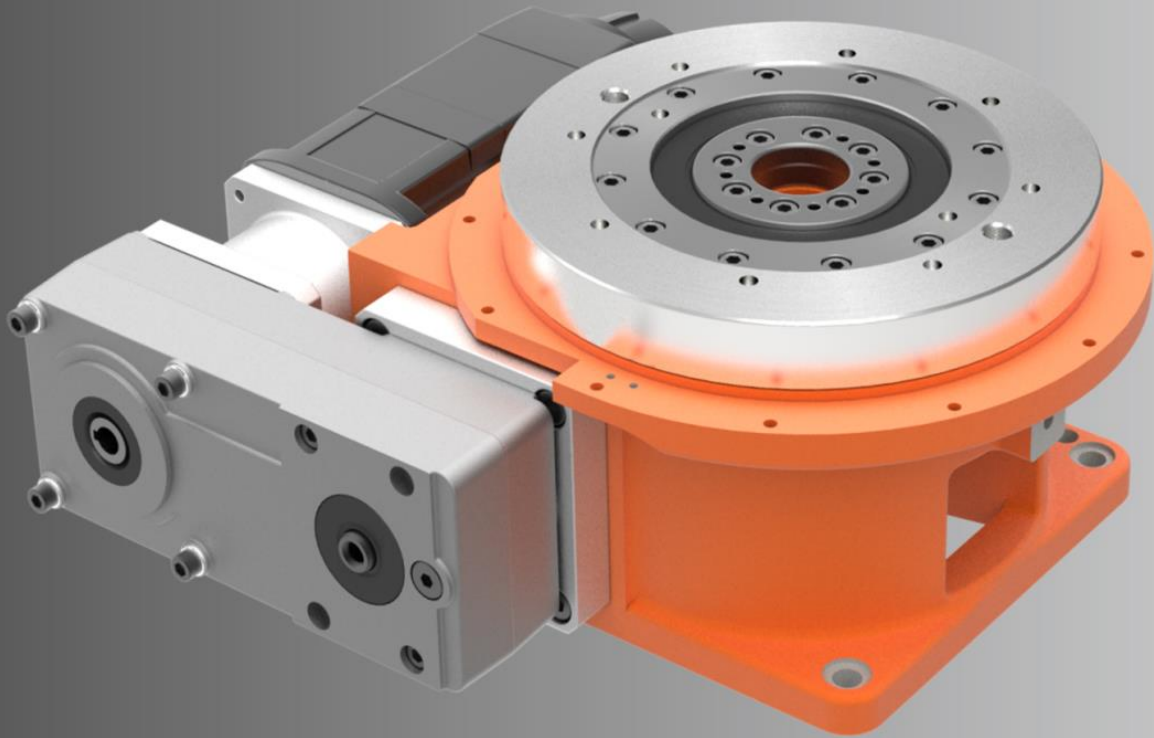



# TRANSLATION OF THE ORIGINAL ASSEMBLY AND OPERATION MANUAL



## FIBROTOR EM.NC



Rotary table	<a href="#">FIBROTOR EM.NC</a>
Type:	-
Item number:	-
Serial number:	-
Dimensions drawing:	-
Year of manufacture:	-
Order number:	-

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Document: Translation of the original assembly and operation manual  
Version V1.2



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## 1 Introduction

### 1.1 Definition

Rotary table Rotary table:

The rotary table is a partly completed machine in the sense of European Guideline 2006 / 42 / EG, Art. 1g and 2g.

### 1.2 Intended use

The purpose of the rotary table is to be mounted in other machines or in other partly completed machinery or equipment, or to be assembled with them.

The commissioning is not permitted until the necessary safety has been guaranteed for the entire installation, into which the rotary table has been mounted, and its conformity with the laws and guidelines of the country where the rotary table is to be operated, has been established and confirmed.

Its use is permitted only within the limits defined in the order characteristics.

The intended use includes also

- the reading of this manual and observing the safety information.
- Observing the relevant documentation.
- Observing the maintenance instructions.

The rotary table may only be used as intended. Only methods and procedures described in this manual may be used.

### 1.3 Improper use

Any use that does not comply with the intended use of the rotary table is considered a misuse and is prohibited.

The rotary table may not be subjected to loads above its maximum load limits.

As a matter of principle, the rotary table is not suitable for

- Operation in mobile or portable systems, on ships or in aircraft
- Operation in life support systems
- Operation in residential housing
- Operation beyond the limits of the specified performance data and operating parameters
- Use in explosive atmospheres
- Use in vacuum spaces
- Use under operating conditions where highly inflammable or explosive substances are processed
- Use under operating conditions with aggressive or solvent-containing substances (e.g. acids, lyes, hydrocarbons, etc.)

The operator of the machine described in this document bears the responsibility for any injuries and damages caused by its improper use.

#### 1.4 Applicable documents

Along with this manual, other applicable documents are necessary for the safe operation of the machine. The data in these documents must be observed.



Instruction for the assembly of a partly completed machine according to Guideline 2006/42/EG



Electric diagram



Hydraulic diagram



Pneumatic diagram



Drawings

#### 1.5 Structure

The structural design is characterised by a rigid mechanical structure. The basic device is comprised of the housing, table top, bearings, cam drive, drive motor with gears and holding brake. Horizontal and vertical use with several motor layouts is possible.

Additional component assemblies are available if the structure is to be extended. The rotary table may also be used as a built-in table.

##### 1.5.1 Bearing

The bearing for the table top is large and is both axially and radially pretensioned. In order to absorb large tilting moments, e.g. when the table top is in a vertical position, the additional component assembly "reinforced table top bearing" is available.

##### 1.5.2 Middle throughlet

The rotary table is delivered with a large clear middle throughlet.

##### 1.5.3 Direction of rotation

The direction of rotation can optionally be to the left or right. Pendulum mode is possible.

##### 1.5.4 Service life

The arrangement is subject to a service life of MTTF = 20,000 h.

##### 1.5.5 Cam drive

The operation is generated by the drive motor via the gearbox and the cam drive on the table top. The cam rollers are pretensioned on both sides on the operating cam.

### 1.5.6 Positioning

Positioning is achieved through the NC control system with position rule capture via encoder. In the positioned condition the cam is stopped play-free by an electric brake. In the event of high tangential forces, a hydraulic table top clamping can be used (greater rigidity, relief of the gearbox parts).

### 1.5.7 Drive motors

As standard, three-phase servo motors are used as drive motors. Direct current or hydraulic servo motors can also be used. For individual cases with low precision requirement the use of three-phase standard motors in conjunction with a frequency converter is possible.

### 1.5.8 Reference point

The rotary table can, as an option, be equipped with a fixed reference point switch. The measuring system is set to this. The switch is used to reduce the speed and has a signal length of approx. 3-4°. The switch is operated in the zero position. The start-up of the reference point switch can be performed with a clockwise (CW) and a counter-clockwise (CCW) direction of rotation.

### 1.5.9 Holding brake

The holding brake is energised to stop the worm shaft. Voltage 24 VDC

The operation is performed from the motor via spur wheel transmission to a worm, which drives the table top via rollers. Positioning is achieved through an NC control system with position rule capture via a corresponding measuring system. In the positioned condition the worm shaft is stopped play-free by the holding brake.

If the solenoid [1] is switched on the dotted magnetic field is depicted. The anchor plate [3] is pressed onto the braking coil carrier with friction lining [4]. The shaft is braked. The brake torque runs from the coil carrier [3] via the friction lining [4], anchor plate [3] and membrane transmission spring [5] to the flange [6] and the shaft.

If the solenoid [1] is de-energised, the membrane transmission spring [5] pulls the anchor plate [3] away from the coil carrier [1]. The shaft can run through freely.

Type	Brake	Voltage	Torque	Power
EM.NC.11	Gr. 3	24 VDC	13 Nm	10 W
EM.NC.13	Gr. 4	24 VDC	24 Nm	15 W
EM.NC.15	Gr. 4	24 VDC	24 Nm	15 W
EM.NC.16	Gr. 6	24 VDC	80 Nm	27 W
EM.NC.17	Gr. 7	24 VDC	160 Nm	34 W
EM.NC.18	Gr. 7	24 VDC	160 Nm	34 W

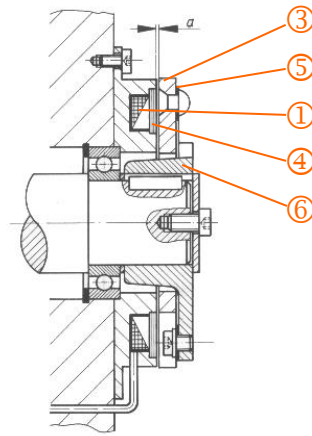


Fig. 1 Holding brake

- ① Magnet
- ② Anchor plate
- ③ Friction lining
- ④ Membrane transmission spring
- ⑤ Flange

#### 1.5.10 Indirect measuring system (Standard design)

The encoder is arranged in the worm shaft axis. The tolerances of the worm rolling gearbox are included in the measurement.

#### 1.5.11 Measuring system on the motor

In particular in the case of digital servo drives the measuring system is placed directly on the motor shaft.

The precision and play of the reduction gearbox are included in the measurement result.

This is only recommendable in relation with mathematically exact gear reduction.

#### 1.5.12 Direct measurement (as from EM.NC.13 possible)

The measuring system is attached to the table top axis. The measuring accuracy is, to a great extent, dependent on the accuracy of the measuring system.

#### 1.5.13 Manufacturers and types of incremental encoders

Standard manufacturer: Heidenhain

Number of lines	Type	Ident. No.
1.500	ROD 426 E/1500	05 51 895
5.000	ROD 426 B/5000	
5 m cable Radial output without plug (4x2x0,14+4x0.25)mm <sup>2</sup> Voltage supply 5V ± 5%		

### 1.5.14 Cable colours and connections

Function	Core colour
Signal 1	Brown
\Signal 1	Green
\Signal 2	Pink
Signal 2	Grey
+5V	Brown-Green
0V	White-Green
Sensor +5V	Blue
Sensor 0V	White
Signal 0	Red
\Signal 0	Black

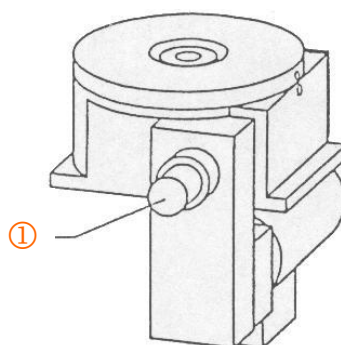


Fig. 2 Encoder

① Encoder

Structurally similar increm. encoder	
BDG 63 10	Balluff
DG 118	RSF Elektronik
DG 60 D	Stegmann
63-2	Leine & Linde

**NOTICE**

To avoid mechanical overloads on the rotary table, even in the event of an emergency stop, the acceleration time  $t_a$  (see “Technical Data” in the appendix) must not be undershot.

## 1.6 Warranty

The warranty is regulated by contract (see General Terms and Conditions or Contract).

## 1.7 Translation of the Original maintenance and operation manual

This manual is the translation of the original maintenance and operation manual and is part of the scope of delivery.

This manual describes the operation of the machine and contains important information about its intended use.

This manual is addressed especially to the personnel that has been trained and authorised for operating and servicing the machine.

A copy of this manual must be stored and made continuously available at the operating site of the machine and everyone assigned to work on or with the machine must read, understand and apply it.

The safety instructions in the individual chapters must be observed.

This manual and the other relevant documents (see Chapter 1.4 Applicable documents on page 10) are not subject to any modification service.

We reserve the right to update data and drawings in this manual based on further technical development.

The respectively current version can be requested from the manufacturer.

### 1.7.1 Legend

Certain marks, symbols and abbreviations with the following meaning are used in this manual for clear organisation of its contents:

- 1. indicates an enumeration.
  - a) indicates the second level of an enumeration.
- indicates a listing.
  - ▶ indicates the second level of a listing.



The book symbol before the text is a reference to another applicable document. The content of this document must be observed.



The information symbol before the text indicates an additional instruction or an important application tip.

### 1.7.2 Figures

The figures show the machine as an example. Deviations in the graphical presentation compared to the delivered machine are possible.

### 1.7.3 List of the valid pages

The number of pages in this manual, including the title page: 60

### 1.7.4 Meaning of the safety instructions in this manual

This manual contains instructions which must be observed for the protection of personnel and the prevention of property damage.

The safety instructions related to warnings about injuries are emphasised with the help of a code chart containing a warning triangle and a signal word. The respective text describes the type of hazard, its source, the means of prevention and the consequences of disregarding the safety instruction.

The general instructions or those related to possible property damage are designated with a code chart without a warning triangle.

The code charts used in this manual have the following meaning:



**DANGER** designates a hazardous situation which, if not prevented, can lead to death or serious injury.



**WARNING** designates a hazardous situation which, if not prevented, can lead to death or serious injury.



**CAUTION** designates a hazardous situation which, if not prevented, can lead to light to medium-level injuries.



**ATTENTION** designates additional instructions, provides information about possible property damage and is not related to possible injuries.

## 1.8 Definitions of terms

Manual	General designation of this document.
EMERGENCY STOP	Immediate interruption of all motion processes by activation of an emergency stop button.
Protective equipment	Technical equipment on the machine whose purpose is to guarantee its safety.
Safety instruction	Instruction in manuals and handbooks related to possible physical injuries.
Safety information	Information about the safe operation of the machine.





## 2 Safety

### 2.1 BASIC SAFETY INSTRUCTIONS

**Most accidents during work with machines are due to disregarding the basic safety instructions.**

**Perceiving a possible hazard can prevent an accident before it occurs. If there are hazards, the safety information on the rotary table and in this document provides warnings about these hazards. If the warnings are disregarded, this can lead to physical injuries or death.**

**FIBRO GmbH cannot foresee all possible circumstances that can lead to potential hazards. Therefore, the warnings in this document and on the rotary table do not include all hazards.**

Personnel must have the necessary training and experience and possess the necessary tools in order to be able to perform the work on the machine correctly.

Improper operation, maintenance or repair can be dangerous and cause serious or fatal injuries.

No work related to transport, assembly, maintenance or repair may be performed if the information about transport, assembly, maintenance or repair has not been read and understood.

The rotary table is designed for mounting in other machines or for assembly with other machines. FIBRO GmbH has no control over the intended use of the machine.

The operator is responsible for the safety devices for operation of the machine. Operation without safety devices is prohibited.

The operator is responsible for the safe operation and the information that is necessary for the operation.

The rotary table may not be used in any way that deviates from the instructions in this manual. All safety rules and safety measures, including the site-related regulations and safety measures at the workplace, which are applicable to its use, must be observed.

If work equipment, operation, work methods or work techniques that have not been explicitly proposed by FIBRO GmbH are used, the operator must himself ensure the safety for himself and for other persons.

It must also be ensured that the rotary table does not get damaged or become unstable over the course of the intended operation, maintenance and repair work.

The information, descriptions and figures in this document are based on the information that was available at the time of creation of this document.

The descriptions, operating pressures, measurement methods, figures and other items can be changed at any time. These changes can affect the characteristics of the rotary table. The currently applicable information must be provided prior to starting the performance of any work.

### 2.1 BASIC SAFETY INSTRUCTIONS

---

#### 2.1.1 Due diligence of the operator

The rotary table is designed and manufactured according to the state of the art. The requirements for ensuring the safety and protection of health have been fulfilled.

However, this safety can be achieved in operational practice only when all necessary measures in this respect have been taken. The operator of the machine must plan these measures and control their implementation.

The operator must make sure that

- the rotary table is used only as intended.
  - The rotary table must be operated only in a fully functional state with all mechanical and/or electrical safety devices in place.
  - A copy of this manual and of all other applicable documents must be always available in a complete and good legible condition at the operation site of the rotary table. It must be ensured that all persons who have to perform activities on the rotary table can consult the manual at any time.
  - The rotary table is operated and maintained by specially trained and authorised personnel.
  - Personnel are familiar with the manual and especially the safety instructions contained within it.
  - The responsibilities of personnel in the operation and maintenance are clearly defined and observed.
  - Personnel is regularly instructed in all applicable issues related to the work safety and environmental protection.
  - The operating instructions related to the work safety and accident prevention are enforced.
  - The national accident prevention regulations and in-house rules are observed.
  - When necessary, personal protective clothing is provided.
- 



---

Fig. 3 Personal protective clothing

### 2.1.2 PERSONNEL REQUIREMENTS

The following safety instructions must be observed in all operations on the rotary table. Their violation can cause serious injuries or death.

All persons working on and with the rotary table must:

- read the manual and confirm with their signature that they have understood it.
- observe the safety information and guidelines in the manual and the instructions contained in it.
- make sure that there are no unauthorised persons in the rotary table area.
- make sure that the personnel in training works first on the rotary table only under the supervision of an experienced and trained person.
- in addition to the manual, observe also the operating instructions for work safety and accident prevention issued by the operator.
- inform the operator or the supervisory personnel about any malfunctions.
- inform immediately the respective managers about any changes in the rotary table which can affect its safety.

## 2.2 Qualification of the personnel

For certain task areas, a special qualification is necessary for personnel.

Task area	Qualification
Electrical system	
Work on the electrical equipment	Skilled electricians
Mechanics	
Commissioning and operation	Authorised and trained personnel
Inspections	Trained personnel
Maintenance	Authorised and trained personnel
Cleaning	Trained personnel
Repair	Service personnel of FIBRO GmbH

#### 2.3 Safety devices on the machine

The rotary table is designed for mounting in other machines or for assembly with other machines. FIBRO GmbH has no control over the intended use of the machine.

The operator is responsible for the safety devices for operation of the machine. Operation without safety devices is prohibited.

The operator is responsible for the safe operation and the information that is necessary for the operation.

The operator must take all the necessary measures to protect his personnel against injuries from the machine

#### 2.4 Remaining risks



##### **Movement of the table top**

The table top turns with high torque. Safety precautions such as, for example, protective grids, jog mode, two-hand operation, emergency stop button, etc. must be taken. Do not reach in the path of motion. Danger of crushing.

##### **Explosive atmospheres**

The rotary table is not designed for operation in an explosive atmosphere. Operation in explosive atmosphere or the processing of inflammable substances can lead to explosion. The operator must take all necessary measures for operating the rotary table only as intended. An explosion can cause serious to fatal injuries.

##### **Unauthorised changes**

Any unauthorised changes or any mounting of additional equipment not approved by the manufacturer compromise the function of the rotary table and can lead to dangerous situations. Therefore, any structural changes of the rotary table are prohibited. The mounting of additional equipment must be discussed with the manufacturer. Serious injuries or death are possible.

### 3 Technical description

#### 3.1 General technical data

The technical data of the rotary table depend on the contract.

-  A name plate with number, year of manufacture and type is fixed on the rotary table.



Fig. 4 Name plate

For all questions and orders, the data on the name plate must be provided.


- ① Number
- ② Type
- ③ Year of manufacture

#### 3.2 Electrical connections

Operating voltage	Motor-dependent (see the technical specification)
Control voltage	Motor-dependent (see the technical specification)
Brake voltage	Motor-dependent (see the technical specification)

#### 3.3 Temperature ranges

Operation	between +15° C and +40° C
Storage	between -15° C and +60° C

-  For information about the technical specifications, time diagrams and wiring diagrams, see Chapter 16 annex.

#### 3.4 Sealing air (optional)

The rotary table has a connection for the sealing air between the housing and the table top (for position and connection thread see the dimensional drawing).

The necessary compressed air must be provided by the supply facilities of the operator.

The sealing air must be regulated and purified by means of a control valve with a filter.

The sealing air pressure must be maximum 0,05 MPa (0,5 bar; 7 psi).

##### **NOTICE**

If the pressure of 0,05 MPa (0,5 bar; 7 psi) is exceeded, this can cause serious damage to the rotary table.

The sealing air must correspond to quality class 4 according to DIN-ISO 8573-1:

- Solid matter: maximum particle size 15 µm; maximum particle density 8 mg/m<sup>3</sup>
- Oil content: maximum oil concentration - 5 mg/m<sup>3</sup>
- Water content: maximum pressure condensation point +3 °C

#### 3.5 Operating parameters

Acceleration and deceleration time in the case of adjustable drives:

- In the standard the rotary table for the connection to the mains network is designed with 3x 400V / 50Hz. During operation with the frequency converter the characteristic values featured in the specification must be observed.
- The acceleration and deceleration times for rotary tables with fixed division are determined by the operating cam. A ramp is not required on the three-phase braking motor.

#### 3.6 Assembly units

##### 3.6.1 Rotary table

The table top is operated with various motor types and operating cam.

This enables performing rotational movements in any direction and angle.

The positioning precision is determined by the different layouts of the measuring system. A drill pattern is included in the table top.



For information about the technical specifications, time diagrams and wiring diagrams, see Chapter 16 annex.

### 3.6.2 Cam roller gearbox

The operation is generated from the drive motor via a gearbox and cam drive to the table top.

The cam rollers are pretensioned on both sides on the operating cam.

The table top is held in an exact play-free position by the operating cam and the cam rollers.

The direction of rotation can optionally be to the left or right. The rotary table can swing between the positions by a change in the direction of rotation on the drive motor.

- ① Cam rollers
- ② Operating curve
- ③ Table top



Fig. 5 Worm gearbox

## 3.7 Additional component assemblies and accessories

### 3.7.1 Hydraulic table top clamping

In its positioned state, the table top is connected with the housing in a friction-locked and backlash-free manner by means of hydraulically impinged clamping. The monitoring of the pressure is performed with the pressure switch.

Clamping time approx. 0.4 s,

Release time approx. 0.2s.

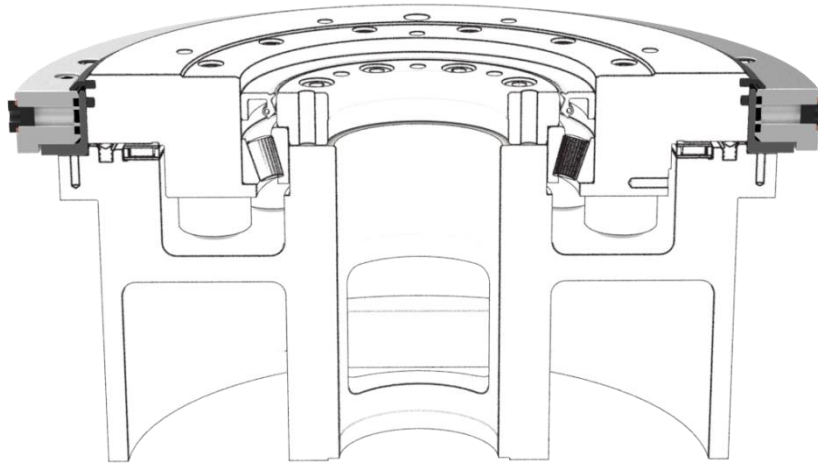


Fig. 6 Hydraulic table top clamping

## NOTICE

The clamping should never be activated during the rotation motion of the table top (also not at emergency stop!). The rotary table should never start against closed clamping. This leads to damages. When the clamping is activated, the table top and the housing are connected to each other in a friction-locked manner. The max. clamping pressure and the max. operating pressure should not be exceeded. At higher pressures, the clamping elements can be damaged. The activation of the tangential forces may take place only within the limits defined by the technical specification. If the tangential moments at the clamped table top are exceeded, the clamping elements and, possibly, the driving elements are destroyed.

#### 3.7.2 Connection diagram table top clamping

- ① Pressure switch, setting range 2-20 bar, Ident. No.: - No.: 070 572 3
- ② Pressure switch, setting range 10-100 bar, Ident. No.: - No.: 075 704 7
- ③ Pneumatic hydraulic tensioning unit, type MO 12  
Ident. - No.: 075 766 6



### 3.7 ADDITIONAL COMPONENT ASSEMBLIES AND ACCESSORIES

### Settings:

S1: 5 bar clamping control released

S3: 64 bar control clamped

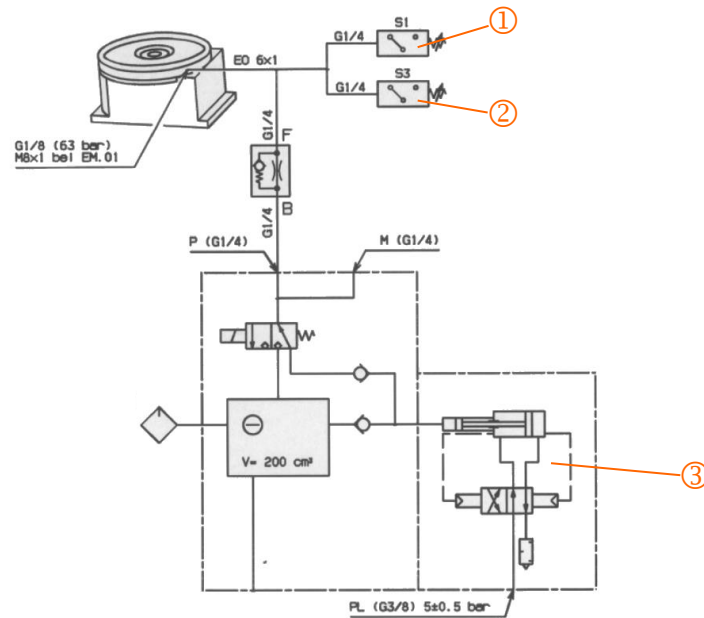


Fig. 7 Connection diagram table top clamping

##### 3.7.2.1 Functional diagram table top positioning

Initial position: The table top is in any position

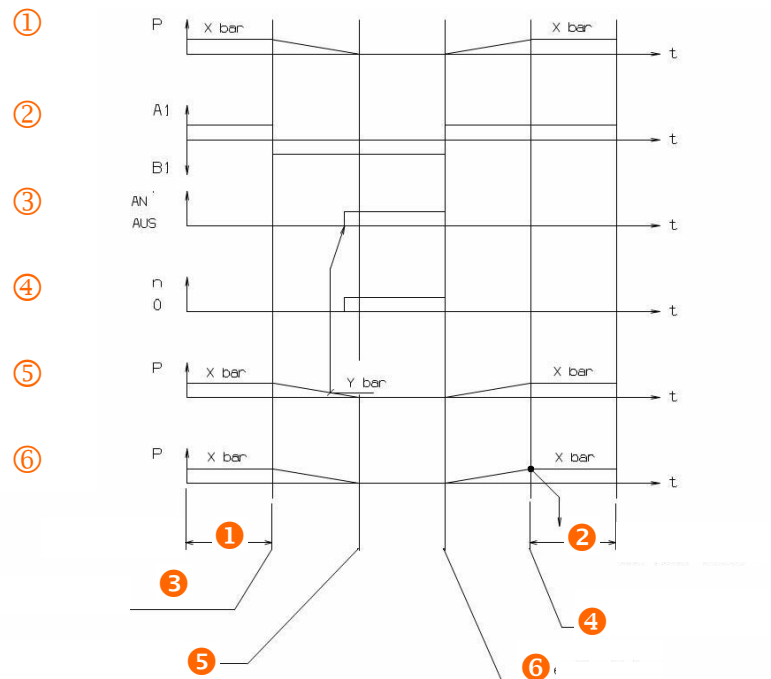


Fig. 8 Functional diagram table top positioning

- |                                      |   |
|--------------------------------------|---|
| ① = Clamping table top               | ① = Initial position                      |
| ② = 4/2 directional valve            | ② = new initial position of the table top |
| ③ = Turn the motor for the table top | ③ = 4/2 directional valve on B1           |
| ④ = Turn the table top               | ④ = Table top clamped                     |
| ⑤ = Pressure switch S1/1             | ⑤ = Clamping released                     |
| ⑥ = Pressure switch S2/1             | ⑥ = new position of the table top         |
| X = Clamping pressure                | Y = Pressure $\leq$ 2 bar                 |

## 4 Transport

### 4.1 Important safety guidelines



#### **Suspended loads**

Dimensioned load suspension device that are too weak can break. The suspended loads can swing. The lifting equipment and the load suspension devices must correspond to the regulations and should be designed for the weight of the components, including the packaging. It is forbidden to stand under suspended or lifted loads. A sufficiently safe distance must be maintained. The crane operators must be authorised to operate the respective equipment. Injuries from falling loads.

#### **Falling loads**

Incorrectly fixed belts or chains can slip. Transport equipment that is not designed for the weight of the individual components can fail. The transport box can fall. Only hoisting equipment with crossbars must be used. The belts and chains must be always outside of the pole plates. Injuries from falling boxes.

#### **Tilted loads**

If the centre of gravity is disregarded, a load can tilt. The rotary table must be positioned so that the load can be in equilibrium. Always take into consideration the centre of gravity when fastening the transport means. Secure the load against tilting. Injuries from tilted loads.

#### **Unsecured rotary table**

The rotary table can turn or become displaced from the linear axis (depending on the implementation of the rotary table). Provide the rotary table with transport locks for transport. Remove the transport locks only after the assembly has been completed. There is a risk of impact and crushing injuries.

During the transport of the rotary table or its components, the following points must be observed:

- The transport work must only be performed by trained transport personnel and in strict compliance with the safety instructions.
- The transport routes must be blocked and secured so that no unauthorised persons can enter the hazardous zone.
- Protect the sharp edges with edge protection.
- Use only whole belts.
- Compliance with the local applicable accident prevention regulations is mandatory.





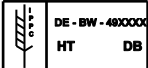
## 4.2 Packaging and weight

For shipping by truck, the rotary table is secured with transport locks and packaged in foil.

For shipping by sea the rotary table is secured at FIBRO GmbH with transport locks and packaged in a wooden box.

The total weight of each box is printed on the box. In addition, the box is marked with labels according to the internationally valid symbols.

These labels must be observed in order to handle with care the packaged rotary table.

	Top		Protect from moisture, rain or snow
	Fragile content		Fasten here with ropes, belts or chains
	Marking according to the International Plant Protection Convention (IPPC)		

The packaging materials must be either reused or properly disposed of in accordance with the country-specific regulations.

## 4.3 Transport damages

The shipment must be inspected for completeness and transport damages immediately after the delivery. If damage is found on the packaging that indicates possible damage to the content, the content must be also inspected for damage.

If damage is found, this must be communicated immediately to the transport company and confirmed by this company.

## 4.4 Interim storage

### NOTICE

The packaging used by FIBRO is a transport packaging. The transport packaging is not suitable for the storage of the rotary tables. The customer shall take appropriate measures in order to avoid corrosion damages during storage/temporary storage.

## 4.5 Permitted equipment and auxiliary devices for the transport

The unloading of the boxes and their transport to the installation site can be performed with an overhead crane. Use crossbars.

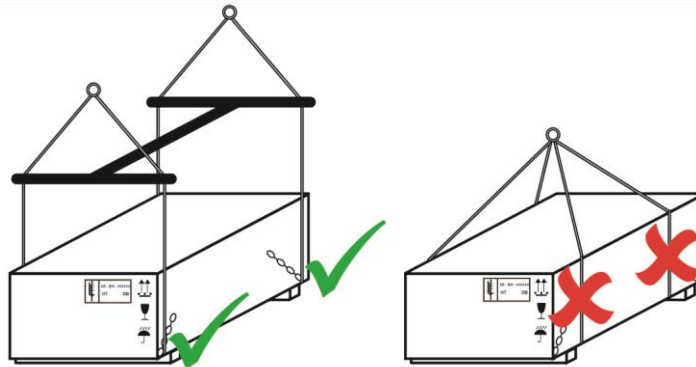


Fig. 9 Transporting boxes

For the transport of the unpacked rotary table, use only suitable attachment eyes. The use of ring bolts as load suspension devices is not permitted.



## 4.6 Transport locks

### NOTICE

The rotary table can be transported as an individual device without separate transport locks. In the case of combination layouts transport locks according to the supplementary sheet must be used.

### 4.6.1 Unpacking and transporting of the rotary table

1. Unpack the rotary table, and make it freely accessible on all sides.
2. Inspect the rotary table for damage during the transport.
3. Verify the entire delivery scope against the delivery papers.
  - ▶ Request that the established deficiencies be confirmed by the shipping company and inform FIBRO GmbH thereof immediately.
4. Screw suitable attachment eyes [A] in the screw threads provided on the table top or housing.

## 4.7 RETURN SHIPPING

---

**NOTICE**

Damage to components. Never lift the rotary table suddenly with a jerk.

5. Hook the belts onto the attachment eyes and lift the rotary table from the box while observing the safety instructions and transport regulations.
6. Transport the rotary table in compliance with the safety instructions and transport regulations.
7. Hook the belts onto the attachment eyes and lift the machine from the box while observing the safety instructions and transport regulations.

### 4.7 Return shipping

All parts, which are forwarded to the manufacturer for repair, must be securely packaged for the return shipping.

The air vent screws of the gear boxes must be closed in order to prevent oil leakage.

The electronic components must be always transported in antistatic packaging.

**NOTICE**

The transport locks must be re-attached prior to any further transportation of the rotary table.

### 4.8 Instructions for disposal of packaging material

The packaging materials must be either reused or properly disposed of in accordance with the country-specific regulations.

## **5 Assembly**

### **5.1 Important safety guidelines**



#### **Incorrect installation**

The assembly work should be performed by qualified personnel only. Work on the power supply line connections should be performed by qualified electricians only. A check must be carried out to ensure that the power supply frequency and voltage correspond with the data in the technical specification. The electric, hydraulic and pneumatic devices must be connected only when the power supply is turned off. Crushing and electrocution injuries.

When assembling the rotary table or its components, the following must be ensured:

- the assembly site is suitable for the operational weight, including the superstructural parts of the client and the tools.
- the expected loads, torques and moments of inertia have been taken into consideration.
- the assembly site has been isolated with a signal strip.
- the assembly site has been marked with danger signs.
- only authorised persons have access to the work area and no other persons could be endangered by the assembly work.

### **5.2 Installation requirements**

The assembly site must be prepared for the assembly work and has to be clean and even.

The mounting bolts must be available.

### **5.3 Assembly of the rotary table**

#### **5.3.1 Mechanical assembly**

##### **NOTICE**

Rotary table damage. The rotary table should not be braced while being bolted. The maximum bolting depth and the tightening moments of the mounting bolts as well as the maximum offset for the cylindrical pins must be observed.

Transport the rotary table to the assembly site in compliance with the safety instructions and transport regulations.

Sagging load. Do not hold between the rotary table and the installation surface.  
Crushing of hands or fingers.

- Lower the machine carefully and place.
- Remove the transport belts.
- Connect sealing air for rotary table (see chapter 3.4 Sealing air) and measuring system.



The type and positions of the connections must be taken from the dimensional drawing and the electric diagram in the appendix.



The information regarding the type, size and other data for pneumatic, hydraulic, water and electrical connections must be taken from the diagrams and drawings enclosed in the appendix.

- Check function:
  - ▶ – Functional sequence (see chapter 7.3 Operating modes)
  - ▶ – Measuring system

## 5.4 Modifications and alterations

### 5.4.1 Admissible modifications and alterations

The admissible alterations can affect the performance of the rotary table. The admissible alterations are:

- Installing tools, workpieces and devices on the switching plate.
- Attaching hoses, pneumatic lines or cables to the rotary table.
  - ▶ The hoses, pneumatic lines or cables must be mounted in such a way that they do not impede the rotational movements or cause motion errors of the rotary table.

### 5.4.2 Forbidden modifications and alterations

- Modifications of the connection cable between the rotary table and the control system
- Modification of any access panelling on the rotary table or the drive system
- Modifications (including drilling and cutting) of any part of the rotary table surface
- Modifications of any electronic component or printed circuit board
- Laying of additional hoses, air ducts or wires inside the rotary table
- Changing the system pressure of the hydraulic clamping



## 6 Commissioning

### 6.1 Important safety guidelines

The rotary table is designed for mounting in other machines or for assembly with other machines. FIBRO GmbH has no control over the intended use of the rotary table.

The commissioning is a responsibility of the operating company.

### 6.2 Prior to the commissioning

Prior to the commissioning, visual inspection of the rotary table has to be performed. Hereby it is necessary to check and make sure that

- the safety devices are operational.
- there are no damages on the rotary table.
- there are no foreign bodies, tools or other objects on the machine.
- all supply facilities are connected and operational.

Prior to the return to operation, a test run must be performed.

#### 6.2.1 Test run

The test run is performed without any superstructures on the table top.

Prior to the test run it is necessary that

- all safety devices are tested.
- the rotation directions of the gears are tested.
- the functional processes are tested.



## 7 Operation

### 7.1 Important safety guidelines



#### **Inadmissible operating parameters / software.**

The change of the operating parameters leads to a change in the system behaviour of the rotating or moving parts of the rotary table. The use of a controller with unlicensed software creates a risk for the safety of the rotary table. The operating parameters may be changed only by authorised personnel with detailed knowledge of the modes of operation and the structure of the rotary table. The use of unlicensed software is prohibited. Violation of this prohibition can lead to serious injuries.

In the operation of the rotary table it must be ensured that

- the rotary table is ready for operation and the operating parameters have been set up correctly.
- the operating personnel has been informed prior to starting the rotary table about the correct behaviour in the event of accidents.
- the operation is performed only by persons who have been trained, instructed and authorised for that. These persons must know this manual and proceed according to it.
- the rotary table is used / deployed only in accordance with its intended use (see Chapter 1.2 Intended use on page 9).
- during power-up and operation there is no one in the hazard area of the rotary table.
- the operating instructions of the operator are observed.

### 7.2 Workplaces of the operating personnel

The workplaces of the operating personnel are determined by the operator of the machine.

### 7.3 Operating modes

The operating modes can be taken from the specification in the annex.

### 7.4 Functional sequences

#### 7.4.1 Functional sequence of a dividing movement

##### **Prerequisites:**

The table top is in any position.

Electric holding brake energised.

NC control system: Data entry completed

## 7.5 ROTARY TABLE - TURNING ON AND OPERATION

### 7.4.2 Path of motion

Electric holding brake is ventilated (de-energised).

During the dividing procedure by a servo motor the acceleration and deceleration time must be observed. (NC controlled)

If the NC rotary table has reached the target position, the worm shaft is stopped by the holding brake.

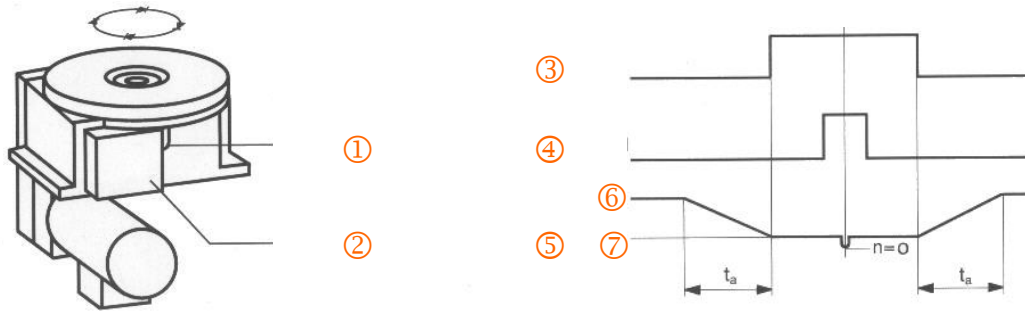


Fig. 10 Path of motion

- |                                  |                          |
|----------------------------------|--------------------------|
| ① Reference point switch         | ⑤ Speed on the table top |
| ② Brake 24V DC                   | ⑥ $n_{\max}$             |
| ③ Proximity switch               | ⑦ $n_{\min}$             |
| ④ Encoder reference point signal |                          |

## 7.5 Rotary table - turning on and operation

The rotary table is designed for mounting in other machines or for assembly with other machines. FIBRO GmbH has no control over the intended use of the rotary table.

The operator is responsible for the safety devices for operation of the machine. Operation without safety devices is prohibited.

The operator is responsible for the safe operation and the information that is necessary for the operation.

## 8 Faults

### 8.1 Important safety guidelines



#### Unauthorised personnel

Any personnel that has not been adequately trained does not have the necessary authorisation to localise faults or correct errors. Any defects may only be corrected by FIBRO Customer Service or by members of staff from the operating company who are trained and authorised for performing the respective activity. Before the correction of the defects, the machine must be shut down from the master switch and secured against unintended reactivation. The action area of the moving machine parts must be secured. The repairs must be performed by FIBRO personnel only. The use of unauthorised personnel can lead to injuries resulting from incorrect action.

### 8.2 Customer service

If you need assistance from our customer service, please provide the following data:

- Serial number according to the name plate
- Description of the occurring fault
- The point in time and the circumstances of the occurred fault
- The presumed cause

You can reach our customer service Monday to Friday from 07:00 am to 5:00 pm under the

**Service number +49 (0) 7134 - 73-243**

Outside the times stated, a recorded message with additional information is available.

#### Address of the customer service:

FIBRO GmbH  
Rotary Table Division  
Weidachstrasse 41 - 43  
D-74189 Weinsberg

All FIBRO representation offices worldwide can be found under [www.fibro.de](http://www.fibro.de)

[rtservice@fibro.de](mailto:rtservice@fibro.de)



## 9 Repair

### 9.1 Important safety guidelines



#### Unauthorised personnel

The personnel of the operator may perform only the maintenance work described in this manual. This personnel must be trained and authorised for performing these activities. The action area of the moving machine parts must be secured. All other work and repairs must be performed by FIBRO personnel only. The use of unauthorised personnel can lead to injuries resulting from incorrect action.

#### Using wrong spare parts

Using the wrong spare parts or materials can endanger the safety of the rotary table. Only spare parts from our spare parts list or spare parts released for use by us can be used. No individual components may be exchanged with each other. Only the specified materials must be used. The self-locking bolts and nuts must be always replaced with new ones. All prescribed tightening torques must be adhered to exactly as specified. Failure of unapproved spare parts can cause injuries.

#### Missing safety devices

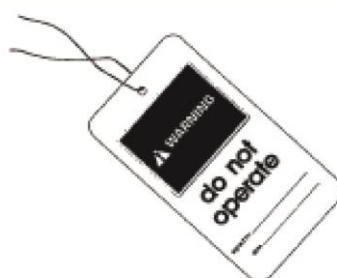
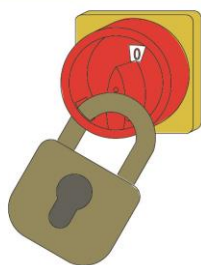
Under certain circumstances, safety devices may have to be removed when maintenance work is performed. The removed parts must be reassembled immediately after completing the maintenance work. The protection function must be tested. Operation of the machine without safety devices is prohibited. Operation of the machine without the safety devices can cause serious or fatal injuries.



Forgotten tools or other objects can fall into the running machine and cause material damages. Before turning on the machine, check whether there are tools or other objects on the rotary table. Remove any forgotten tools or other objects.

Prior to performing any maintenance and cleaning work, turn off the main switch and secure it with a padlock.

Prior to any maintenance work, put warning signs "Do not turn on" or similar warnings on the main switches and the control consoles.



## **9.2 Maintenance work**

The following activities are considered maintenance work:

- Inspection
- Maintenance / cleaning
- Repair

### **9.2.1 Inspections**

Daily before the start of the work shift:

- Inspection of the essential functional units.
- Inspection of the air pressure on the manometer.
- Inspection of the filter bowl for the accumulated condensate.

### **9.2.2 Maintenance / cleaning**



#### **Turn off the machine in a secure manner**

Performing maintenance and cleaning work when the power supply is turned on is dangerous. Perform the 5 steps to securely turn off the electric power supply. All other power supply sources must be also turned off. Injuries when the power supply is turned on.

#### **5 steps for securely turning off the electric power supply.**

- Turn off the main switch (disconnect all sides)
- Secure the main switch against re-starting
- Check for absence of voltage
- Ensure the grounding of all sides
- Cover any live neighbouring parts

After the work has been completed, the shut-down must be in cancelled in the reverse order.



When maintaining the rotary table, the following must be ensured:

- all work steps are performed in the specified order.

After the maintenance work has been completed, it must be checked whether

- the work has been performed completely.
- all foreign bodies have been removed from the work area.
- the safety devices have been mounted properly and are functioning.

The operator must establish the cleaning intervals.

#### 9.2.2.1 Long-term lubrication

The rotary table is delivered filled with suitable synthetic oil. The gearbox is filled with synthetic gearbox oil. The lubricants are designed for a service life of at least 20,000 operating hours.

A change in lubricant is only required in the event of coolant and lubricant ingress, as well as in the event of a general overhaul of the device. Contact our customer service in this regard.

-  It is recommendable to thoroughly clean the gearbox when changing the lubricant.

The rolling bearings filled with grease must be cleaned every 20,000 operating hours and filled with new grease. Whilst doing so, ensure that the bearing space is filled with approx. 1/3 grease.

#### **NOTICE**

Synthetic and mineral lubricants must not be mixed with each other.

#### **NOTICE**

In the case of ambient temperatures below – 20°C and above + 60°C rotary shaft seals with special material quality must be used.

#### **NOTICE**

In the case of external reservoirs observe their lubrication instructions.

#### 9.2.2.1 Mounting position of horizontal table top

The rotary table is delivered filled with suitable synthetic oil. The gearbox is filled with synthetic gearbox oil.

#### 9.2.2.2 Mounting position of vertical and upside-down table top

The control cam and drive rollers of the rotary table are greased with Arcanol MULTITOP before delivery.

## 9.2.2.3 Lubrication plan

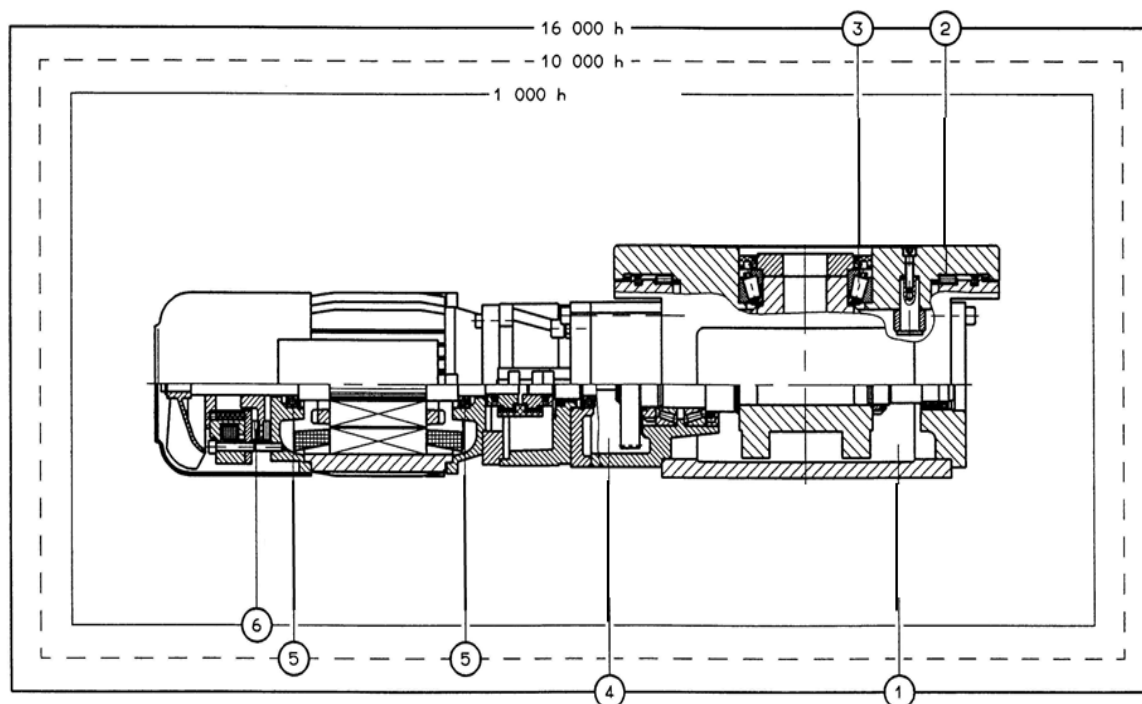


Fig. 11 Lubrication plan

- ① Lubricant rotary indexing table
- ② + ③ Lubricant rolling bearing
- ④ Lubricant gearbox
- ⑤ Lubricant rolling bearing
- ⑥ Motor brake control

## 9.2.2.4 Lubricants

① Lubricant rotary table:

The following **synthetic oils** are permitted for the rotary table:

Manufacturer / supplier	Designation
Q8	Q8 EL Greco 220
MOBIL	Mobilgear SHC XMP 220
ARAL	Aral Degol GS 220
BP	BP Enersyn SG-XP 220

**②+③ Lubricant rolling bearing**

The following **synthetic greases** are permitted for the rolling bearing:

Manufacturer / supplier	Designation
FAG	Arcanol MULTITOP
ARAL	Aralub HLP2
DEA	Discor 8 – EP 2
ESSO	Beacon 325
KLÜBER	Isoflex NCA 15
MOBIL	Mobiltemp SHC 32
SHELL	AERO Shell Grease 16 or 7

**④ Lubricant offset gearbox (FIBROTOR EM, EM.NC, and RT)**

The following **synthetic oils** are permitted for the offset gearbox:

Manufacturer / supplier	Designation
Q8	Q8 EL Greco 220
MOBIL	Mobilgear SHC XMP 220
ARAL	Aral Degol GS 220
BP	BP Enersyn SG-XP 220
KLÜBER	Syntheso D 220 EP

**NOTICE**

In the case of external reservoirs observe their lubrication instructions.

**9.2.2.5 Filling quantities**

Type	(1) Rotary table	(4) Offset Gearbox
EM.10 / EM.NC.10	0,03 l	
EM.11 T02	0,10 l	0,07 l
EM.11 >T02 / EM.NC.11	0,06 l	0,07 l
EM.12 / EM.NC.12	0,17 l	0,07 l
EM.13 T02	0,25 l	0,40 l
EM.13 >T02 / EM.NC.13	0,4 l	0,40 l
EM.15 / EM.NC.15	0,6 l	0,40 l
EM.16 / EM.NC.16	1,1 l	1,0 l
EM.17 / EM.NC.17	2,5 l	1,0 l
EM.18 / EM.NC.18	5,0 l	1,0 l
EM.19 / EM.NC.19	10,0 l	
EM.20 / EM.NC.20	18,0 l	

Typ	(1) Rundtisch	(4) Getriebe
ER.10	0,03 l	Getriebe ist wartungsfrei
ER.11 T02	0,10 l	
ER.11 >T02	0,06 l	
ER.12	0,17 l	
ER.13 T02	0,25 l	
ER.13 >T02	0,4 l	
ER.15	0,6 l	
ER.16	1,1 l	
ER.17	2,5 l	

### 9.2.3 Repair

The operator of the rotary table should not perform any overhaul / repair work.

If there is a need of overhaul / repair work, the FIBRO GmbH customer service must be informed.

## 10 Shutdown

### 10.1 Important safety guidelines



#### Restoring the power supply

The restoration of the energy supply to a shut-down machine can lead to unexpected start. In order to shut down the machine, it must be turned off from the main switch and secured against unintended starting. The action area of the moving machine parts must be secured. The restoration of the power supply can lead to injuries.

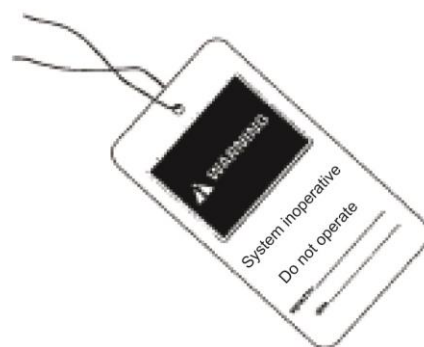
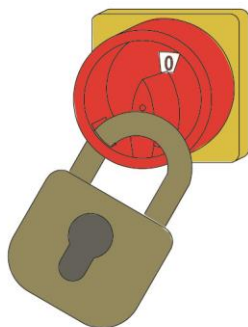
#### Unauthorised personnel

Personnel that has not been properly trained does not have the authorisation to take the machine out of operation. The shutdown must only be performed by trained personnel that has been authorised for performing the respective activities. The use of unauthorised personnel can lead to injuries resulting from incorrect action.

### 10.2 Temporary shutdown

For the temporary shutdown:

- Turn off the machine in a proper manner.
- Secure the machine against unintentional restarting.
- Put a warning sign on the machine that shows clearly that it is temporarily out of operation.

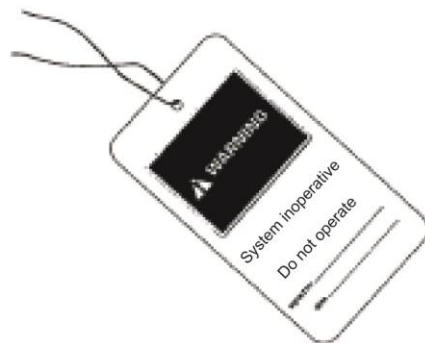
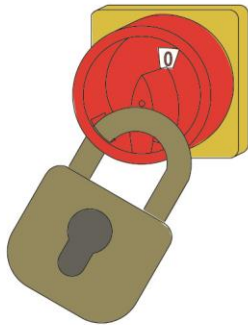


Return to operation (see Chapter 6.2 Prior to the commissioning on page 33).

#### 10.3 Permanent shutdown

For permanent shutdown and decommissioning:

- Turn off the machine in a proper manner.
- Secure the machine against unintentional restarting.
- Put a warning sign on the machine that shows clearly that it is permanently out of operation.



## **11 Disassembly and disposal**

### **11.1 Important safety guidelines**

The rotary table should be disassembled by specialised personnel of FIBRO GmbH only.

Disassembly by personnel of the operator is prohibited.



#### **Unauthorised personnel**

In the process of disassembly and during transportation, parts can tilt or fall. Loads can swing or fall down. Do not stand under suspended loads. The auxiliary personnel may act only on instructions by the specialised personnel. During the transport, the safety measures for the transport should also be observed. Disregarding the safety measures can lead to serious injuries.

**The auxiliary personnel of the operator must strictly adhere to the instructions of the FIBRO personnel and observe the safety instructions.**

The auxiliary personnel must wear personal protective clothing.

---



### **NOTICE**

Leaking lubricants, solvents and preserving agents can damage the environment. Remove any leaking lubricants, solvents and preserving agents immediately.

## 11.2 Disposal of components

### NOTICE

#### **Dispose of the components in a proper manner!**

The improper disposal of components can cause damage to the environment and is subject to criminal prosecution. The components have to be disposed of in accordance with the applicable local and regional laws and guidelines. Attention must be paid to the environmentally compatible disposal of the process consumables. The local regulations regarding the proper waste recycling or removal must be observed.

The local authorities provide information about the disposal and collection depots.

The machine consists of:

- Iron / steel
- Aluminium
- Grey cast iron
- Brass
- Copper (motors and electric lines)
- Plastics (electric lines, pneumatic hoses)
- Electronic components

The process consumables are:

- Gearbox oil
- Hydraulic oil
- Low-viscosity grease



## 12 Service and spare parts

### 12.1 Service

You can reach our customer service Monday to Friday from 07:00 am to 5:00 pm under the

**Service number +49 (0) 7134 - 73-243**

or under [rtservice@fibro.de](mailto:rtservice@fibro.de)

Outside the times stated, a recorded message with additional information is available.

Address all written enquiries to:

FIBRO GmbH  
Rotary Table Division  
Weidachstrasse 41 - 43  
D-74189 Weinsberg

[rtservice@fibro.de](mailto:rtservice@fibro.de)

All FIBRO representation offices worldwide can be found under [www.fibro.de](http://www.fibro.de)

### 12.2 Spare parts

Spare parts must meet the technical requirements specified by FIBRO GmbH. By ordering original spare parts from FIBRO GmbH, you are assured that these requirements will be met.

**NOTICE**

FIBRO GmbH can assume no liability for any damage caused as a result of using non-original spare parts.

#### 12.3 Spare parts ordering

When ordering spare parts, please provide the following data:

- Name, address, shipping address
- Exact designation of the equipment (take serial number from the name plate)
- Exact spare part designation
  - ▶ When necessary, enclose samples, photos or sketches
- Quantity of the spare parts needed

Please address your spare parts order to:

FIBRO GmbH  
Rotary Table Division  
Weidachstrasse 41 - 43  
D-74189 Weinsberg

rtservice@fibro.de

All FIBRO representation offices worldwide can be found under [www.fibro.de](http://www.fibro.de)

Upon receipt of the spare parts delivery:

- Check that the right number of parts has been delivered and that they are all correct and in good condition
- Report any errors immediately

Any compensation claims for damage in transit must be reported to us immediately

## **13 Declaration of incorporation**

### **13.1 Declaration of incorporation**

in accordance with EU machinery directive 2006/42/EC (Annex II B)

The manufacturer FIBRO GmbH  
Weidachstr. 41-43  
D-74189 Weinsberg

**We herewith declare**, that the incomplete machine described below

#### **Product description**

Rotary table type: **FIBROTOR EM.NC**  
Type designation: -  
Item number: -  
Serial number: -  
Dimensional drawing: -  
Year of manufacture: -

satisfies the basic requirements of machinery directive 2006/42/EC as far as possible within the context of the scope of delivery.

In addition, we declare that the special technical documentation has been prepared in accordance with Annex VII

Part B of this guideline.

The incomplete machine also meets the requirements of Directives 2014/35/EU regarding electrical equipment and 2014/30/EU regarding electromagnetic compatibility.

**We undertake** to submit, via our documentation department, the special documents for the incomplete machine to the market supervisory authorities upon justified request.


The incomplete machine must not be put into service until the final machinery/plant into which it is to be incorporated has been declared in conformity with the provisions of Directive 2006/42/EC on machinery and until the EC Declaration of Conformity according to Annex II A is issued.

#### **The person authorised to compile the relevant technical documentation (EU address)**

Mr. Walter Frey / Agust-Läpple-Weg / 74855 Haßmersheim      Head of Documentation / CE  
Coordinator

Weinsberg, 20.05.2020

  
.....  
**Krischke**  
Rotary Table Division Head

  
.....  
**Bormann**  
Quality Assurance Department  
Head



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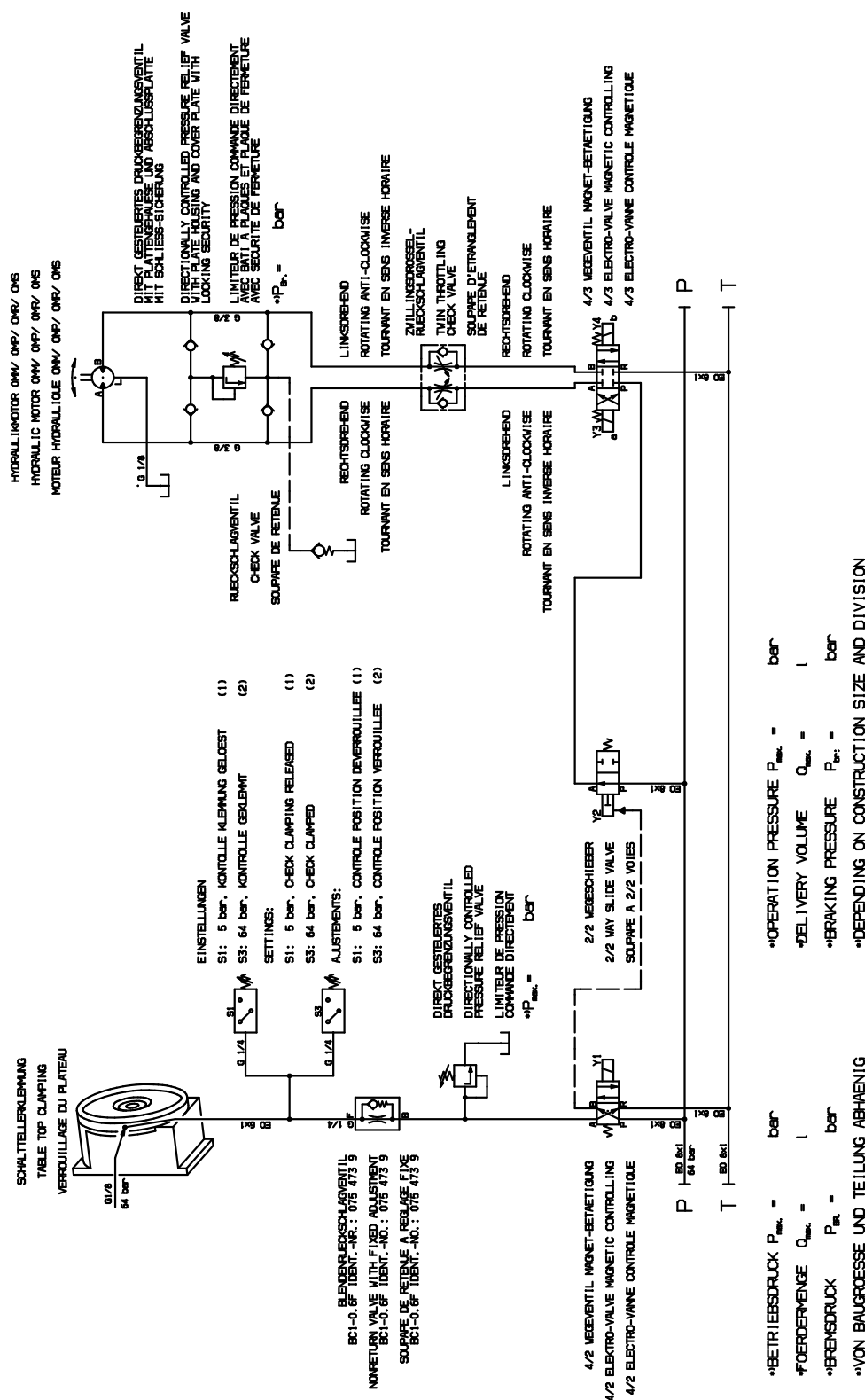
## 15 Personal notes

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## 16.2 Other documents

Technical specification  
Dimensional drawing(s)  
Connection diagram



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