

DE 2

Rotate unit

3 842 998 871

3 842 998 872

3 842 998 873

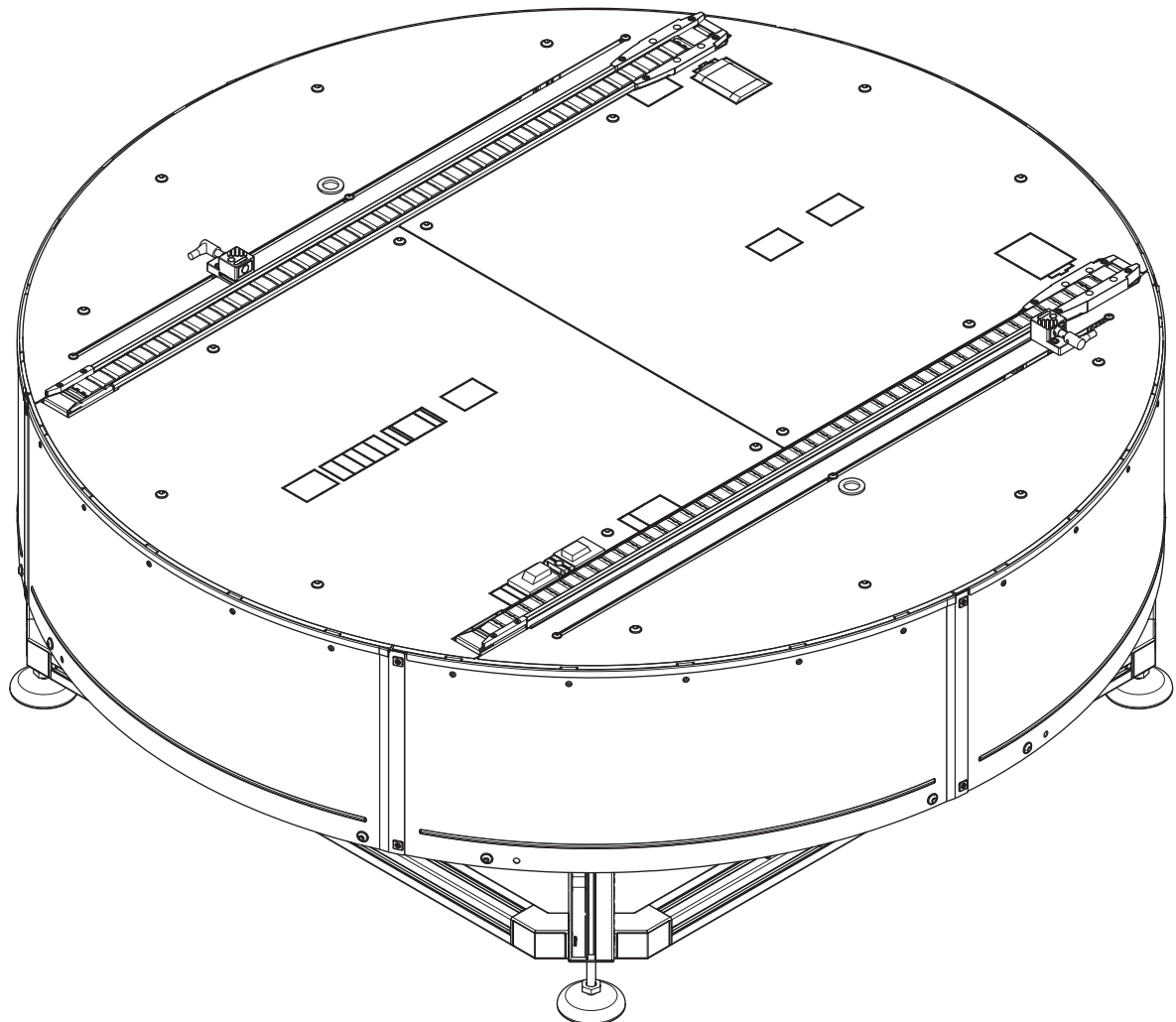
3 842 998 874

3 842 998 875

Assembly instructions
3 842 559 189/2020-01

Replaces: 2018-04
ENGLISH

ENGLISH



The information in this manual is for product description purposes only. Any information in this manual on how to use the product only constitute examples and recommendations. Catalog information is not binding. The information given does not exempt the user from the obligation of own judgment and verification. Our products are subject to natural wear and aging.

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An example configuration is shown on the title page. The delivered product may thus vary from the illustration.

The original assembly instructions are in German.

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- | | | | |
|-----------|----------------------|----------------------------|-----------|
| DE | 3 842 559 188 | DE 2 Dreheinheit | Deutsch |
| EN | 3 842 559 189 | DE 2 Rotate unit | English |
| FR | 3 842 559 190 | DE 2 Unité de rotation | Français |
| IT | 3 842 559 191 | DE 2 Unità girevole | Italiano |
| ES | 3 842 559 192 | DE 2 Dispositivo de giro | Español |
| PT | 3 842 559 193 | DE 2 Unidade giratória | Português |
| ZH | 3 842 559 194 | DE 2 旋转单元 | 中文 |
| CS | MTCS 559 188 | 1) DE 2 Otočná jednotka | Česky |
| PL | MTPL 559 188 | 1) DE 2 Jednostka obrotowa | Polski |
| HU | MTHU 559 188 | 1) DE 2 Forgatóegység | Magyar |
| RO | MTRO 559 188 | 1) DE 2 Unitate de rotire | Română |
- 1) Only as PDF / Not available in print.

Contents

1	About this documentation	5
1.1	Validity of the documentation	5
1.2	Required and supplementary documentation	5
1.3	Presentation of information	5
1.3.1	Safety instructions	5
1.3.2	Symbols	6
1.3.3	Designations	7
2	Safety instructions	7
2.1	About this section	7
2.2	Intended use	7
2.3	Improper use	8
2.4	Personnel qualifications	8
2.5	General safety instructions	8
2.6	Product-specific safety instructions	9
2.7	Personal protective equipment	10
2.8	Owner responsibilities	10
3	General notes on property and product damage	10
4	Scope of delivery	10
4.1	Condition on delivery	10
5	About this product	11
5.1	Specifications	11
5.1.1	Applications of the DE 2 rotate unit	13
5.1.2	Version of the DE 2 rotate unit	13
5.2	Product description	14
5.3	Identification of the product	16
6	Transport and storage	16
6.1	Transporting the product	16
6.2	Storing the product	18
7	Assembly	18
7.1	Unpacking	18
7.2	Installation requirements	18
7.2.1	Installation position	18
7.3	Required tools	18
7.4	Required accessories	19
7.4.1	Anchoring of the rotate unit at the floor.	19
7.4.2	Sensors	19
7.4.3	Frequency converters	19
7.4.4	I/O modules	19
7.5	Symbols used	20
7.6	Assembling the product	21
7.6.1	Setting up the DE 2 rotate unit	21
7.6.2	Assembling/disassembling the protective covers of the rotate unit	26
7.6.3	Purpose and function of sensors and actuators	27
7.6.4	Assembling the sensors	30
7.6.5	Assembling the stop gates for end position and workpiece pallet locking	34
7.6.6	Assembly positions of sensors and stop gates for end position, stopping, and locking of the workpiece pallet	36
7.6.7	Connecting lines in cable drag chain of the rotate unit	40
7.6.8	Pneumatic connection of the product	45
7.6.9	Electrical connection of the product	46
8	Commissioning	49
8.1	Initial commissioning	49
8.1.1	Test run, running in	50

8.2	Residual risks	53
8.2.1	Rotate unit DE 2 with protective covers	53
8.2.2	Rotate unit DE 2 without protective covers	54
8.3	Re-commissioning after a standstill	56
9	Operation	57
9.1	Information on operation	57
9.1.1	Wear	57
9.1.2	Measures to reduce wear	57
9.1.3	Loading the workpiece pallet	57
9.1.4	Environmental factors	58
10	Maintenance and repair	59
10.1	Cleaning and care	60
10.2	Inspection	60
10.3	Maintenance	61
10.4	Replacing wear parts	63
10.4.1	Replacing the motor/gear of the belt section	63
10.4.2	Assembling/disassembling the protective covers of the rotate unit	63
10.4.3	Repairing the belt section	63
10.4.4	Replacing the conveyor medium of the belt section	64
10.4.5	Replacing the support wheels of the rotate unit	77
10.4.6	Replacing the gear motor of the rotate unit	78
10.4.7	Setting the rotary movement stop bracket (actual end positions at 0°, 90°, 180°, 270°)	79
10.4.8	Replacing the rotary movement end position sensor	80
10.4.9	Replacing the sensors for rotary movement control	81
10.4.10	Replacing the sensor/stop gate for stopping and locking of the rotary movement	81
10.4.11	Replacing the sensors for end position, stopping and locking of the workpiece pallet	81
10.4.12	Replacing the stop gates for end position and workpiece pallet locking	81
10.5	Spare parts	81
11	Decommissioning	82
12	Disassembly and replacement	82
12.1	Preparing the product for storage/later use	82
13	Disposal	82
14	Upgrading and modification	83
15	Troubleshooting	83
16	Technical data	84
16.1	Ambient conditions	84
16.2	Pneumatics	85
16.3	Permissible gravity center position	85
17	Appendix	86
17.1	Function examples	86
17.1.1	Control diagram	86
17.1.2	Program sequence	87
17.2	Trademark information	92

1 About this documentation

1.1 Validity of the documentation

This documentation applies to the following products:

- 3 842 998 871 rotate unit DE 2 - BG 1
- 3 842 998 872 rotate unit DE 2 - BG 2
- 3 842 998 873 rotate unit DE 2 - BG 3
- 3 842 998 874 rotate unit DE 2 - BG 4
- 3 842 998 875 rotate unit DE 2 - BG 5

This documentation is intended for fitters, operators, service engineers and system owners.

This documentation contains important information relating to the safe and proper assembly, transportation, commissioning, operation, use, maintenance and disassembly of the product, and on how to rectify simple faults yourself.

- Read this documentation in full prior to working with the product, particularly section 2 "Safety instructions" and section 3 "General notes on property and product damage".

1.2 Required and supplementary documentation

- Only commission the product if the documentation marked with the book symbol  is available and you have understood and followed the instructions in it.

Table 1: Required and supplementary documentation

Title	Document number	Document type
 Employee safety training ²⁾	3 842 527 147	
 Declaration of incorporation	3 842 562 615	
 Assembly instructions for belt section ²⁾	• For version with BS 2: 3 842 518 577 + 3 842 542 264 • For version with BS 2/C, .../R, .../C-H, .../R-H, .../R-V: 3 842 358 723 • For version with BS 2/G-250: 3 842 558 993	
 Assembly instructions for connection belt BS 2/C+R ²⁾	3 842 522 441	
MTpro ¹⁾	3 842 539 057	With list of spare parts

¹⁾ Download at: www.boschrexroth.com/mtpro

²⁾ If not included in the scope of delivery, download from the media directory:
www.boschrexroth.com/medienverzeichnis

1.3 Presentation of information

Standardized safety instructions, symbols, terms and abbreviations are used so that you can use this documentation to work quickly and safely with your product. These are explained in the following sections to help you understand them better.

1.3.1 Safety instructions

This document contains safety instructions in section 2.6 "Product-specific safety instructions" and section 3 "General notes on property and product damage", as well as before any sequence of actions or any required action which involves a risk of personal injury or property damage. Be sure to observe all safety precautions.

Safety instructions are set out as follows:


SIGNAL WORD

Type and source of danger!
 Consequences of non-compliance
 ► Measures to prevent danger
 ► ...

- **Warning sign:** points out the danger
- **Signal word:** indicates the severity of the danger
- **Type and source of danger:** indicates the type and source of the danger
- **Consequences:** describes the consequences of non-compliance
- **Prevention:** states how the danger can be avoided

Table 2: Risk classes according to ANSI Z535.6-2006

Warning sign, signal word	Meaning
 DANGER	Indicates a hazardous situation that will result in severe injury or death if not avoided.
 WARNING	Indicates a hazardous situation that may result in severe injury or death if not avoided.
 CAUTION	Indicates a hazardous situation that may result in minor to moderate injury if not avoided.
NOTICE	Property damage: The product or the surrounding area could get damaged.

1.3.2 Symbols

The following symbols indicate important information that is not safety-relevant but increases the comprehensibility of the documentation.

Table 3: Meaning of the symbols

Symbol	Meaning
	If this information is not observed, the product cannot be used and/or operated as designed.
►	Single, independent action
1. 2. 3.	Numbered steps: The numbers indicate that the steps must be performed in order.

1.3.3 Designations

This document uses the following designations:

Table 4: Designations

Designation	Meaning
DE 2	Rotate unit from the Rexroth TS <i>2plus</i> transfer system.
BG	Size
WT 2 WT 2-F WT 2/F-H WT 2-H	Workpiece pallet from the Rexroth TS <i>2plus</i> transfer system Assembling the lateral stop gate at the belt section.
VE 2/...	Stop gate for workpiece pallet from the Rexroth TS <i>2plus</i> transfer system.
UZ	In clockwise direction
GUZ	In counter-clockwise direction

2 Safety instructions

2.1 About this section

The product has been manufactured in accordance with the generally accepted rules of current technology. Nevertheless, there is a risk of personal injury and property damage if you do not read this section and follow the safety instructions in this document.

- ▶ Read this documentation carefully and completely before you start working with the product.
- ▶ Keep the documentation accessible to all users at all times.
- ▶ Always include them when giving the product to a third party.

2.2 Intended use

The product is a partly completed machinery.

You may use the product as follows:

- For installation in a Rexroth TS *2plus* transfer system
- For rotation of Rexroth workpiece pallets WT 2, WT 2-F, WT 2/F-H, WT 2-H
- Maximum load/section load: See technical data on page 84.
- For ambient conditions, see page 84.

The DE 2 rotate unit is not intended for direct use in the work area (for definition, see DIN EN 619, Safety and EMC requirements for equipment for mechanical handling of unit loads).

If the DE 2 rotate unit is used in the work area or in direct vicinity of the work area, user-side measures for safe operation must be taken.

The product is strictly intended for professional use and not for private use. Intended use also includes having read and understood these instructions, especially section 2 "Safety instructions".

2.3 Improper use

Any use other than that described in the section "Intended use" is considered improper and is not permitted.

Bosch Rexroth AG is not liable for any damage resulting from improper use. The user alone bears any risks associated with improper use.

The following foreseeable misuses also constitute improper use:

- Transporting goods other than those specified.
- Transporting people on the product or transported material.
- Climbing onto the product.
 - the product is not accessible.
- Private use.

2.4 Personnel qualifications

The activities described in this document require basic knowledge of mechanical, electrical and pneumatic systems, as well as familiarity with the corresponding technical terms. Additional knowledge regarding the use of lifting gear and corresponding slings is required for transporting and handling the product.

To ensure safe use, these activities should therefore only be performed by qualified personnel or by an instructed person acting under the direction of such a person.

"Qualified personnel" refers to those who can recognize potential hazards and take appropriate safety measures based on their technical training, knowledge, experience, and understanding of the relevant regulations pertaining to the work being performed. Qualified personnel must comply with the relevant technical regulations and have the necessary expertise.



Bosch Rexroth offers training support for specialized fields. You can find an overview of the training content online at: <http://www.boschrexroth.de/didactic>

2.5 General safety instructions

- As owner, please note the following: before the initial commissioning of the product, carry out a risk assessment in accordance with the national regulations in your country (in Germany: according to the Occupational Health and Safety Act).
- As distributing company/manufacturer of the machine, observe the following: Before the initial commissioning of a conveyor system, conduct a risk assessment in accordance with DIN EN ISO 12100.
- Observe the applicable accident prevention and environmental protection regulations.
- Observe the safety rules and regulations of the country in which the product is being used.
- Only use Rexroth products that are in proper working order.
- Heed all the notices on the product.
- Persons who assemble, operate, disassemble or maintain Rexroth products should not be under the influence of alcohol, drugs or medication that may affect their ability to respond.
- Use only original accessories and spare parts from Rexroth in order to prevent hazards to people due to unsuitable spare parts.
- Observe the technical data and ambient conditions specified in the product documentation.
- Only commission the product if it has been determined that the end product (for example, a machine or system) into which the Rexroth products have been installed complies with national provisions, safety regulations and application standards.

2.6 Product-specific safety instructions

General	• Do not attempt to modify the product. • Do not expose the product to any mechanical loads under any circumstances. Never use the product as a handhold or step. Do not place any objects on the product. • Always secure the product against tipping over.
During transport	• Observe the transport instructions on the packaging.
During assembly	• Inspect the product for obvious transport damage. • Route the cables and lines adequately protected to prevent mechanical damage and ensure that no one can trip over them. • Make sure the system component you are working on is depressurized and de-energized before assembling the product or inserting or removing plugs. • Ensure that the system component cannot be switched back on. • Before commissioning, make sure that all seals and plugs for the screwed connections are correctly installed and undamaged to prevent liquids and foreign bodies from entering the product.
During commissioning	• Allow the product to acclimatize for a few hours prior to commissioning in order to prevent water condensation from forming in the housing. • Make sure that all electrical and pneumatic connections are either in use or covered. • Check the safety requirements according to DIN EN 619. • Only commission a product that has been completely installed. • Make sure that all the safety equipment which forms part of the product is present, has been properly installed, and is fully functional. Do not move, bypass or disable any safety equipment. • Do not reach into moving parts. • Check the product for malfunctions.
During operation	• Make sure that only authorized personnel perform the following tasks within the scope of the product's intended use: – starting or operating the system, or interfering with its normal operation. – Operating component or part adjusters. • Only allow people to be in the immediate vicinity of the product when it is operating if they are authorized by the owner to be there. This also applies when the product is idle. • Make sure that: – There are no obstacles preventing access to the EMERGENCY STOP controls. – All delivery points, workstations and passages are kept clear. • Do not use EMERGENCY STOP controls for routine stopping. • Regularly check the EMERGENCY STOP controls to ensure that they are functioning properly. • Following an EMERGENCY STOP or in the event of a fault or other irregularity, turn the product off and secure it against being switched back on. • Do not reach into moving parts. • An idle system is not necessarily a safe system, as stored energy can be released unintentionally or through improper maintenance procedures.
EMERGENCY STOP, malfunction	• After an EMERGENCY STOP or a malfunction, only switch the system back on once you have established and rectified the cause of the fault.
During servicing and repair	• Make sure that access to maintenance and inspection points is kept unobstructed. • Perform the prescribed maintenance work at the intervals specified in section 10.3 "Maintenance". • Make sure that no line connectors, connections or components are disconnected as long as the system is supplied with pressure and voltage. Secure the system against being switched back on.
During disposal	• Dispose of the product in accordance with the regulations in your country.

2.7 Personal protective equipment

- Appropriate protective clothing should be worn when handling/using the product (e.g. safety shoes, close-fitting clothing, a hair net for long, loose hair). As the system owner or operator, you are personally responsible for ensuring the use of appropriate protective equipment when the product is being used. All component parts of the personal protective equipment must be free of damage.

2.8 Owner responsibilities

- Before the initial commissioning or re-commissioning of a conveyor system, carry out a risk assessment in accordance with DIN EN ISO 12100.
- Before initial commissioning, make sure there are no protruding or sharp-edged parts that may be a hazard to personnel working or moving in the area.
- Provide safety-related instructions to the operating personnel before initial commissioning or re-commissioning, and then at regular intervals.

3 General notes on property and product damage

The warranty only applies to the delivered configuration.

- During cleaning**
- The warranty is void in the event of incorrect assembly, commissioning and operation, as well as improper use and/or improper handling.
 - Prevent cleaning agents from getting into the system.
 - Do not use solvents or aggressive detergents.
 - Do not use a pressure washer for cleaning.

4 Scope of delivery

The scope of delivery includes the following:

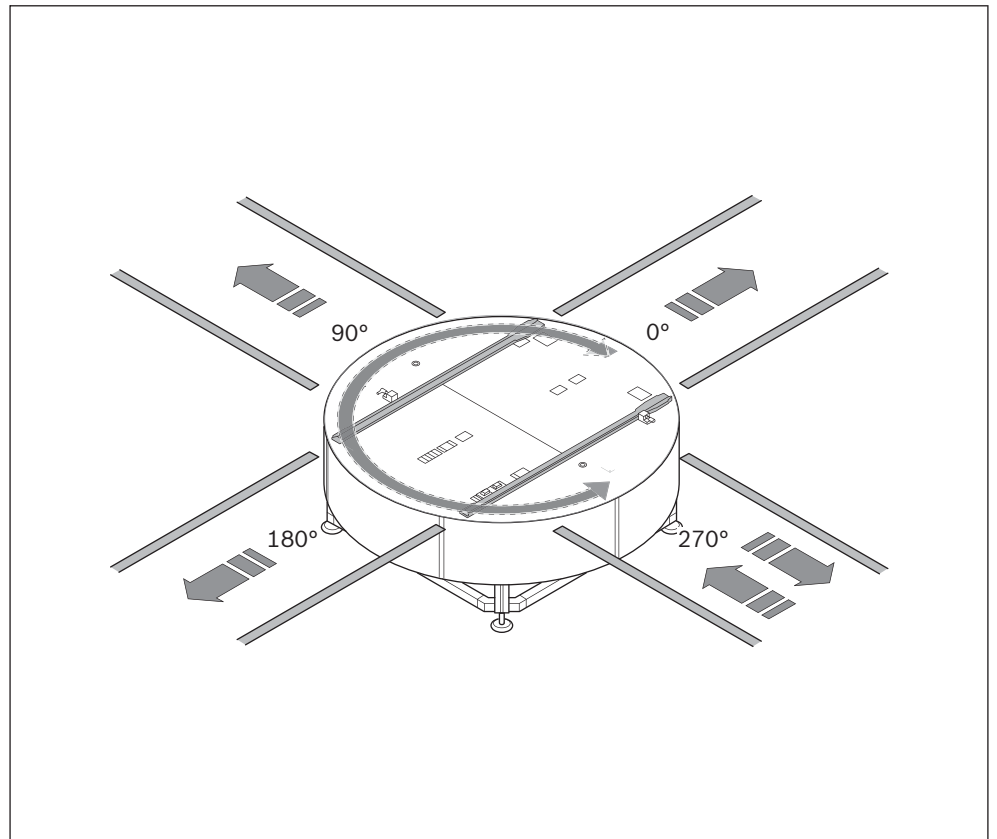
- 1x DE 2 rotate unit
- 1x Assembly instructions "DE 2, rotate unit".

4.1 Condition on delivery

- DE 2 rotate unit mounted on pallet.
- In the condition on delivery, the drive head faces to 0°. Rotation by 270° in counter-clockwise direction possible.

5 About this product

5.1 Specifications



559 188-01

Fig. 1: Condition on delivery: Right end position, 270° can be rotated in counter-clockwise direction

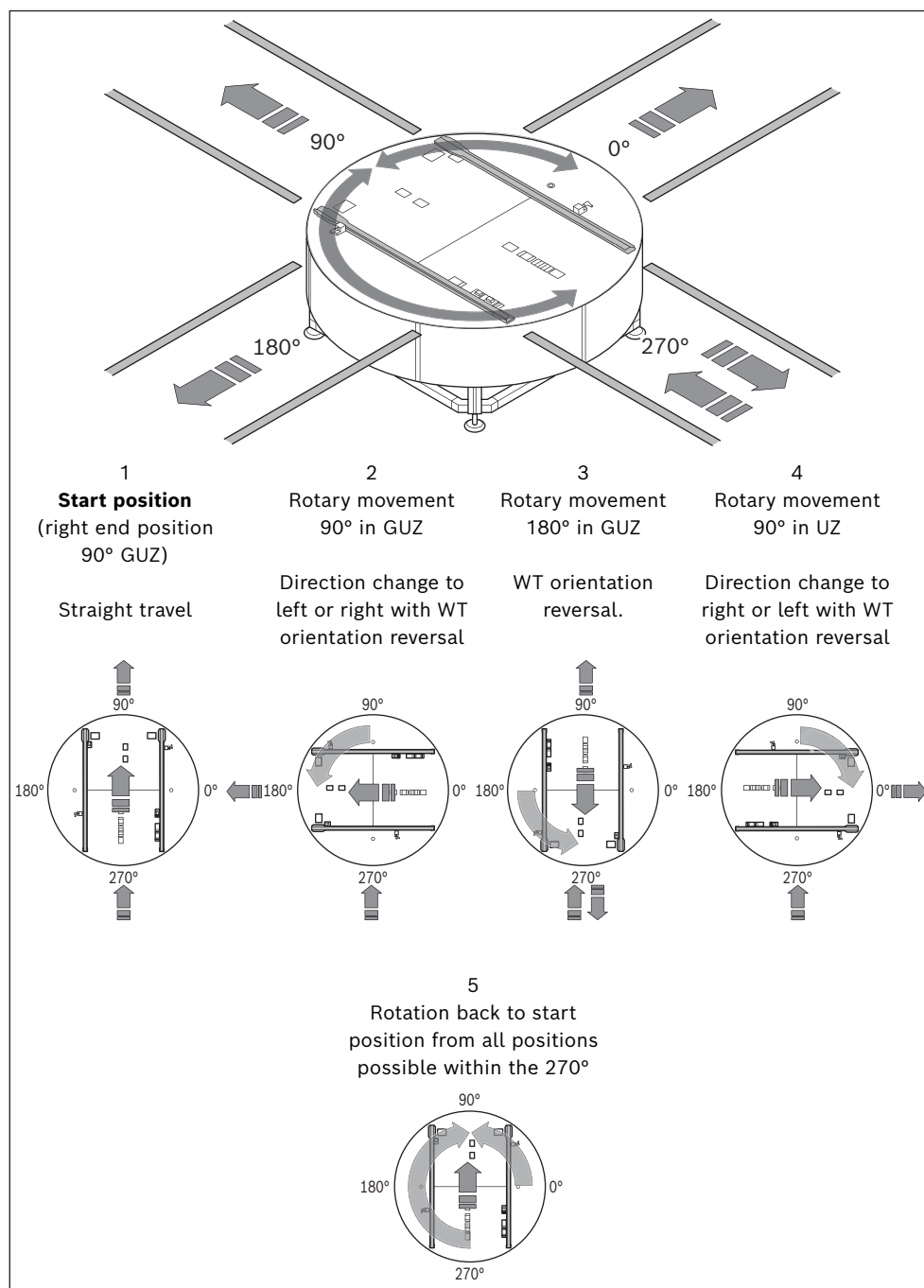


Fig. 2: Application example: Start position rotated by 90 °C in counter-clockwise direction from right end position (condition on delivery), can be rotated by 90° in clockwise direction and by 180° in counter-clockwise direction

5.1.1 Applications of the DE 2 rotate unit

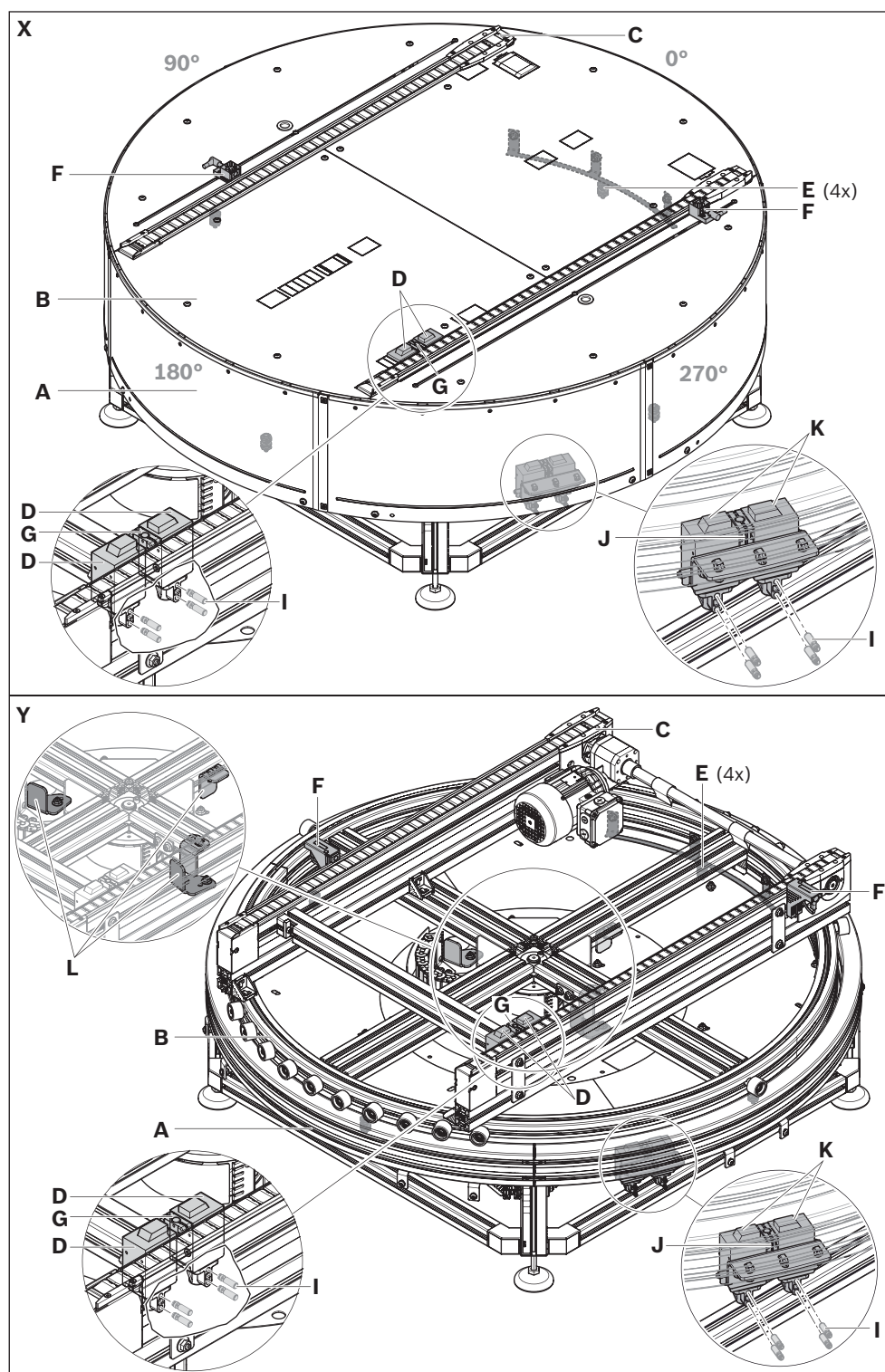
- Installation between 2, 3 or 4 BS 2... belt sections
- Horizontal rotation of WT 2... workpiece pallets by 90°, 180° or 270°
- Reversal of the orientation of the WT 2 workpiece pallet including the workpiece.
- Possible rotation angle of up to 270°. Due to the structure, the rotate unit must then be rotated back.

5.1.2 Version of the DE 2 rotate unit

- Conveyor medium: Toothed belt, flat-top, roller or duplex chain.
- Suitable for reversible operation.
- Motor connection with cable/plug.

5.2 Product description

- X:** Version with protective covers
- Y:** Version without protective covers
- A:** DE 2 rotate unit, lower part (standing)
- B:** DE 2 rotate unit, upper part (rotating by 90°, 180° or 270°)
- C:** BS 2/... belt section
- D:** Stop gate (locking of WT 2 during rotation)
- E:** Sensor option for DE 2 for control of the rotary movement and running to rotary bearings (sensors not included in the scope of delivery)
- F:** Sensor option for WT 2 for control of the deceleration and WT end position (sensors not included in the scope of delivery)
- G:** Sensor option for WT end position (sensors not included in the scope of delivery)
- I:** Sensor option for VE (sensors not included in the scope of delivery)
- J:** Sensor option for rotary movement end position (scope of delivery)
- K:** Sensor option for stop gate (sensors not included in the scope of delivery)
- L:** Mechanical rotary movement end stop



559 188-02

Fig. 3: DE 2 rotate unit (illustrated: DE 2 - BG 4, with BS 2/R belt section for WT 2)

- X:** Version with protective covers
- Y:** Version without protective covers
- A:** DE 2 rotate unit, lower part (standing)
- B:** DE 2 rotate unit, upper part (rotating by 90°, 180° or 270°)
- C:** BS 2/... belt section
- D:** Stop gate (locking of WT 2 during rotation)
- E:** Sensor option for DE 2 for control of the rotary movement and running to rotary bearings (sensors not included in the scope of delivery)
- F:** Sensor option for WT 2 for control of the deceleration and WT end position (sensors not included in the scope of delivery)
- H:** Sensor option for WT end position (sensors not included in the scope of delivery)
- I:** Sensor option for VE (sensors not included in the scope of delivery)
- J:** Sensor option for rotary movement end position (scope of delivery)
- K:** Sensor option for stop gate (sensors not included in the scope of delivery)
- L:** Mechanical rotary movement end stop

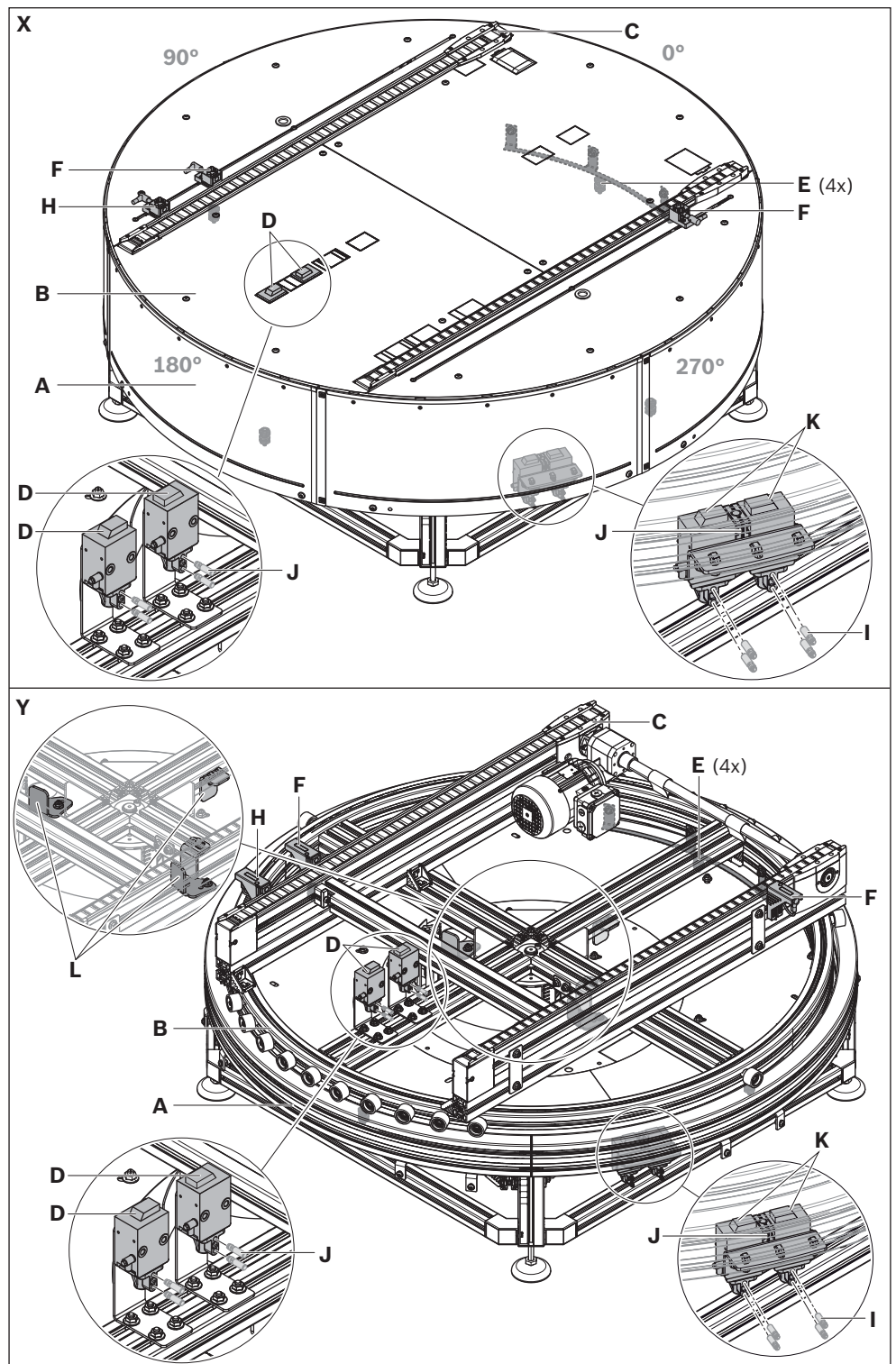


Fig. 4: DE 2 rotate unit (illustrated: DE 2 - BG 4, with BS 2/R belt section for WT 2-H / .../F-H)

559 188-04

5.3 Identification of the product

- A:** Material number
(order number)
- B:** Designation
- C:** Information on the
version and dimensions
- D:** Production date

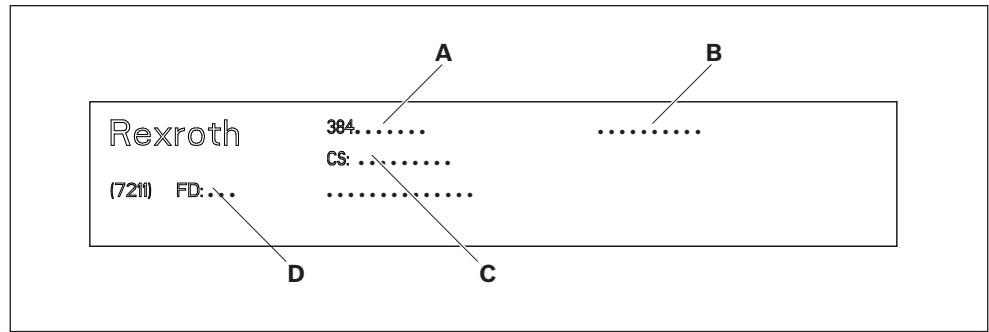


Fig. 5: Nameplate

6 Transport and storage

- Observe the transport instructions on the packaging.
- Transport weight: see delivery documents.
- Secure the product against tipping over!
- Always maintain ambient conditions during loading and transport, see page 84.

6.1 Transporting the product



WARNING

Suspended loads can fall!

Falling objects can result in severe injury (or even death).

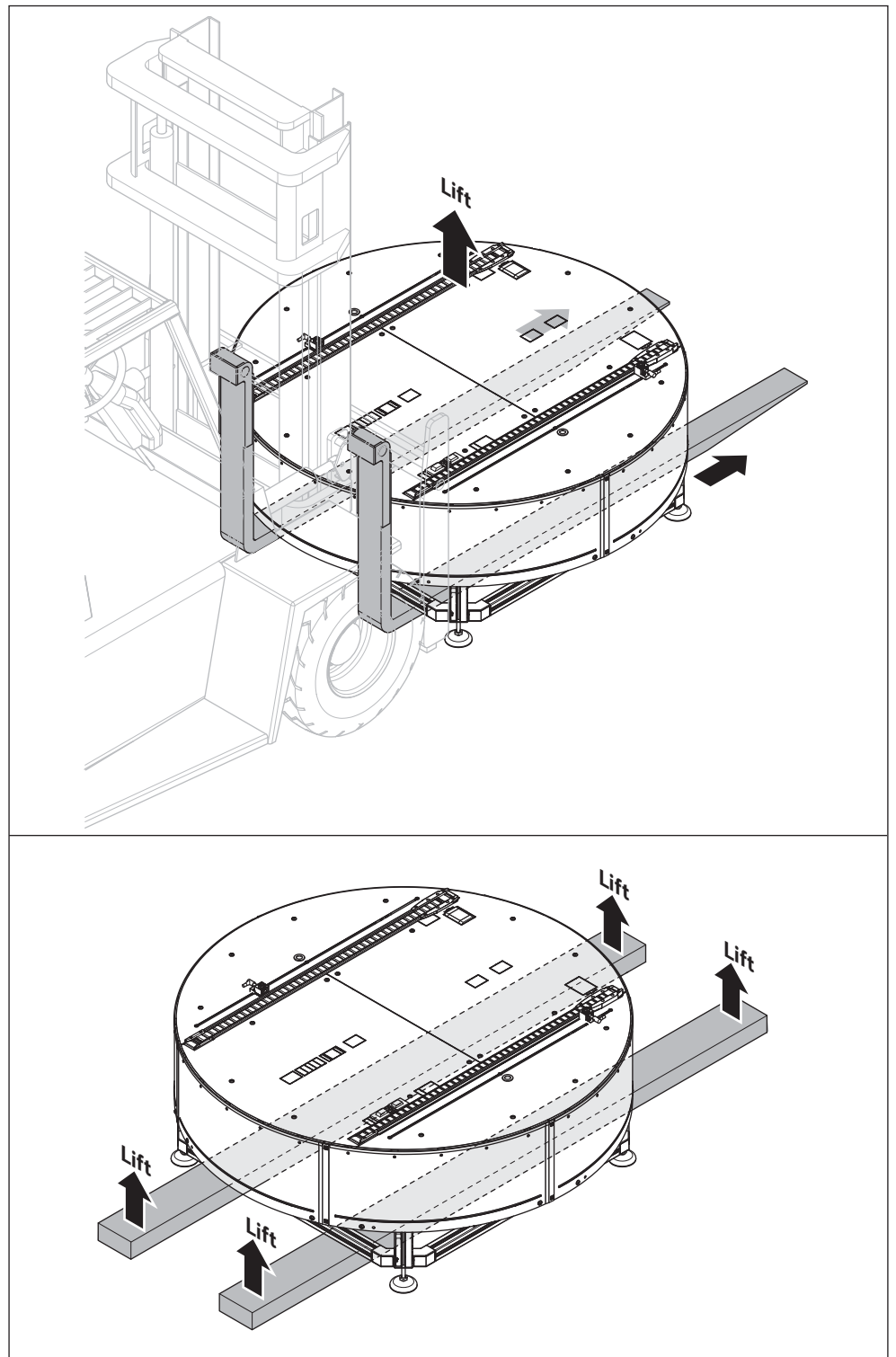
- Use only slings with sufficiently high bearing loads (for product weight, see delivery documents).
- Make sure the lifting straps are correctly fastened before lifting the product!
- Secure the product against tipping over when lifting!
- Make sure that no one but the operator is in the danger zone during lifting and lowering!

NOTICE

Risk of damage to the rotate unit due to incorrect transport

Incorrect transport and use of unsuitable lifting and suspension gear leads to a risk of damage to the rotate unit.

- The rotate unit may only be lifted with suitable industrial trucks or other suitable lifting gear and suspension gear as illustrated in Fig. 6.



559 188-33

Fig. 6: Lifting and transport of the rotate unit

6.2 Storing the product

- Only set the product down on a flat surface.
- Protect the product from mechanical stress.
- Protect the product from environmental influences, such as dirt and moisture.
- Observe the ambient conditions, see page 84.
- Support the product so that suspended motors/actuators/cylinders will not be strained.

7 Assembly

7.1 Unpacking

- ▶ Lift the product out of the packaging / off the pallet.
- ▶ Dispose of the packaging material in accordance with the applicable regulations in your country.

7.2 Installation requirements

- ▶ During installation, be sure to maintain the ambient conditions specified in the Technical Data (see page 84).

7.2.1 Installation position

- ▶ Install the product level and plumb to connected upstream/downstream conveyor sections, at right angles, and axially parallel. This ensures proper functioning and prevents premature wear.

7.3 Required tools

- Hex wrench (open-end) SW13.
- Hex socket wrenches SW3, SW4, SW5, SW6.
- Hex socket wrench (Torx™) T30, T50
- Posidriv screwdriver PZ2
- Hammer
- Level
- Combination pliers
- Flat smooth file

7.4 Required accessories

7.4.1 Anchoring of the rotate unit at the floor.

For each connection, you will need:

- 1x **3 842 146 815** Foundation bracket
- 1x **3 842 526 560** Dowel
- 2x **3 842 528 718** T-bolt
- 2x **3 842 345 081** Flange nut

7.4.2 Sensors

(not included in the scope of delivery)

Location	No.	Diameter with connector	Sensor
End position of rotary movement ¹⁾	1x	M12 with M8, S _N = 4 mm, flush ¹⁾	3 842 549 811
Position control (0° / 90° / 180° / 270°)	4x	M12 with M8, S _N = 4 mm, flush	3 842 549 812
Or alternatively:	4x	M12 with M12, S _N = 4 mm, flush	3 842 549 814
Stopping and locking of the rotary movement (VE)	4x	M8 with M8, S _N = 2 mm, flush	3 842 551 761
WT end position and running in of workpiece pallets with deceleration (ramp)	3x	M12 with M12, S _N = 8 mm, not flush	3 842 557 633
Or alternatively:	3x	M12 with M8, S _N = 8 mm, not flush	3 842 549 813
Stopping and locking the workpiece pallet (VE)	2x	M8 with M8, S _N = 2 mm, flush	3 842 551 761

¹⁾ Included in the scope of delivery, already assembled

7.4.3 Frequency converters

(not included in the scope of delivery)

- 1 x for motor for rotary movement
- 1 x for motor of belt section (deceleration and start-up of the workpiece pallet)

7.4.4 I/O modules

(PROFIBUS® or Ethernet, not included in the scope of delivery)

- For connection of proximity switches for control of the workpiece pallet
- For connection of necessary solenoid valves for control of the stop gates

7.5
Symbols used

	Connection with T-bolt and flange nut. Make sure the T-bolt is in the correct position when inserting it into the slot and tightening it. The notch at the head of the screw indicates the orientation of the T-bolt. 1 = T-bolt insertion position in the slot. 2 = T-bolt clamping position in the slot. Tightening torque: 25 Nm
	Hex wrench SW = wrench size ... mm M_D = required tightening torque ... Nm
	Hex socket wrench SW = wrench size ... mm M_D = required tightening torque ... Nm
	Screwdrivers for cross-head screws PZ ... = Pozidriv screw drive, size ... PH ... = Phillips screw drive, size ...
	Lubricate/lubricate with specific grease lubricant: • gleitmo 585 K: gleitmo 585 K, www.fuchs-lubritech.com • Anti-Seize: Food Grade Anti-Seize/Loctite 8014, www.henkel.com
	Lubricate/lubricate with specific mineral oil: • GHD: Structovis GHD, www.klueber.com • V 68: mineral oil with a viscosity of 68
	Secure the screws with: • Loctite 243: medium strength (detachable), www.loctite.de • Loctite 601: high-strength screw retention (non-detachable), www.loctite.de
	The marked parts are not required for the described assembly. Dispose of the parts or use them for other purposes.
	Graphical depiction of the assembly steps. The numbers correspond to the sequence of assembly steps in accordance with the instructions in the accompanying text.
	Graphical depiction of the designation of components. The letters denote the components mentioned in the accompanying text.
	Detail view from a different direction, for example, the back or the bottom side of the product.

7.6 Assembling the product

7.6.1 Setting up the DE 2 rotate unit



Please note:

- The height difference Δ between the section of the rotate unit and the connected section must not exceed ± 1 mm (see detail X).
- If anchoring to the floor is not possible, connect the frame of the rotate unit to the section supports/frame of connected sections.

1. Align the rotate unit.
 - horizontal
 - flush and at the height of upstream/downstream belt sections.
2. Screw the rotate unit to the floor.

For each connection, you will need:

 - 1x foundation bracket, **3 842 146 815**
 - 1x dowel, **3 842 526 560**
 - 2x T-bolt, **3 842 528 718**
 - 2x flange nut, **3 842 345 081**

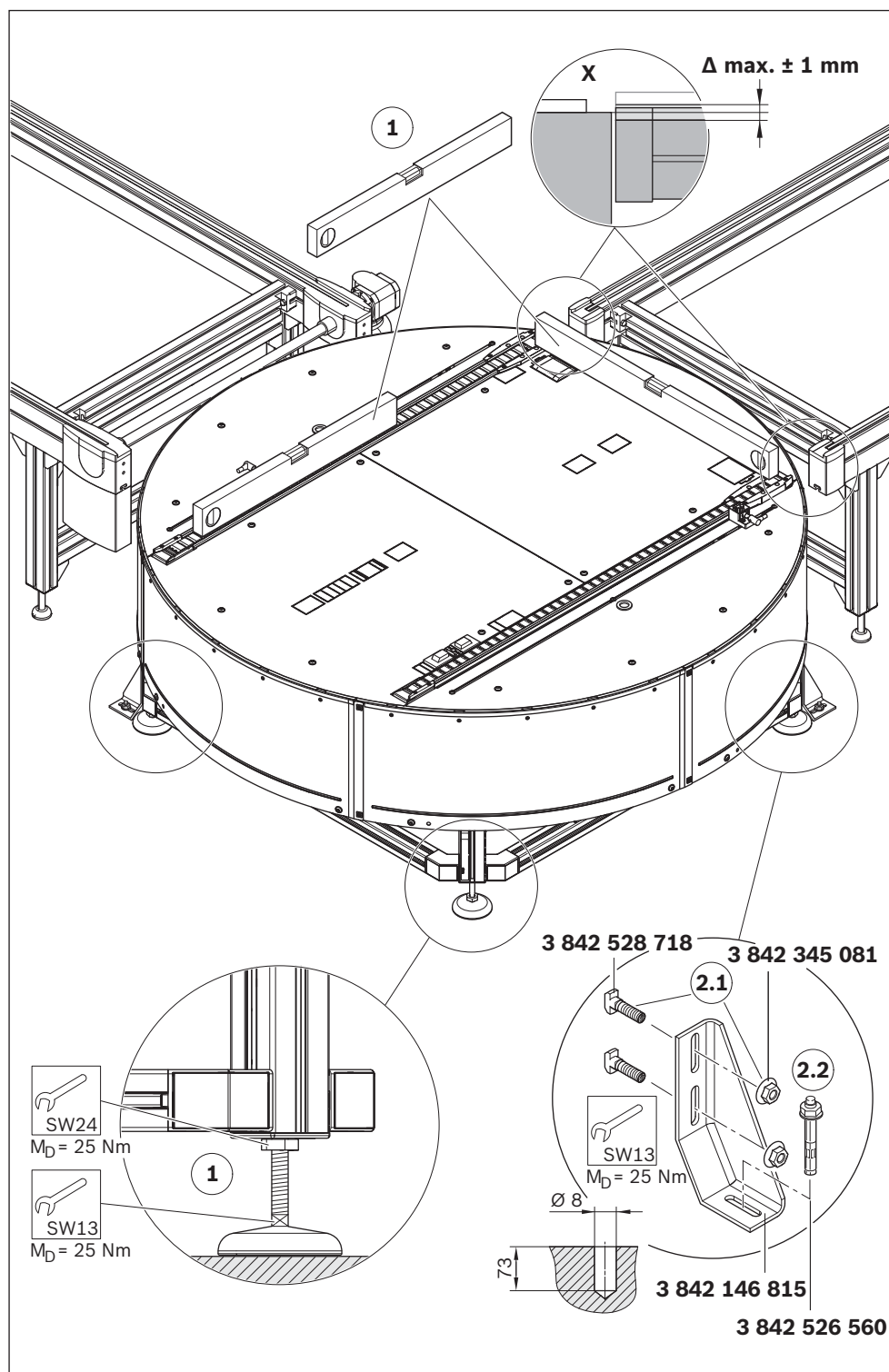
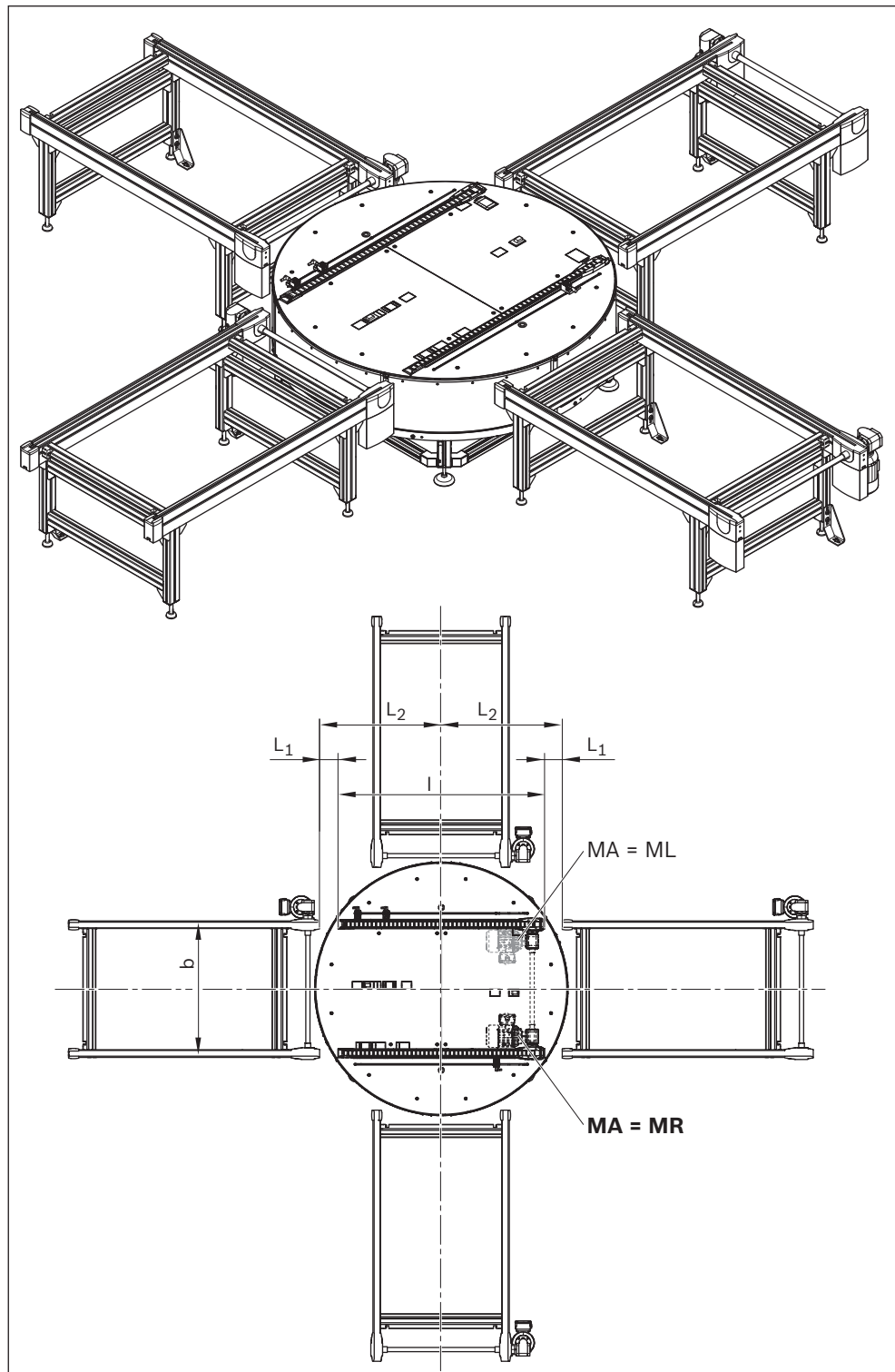


Fig. 7: Setting up the DE 2 rotate unit (illustrated: DE 2 - BG 4, with BS 2/R belt section for WT 2)

559 188-03

**Please note:**

- To bridge the conveyor trench between DE 2 rotate unit and the downstream section BS 2/R; BS 2/C; BS 2/G-250, connection belts are required at the connecting sections of some versions.
 - Required accessories for bridging the conveyor trench. See page 25.
- DE 2 with BS 2: see Table 6 on page 23
 - DE 2 with BS 2/R; BS 2/C; BS 2/G-250: see Table 7 on page 24

Distance of connecting belt sections

559 188-10

Fig. 8: Distance of connecting belt sections

Table 6: Distance to connecting belt sections, BS 2

b (mm)	l_T (mm)	WT 2 and WT 2/F ¹⁾					WT 2/H and WT 2/F-H ²⁾				
		BG ³⁾	MA ⁴⁾	l ⁵⁾ (mm)	L1 (mm)	L2 (mm)	BG ³⁾	MA ⁴⁾	l ⁵⁾ (mm)	L1 (mm)	L2 (mm)
400	400	1	MR	656	54.0	382.0	1	ML	656	54.0	382.0
400	480	1	MR	656	54.0	382.0	1	ML	656	54.0	382.0
480	400	1	MR	597	65.5	364.0	1	ML	597	65.5	364.0
480	480	1	MR	597	65.5	364.0	1	ML	597	65.5	364.0
480	640	2	MR	818	54.0	463.0	2	ML	818	54.0	463.0
480	800	3	MR	1001	47.5	548.0	3	ML	1001	47.5	548.0
640	480	2	MR	695	100.5	448.0	2	ML	695	100.5	448.0
640	640	3	MR	903	76.5	528.0	2	ML	695	100.5	448.0
640	800	3	MR	903	76.5	528.0	3	ML	903	76.5	528.0
640	1040	4	MR	1324	49.0	711.0	4	ML	1324	49.0	711.0
800	480	3	MR	761	147.5	528.0	3	ML	761	147.5	528.0
800	640	3	MR	761	147.5	528.0	3	ML	761	147.5	528.0
800	800	4	MR	1231	92.5	708.0	4	ML	1231	92.5	708.0
800	1040	4	MR	1231	92.5	708.0	4	ML	1231	92.5	708.0
800	1200	5	MR	1646	65.0	888.0	5	ML	1646	65.0	888.0
1040	640	4	MR	1031	192.5	708.0	4	ML	1031	192.5	708.0
1040	800	4	MR	1031	192.5	708.0	4	ML	1031	192.5	708.0
1040	1040	5	MR	1503	136.5	888.0	5	ML	1503	136.5	888.0
1040	1200	5	MR	1503	136.5	888.0	5	ML	1503	136.5	888.0
1200	800	5	MR	1376	200.0	888.0	5	ML	1376	200.0	888.0
1200	1040	5	MR	1376	200.0	888.0	5	ML	1376	200.0	888.0
1200	1200	5	MR	1376	200.0	888.0	5	ML	1376	200.0	888.0

1) WT 2 and WT 2/F workpiece pallets with lateral stop gate

2) WT 2/H and WT 2/F-H workpiece pallets with center stop gate

3) Size

4) Motor mounting: ML = middle left, MR = middle right

5) Length of the belt section assembled at the DE 2

Table 7: Distance to connecting belt sections, BS 2/R; BS 2/C; BS 2/G-250

b (mm)	l_T (mm)	WT 2 and WT 2/F ¹⁾						WT 2/H and WT 2/F-H ²⁾					
		BG ³⁾	MA ⁴⁾	l ⁵⁾ (mm)	L1 (mm)	L2 (mm)	Connection belt required ⁶⁾	BG ³⁾	MA ⁴⁾	l ⁵⁾ (mm)	L1 (mm)	L2 (mm)	Connection belt required ⁶⁾
400	400	1	ML	656	68	396	●	1	ML	656	68	396	●
400	480	1	ML	656	68	396	●	1	ML	656	68	396	●
480	400	1	ML	597	84.5	383	●	1	ML	597	84.5	383	●
480	480	2	ML	818	69	478	●	2	ML	818	69	478	●
480	640	2	ML	818	54	463		2	ML	818	54	463	
480	800	3	ML	1001	47.5	548		3	ML	1001	47.5	548	
640	480	2	ML	695	98.5	446	●	2	ML	695	98.5	446	●
640	640	3	ML	903	71.5	523		3	ML	903	71.5	523	
640	800	4	ML	1324	49	711		4	ML	1324	49	711	
640	1040	4	ML	1324	49	711		4	ML	1324	49	711	
800	480	3	ML	761	142.5	523	●	3	ML	761	142.5	523	●
800	640	4	ML	1231	87.5	703	●	4	ML	1231	87.5	703	●
800	800	4	ML	1231	87.5	703		4	ML	1231	87.5	703	
800	1040	4	ML	1231	87.5	703		4	ML	1231	87.5	703	
800	1200	5	ML	1646	60	883		5	ML	1646	60	883	
1040	640	4	ML	1031	187.5	703	●	4	ML	1031	187.5	703	●
1040	800	4	ML	1031	187.5	703	●	4	ML	1031	187.5	703	●
1040	1040	5	ML	1503	131.5	883		5	ML	1503	131.5	883	
1040	1200	5	ML	1503	131.5	883		5	ML	1503	131.5	883	
1200	800	5	ML	1376	195	883	●	5	ML	1376	195	883	●
1200	1040	5	ML	1376	195	883		5	ML	1376	195	883	
1200	1200	5	ML	1376	195	883		5	ML	1376	195	883	

1) Stop by lateral stop gate

2) Stop by center stop gate

3) Size

4) Motor mounting: ML = middle left, MR = middle right

5) Length of the belt section assembled at the DE 2

6) To bridge the conveyor trench between DE 2 rotate unit and the downstream section, connection belts are required at the connecting sections.

Bridging the conveyor trench



Please note:

- To bridge the conveyor trench between DE 2 rotate unit and the downstream section BS 2/R; BS 2/C; BS 2/G-250, connection belts are required at the connecting sections of some versions.
- The connection belts can only be installed at the modular units listed in Table 8.
- Observe the direction of transport and reversibility of this modular units.

Required accessories:

- BS 2/C+R connection belt on left
3 842 528 480
- BS 2/C+R connection belt on right
3 842 539 096

A: Assembly on return side

B: Assembly on drive side

- For assembly, see assembly instructions for BS 2/C+R connection belt
3 842 522 441

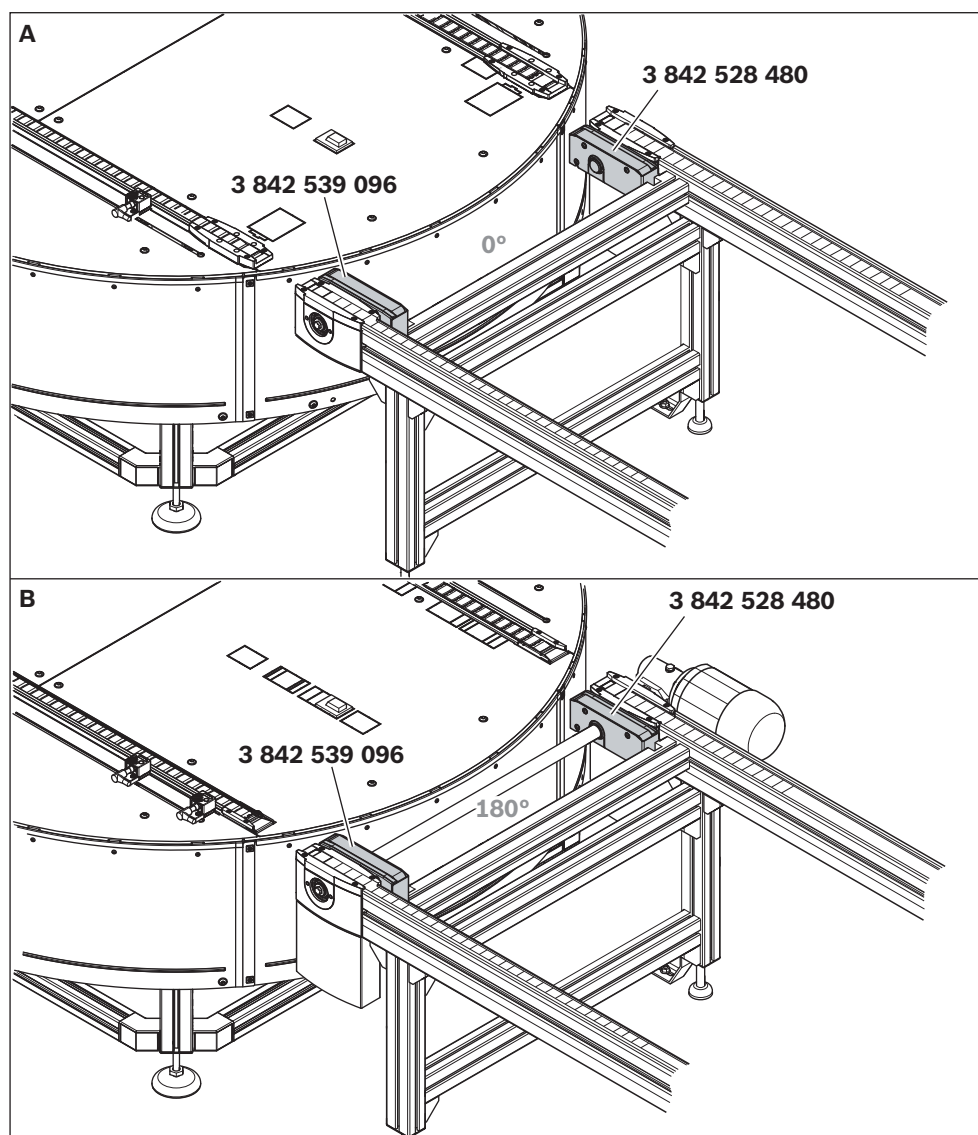


Fig. 9: Bridging the conveyor trench

559 188-34

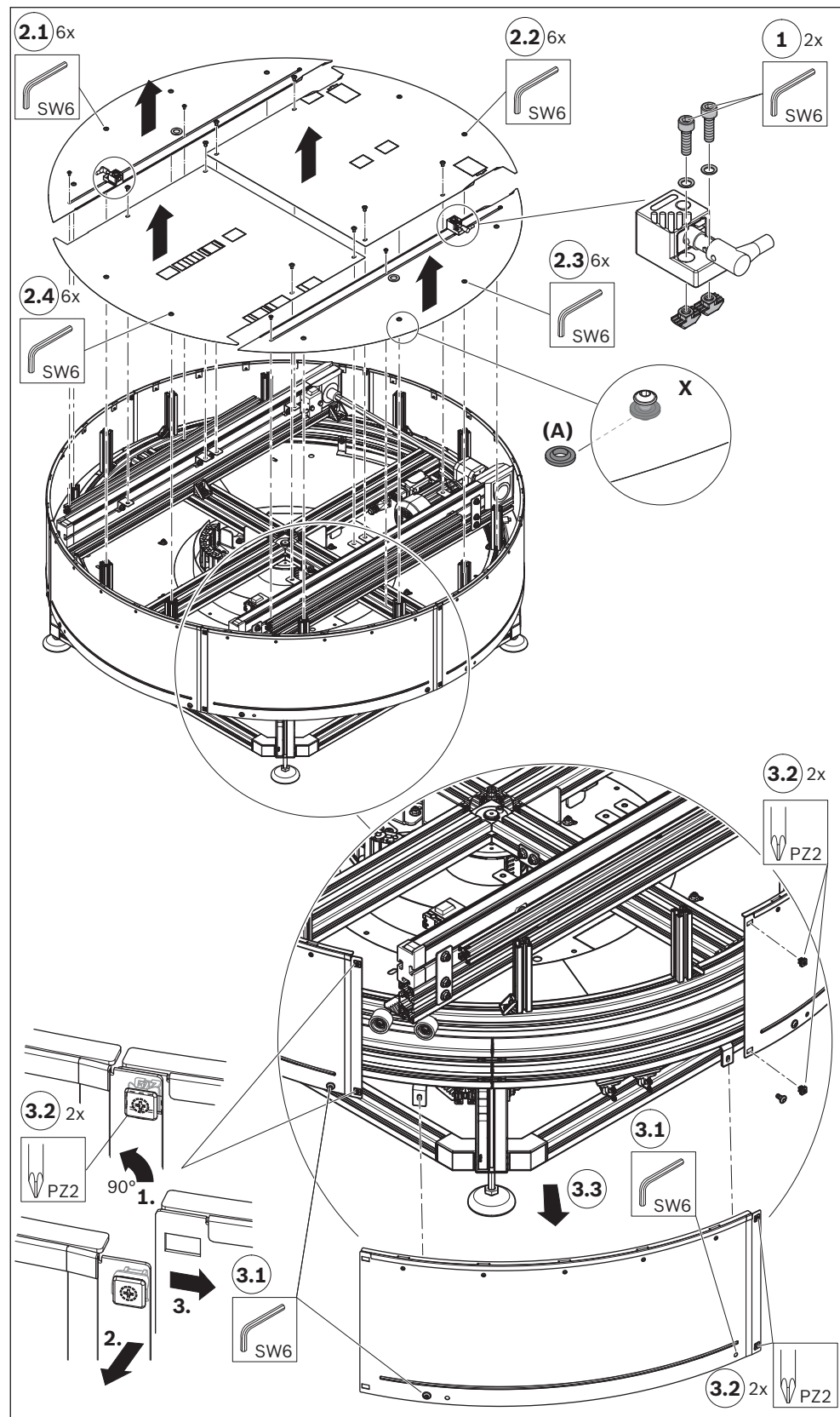
Table 8: Use and assembly options

Flat top chain			Accumulation roller chain		
BS 2/C-100	3 842 999 917	Drive side	BS 2/R-300	3 842 999 904	Drive side
BS 2/C-250	3 842 999 985	Drive axis	BS 2/R-700	3 842 998 096	Drive side
BS 2/C-H	3 842 998 239	Return side	BS 2/R-H	3 842 998 238	Return side
AS 2/C-100	3 842 998 053		AS 2/R-300	3 842 998 052	
AS 2/C-250	3 842 998 087		AS 2/R-700	3 842 998 072	
UM 2/C-170	3 842 528 806		UM 2/R-170	3 842 528 807	

**Please note:**

- For commissioning and maintenance, various covers may need to be removed. This is respectively indicated in the respective chapters.
- Some screws of the covers are securely connected with the cover by lock washers (A) (see detail X).
- The lock washers must not be removed.

1. Remove the sensor holders.
 2. Remove the top covers.
 3. Remove the lateral covers.
- Install the covers and holders in reverse order.

7.6.2 Assembling/disassembling the protective covers of the rotate unit**Fig. 10: Disassembling/assembling the DE 2 protective covers**

559 188-09

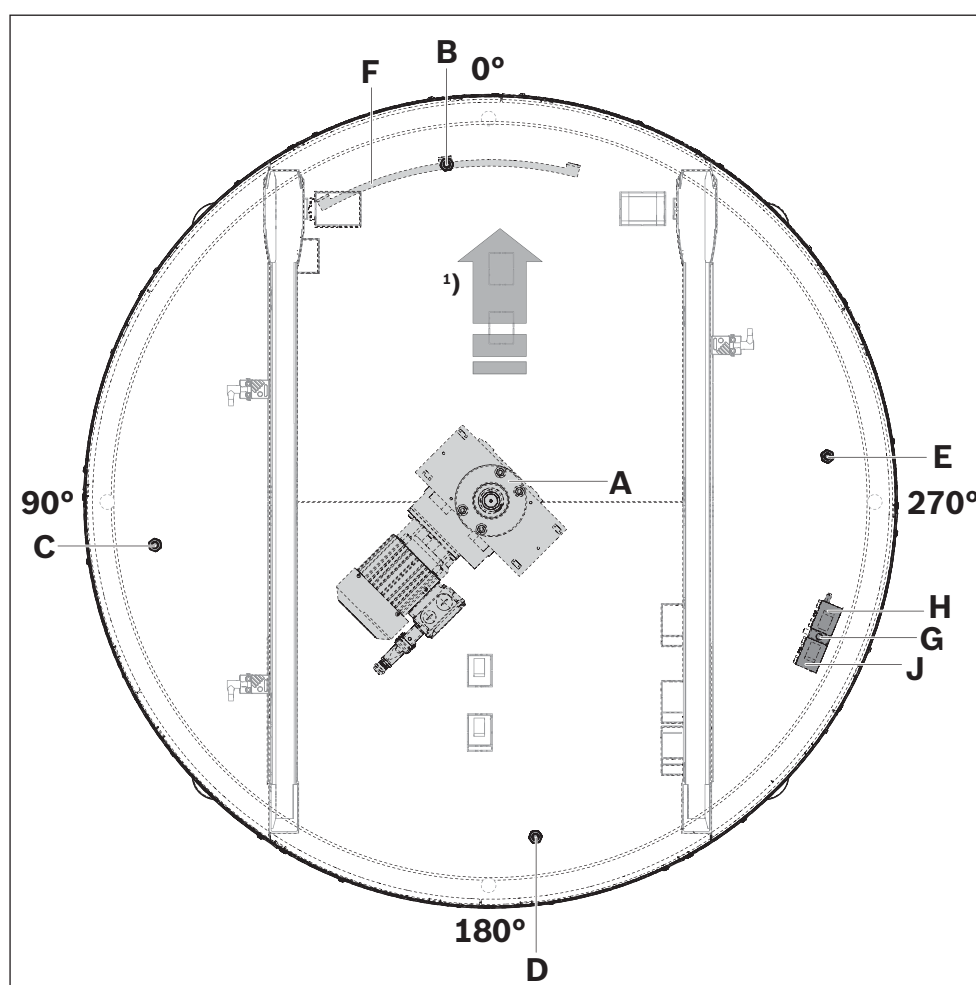
7.6.3 Purpose and function of sensors and actuators

Sensors and actuators of rotary movement

- The rotate unit can be set to 4 positions (0°, 90°, 180°, 270°).
The total rotation angle of 0° to 270° in counter-clockwise direction is mechanically limited.
- The workpiece pallet can run in or out in all positions.
- Drive (A) moves the rotary table with the belt section.
- The sensors (B, C, D, E) localize the position of the rotary table.
Via the switching element (F), the deceleration is initiated with the frequency converter and the rotary table is slowly set to the desired position.
- The sensor (G) indicates reaching of the desired position of the rotary table, the motor can be switched off.
- The rotary table is stopped and locked by the stop gates (H, J) in the desired position.
 - Stop gate (H) in counter-clockwise rotational direction (GUZ)
 - Stop gate (J) in clockwise rotational direction (UZ)

- A:** Rotate unit drive
B: Sensor to position 0° (iStopprampe Pos0)
C: Sensor to position 90° (iStopprampe Pos90)
D: Sensor to position 180° (iStopprampe Pos180)
E: Sensor to position 270° (iStopprampe Pos270)
F: Switching element for deceleration ramp
G: Sensor end position (iDE in Pos)
H: VE, Stop GUZ (DE Stopper GUZ)
J: VE, Stop UZ (DE Stopper UZ)

1) Travel direction



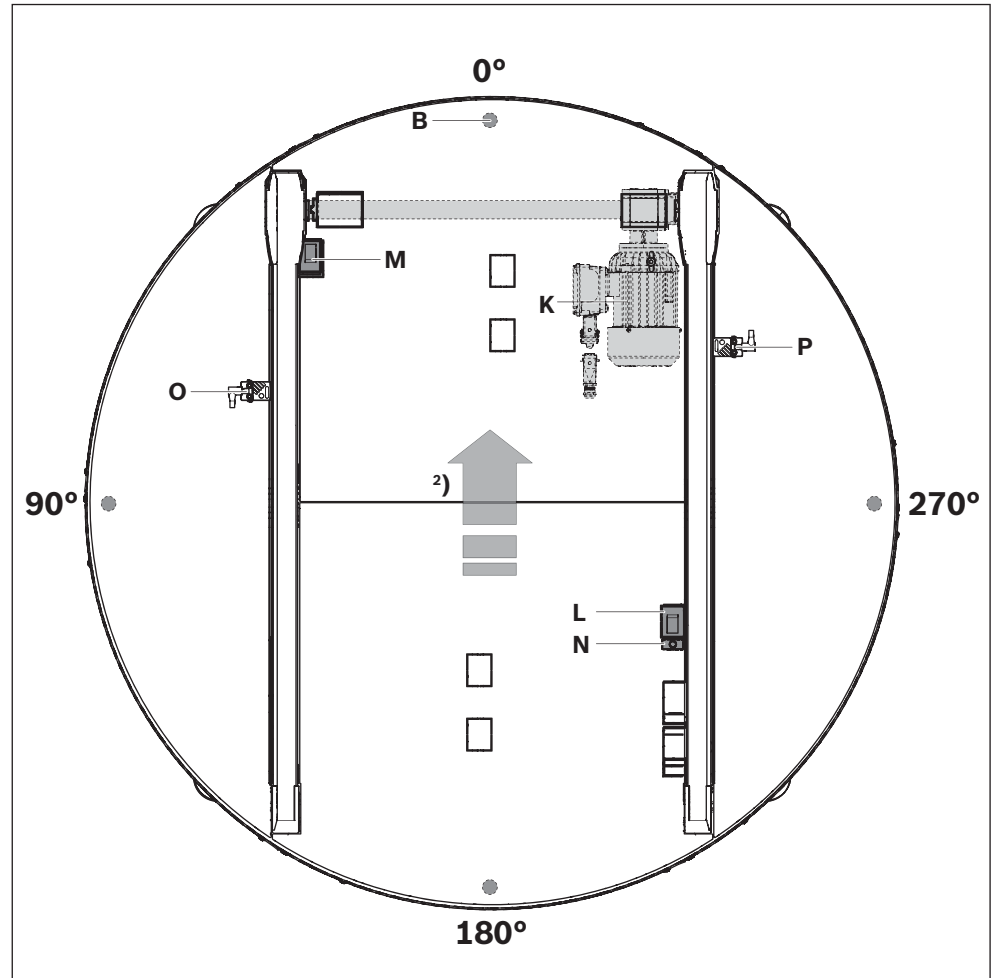
559 188-11

Fig. 11: Sensors and actuators of rotary movement (illustrated: condition on delivery)

Sensors and actuators of the belt section for WT 2

- The drive (K) moves the workpiece pallet on the belt section.
 - The sensors (O, P) localize the position of the workpiece pallet.
 - Sensor (P) in travel direction
 - Sensor (O) in reversing direction
 - The sensor (N) indicates reaching of the end position of the workpiece pallet.
 - The workpiece pallet is stopped by the stop gates (L, M) in end position.
 - Stop gate (L) in travel direction
 - Stop gate (M) in reversing direction
- With the stop gate against travel direction, the workpiece pallet can be secured during the rotary movement.

- B:** Sensor to position 0°
(iStopprampe Pos0)
- K:** Belt section drive
- L:** Stop gate,
Stop in travel direction/
locking ¹⁾ in reversing
direction
(WT Stopper Links)
- M:** Stop gate,
Stop in reversing
direction/locking ¹⁾
in travel direction
(WT Stopper Rechts)
- N:** Sensor end position
(iWT in Pos)
- O:** Deceleration sensor
(ramp) in reversing
direction
(iWT Rampe Links)
- P:** Deceleration sensor
(ramp) in travel
direction
(iWT Rampe Rechts)
- ¹⁾Securing of the position of the
workpiece pallet during rotary
movement.
- ²⁾ Travel direction



559 188-30

Fig. 12: Sensors and actuators of the belt section for WT 2 (illustrated: condition on delivery)

Sensors and actuators of belt section for WT 2/H and WT 2/H-F

- The drive (K) moves the workpiece pallet on the belt section.
 - The sensors (O, P) localize the position of the workpiece pallet.
 - Sensor (O) in travel direction
 - Sensor (P) in reversing direction
 - The sensor (N) indicates reaching of the end position of the workpiece pallet.
 - The workpiece pallet is stopped by the stop gates (L, M) in end position.
 - Stop gate (L) in travel direction
 - Stop gate (M) in reversing direction
- With the stop gate against travel direction, the workpiece pallet can be secured during the rotary movement.

- B:** Sensor to position 0°
(iStopprampe Pos0)
- K:** Belt section drive
- L:** Stop gate,
Stop in travel direction/
locking ¹⁾ in reversing
direction
(WT Stopper Links)
- M:** Stop gate,
Stop in reversing
direction/locking ¹⁾ in
travel direction
(WT Stopper Rechts)
- N:** Sensor end position
(iWT in Pos)
- O:** Deceleration sensor
(ramp) in reversing
direction
(iWT Rampe Links)
- P:** Deceleration sensor
(ramp) in travel
direction
(iWT Rampe Rechts)
- ¹⁾ Securing of the position of
the workpiece pallet during
rotary movement.
- ²⁾ Travel direction

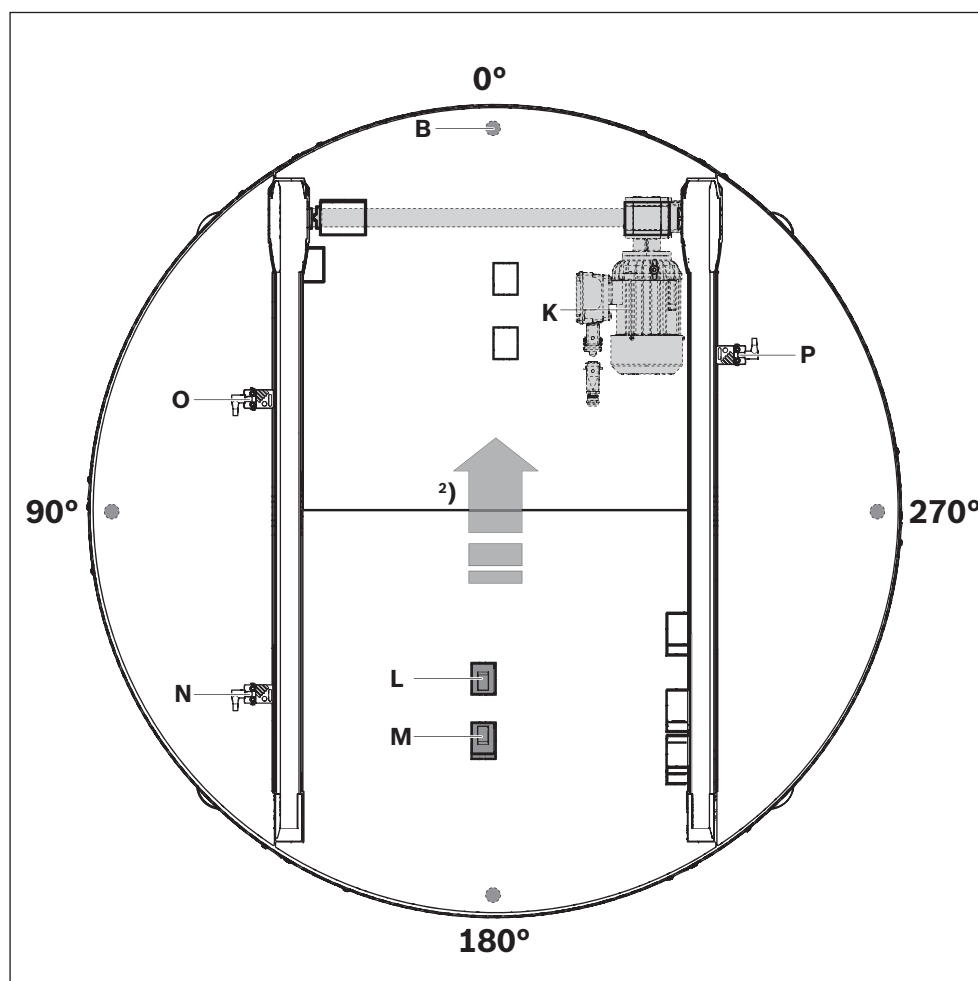


Fig. 13: Sensors and actuators of belt section for WT 2/H and WT 2/H-F (illustrated: condition on delivery)

7.6.4 Assembling the sensors

For rotary movement control

Required sensors:

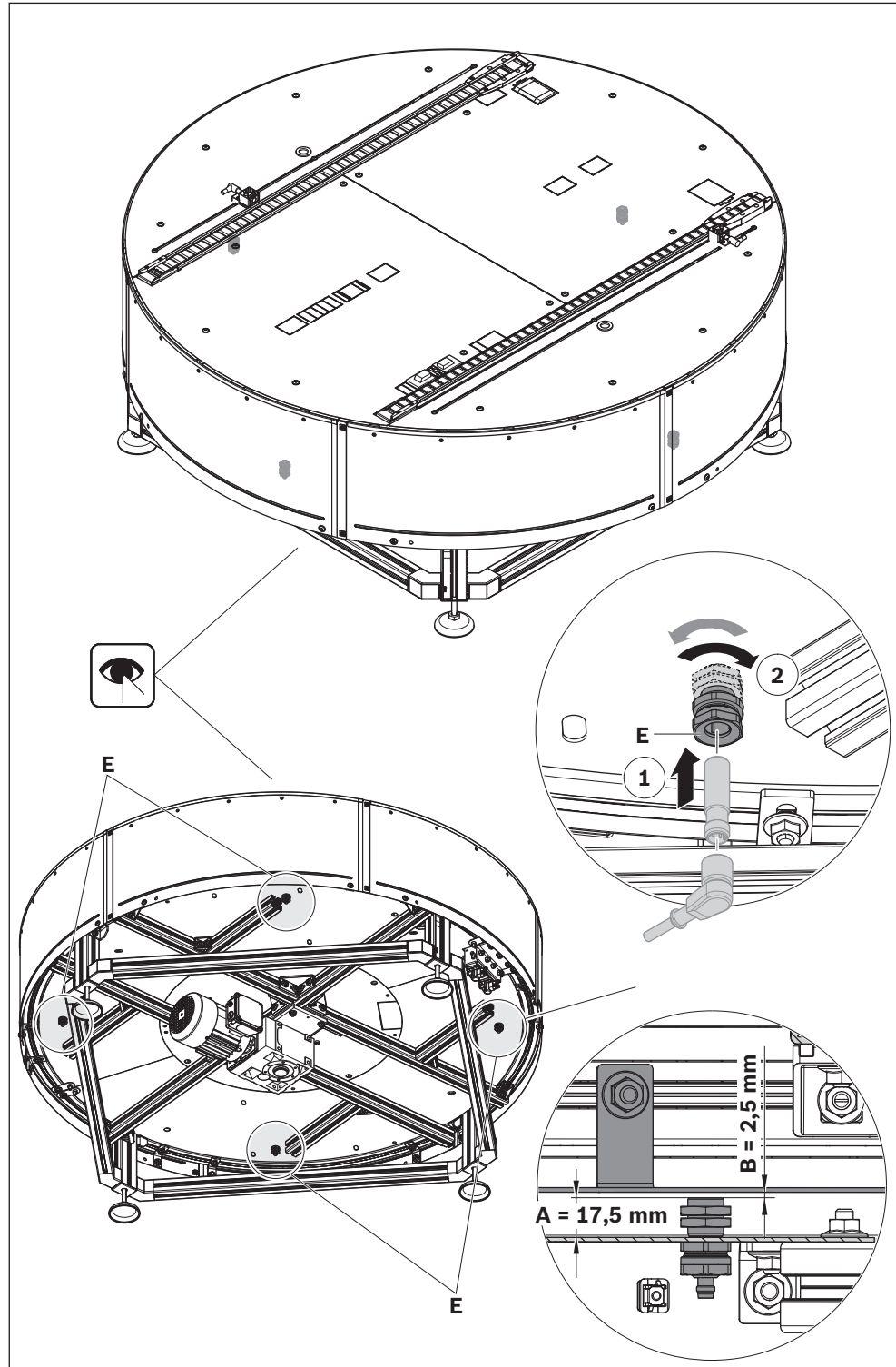
(not included in the scope of delivery)

- 4x M12, $S_N = 4$ mm,
flush, **3 842 549 814**
or alternatively
3 842 549 812

A: Screw-in depth max.
17.5 mm

B: Distance of sensor
to exciter surface
2.5 mm

1. Fully slide the sensor into the clamp sleeve (E).
2. Tighten the clamp sleeve (E).



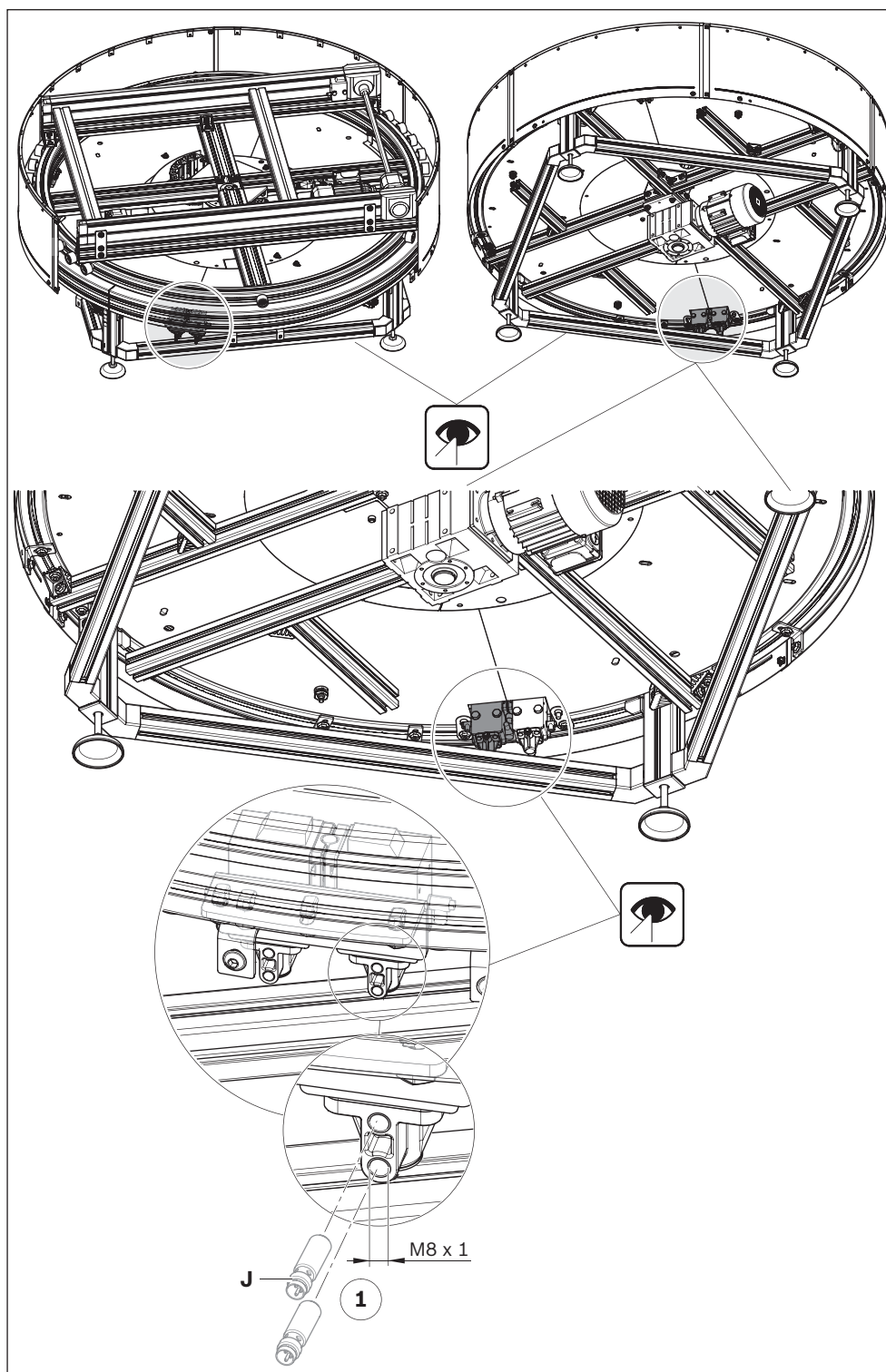
559 188-05

Fig. 14: Assembling the sensors for rotary movement control

Stopping and locking of the rotary movement

Stopping and locking of the rotary movement, required sensors for each VE 2/...: (J, not included in the scope of delivery)
 – 4x M8, $S_N = 2\text{ mm}$, flush,
3 842 551 761

1. Install the required position sensors in the stop gate housing.



ENGLISH

Fig. 15: Assembling the sensors for end position, stopping and locking of the rotary movement

559 188-06

**Please note:**

For precise assembly positions of sensors, refer to section 7.6.6.

X: Version with protective covers

Y: Version without protective covers

Workpiece pallet end position, required sensors:

(G, not included in the scope of delivery)

- 1x M12, $S_N = 4$ mm, flush, **3 842 549 814** or alternatively **3 842 549 812**

Deceleration control, required sensors:

(F, not included in the scope of delivery)

- 2x M12, $S_N = 4$ mm, flush, **3 842 549 814** or alternatively **3 842 549 812**

– Stopping and locking, required sensors for each VE 2/...:

(J, not included in the scope of delivery)

- 4x M8, $S_N = 2$ mm, flush, **3 842 551 761**
- 2x VE 2/... position sensor **3 842 528 817**

- For assembly of the VE 2/... position sensor, see detail X in Fig. 18

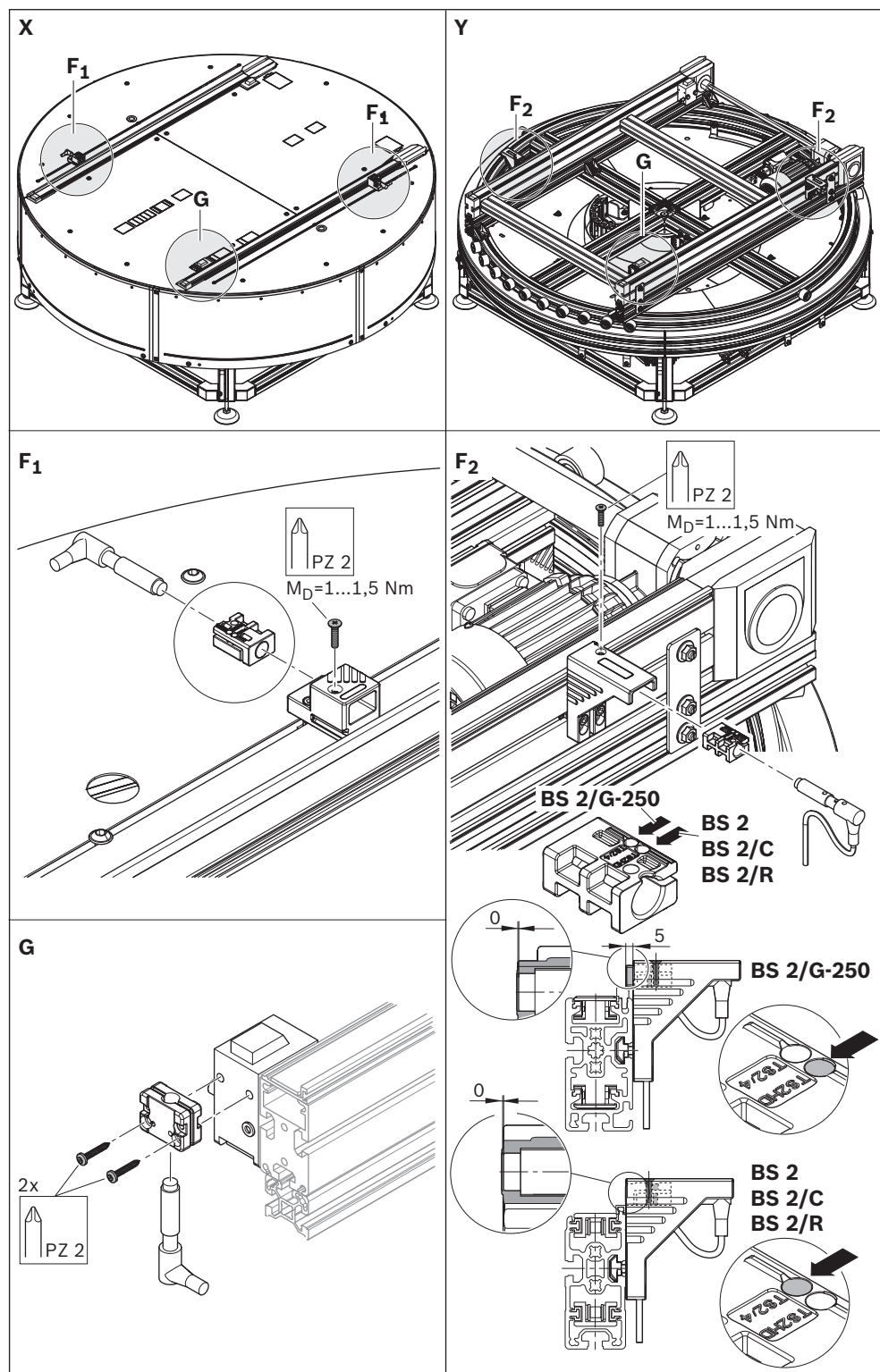
End position, stopping and locking the WT 2 workpiece pallet

Fig. 16: Assembling the sensors for end position, stopping and locking of WT 2

559 188-08

End position, stopping and locking of WT 2-H, WT 2/F-H workpiece pallets



Please note:

For precise assembly positions of sensors, refer to section 7.6.6.

X: Version with protective covers

Y: Version without protective covers

Workpiece pallet end position, required sensors:

(H, not included in the scope of delivery)

- 1x M12, $S_N = 4$ mm, flush, **3 842 549 814** or alternatively **3 842 549 812**

Deceleration control, required sensors:

(F, not included in the scope of delivery)

- 2x M12, $S_N = 4$ mm, flush, **3 842 549 814** or alternatively **3 842 549 812**

Stopping and locking, required sensors for each VE 2/...: (J, not included in the scope of delivery)

- 4x M8, $S_N = 2$ mm, flush, **3 842 551 761**
- 2x VE 2/... position sensor **3 842 528 817**

- For assembly of the VE 2/... position sensor, see detail X Fig. 19

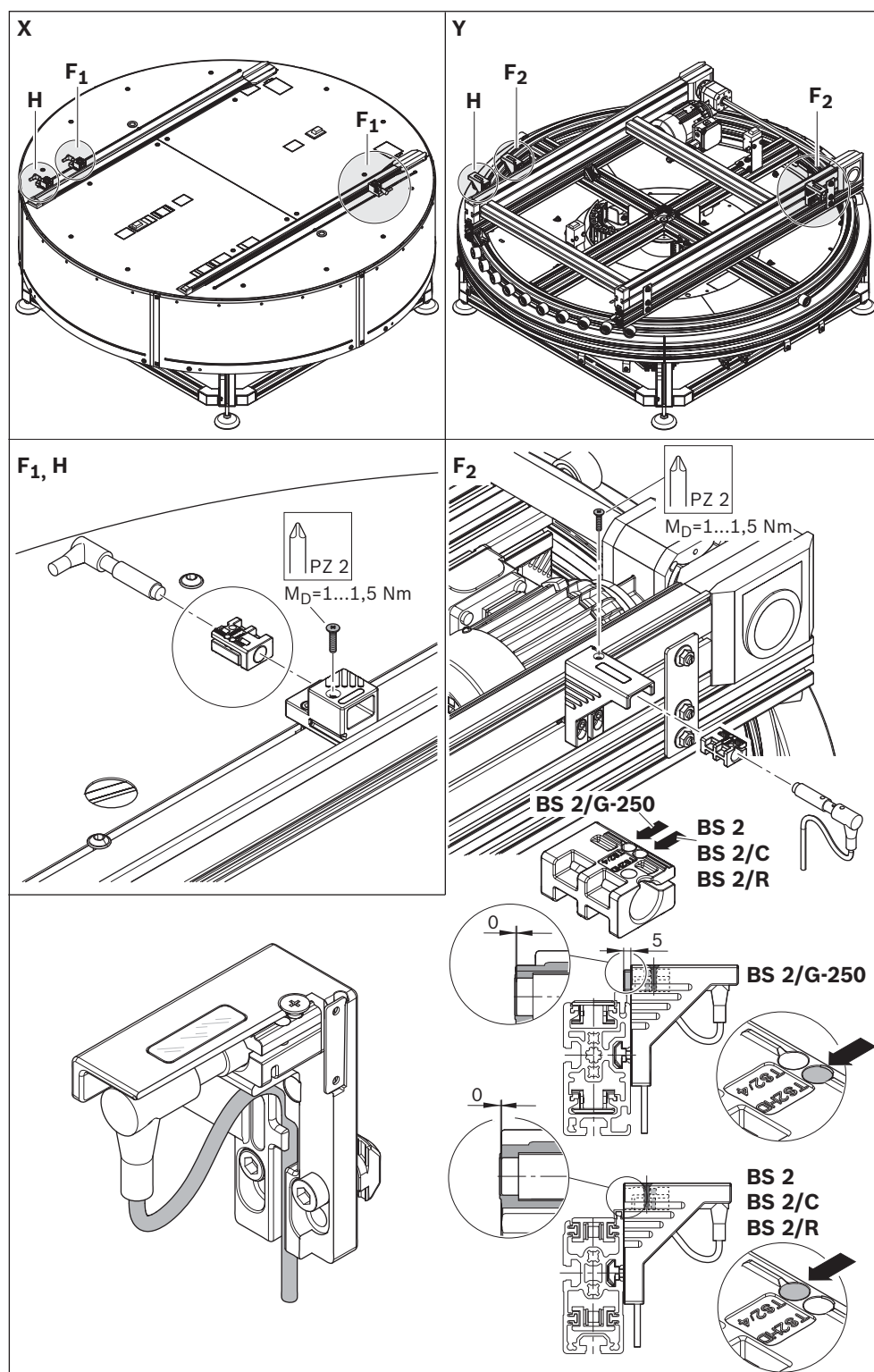


Fig. 17: Assembling the sensors for end position, stopping and locking of WT 2-H, WT 2/F-H

559 188-17

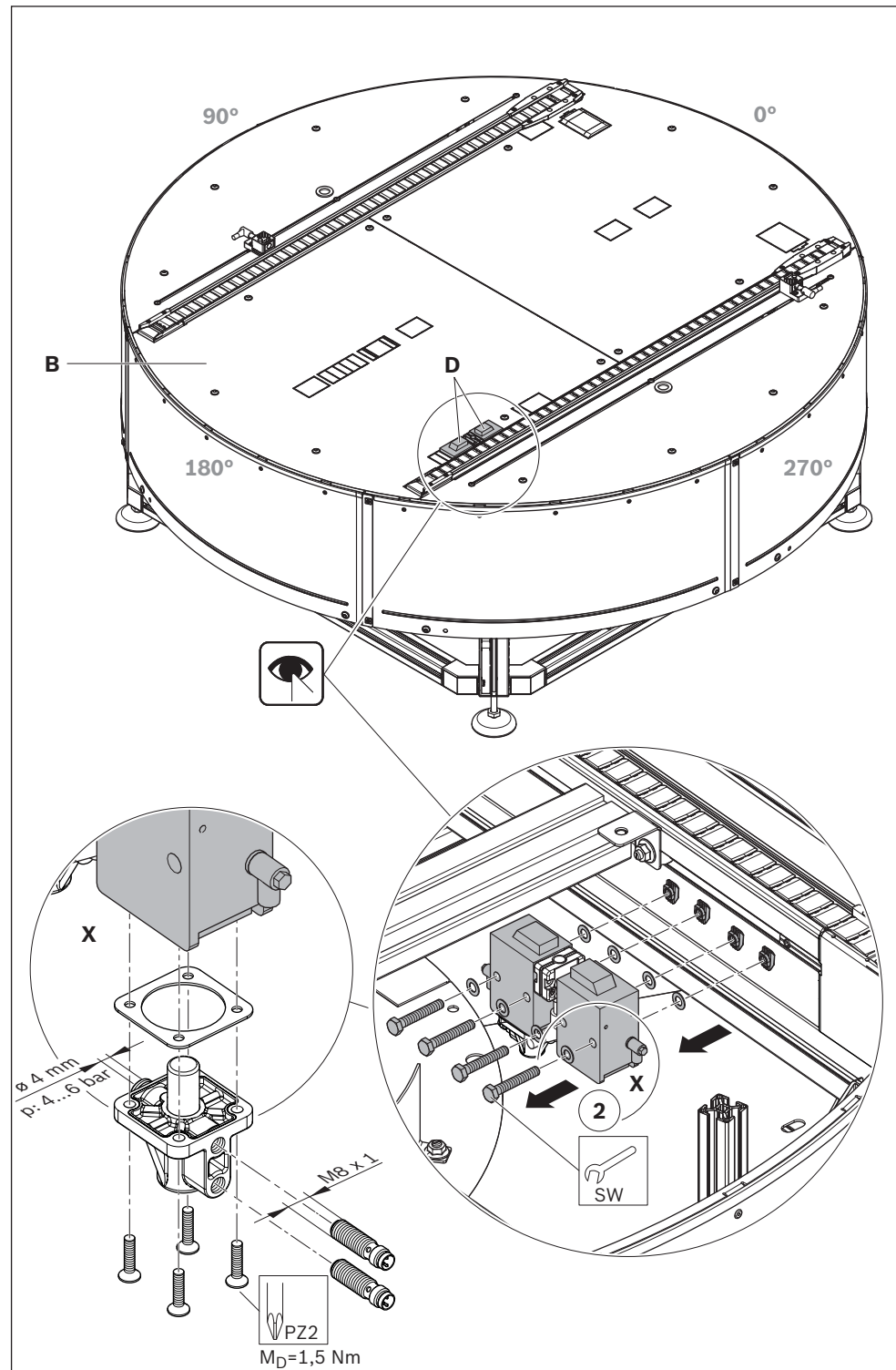
7.6.5 Assembling the stop gates for end position and workpiece pallet locking



Please note:

For precise assembly positions of sensors, refer to section 7.6.6.

1. If applicable, remove the cover (B) (see page 26).
 2. Remove the stop gate (D).
- Install the stop gate in reverse order.
- For assembly of the VE 2/... position sensor (not included in the scope of delivery), see detail X.



559 188-41

Fig. 18: Assembling the stop gates for end position and workpiece pallet locking (illustrated: DE 2 - BG 3, with BS 2/R belt section for WT 2)



Please note:

For precise assembly positions of stop gates, refer to section 7.6.6.

1. If applicable, remove the cover (B) (see page 26).
 2. Remove the stop gate (D).
- Install the stop gate in reverse order.
- For assembly of the VE 2/... position sensor (not included in the scope of delivery), see detail X.

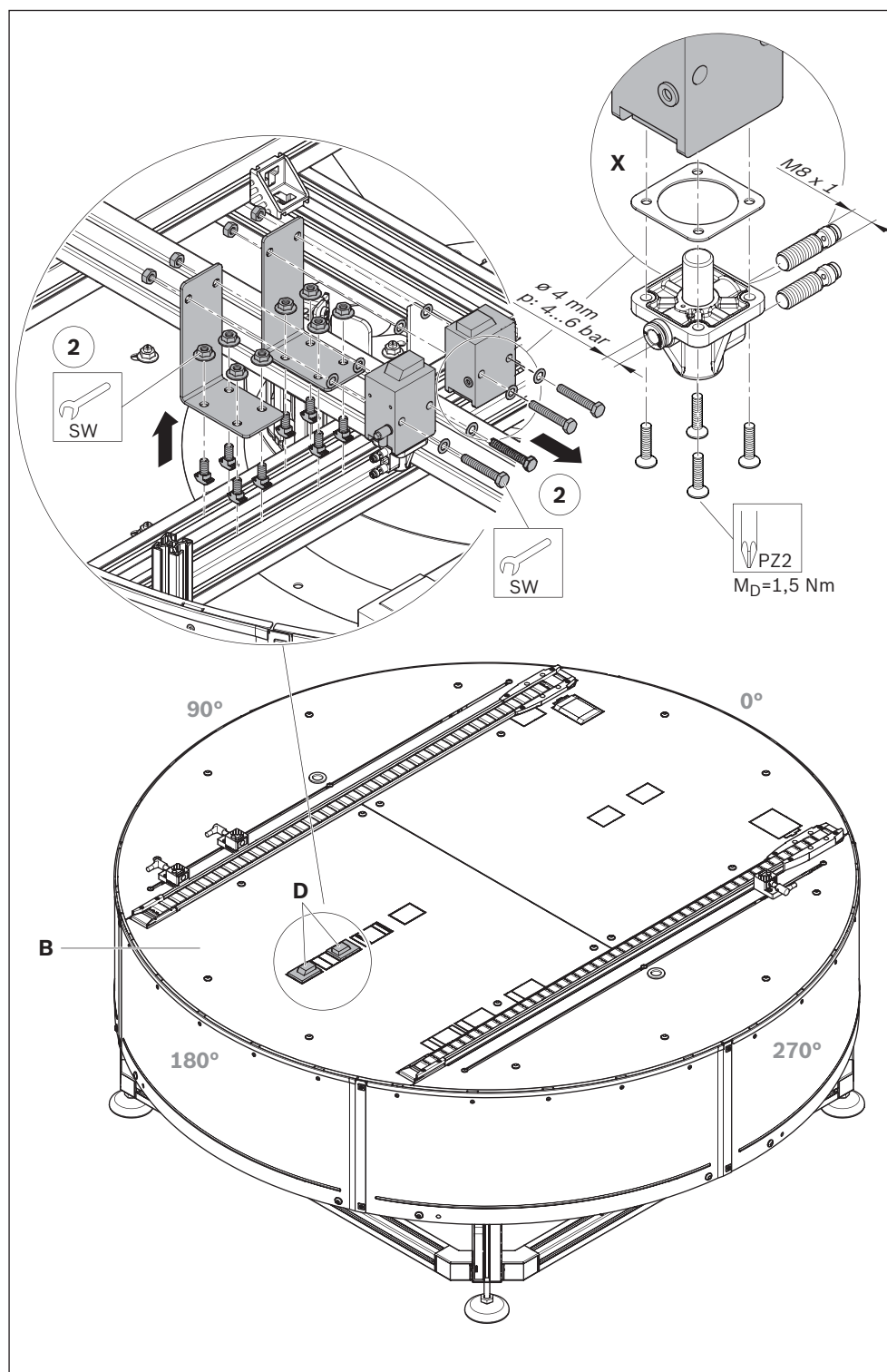


Fig. 19: Assembling the stop gates for end position and workpiece pallet locking (illustrated: DE 2 - BG 3, with BS 2/R belt section for WT 2-H / .../F-H)

7.6.6 Assembly positions of sensors and stop gates for end position, stopping, and locking of the workpiece pallet

BS 2 belt section with WT 2 workpiece pallet

L: Stop gate, stop in travel direction / Locking ¹⁾ in reversing direction (WT Stopper Links)

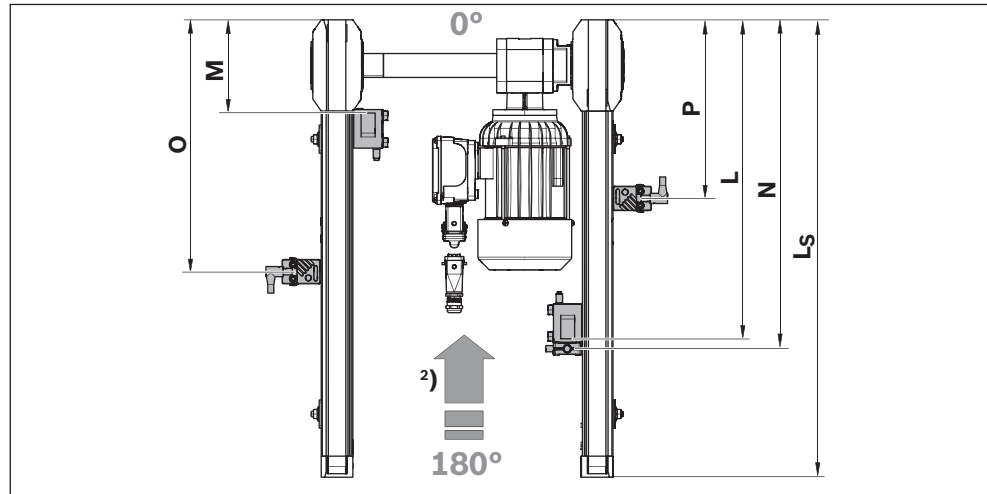
M: Stop gate, Stop in reversing direction / Locking ¹⁾ in travel direction (WT Stopper Rechts)

N: Sensor end position (iWT in Pos)

O: Deceleration sensor (ramp) in reversing direction (iWT Rampe Links)

P: Deceleration sensor (ramp) in travel direction (iWT Rampe Rechts)

¹⁾ Securing of the position of the workpiece pallet during rotary movement.



559 188-35

²⁾ Travel direction

w [mm]	l _r [mm]	BG	Section length L _s [mm]	Motor position	Stop gate L [mm]	M [mm]	Sensors N [mm]	O [mm]	P [mm]
400	400	1	656	MR	459	135	473	300	285
400	480	1	656	MR	539	135	553	380	285
480	400	1	597	MR	459	135	473	300	285
480	480	1	597	MR	539	135	553	380	285
480	640	2	818	MR	699	135	713	540	285
480	800	3	1001	MR	859	135	873	700	285
640	480	2	695	MR	539	135	553	380	285
640	640	3	903	MR	699	135	713	540	285
640	800	3	903	MR	859	135	873	700	285
640	1040	4	1324	MR	1099	135	1113	940	285
800	480	3	761	MR	539	135	553	380	285
800	640	3	761	MR	699	135	713	540	285
800	800	4	1231	MR	859	135	873	700	285
800	1040	4	1231	MR	1099	135	1113	940	285
800	1200	5	1646	MR	1259	135	1273	1100	285
1040	640	4	1031	MR	699	135	713	540	285
1040	800	4	1031	MR	859	135	873	700	285
1040	1040	5	1503	MR	1099	135	1113	940	285
1040	1200	5	1503	MR	1259	135	1273	1100	285
1200	800	5	1376	MR	859	135	873	700	285
1200	1040	5	1376	MR	1099	135	1113	940	285
1200	1200	5	1376	MR	1259	135	1273	1100	285

BS 2 belt section with WT 2-H and WT 2/F-H workpiece pallet

L: Stop gate, stop in travel direction / Locking ¹⁾ in reversing direction (WT Stopper Links)

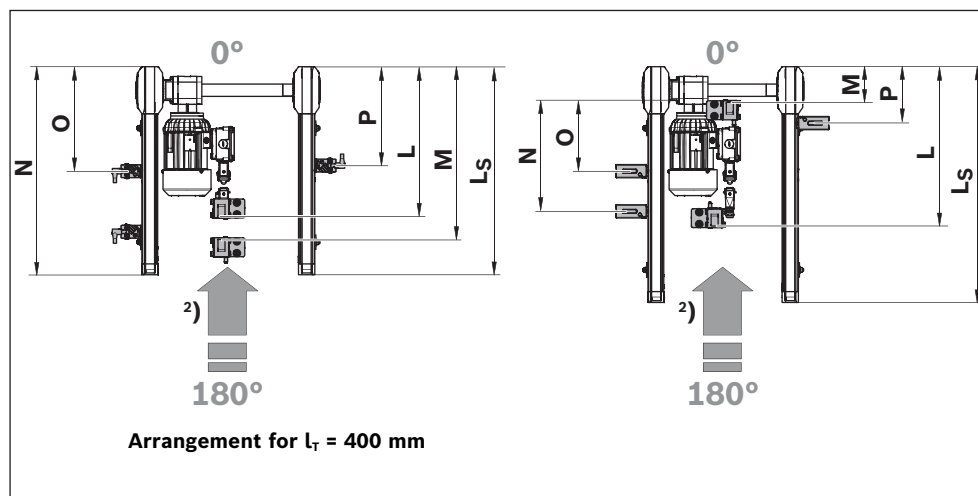
M: Stop gate, Stop in reversing direction / Locking ¹⁾ in travel direction (WT Stopper Rechts)

N: Sensor end position (iWT in Pos)

O: Deceleration sensor (ramp) in reversing direction (iWT Rampe Links)

P: Deceleration sensor (ramp) in travel direction (iWT Rampe Rechts)

¹⁾ Securing of the position of the workpiece pallet during rotary movement.



559 188-36

²⁾ Travel direction

w [mm]	L _r [mm]	BG	Section length L _s [mm]	Motor position	Stop gate L [mm]	M [mm]	Sensors N [mm]	O [mm]	P [mm]
400	400	1	656	ML	495	561	541	371	351
400	480	1	656	ML	91	443	483	313	213
480	400	1	597	ML	431	497	477	307	287
480	480	1	597	ML	91	443	483	313	213
480	640	2	818	ML	93	605	645	475	215
480	800	3	1001	ML	93	765	805	635	215
640	480	2	695	ML	172	524	564	394	294
640	640	2	695	ML	92	604	644	474	214
640	800	3	903	ML	116	788	828	658	238
640	1040	4	1324	ML	206	1118	1158	988	328
800	480	3	761	ML	205	557	597	427	327
800	640	3	761	ML	125	637	677	507	247
800	800	4	1231	ML	273	945	985	815	395
800	1040	4	1231	ML	160	1072	1112	942	282
800	1200	5	1646	ML	93	1165	1205	1035	215
1040	640	4	1031	ML	260	772	812	642	382
1040	800	4	1031	ML	180	852	892	722	302
1040	1040	5	1503	ML	296	1208	1248	1078	418
1040	1200	5	1503	ML	216	1288	1328	1158	338
1200	800	5	1376	ML	352	1024	1064	894	474
1200	1040	5	1376	ML	232	1144	1184	1014	354
1200	1200	5	1376	ML	152	1224	1264	1094	274

BS 2/R-300, BS 2/C-100 and BS 2/G-250 belt section with WT 2 workpiece pallet

L: Stop gate,
stop in travel direction /
Locking ¹⁾ in reversing
direction
(WT Stopper Links)

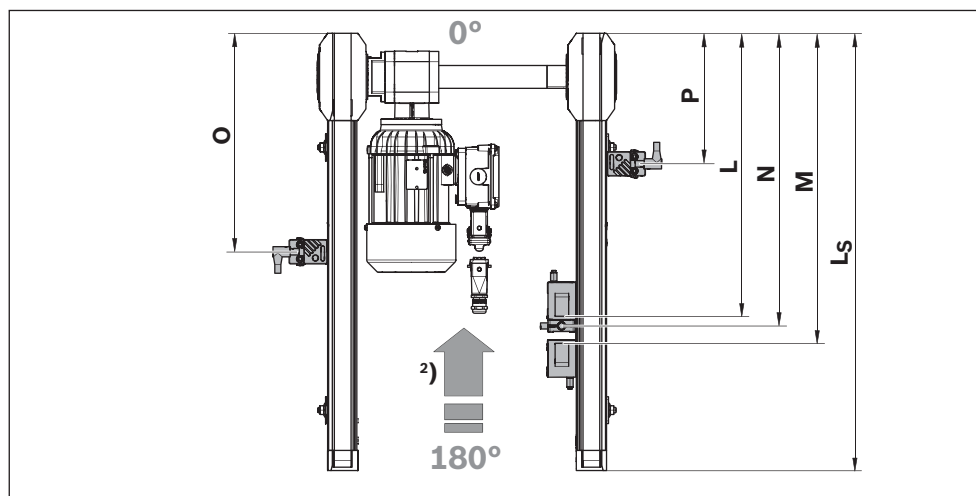
M: Stop gate,
Stop in reversing
direction /
Locking ¹⁾ in travel
direction
(WT Stopper Rechts)

N: Sensor end position
(iWT in Pos)

O: Deceleration sensor
(ramp) in reversing
direction
(iWT Rampe Links)

P: Deceleration sensor
(ramp) in travel
direction
(iWT Rampe Rechts)

¹⁾ Securing of the position of the
workpiece pallet during rotary
movement.



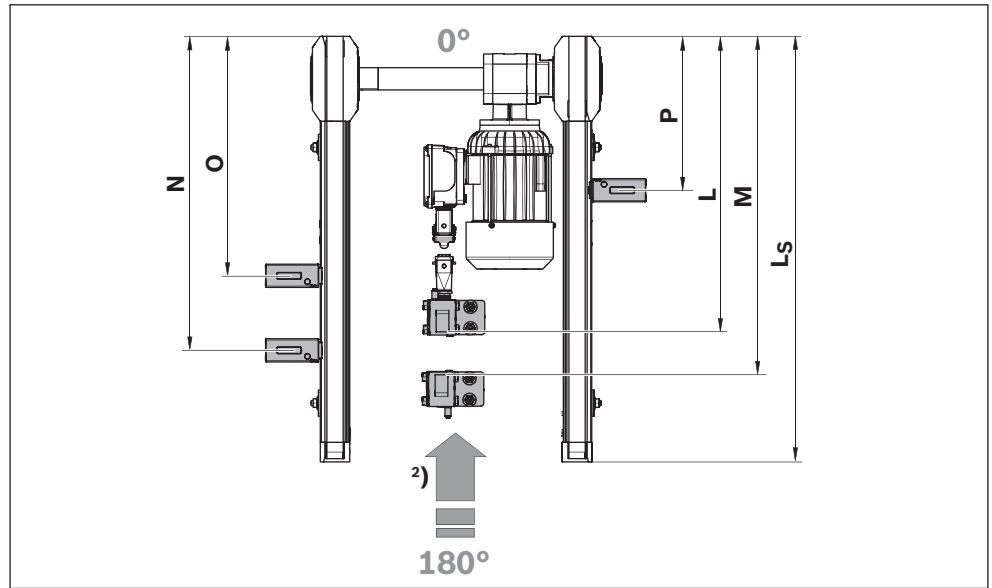
559 188-37

2) Travel direction

w [mm]	l _r [mm]	BG	Section length L _s [mm]	Motor position	Stop gate		Sensors		
					L [mm]	M [mm]	N [mm]	O [mm]	P [mm]
400	400	1	656	ML	427	467	441	271	253
400	480	1	656	ML	427	467	441	271	173
480	400	1	597	ML	362	402	376	206	188
480	480	2	818	ML	589	629	603	433	335
480	640	2	818	ML	589	629	603	433	175
480	800	3	1001	ML	762	802	776	606	188
640	480	2	695	ML	442	482	456	286	188
640	640	3	903	ML	674	714	688	518	260
640	800	4	1324	ML	1091	1131	1105	935	517
640	1040	4	1324	ML	1091	1131	1105	935	277
800	480	3	761	ML	521	561	535	365	267
800	640	4	1231	ML	1002	1042	1016	846	588
800	800	4	1231	ML	1002	1042	1016	846	428
800	1040	4	1231	ML	1002	1042	1016	846	188
800	1200	5	1646	ML	1417	1457	1431	1261	443
1040	640	4	1031	ML	793	833	807	637	379
1040	800	4	1031	ML	793	833	807	637	219
1040	1040	5	1503	ML	1270	1310	1284	1114	456
1040	1200	5	1503	ML	1270	1310	1284	1114	296
1200	800	5	1376	ML	1147	1187	1161	991	573
1200	1040	5	1376	ML	1147	1187	1161	991	333
1200	1200	5	1376	ML	1147	1187	1161	991	173

BS 2/R-300, BS 2/C-100 and BS 2/G-250 belt section with WT 2-H and WT 2/F-H workpiece pallet

- L:** Stop gate, stop in travel direction / Locking ¹⁾ in reversing direction (WT Stopper Links)
- M:** Stop gate, Stop in reversing direction / Locking ¹⁾ in travel direction (WT Stopper Rechts)
- N:** Sensor end position (iWT in Pos)
- O:** Deceleration sensor (ramp) in reversing direction (iWT Rampe Links)
- P:** Deceleration sensor (ramp) in travel direction (iWT Rampe Rechts)



559 188-38

¹⁾ Securing of the position of the workpiece pallet during rotary movement.

²⁾ Travel direction

w [mm]	l _t [mm]	BG	Section length L _s [mm]	Motor position	Stop gate L [mm]	M [mm]	Sensors N [mm]	O [mm]	P [mm]
400	400	1	656	ML	455	521	501	331	311
400	480	1	656	ML	455	521	501	331	231
480	400	1	597	ML	396	462	442	272	252
480	480	2	818	ML	585	651	631	461	361
480	640	2	818	ML	617	683	663	493	233
480	800	3	1001	ML	800	866	846	676	256
640	480	2	695	ML	494	560	540	370	270
640	640	3	903	ML	702	768	748	578	318
640	800	4	1324	ML	995	1061	1041	871	451
640	1040	4	1324	ML	1118	1184	1164	994	334
800	480	3	761	ML	557	623	603	433	333
800	640	4	1231	ML	846	912	892	722	462
800	800	4	1231	ML	940	1006	986	816	396
800	1040	4	1231	ML	1030	1096	1076	906	246
800	1200	5	1646	ML	1359	1425	1405	1235	415
1040	640	4	1031	ML	772	838	818	648	388
1040	800	4	1031	ML	836	902	882	712	292
1040	1040	5	1503	ML	1208	1274	1254	1084	424
1040	1200	5	1503	ML	1288	1354	1334	1164	344
1200	800	5	1376	ML	1012	1078	1058	888	468
1200	1040	5	1376	ML	1144	1210	1190	1020	360
1200	1200	5	1376	ML	1182	1248	1228	1058	238

Required accessories:

- 2x I/O module (PROFIBUS® or Ethernet, not included in the scope of delivery)
 - For connection of proximity switches for control of the workpiece pallet
 - For connection of necessary solenoid valves for control of the stop gates
- Solenoid valves for control of the stop gates

7.6.7 Connecting lines in cable drag chain of the rotate unit**WARNING****High electrical voltage!**

Risk of severe injury or death from electric shock.

- ▶ Disconnect the relevant system component before performing any maintenance or repair work.
- ▶ Secure the system against being switched back on unintentionally.

- Choose control and sensor elements in accordance with EN ISO 13849. Factor in the load being transported and the transport speed.
- Electrical work may only be carried out by qualified personnel! (e.g. connecting the motor)
- Comply with the standard DIN EN 60204 (previously: VDE regulation VDE 0100) for Germany, or the corresponding regulations in the country of use.
- The motors **must always be** operated at frequency converters as only stop gates without damping are used for rotary movement control and control of the deceleration of WT 2.

The lines routed in the condition on delivery in the cable drag are required for connection of the motor of the belt section and for control of the workpiece pallet. Wiring/connection is to be realized by the customer.

- The motor cable with plug is directly connected to the motor of the belt section (see chapter 7.6.9 Electrical connection of the product).
- Connection
 - of proximity switches for control of the workpiece pallet and
 - of necessary solenoid valves for control of the stop gates
 is realized via a customer-side I/O module.
- Voltage supply of customer-side I/O module (24 V DC) is realized via a supply line in the cable drag.
- PE conductor connection to the top rotary table is also realized via an electrical line in the cable drag.
- For compressed air supply of the stop gates (via customer-side solenoid valves), a compressed air hose is included in the cable drag (see chapter 7.6.8 Pneumatic connection of the product).
- Communication with the PLC is realized in the cable drag via
 - Ethernet cables
 - PROFIBUS® cables
 - Bus cables (e.g. Rexroth S-Bus)

NOTICE

Risk of damage to the rotate unit and malfunctions due to incorrect cable routing!

In case of incorrect routing of the lines in the cable drag, damage and possible malfunctions may occur.

- Route the lines in the cable drag in the marked area in such a way that there is no contact between lines and the fixed baffle during rotary movement.

- Route the lines in the cable drag in the permissible area (A) in such a way that there is no contact between lines and the fixed baffle (B) during rotary movement.

A: Permissible area for cable routing

B: Baffle

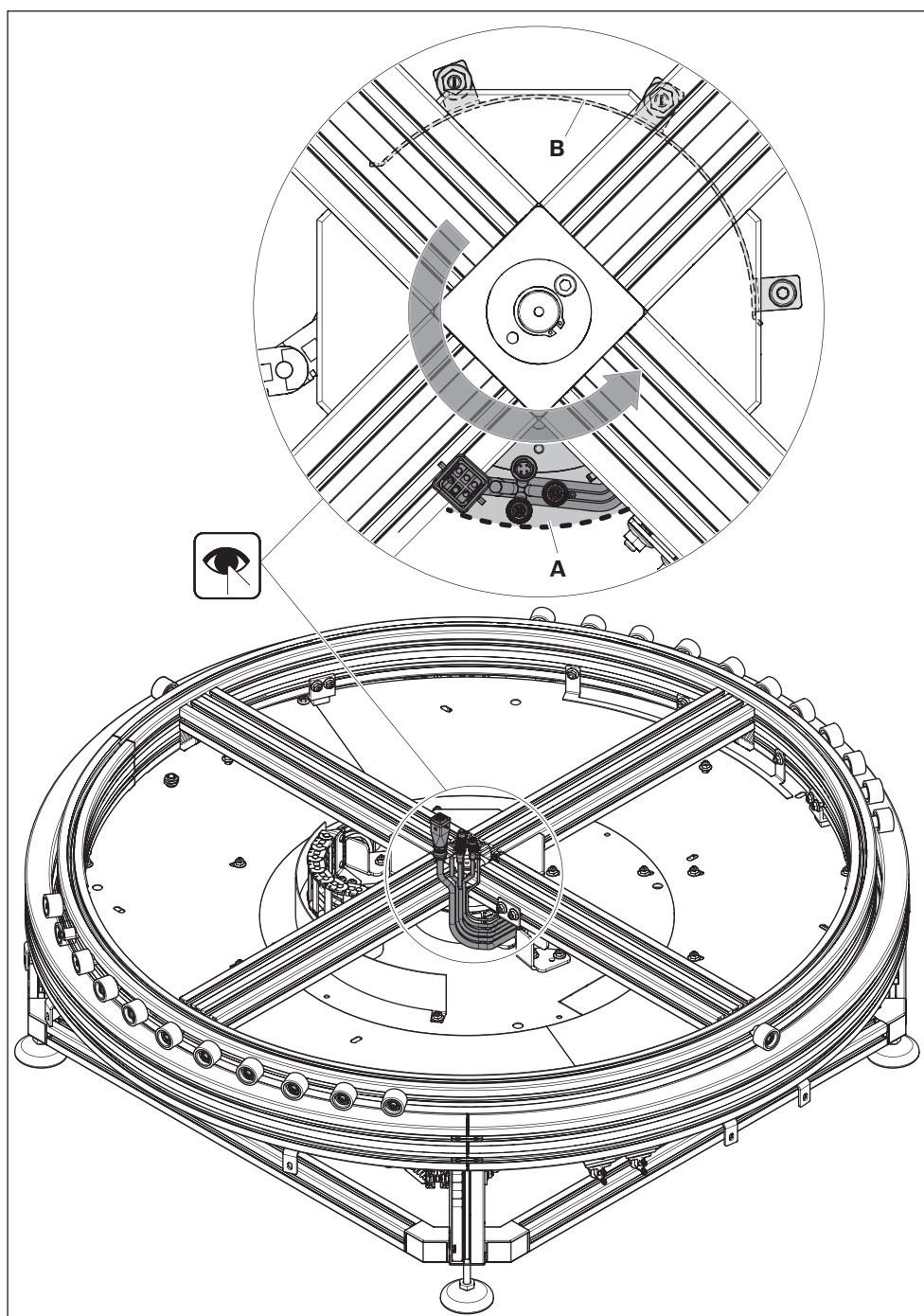
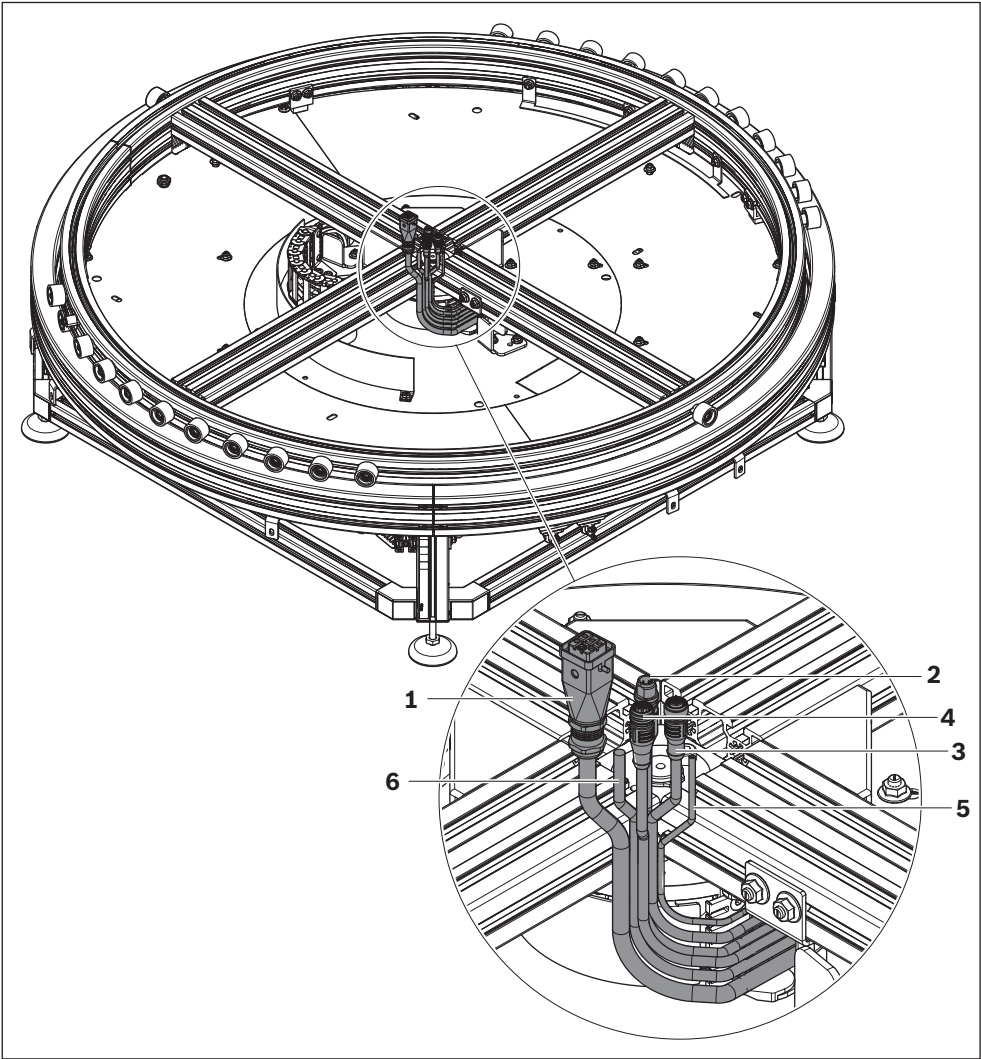


Fig. 20: Routing of lines in cable drag; top view of the rotate unit

559 188-60



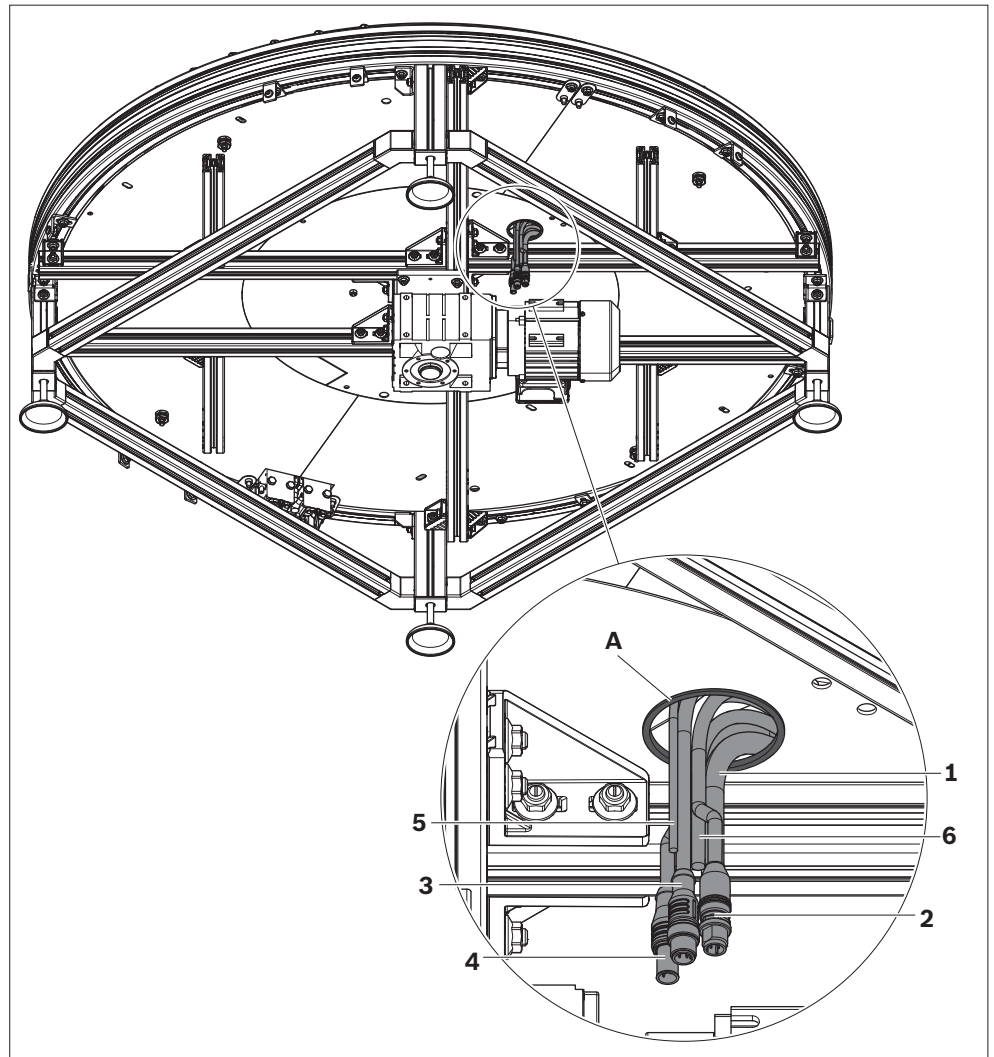
559 188-61

Fig. 21: Top outlet at cable drag, top view

Position	Designation	Socket labeling	Description
1	Motor cable for belt section motor	=RU+CB-X2M1	4 x 1.5 mm ² + 2 x 0.75 mm ² with connection socket
2	Supply line 24 V DC for I/O module (customer-side)	=RU+RU-X2PDC	Socket M12 x 1, 4-pin, A-coded
3	PROFIBUS® cables	=RU+RU-X2DP	Socket M12 0°, shielded, B-coded
4	Ethernet cables	=RU+RU-X2ETH	Plug M12 0°, CAT 5, D-coded
5	Compressed air hose for stop gates (via customer-side solenoid valves)	–	Compressed air hose Ø 6 mm, wall thickness 1.05 mm
6	PE conductor for top rotary table	–	PE conductor 1 x 6 mm ²


Please note:

- Make sure that the edge protector (A) is attached.
- Do not operate the rotate unit without edge protector. This may lead to damage at lines and potential malfunctions.

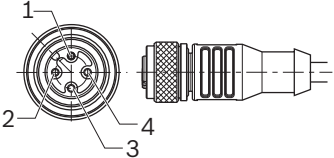
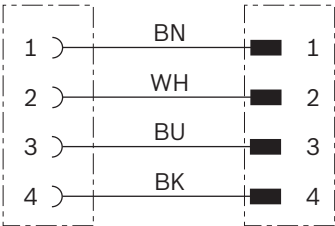
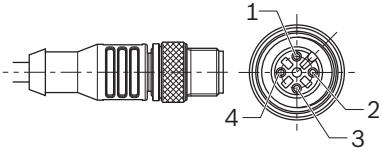
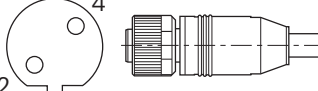
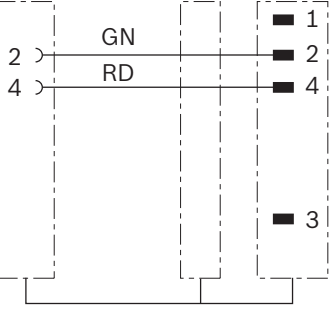
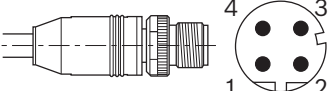
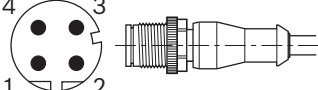
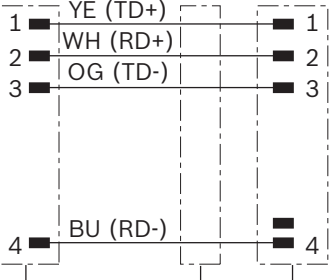
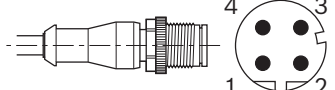


559 188-62

Fig. 22: Bottom outlet at cable drag, bottom view

Position	Designation	Plug labeling	Line labeling	Description
1	Motor cable for belt section motor	=RU+CB-X1M1	=RU+CB-W2M1	4 x 1.5 mm ² + 2 x 0.75 mm ² open cable end
2	Supply line 24 V DC for I/O module (customer-side)	=RU+RU-X1PDC	=RU+RU-W2PDC	Plug M12 x 1, 4-pin, A-coded
3	PROFIBUS® cables	=RU+RU-X1DP	=RU+RU-W2DP	Plug M12 0°, shielded, B-coded
4	Ethernet cables	=RU+RU-X1ETH	=RU+RU-W2ETH	Plug M12 0°, CAT 5, D-coded
5	Compressed air hose for stop gates (via customer-side solenoid valves)	–	–	Compressed air hose Ø 6 mm, wall thickness 1.05 mm
6	PE conductor for top rotary table	–	–	PE conductor 1 x 6 mm ²

Connection lines in cable drag (pos. 2 to 4)

Position/ Designation	Top outlet Cable drag	Connection diagram	Bottom outlet Cable drag
2 Supply line 24 V DC for I/O module (customer- side)			
3 PROFIBUS® cables			
4 Ethernet cables			

7.6.8 Pneumatic connection of the product

! WARNING

High pneumatic pressure!

Risk of severe injury or death.

- Switch off the compressed air supply to the relevant system component before assembling, disassembling or connecting the product to the pneumatic system.
- Secure the system against being switched back on unintentionally.

- For the compressed air and operating pressure specifications, see page 85.

Connect the DE 2 to the compressed air supply.

A: Stop gate with position sensor and active running in

1) Not included in the scope of delivery

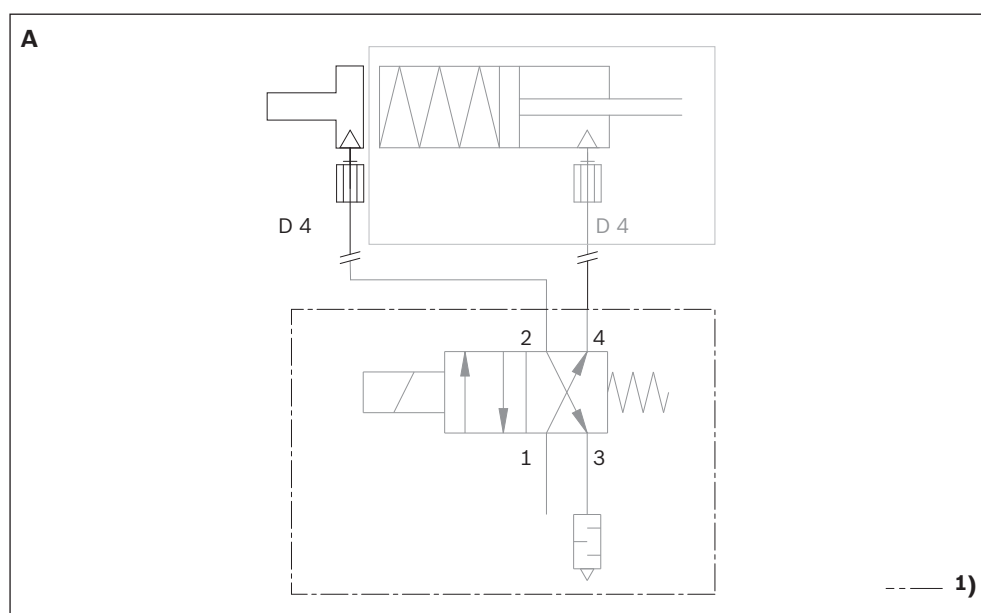


Fig. 23: Pneumatic diagram

Required accessories:

2x frequency converters
(not included in the scope
of delivery)

- 1 x for motor for rotary movement
- 1 x for motor of belt section (deceleration and start-up of the workpiece pallet)

7.6.9 Electrical connection of the product**WARNING****High electrical voltage!**

Risk of severe injury or death from electric shock.

- ▶ Disconnect the relevant system component before performing any maintenance or repair work.
- ▶ Secure the system against being switched back on unintentionally.

- Choose control and sensor elements in accordance with EN ISO 13849. Factor in the load being transported and the transport speed.
- Electrical work may only be carried out by qualified personnel! (e.g. connecting the motor)
- Comply with the standard DIN EN 60204 (previously: VDE regulation VDE 0100) for Germany, or the corresponding regulations in the country of use.
- The motors **must always be** operated at frequency converters as only stop gates without damping are used for rotary movement control and control of the deceleration of WT 2.

Motor connection

- Observe the available supply voltage!
- Observe the electrical connector information on the motor nameplate, see Fig. 24 on page 47.
- Connect the motor in either a wye or a delta configuration in accordance with the connection diagrams, see Fig. 25 on page 47.
- The motor is fitted with a bimetal temperature monitoring switch (potential-free thermal contact, 230 V AC, 300 mA). Wire the motor so that it is de-energized when the switch is triggered.
- Insert the cable so that it cannot get damaged during operation.
- Motor connection with plug (AT = S), see Fig. 26 on page 47. Observe the pre-fuse!

Checking the frequency converter parameters

(Frequency converter not included in the scope of delivery)

- Compare the preset parameters of the frequency converter with the motor nameplate.
- Parameterize the frequency converter according to the motor nameplate.

Checking the rotational direction of the motor

- Let the system run for no more than 2 secs., then ensure the correct rotational direction of the motor.
- Switch any two wires (U1, V1 or W1, see Fig. 25 on Page 47) to change the motor's rotational direction.

**Please note:**

For motors that come with a fitted plug, correct the rotational direction in the frequency converter over the settings or at the socket contact (socket side). This makes replacement easier.

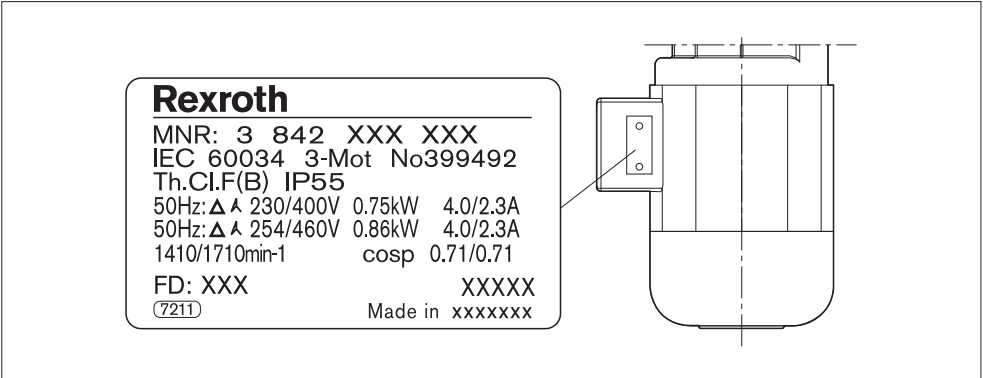


Fig. 24: Motor nameplate (example)

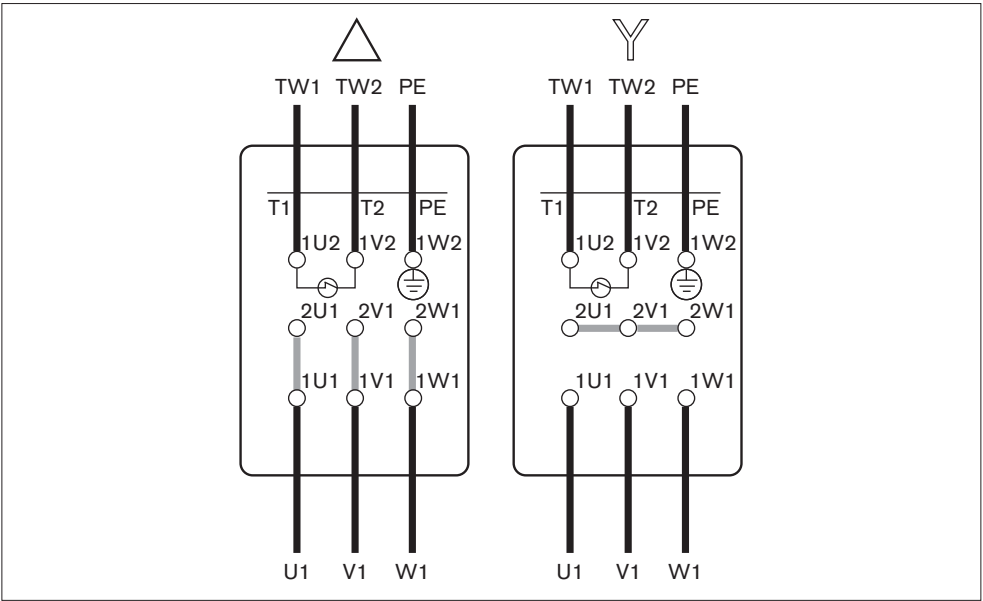


Fig. 25: Delta/ye connection diagrams

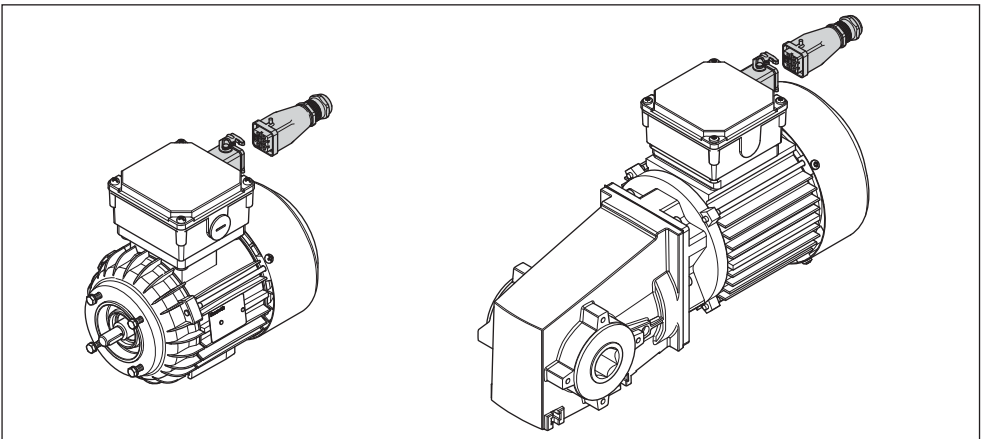


Fig. 26: Motor connection with plug (AT = S)

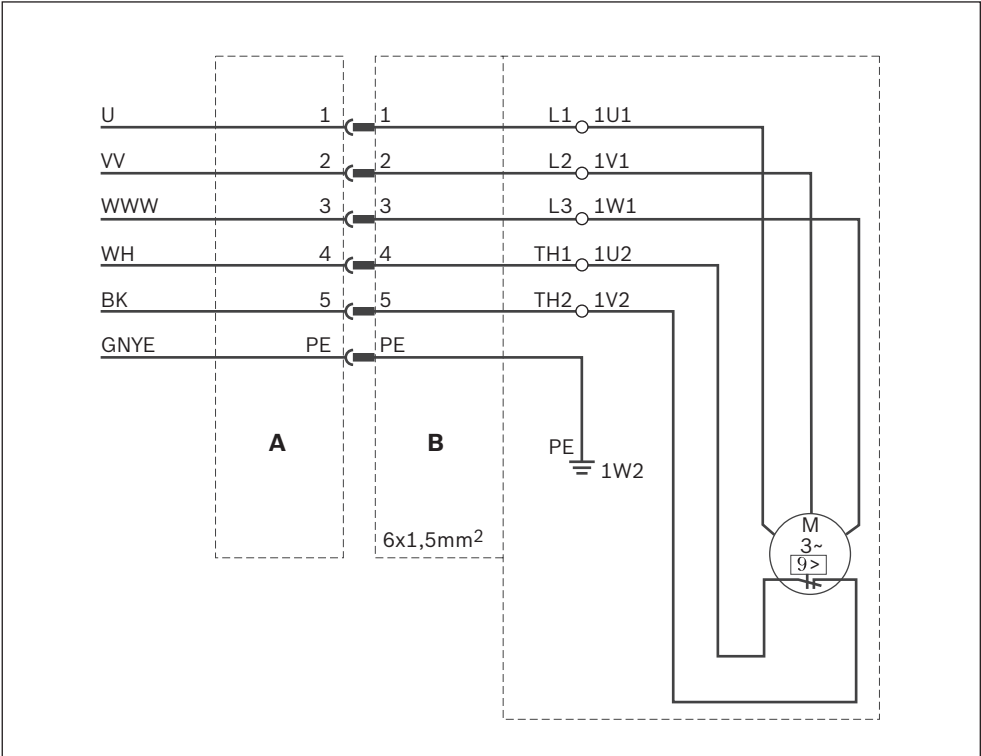


Fig. 27: Motor connection with plug (AT = S), circuit diagram
A: Connection cable side
B: Motor side

The connector consists of UL components.

Connection list

Connection terminals, no.	Pin no.	Code	Wire color
U1	1	L1	U
V1	2	L2	VV
W1	3	L3	WWW
TW1	4	TH1	WH
TW2	5	TH2	BK
	PE	PE	GNYE

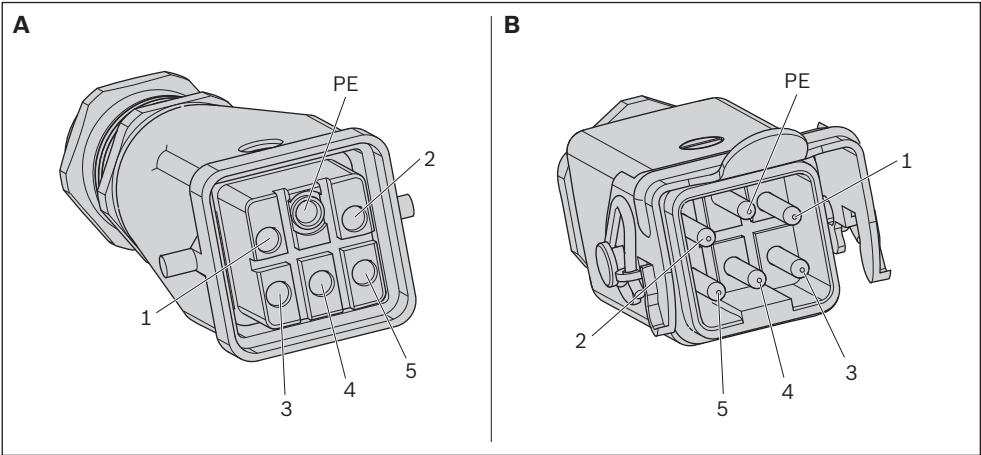


Fig. 28: Motor connection with plug (AT = S), connector
A: Connection cable side
B: Motor side

8 Commissioning

8.1 Initial commissioning

WARNING

Sudden movements!

Risk of severe injury or death.

- ▶ Do not reach into moving parts during operation.
- ▶ Before commissioning, ensure that nobody is within the range of the rotate unit.
- ▶ Do not initiate rotary movement unless it is ensured that no objects are within the transitions from the rotate unit to connected section.

CAUTION

Sudden movements, falling workpiece pallets

Injury due to moving parts or falling objects.

- ▶ Make sure that the product has been installed properly by qualified personnel (see page 8) before starting it up.

NOTICE

Malfunctions due to incorrect assembly and commissioning

The product can get damaged, shortening its service life.

- ▶ Commissioning requires basic mechanical, pneumatic and electrical knowledge as well as knowledge of programming.
- ▶ The product should only be started up by qualified personnel (see page 8).

Short-circuit in the motor due to ingress of fluids

The product can get damaged, shortening its service life.

- ▶ Make sure that all electrical connections are either used or covered. Make sure that all bolted connections and plug-in connections are properly seated.

Malfunctions due to incorrectly set or non-configured end position switches

The product can get damaged, shortening its service life.

- ▶ Make sure that the travel range is free from obstacles.
- ▶ Do not set the product to the end stop or beyond the end positions ($0^\circ (-5^\circ)$ to $270^\circ (+5^\circ)$ in counter-clockwise direction).
There is one mechanical end stop for both rotational directions, rotary movements are possible in a range of -5° and $+275^\circ$.
- ▶ Before the initial start of the program, make sure that the sensors are switching correctly.

- Before the initial commissioning or re-commissioning of a conveyor system, carry out a risk assessment in accordance with DIN EN ISO 12100.
- According to EU Machinery Directive 2006/42/EC, you must equip the transfer system with EMERGENCY STOP control devices.
- The surfaces of motors and gears can reach temperatures of over 65°C under certain load and operating conditions. In these cases, you must comply with the respective applicable accident prevention regulations (UVV) by taking appropriate constructive measures (safety guards) or by affixing/displaying appropriate warning signs!

- Make sure that all the electrical and pneumatic connections are either in use or covered. Make sure that all bolted connections and plug-in connections are properly seated. All relevant protective covers must be fitted.
- Only inspect and adjust continuous conveyors that are in motion or operation when the safety guards are in place.
- Observe DIN EN ISO 13857 when you remove or replace safety guards and/or bypass safety equipment.
- Test runs with open paneling should only be performed by a person with appropriate knowledge and experience using tip switches, and if there is no possibility of interference from other switching devices.
- Only commission the product if all safety equipment has been installed in the system and is ready for use.
- Only commission a product that has been completely installed.
- The motors **must always be** operated at frequency converters as only stop gates without damping are used for rotary movement control and control of the deceleration of WT 2.
- Observe the max. load and the section load of the rotate unit (see section 16 Technical data).
- Observe the permissible gravity center position on the workpiece pallet (see section 16.3).
- The maximum permissible speed and accelerations depend on the weight and gravity center position of the load.

8.1.1 Test run, running in

- ▶ Do not commission the product before carrying out successful production tests.
- ▶ Travel at low speed (~5-10% of operating speed) over the full travel distance. Check the correct setting and function of sensors.
- ▶ As necessary, optimize the interaction of mechanical and electronic systems.
- ▶ After successful test of the sequence, set the frequency converter parameters for normal operation and repeat testing the sequence at normal operating speed.
- ▶ As necessary, optimize the acceleration and deceleration times.
- ▶ **Our recommendation:**
 - Set the acceleration and deceleration times of the frequency converter to 1.5 – 2 sec. (if this time is too short, system vibrations occur due to mechanical tolerances, this prevents smooth movements)
 - Set 2 times for the deceleration ramp of the frequency converter:
 1. Section for reduction of the operating speed to reduced speed.
 2. Section for reduction of the reduced speed to standstill in the desired position.

Setting options of the frequency converter:

– Harmonic movement/sequence:

Coordinate the deceleration ramp time, the reduced speed and a stopping time¹⁾ in the program to set the rotate unit to end position in a smooth movement.

Take into account any possible differences between settings for loaded and unloaded workpiece pallets.

**Please note:**

For the precise position of sensors and actuators, refer to sections 7.6.3 Fig. 11 to Fig. 13.

Rotate unit sensors

A: iDrehZuPos0

B: iDrehZuPos90

C: iStopprampe_Pos0

D: iStopprampe_Pos90

E: iDEinPos

Control signals for frequency converter

F: qDE_FU_GUZ

G: qDE_FUFreq1

H: qDE_FUFreq2

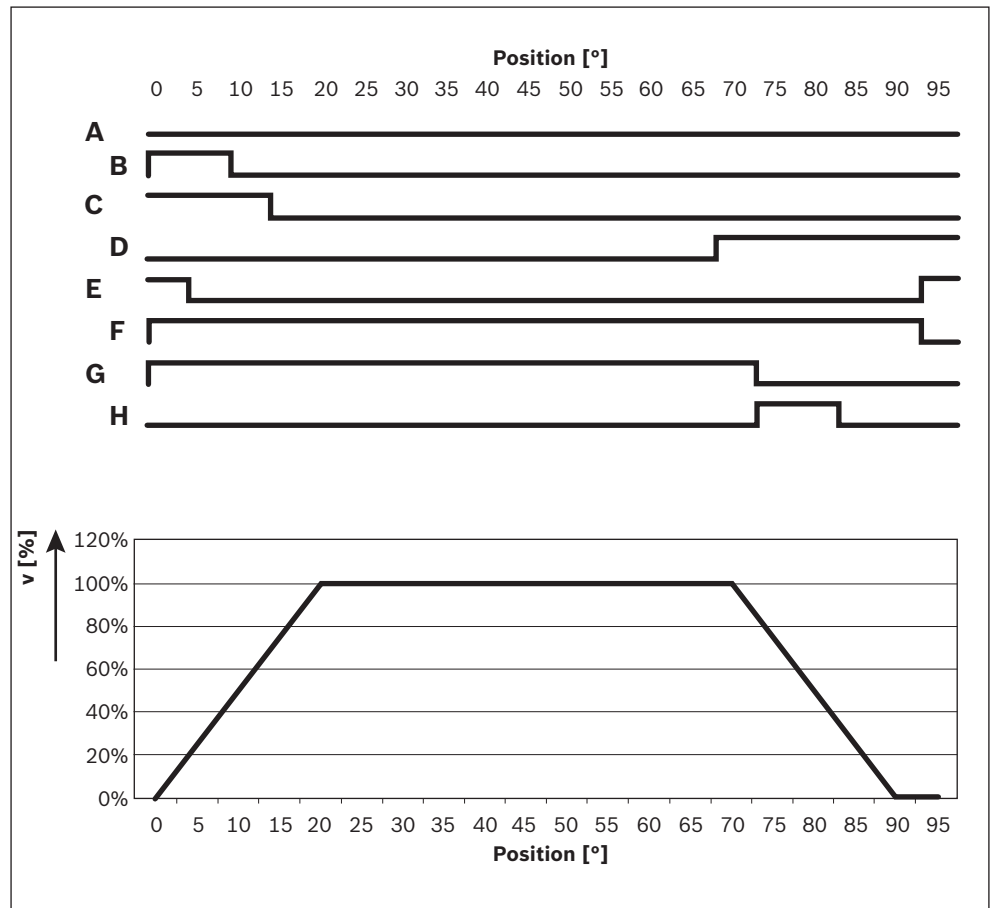


Fig. 29: Harmonic movement/sequence

¹⁾ The rotate unit has not reached its end position if the sensor is reached. The width of the switching element exceeds the sensor width. Both compensates a stopping time.

- Safe sequence: the deceleration ramp time and the reduced speed are set in such a way that setting of the rotate unit to end position is identical with and without load.

In the program, a stopping time ¹⁾ must be set.



Please note:

For the precise position of sensors and actuators, refer to sections 7.6.3 Fig. 11 to Fig. 13.

Rotate unit sensors

- A:** iDrehZuPos0
- B:** iDrehZuPos90
- C:** iStopprampe_Pos0
- D:** iStopprampe_Pos90
- E:** iDEinPos

Control signals for frequency converter

- F:** qDE_FU_GUZ
- G:** qDE_FUFreq1
- H:** qDE_FUFreq2

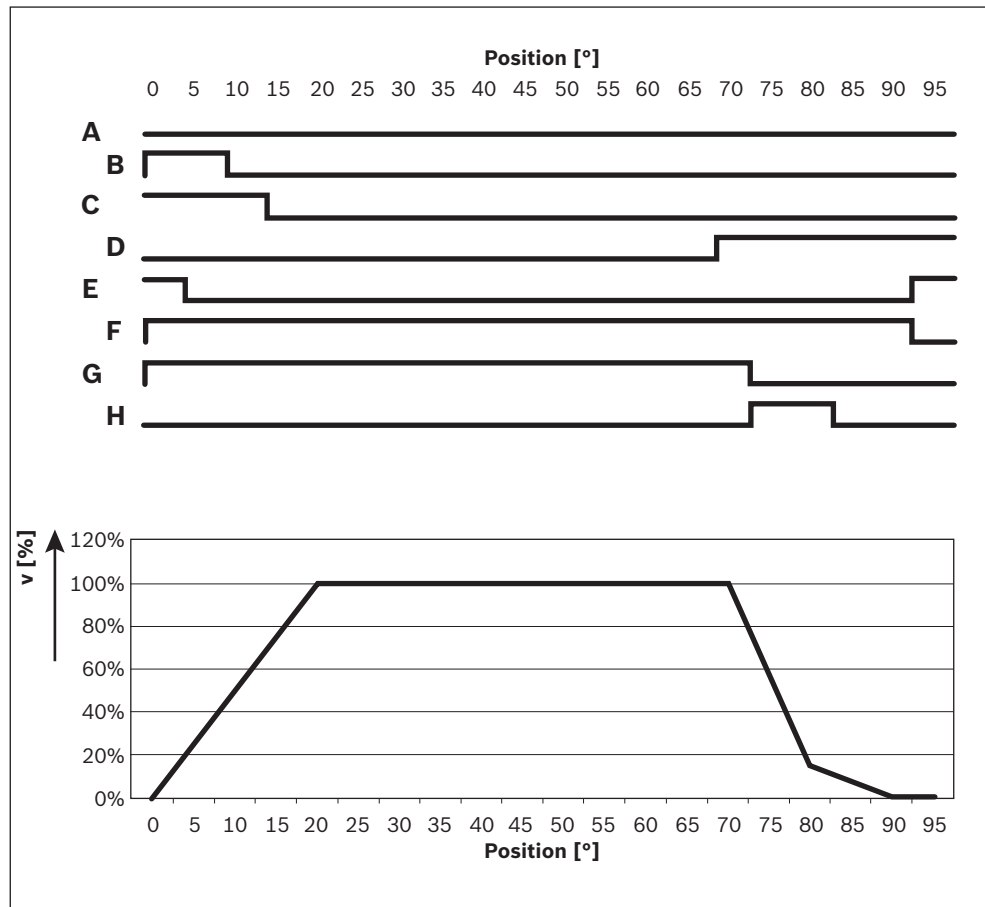


Fig. 30: Safe sequence

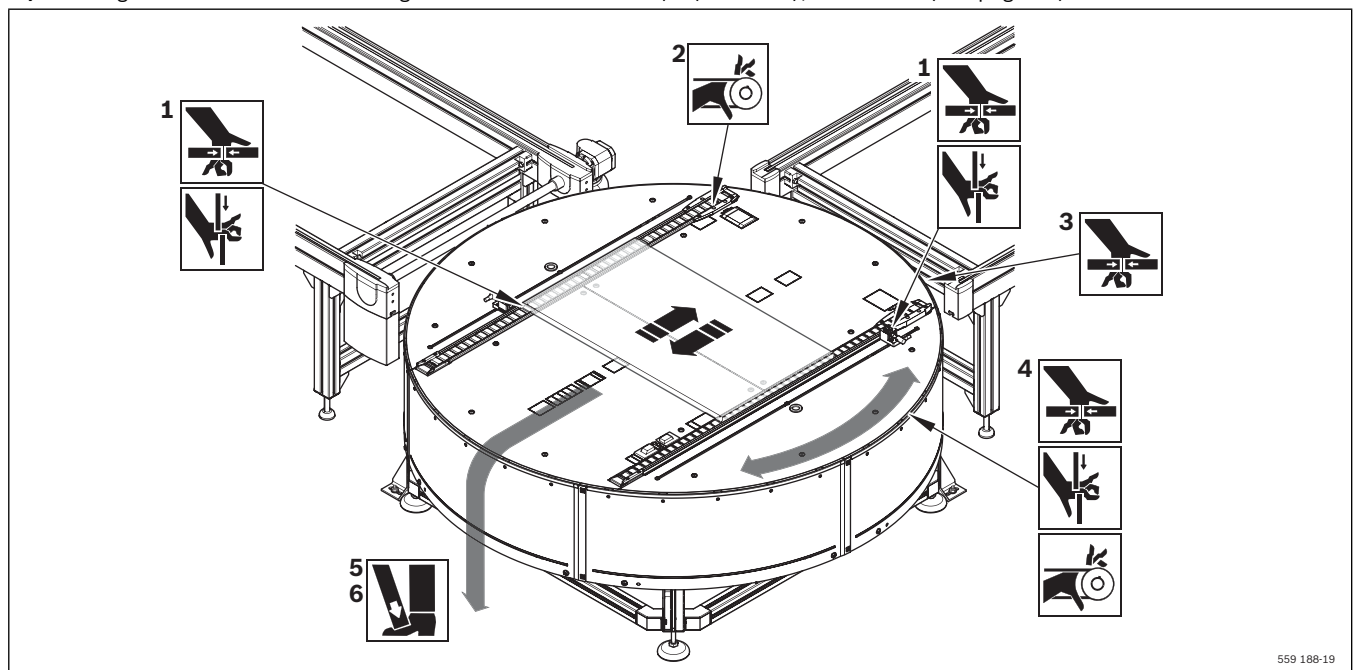
¹⁾ The rotate unit has not reached its end position if the sensor is reached.
The width of the switching element exceeds the sensor width.
Both compensates a stopping time.

8.2 Residual risks

8.2.1 Rotate unit DE 2 with protective covers

Life stage ¹⁾ , location			Situation	Hazard	Action
1	2	Between stop gate, sensor/sensor holder and moved WT.	Limbs can become trapped.		Crushing, shearing Do not reach into the system while it is running. The hazard must be eliminated by structural measures, for example with a separating barrier.
	9				
2	2	Entanglement zone near drive and return unit (reversible operation).	Clothing or long hair can become entangled.		Crushing or pulling out of hair Do not reach into the system while it is running. Regular safety training for employees. Wear protective clothing.
	9				
3	2	Between WT and upstream/downstream section	Limbs can become trapped parts between WT and components of the section.		Crushing Do not reach into the system while it is running. The hazard must be eliminated by structural measures, for example with a separating barrier.
	9				
4	2	Between edges of the top and lateral cover sheets.	Limbs can become trapped. Clothing or long hair can become entangled.		Crushing, shearing or pulling out of hair Do not reach into the system while it is running. Regular safety training for employees. Wear protective clothing.
	9				
5	2	Workpiece pallet dropping from belt section during rotation.	Crushing of body parts due to falling WT.		Crushing Structural measure required, e.g. use of stop gate, operated with safety controller according to DIN EN 13849-1.
	9				
6	2	During running in and out of the WT: Workpiece pallet dropping off the belt section as the end position of the rotate unit is not reached.	Crushing of body parts due to falling WT.		Crushing Structural measure required, e.g. use of stop gate, operated with safety controller according to DIN EN 13849-1.
	9				

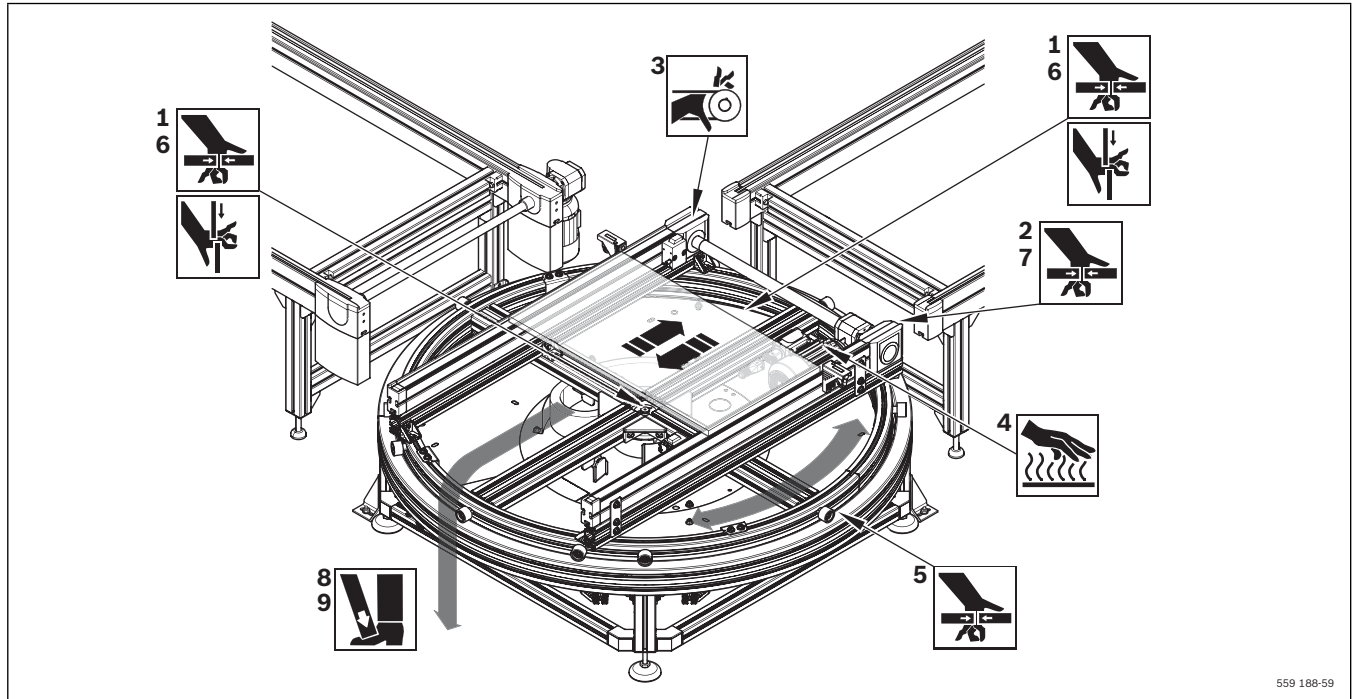
¹⁾ Life stages of the machine according to EN 12100 Sect. 5.4 a /b (No. 1- 27), Sect. 5.4 a (see page 56)



8.2.2 Rotate unit DE 2 without protective covers

Life stage ¹⁾ , location			Situation	Hazard	Action	
1	2	Between cross connector, drive shaft, motor, gear, drive/return head, stop gate, sensor/sensor holder, frame and moved WT.	Limbs can become trapped.		Crushing, shearing	Do not reach into the system while it is running. The hazard must be eliminated by structural measures, for example with a separating barrier.
	9					
2	2	Between WT and upstream/downstream section	Limbs can become trapped parts between WT and components of the section.		Crushing	Do not reach into the system while it is running. The hazard must be eliminated by structural measures, for example with a separating barrier.
	9					
3	2	Entanglement zone near drive and return unit (reversible operation).	Clothing or long hair can become entangled.		Crushing or pulling out of hair	Do not reach into the system while it is running. Regular safety training for employees. Wear protective clothing.
	9					
4	2	Motor/gear surface.	Contact between motor/gear and body part.		Burning	Motor and gears must be covered if the drive temperature exceeds 65 °C. The hazard must be eliminated by structural measures, for example with a separating barrier.
	9					
5	2	Between support wheels and running surface.	Limbs can become trapped between support wheels and running surface.		Crushing	Do not reach into the system while it is running. The hazard must be eliminated by structural measures, for example with a separating barrier.
	9					
6	2	Between rotating and stationary parts in the rotate unit.	Limbs can become trapped between rotating and stationary parts in the rotate unit.		Crushing, shearing	Do not reach into the system while it is running. The hazard must be eliminated by structural measures, for example with a separating barrier.
	9					
7	2	Between section ends of upstream/downstream sections and the section of the rotate unit during rotation.	Limbs can become trapped between section ends.		Crushing, shearing	Do not reach into the system while it is running. The hazard must be eliminated by structural measures, for example with a separating barrier.
	9					
8	2	Workpiece pallet dropping from belt section during rotation.	Crushing of body parts due to falling WT.		Crushing	Structural measure required, e.g. use of stop gate, operated with safety controller according to DIN EN 13849-1.
	9					
9	2	During running in and out of the WT: Workpiece pallet dropping off the belt section as the end position of the rotate unit is not reached.	Crushing of body parts due to falling WT.		Crushing	Structural measure required, e.g. use of stop gate, operated with safety controller according to DIN EN 13849-1.
	9					

¹⁾ Life stages of the machine according to EN 12100 Sect. 5.4 a /b (No. 1- 27), Sect. 5.4 a (see page 56)



559 188-59

Life stages of the machine according to EN 12100 Sect. 5.4 a /b (No. 1- 27), Sect. 5.4 a

- 1** Transport, assembly and installation
- 2** Commissioning
- 3** Use
- 4** Disassembly, decommissioning and disposal
- 5** Setting up
- 6** Verifying
- 7** Teaching/programming
- 8** Changeover
- 9** Startup
- 10** All operating modes
- 11** Feeding the machine
- 12** Removing product from the machine
- 13** Shutting the machine down
- 14** Shutting the machine down in the case of an emergency
- 15** Restoring operation after a bottleneck or blockage
- 16** Restarting after unscheduled shutdown
- 17** Troubleshooting and remedial action (intervention by operating personnel)
- 18** Cleaning and keeping clean
- 19** Preventive maintenance
- 20** Corrective maintenance

Operating states of the machine, Sect. 5.4 b

- 21** Normal operation
- 22** Modification of a property or a dimension of the material or workpiece to be processed
- 23** Failure of one (or more) of its components or supply devices
- 24** External disturbances (e.g. impact, vibration, electromagnetic interference)
- 25** Design faults or defects (e.g. software errors)
- 26** Disruption in the power supply
- 27** Ambient conditions (e.g. damaged floors)

8.3 Re-commissioning after a standstill

Follow the steps outlined for the initial commissioning.

9 Operation

CAUTION

Hot electric motor surfaces during operation!

Risk of burns from touching hot surfaces above 65 °C.

- ▶ Install appropriate guards.
- ▶ Let the unit cool down for at least 30 minutes before performing maintenance and/or repair work.

9.1 Information on operation

9.1.1 Wear

- Individual components are subject to unavoidable wear by their very nature. Constructive measures and the selection of materials help ensure functional reliability over the full service life. However, wear is also dependent on the operating, maintenance and ambient conditions at the place of use (resistance, contamination).
- Overloading the conveyor sections can cause the conveyor medium to malfunction and lead to the premature breakdown of motors and gears.
- If pneumatically activated components are overloaded, it is not possible to guarantee their function.

9.1.2 Measures to reduce wear

The following obvious measures will reduce wear:

- Switch off the conveyor section when the system is not in use, e.g. during breaks, at night and on weekends.
- Do not select a higher speed for the conveyor section than that required for the corresponding function.
- Avoid contamination caused by abrasive media, reduce contamination by cleaning on a regular basis.

9.1.3 Loading the workpiece pallet

The modular units are designed and tested under the assumption that the workpiece pallets will not all have the same weight during one cycle on one conveyor section. Workpiece pallets are both loaded and unloaded. Significantly different weights may require special measures to avoid malfunctions. This applies to:

- Reaching of the end position with the settings for reduced speed and ramp speed.
- Setting the workpiece pallets on the belt section back into motion.

9.1.4 Environmental factors

- Our products are resistant to many media that are commonly found in manufacturing, such as water, mineral oil, grease and detergents. Contact your Rexroth representative if you have any doubts about resistance to specific chemicals, such as test oil, doped oils, aggressive cleaning agents, solvents or brake fluid.
- Avoid prolonged contact with highly reactive acidic or alkaline materials.
- Contamination can greatly increase wear – specifically from abrasive media from the surrounding area, such as sand and silicates, e.g. from construction as well as machining processes in the transfer system (e.g. welding beads, pumice powder, glass shards, chips, waste parts, etc.). Maintenance intervals should be significantly shortened under these circumstances.
- Resistance to media and contamination does not mean that functional safety is guaranteed in every case.
 - Liquids that thicken as they evaporate and become highly viscous or adhesive (sticky) can lead to malfunctions.
 - If they get carried onto systems with rollers, media which have a lubricating effect can lead to a reduction in the drive power that is transmitted via friction. In such instances, special care must be taken when planning the system, and the maintenance intervals must be correspondingly shortened.

10 Maintenance and repair

WARNING

High electrical voltage!

Risk of severe injury or death from electric shock.

- ▶ Disconnect the relevant system component before performing any maintenance or repair work.
- ▶ Secure the system against being switched back on unintentionally.

High pneumatic pressure!

Risk of severe injury or death.

- ▶ Switch off the compressed air supply to the relevant system component before performing any maintenance or repair work.
- ▶ Secure the system against being switched back on unintentionally.

CAUTION

Hot electric motor surfaces during operation!

Risk of burns from touching hot surfaces above 65 °C.

- ▶ Install appropriate guards.
- ▶ Let the unit cool down for at least 30 minutes before performing maintenance and/or repair work.

- Only inspect and adjust continuous conveyors that are in motion or operation when the safety guards are in place.
- Observe DIN EN ISO 13857 when you remove or replace safety guards and/or bypass safety equipment.
- Test runs with open paneling should only be performed by a person with appropriate knowledge and experience using tip switches, and if there is no possibility of interference from other switching devices.

10.1 Cleaning and care

NOTICE

Failure of bearings

Applying grease-dissolving substances to the bearing points, e.g. during cleaning, leads to bearing failure. There is a risk of damage to property, and the service life may be reduced.

- ▶ Keep degreasers or aggressive cleaning agents away from the bearings!
- ▶ Only clean the product with a damp cloth.

Failure of the toothed belt

Applying grease-dissolving substances to the toothed belt, e.g. when cleaning, leads to the failure of the toothed belt. There is a risk of damage to property.

- ▶ Keep degreasers or corrosive cleaning agents away from the toothed belt!
- ▶ Only clean the product with a damp cloth.

Conveyor chain failure (flat top chain/duplex roller chain/accumulation roller chain)

Insufficient lubrication or treatment of the conveyor chain with grease-dissolving substances, e.g. during cleaning, can result in conveyor chain failure or even crashing. There is a risk of damage to property.

- ▶ Always comply with the maintenance intervals.
- ▶ Keep a maintenance schedule.
- ▶ Keep degreasers or aggressive cleaning agents away from the conveyor chain!
- ▶ Only clean the product with a damp cloth.

10.2 Inspection

Toothed belt

Periodically perform a weekly visual inspection of the toothed belt for signs of wear, especially in the area of the weld seam.

Conveyor chain (flat top chain/duplex roller chain/accumulation roller chain)

Inspect the conveyor chain regularly, every 1000 hrs, for ease of movement, sufficient lubrication and wear. Check more frequently, e.g. every 500 hrs or 200 hrs, when using production processes that include rinsing, fluid transfer, etc. in which the lift transverse unit chain could be washed out.

Stop gate

Check the pneumatic connections regularly for leaks.

10.3 Maintenance

CAUTION

Sudden movements, falling workpiece pallets

Risk of injury caused by sudden movements and falling objects.

- ▶ Only work on the conveyor chain when the belt section is stationary.
- ▶ Secure the system against being switched back on unintentionally.

Toothed belt

If necessary, re-oil the toothed belt with mineral oil (viscosity 68 acc. to DIN, e.g. Aral, Shell). Apply some mineral oil to a cloth and spread the oil moist over the toothed belt.

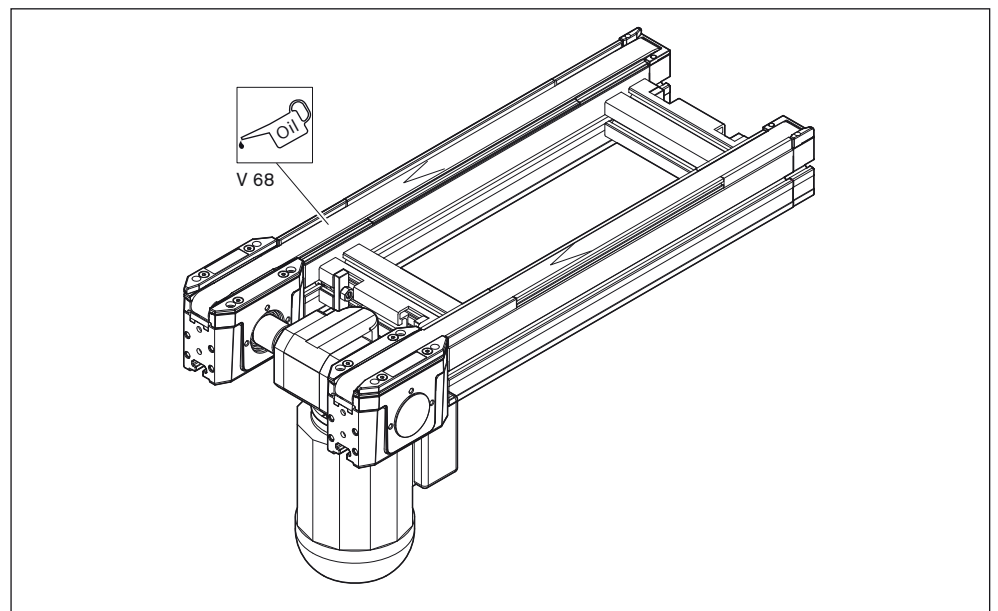


Fig. 31: Oiling the toothed belt

Checking and retensioning the flat top chain

- Retension the conveyor chain 150 hrs after initial commissioning (see Section 10.4.4 Replacing the conveyor medium of the belt section Fig. 39 on Page 68).
- Retension the conveyor chain every 1,000 hrs (see Section 10.4.4 Replacing the conveyor medium of the belt section Fig. 39 on Page 68).
- Replace the conveyor chain when wear becomes visible, at the latest however when it has increased in length by 3% (see Section 10.4.4 Replacing the conveyor medium of the belt section).

Lubricating the flat top chain/accumulation roller chain/duplex chain

The conveyor chain used in this product comes lubricated.

- Lubricate the conveyor chain before initial commissioning with Structovis GHD (0 842 904 229), using 1–2 g oil/m of chain, then every 1,000 hrs with 2–3 g oil/m of chain.
- Lubricate more frequently, e.g., every 500 or 200 hrs when using production processes that include rinsing, fluid transfer, etc. in which the lift transverse unit chain could be washed out (see Section 10.4.4 Replacing the conveyor medium of the belt section).

*) Also lubricate the sides of the flat-top chain belt.

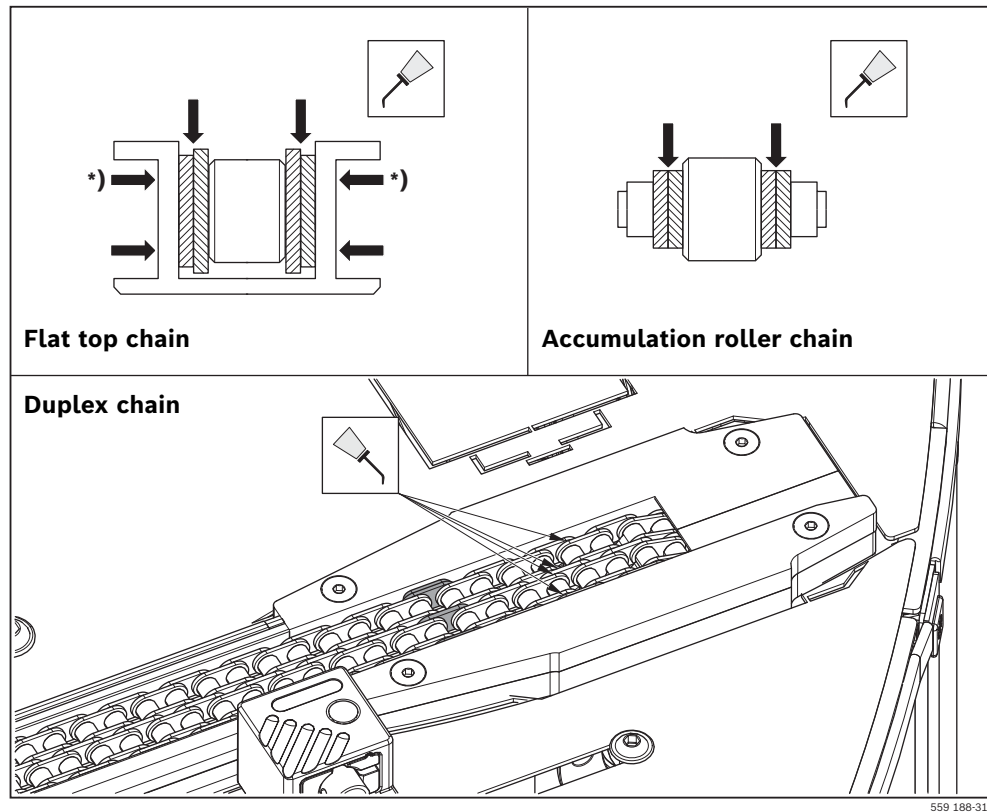


Fig. 32: Lubricating points

Replace the conveyor chain when wear becomes visible or at the latest when it has increased in length by 3% and the chain tensioner has reached the limit stop. For replacement of the conveyor medium, see chapter 10.4.4.

Bearings

The bearings have lifelong lubrication and are maintenance-free under normal conditions of use.

Gear

The gears are maintenance-free.

Motor

To ensure adequate cooling of the motors, regularly remove dirt and dust deposits:

- from the surface of the motor,
- from the intake openings on the fan hood,
- from between the cooling ribs.

The cleaning intervals depend on the ambient and operating conditions.

10.4 Replacing wear parts

Required tools

- Hex wrench SW13.
- Hex socket wrenches SW3, SW4, SW5, SW6.
- Posidriv screwdriver PZ2
- Caliper, 500 mm
- Rubber mallet
- Drift punch

Required accessories

- For flat top chain
 - Chain lock, **3 842 535 333**
 - Disassembly tool, **8 981 010 510**, for shortening/lengthening the chain
- For accumulation roller chain
 - Chain lock, **3 842 530 417**
 - Disassembly tool, **3 842 010 511**

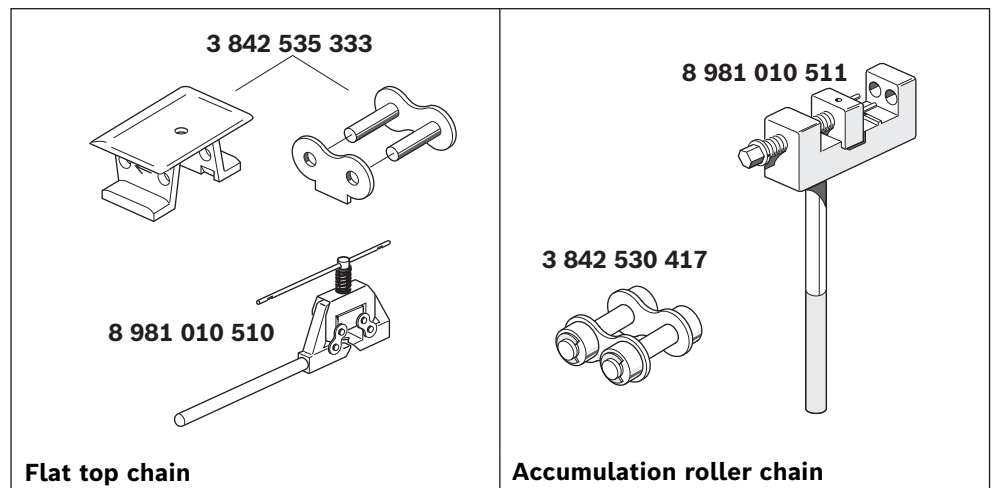


Fig. 33: Accessories for replacing the chain

10.4.1 Replacing the motor/gear of the belt section

See assembly instructions of the belt section.

10.4.2 Assembling/disassembling the protective covers of the rotate unit

See section 7.6.2 Assembling/disassembling the protective covers of the rotate unit on page 26.

10.4.3 Repairing the belt section

See assembly instructions for BS 2/.... belt section

10.4.4 Replacing the conveyor medium of the belt section

Replacing the toothed belt

See assembly instructions of the belt section.

Replacing the flat top chain

NOTICE

Conveyor chain failure (flat top chain/duplex roller chain/accumulation roller chain)

Deformations such as bending and/or twisting of the chain, e.g., by tilting the chain reel during installation, can result in conveyor chain failure and even crashing. There is a risk of damage to property.

- ▶ Make sure the chain remains straight and can leave the chain reel smoothly during installation.
- ▶ Make sure the chain reel cannot tilt during installation.
- ▶ If the chain reel does tilt during installation and the chain is deformed: Use the disassembly tool to remove the affected area, with a generous margin on either end.

NOTICE

Running direction of conveyor chain

Make sure the running direction of the conveyor chain is the same as the main direction of transport.

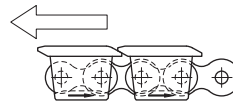


Fig. 34: Running direction of chain

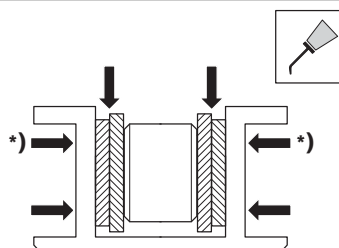
NOTICE

Conveyor chain failure

Inadequate lubrication of the conveyor chain can result in conveyor chain failure or even crashing. There is a risk of damage to property.

The conveyor chain used in this product comes lubricated.

- ▶ Lubricate the conveyor chain before initial commissioning with Structovis GHD (0 842 904 229), using 1–2 g oil/m of chain, then every 1,000 hrs with 2–3 g oil/m of chain.



*) Also lubricate the sides of the flat-top chain belt.

Fig. 35: Lubricating points

**Please note:**

- To replace the flat top chain the belt section of the rotate unit must be removed.
- For installation, the belt section must be centrally aligned to the rotate unit.

Preliminary steps

Allow the belt section to run briefly and position the flat-top plate with hole (A, chain lock position) on the drive sprocket.

- ▶ Make sure the system is de-energized and depressurized.
- ▶ Secure the system against being switched back on.
- ▶ If applicable, remove the top and, if necessary, also the lateral protective covers (see page 26).

1. Mark the position of the mounting plates at the belt section and rotate unit.
2. Remove the belt section.
3. Remove the belt section to the top.
4. Remove the covers from the drive heads.
5. Remove the cover sheets from the chain tensioners.

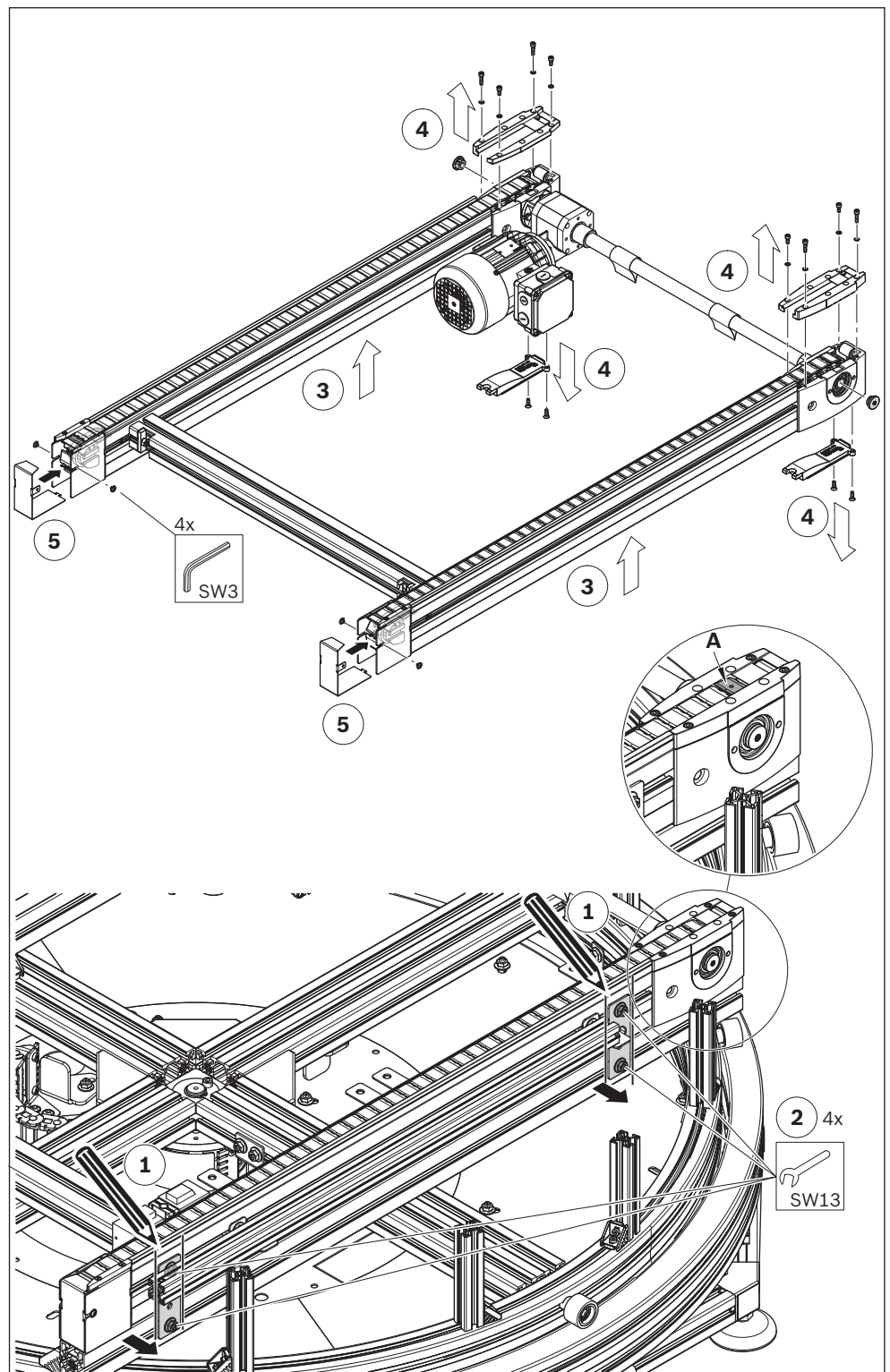


Fig. 36: Replacing the flat top chain, preparation

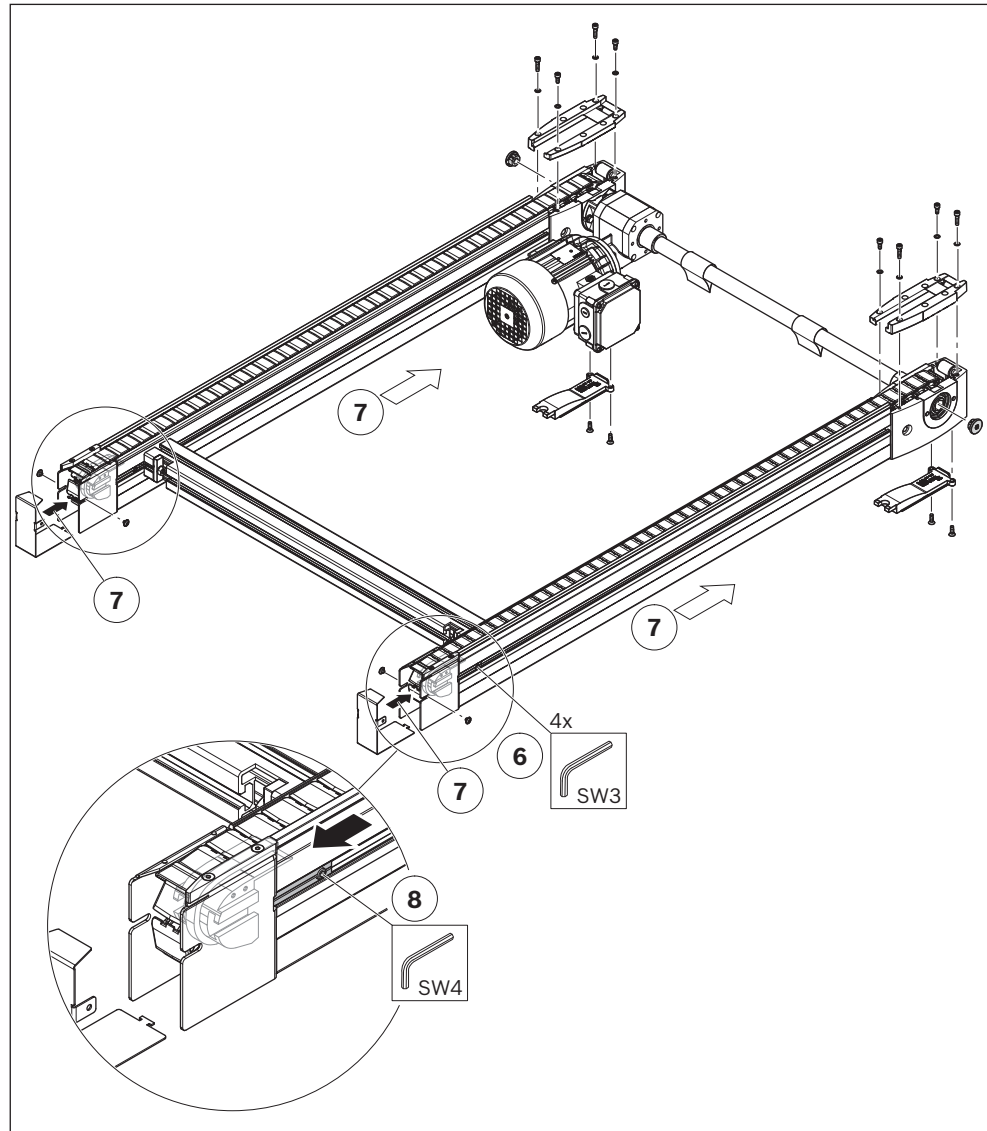
! CAUTION

Chain tensioner under extreme tension!

Risk of crushing due to unintentionally loosening the fastening bolts.

- Make sure the chain tensioner remains tensioned during assembly and cannot loosen unintentionally.

6. Loosen the chain tensioners.
7. Slacken the chain as much as possible.
8. Re-tighten the chain tensioners.



559 188-45

Fig. 37: Slackening the flat top chain

9. Open the flat-top chain belt (chain lock under flat-top plate with hole).
10. Pull the chain back from the drive heads.
11. Remove the sliding piece.
12. Pull the chain completely off of the belt section.

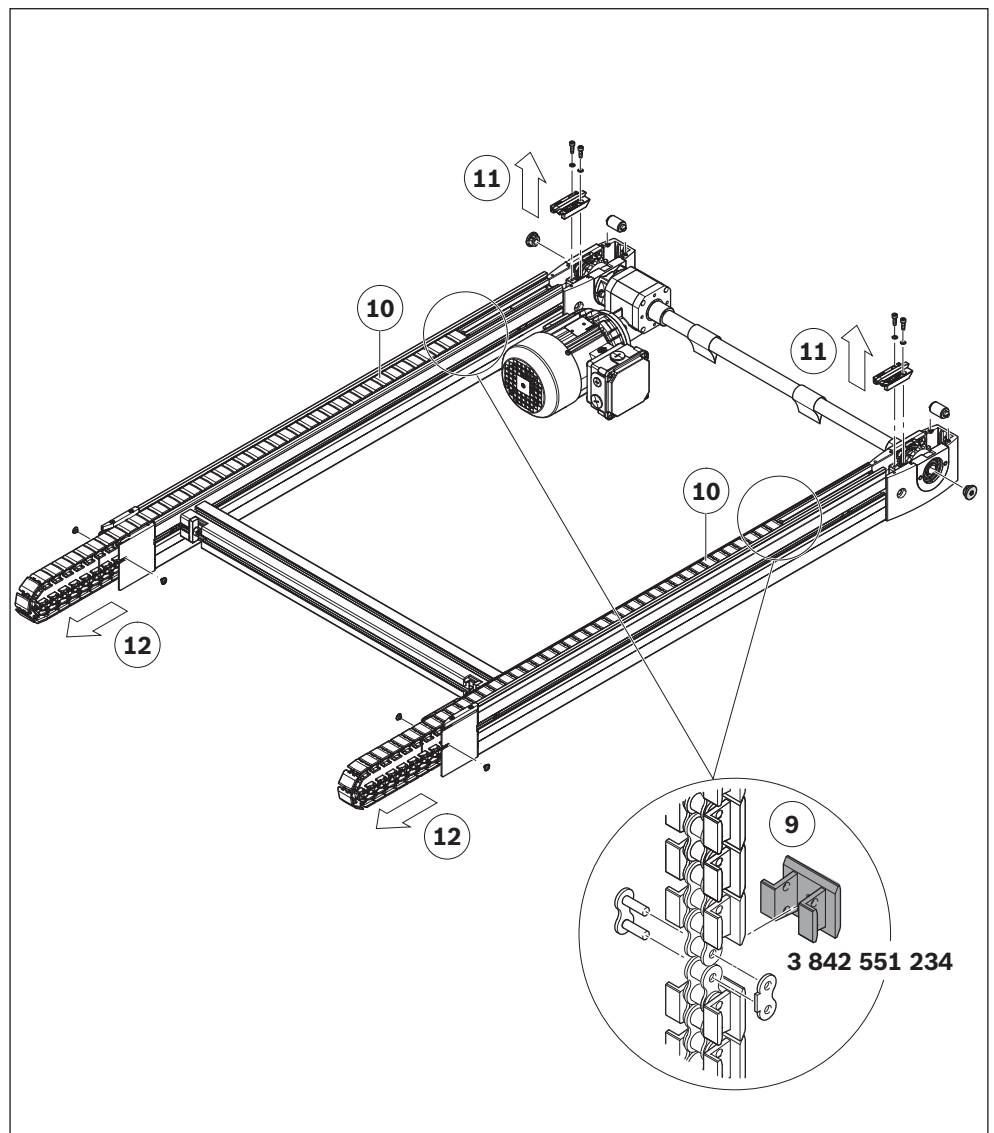


Fig. 38: Disassembling the flat top chain

**Please note:**

- Observe the running direction of the chain (X)
- Use the disassembly tool **8 981 010 510** to shorten/lengthen the new chain.

13. Slide the chain from the chain tensioner along the return level up to the drive head.
14. Guide the chain up and around the drive gear.
15. Install the sliding piece.
16. Guide the other end of the chain to the drive head.
17. Connect the chain together and attach the flat-top plate with hole.
18. Loosen the chain tensioner. To tension the chain, pull the chain tensioner as far back as possible and fasten it in place.
19. Install the covers on the drive heads.
20. Install the cover sheets on the chain tensioners.
21. Install the belt section according to the markings at the mounting plates. The belt section must be centrally aligned to the rotate unit.
22. If applicable, install the covers.

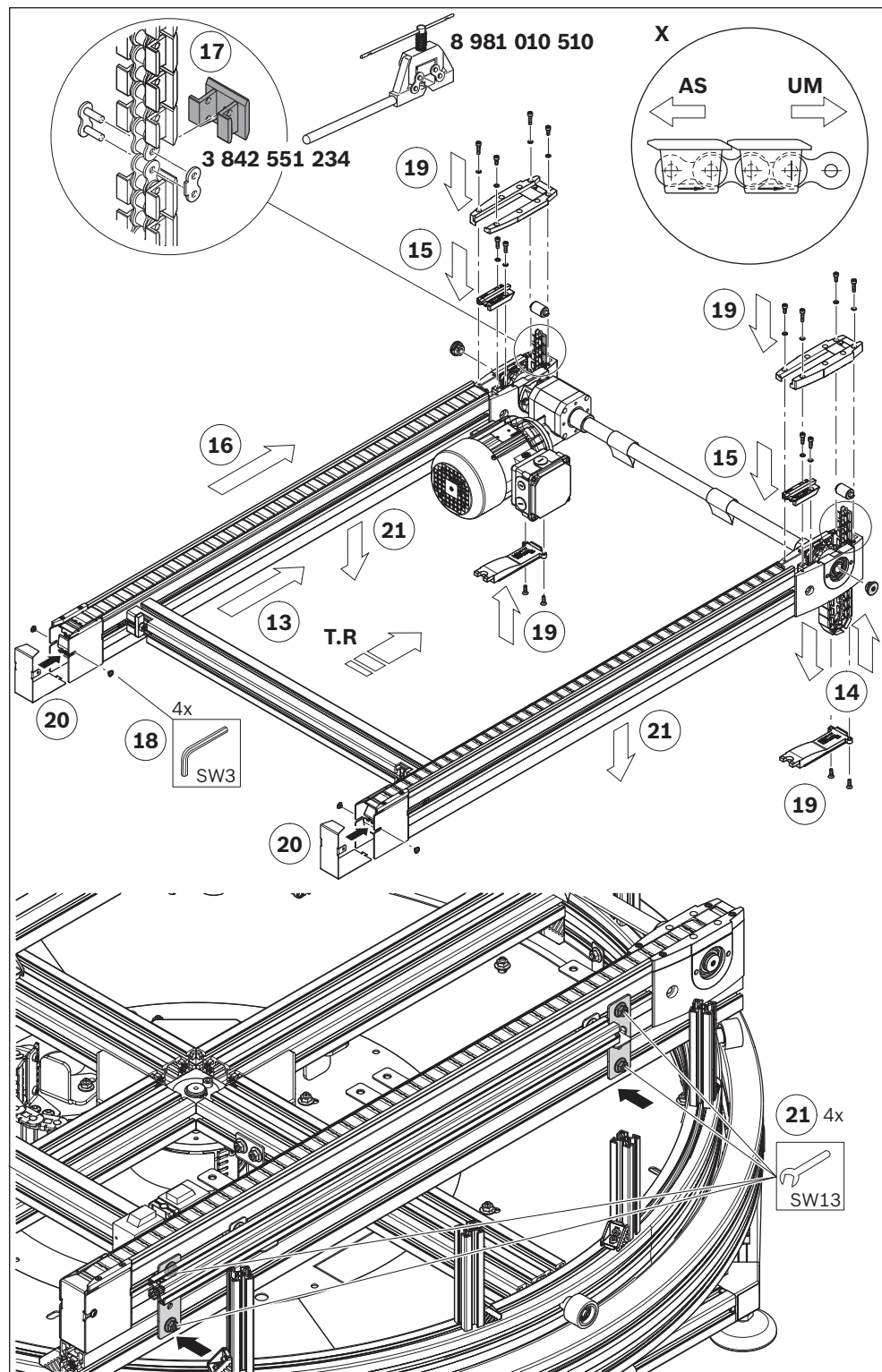


Fig. 39: Assembling and tensioning the flat top chain

559 188-47

Replacing the duplex roller chain

Preliminary steps

Allow the belt section to run briefly and position the chain lock (B) on the drive sprocket.

- ▶ Make sure the system is de-energized and depressurized.
- ▶ Secure the system against being switched back on.
- ▶ If applicable, remove the top and, if necessary, also the lateral protective covers (see page 26).



Please note:

- You can replace the roller chain without removing the belt section from the rotate unit.
- To replace worn guides or if space is restricted, remove the belt section from the rotate unit.
- For removal and installation of the belt section at the rotate unit, see Fig. 36 and Fig. 39.
- For installation, the belt section must be centrally aligned to the rotate unit.

1. Remove the top covers of the drive heads.
2. Remove the cover sheets from the chain tensioners.

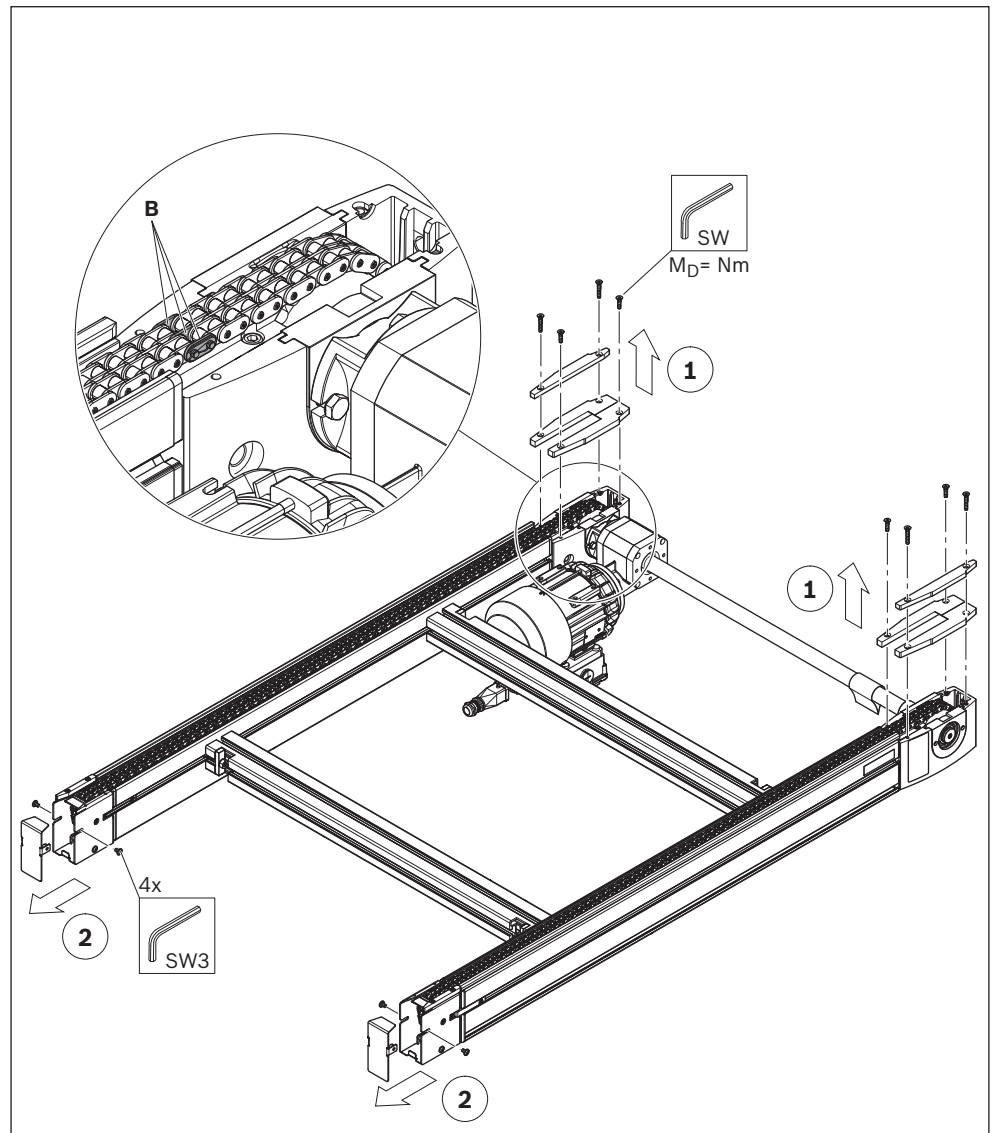


Fig. 40: Replacing the duplex roller chain, preparation

559 188-48

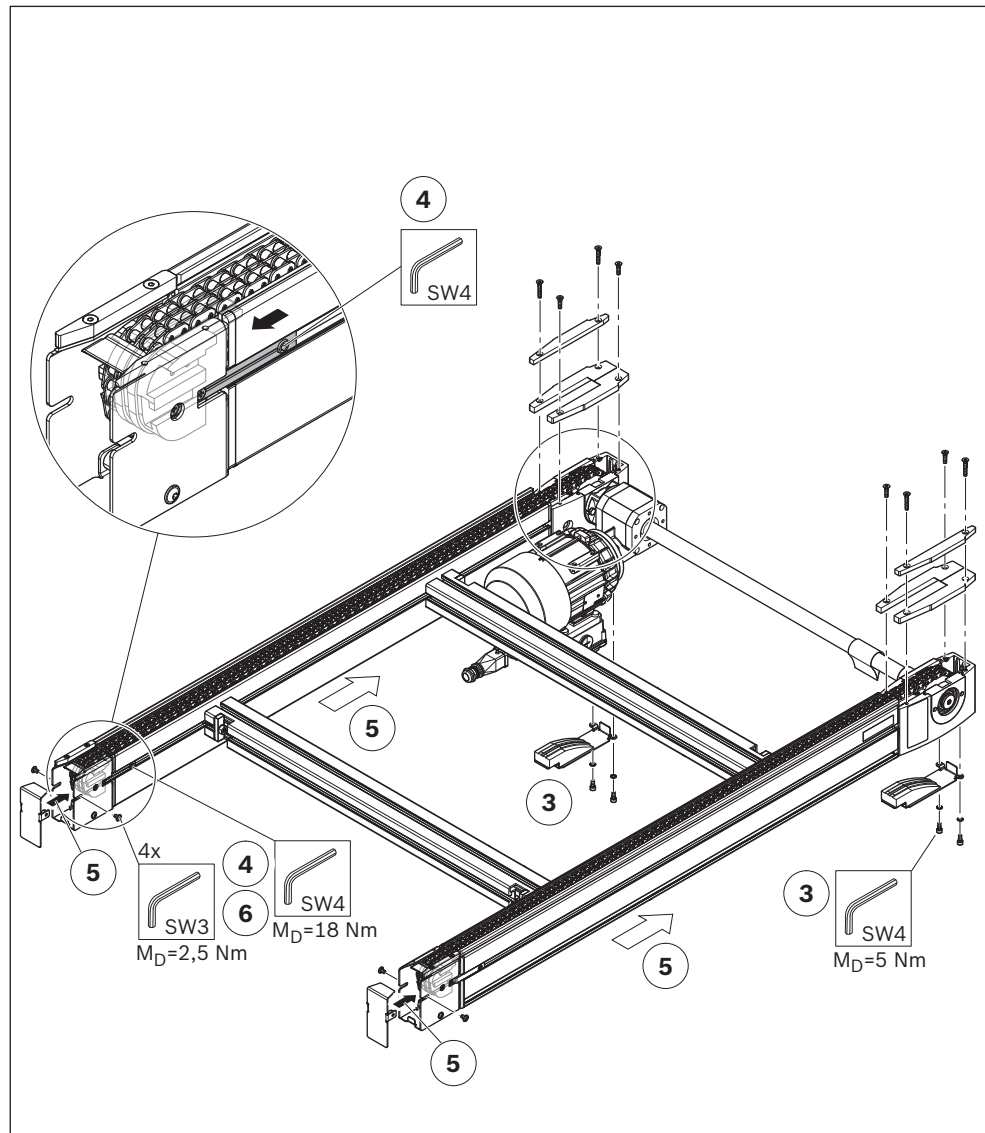
! CAUTION

Chain tensioner under extreme tension!

Risk of crushing due to unintentionally loosening the fastening bolts.

- Make sure the chain tensioner remains tensioned during assembly and cannot loosen unintentionally.

3. (Only necessary if you want to replace the guides; to do this, remove the belt section from the rotate unit: Remove the bottom covers of the drive heads.)
4. Loosen the chain tensioners.
5. Slacken the chain as much as possible.
6. Re-tighten the chain tensioners.



559 188-49

Fig. 41: Slackening the duplex roller chain

7. Open the chain lock.
8. Pull the chain back from the drive heads.
9. Only necessary if you want to replace the guides or the sprocket: Remove the sliding piece.



Assembly tip

Before you pull out the worn-out chain: Connect the new chain with the worn-out chain (chain lock). Pulling out the worn-out chain will pull in the new chain.

10. Pull the chain completely off of the belt section.
- Replace the chain.
 - Check the sprocket and the chain guides for break-in scoring. Replace worn parts.

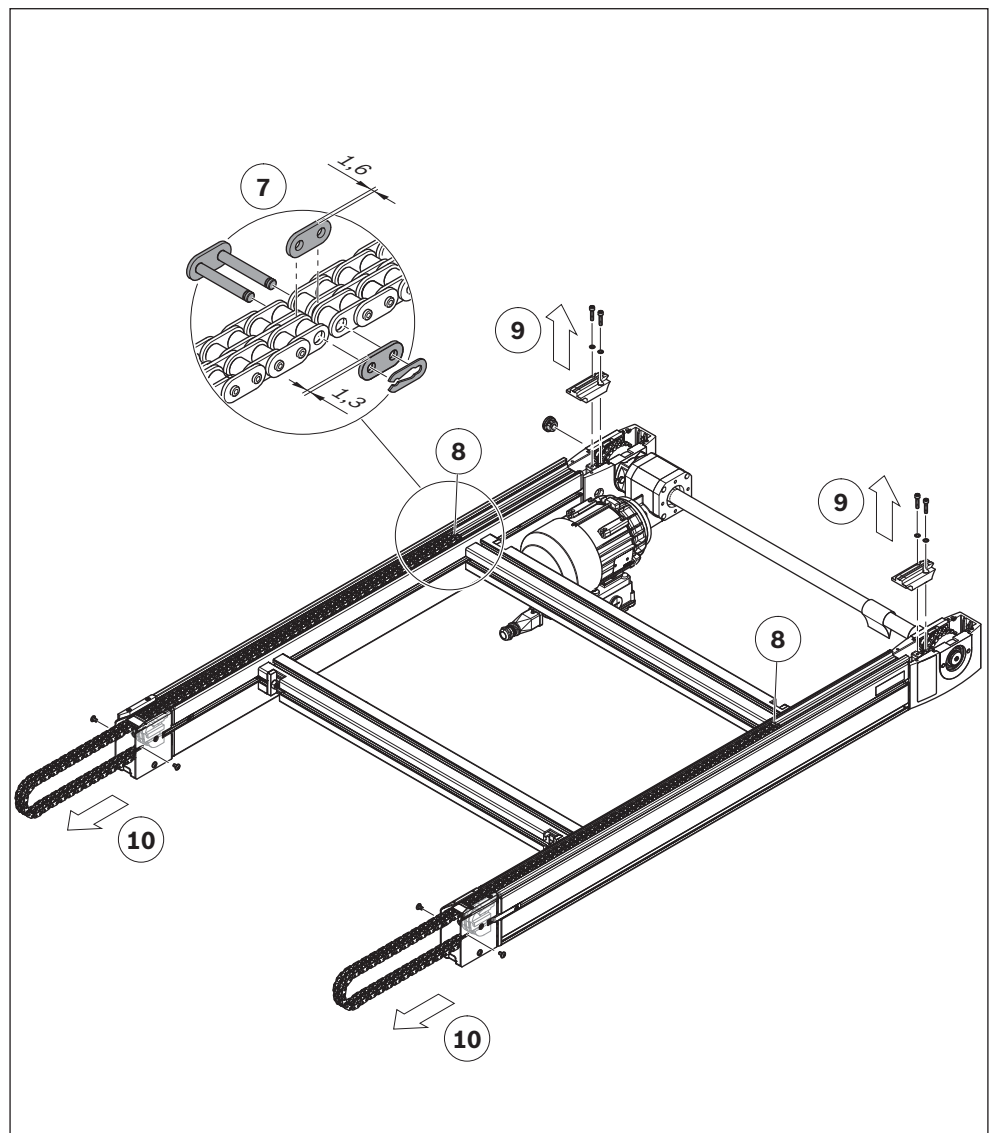


Fig. 42: Disassembling the duplex roller chain

Replacing the accumulation roller chain

Preliminary steps

Allow the belt section to run briefly and position the chain lock (B) on the drive sprocket.

- ▶ Make sure the system is de-energized and depressurized.
- ▶ Secure the system against being switched back on.
- ▶ If applicable, remove the top and, if necessary, also the lateral protective covers (see page 26).



Please note:

- You can replace the roller chain without removing the belt section from the rotate unit.
- To replace worn guides or if space is restricted, remove the belt section from the rotate unit.
- For removal and installation of the belt section at the rotate unit, see Fig. 36 and Fig. 39.
- For installation, the belt section must be centrally aligned to the rotate unit.

1. Remove the top covers of the drive heads.
2. Remove the cover sheets from the chain tensioners.

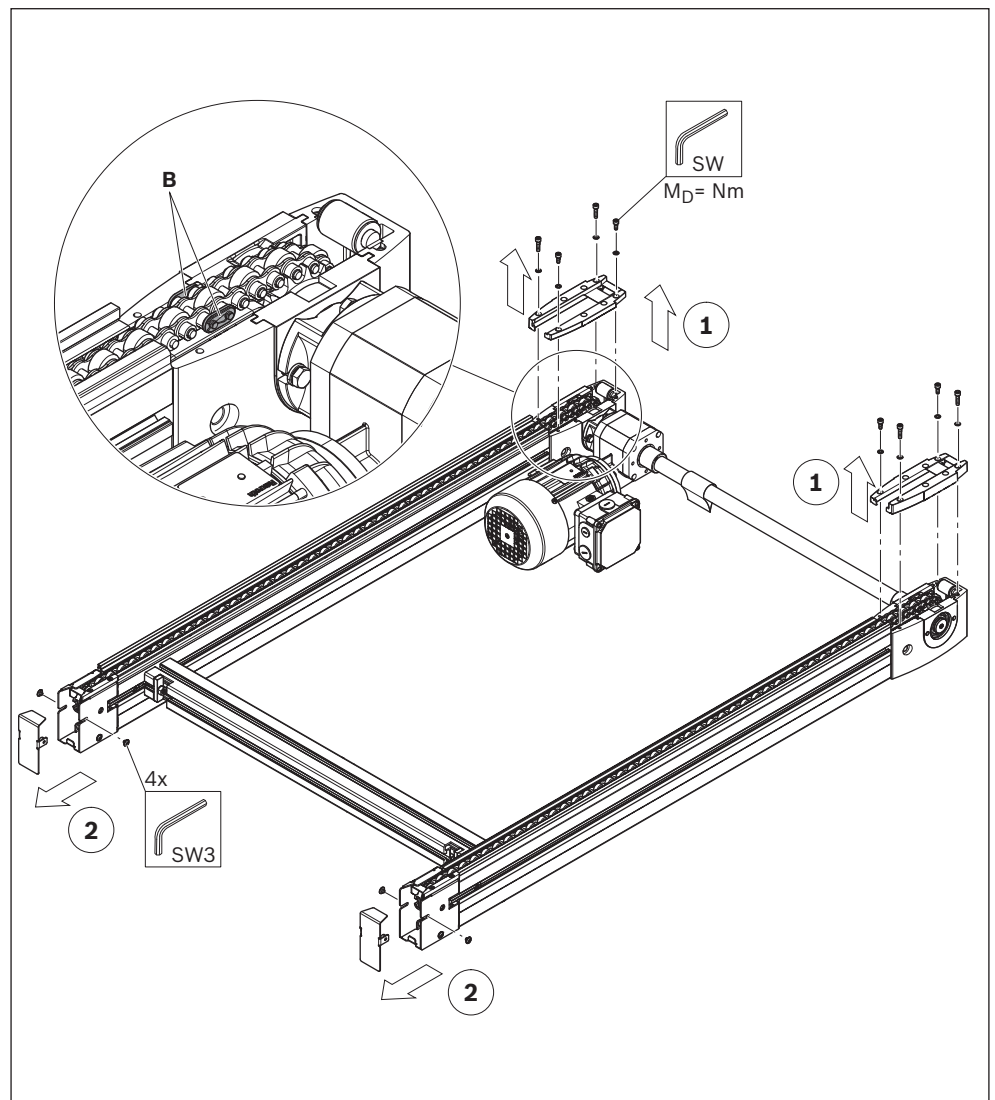


Fig. 44: Replacing the accumulation roller chain, preparation

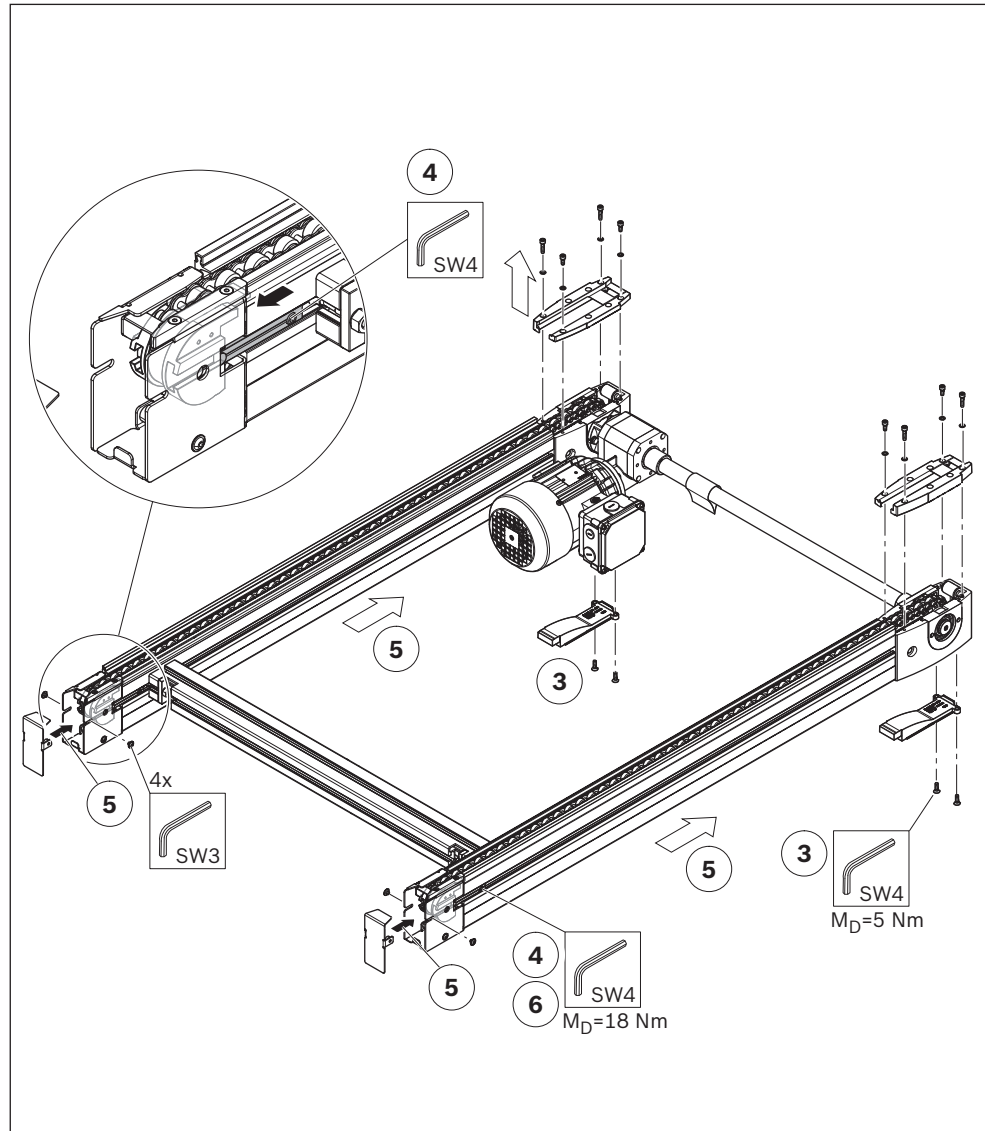
! CAUTION

Chain tensioner under extreme tension!

Risk of crushing due to unintentionally loosening the fastening bolts.

- Make sure the chain tensioner remains tensioned during assembly and cannot loosen unintentionally.

3. (Only necessary if you want to replace the guides; to do this, remove the belt section from the rotate unit: Remove the bottom covers of the drive heads.)
4. Loosen the chain tensioners.
5. Slacken the chain as much as possible.
6. Re-tighten the chain tensioners.



559 188-53

Fig. 45: Slackening the accumulation roller chain

7. Open the chain lock.
8. Pull the chain back from the drive heads.
9. Only necessary if you want to replace the guides or the sprocket: Remove the sliding piece.



Assembly tip

Before you pull out the worn-out chain: Connect the new chain with the worn-out chain (chain lock). Pulling out the worn-out chain will pull in the new chain.

10. Pull the chain completely off of the belt section.
- Replace the chain.
 - Check the sprocket and the chain guides for break-in scoring. Replace worn parts.

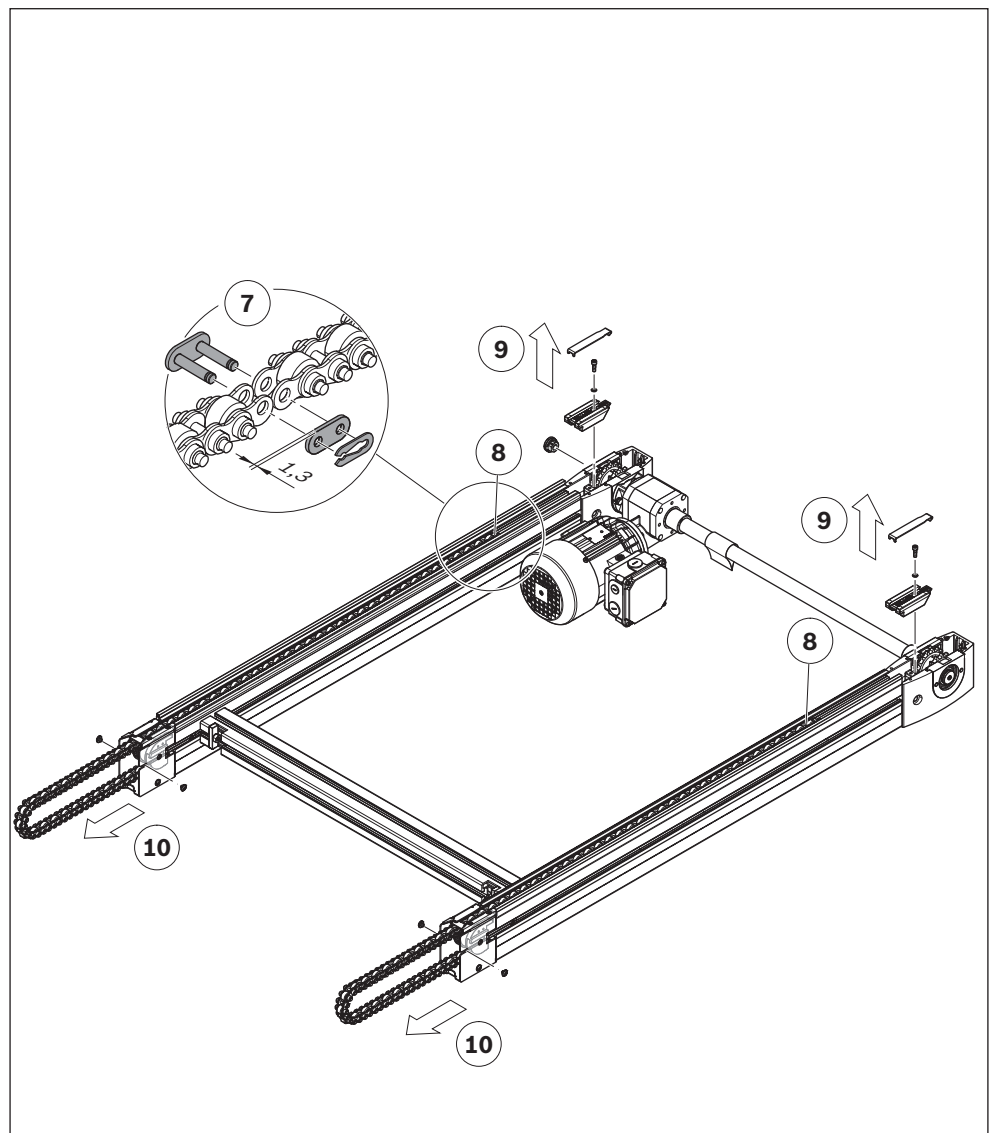
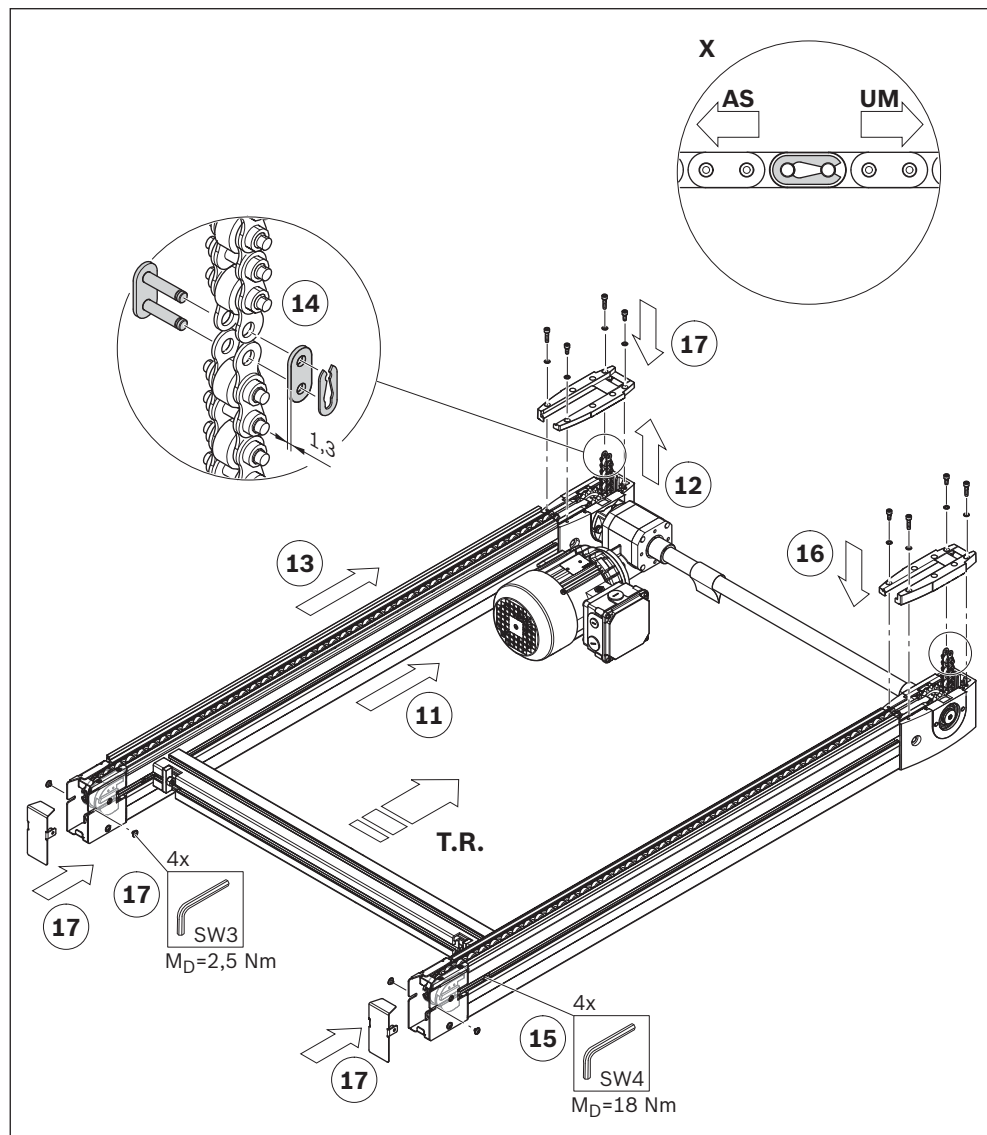


Fig. 46: Disassembling the accumulation roller chain

11. Slide the chain from the chain tensioner along the return level up to the drive head.
12. Guide the chain up and around the drive gear.
13. Guide the other end of the chain to the drive head.
14. Close the chain.
15. Loosen the chain tensioner. To tension the chain, pull the chain tensioner as far back as possible and fasten it in place.
16. Install the covers on the drive heads.
17. Install the cover sheets on the chain tensioners.



559 188-55

Fig. 47: Assembling and tensioning the accumulation roller chain

10.4.5 Replacing the support wheels of the rotate unit

1. If applicable, remove the lateral protective covers (see page 26).
2. Remove the worn support wheel (K).
3. Install the new support wheel (K).

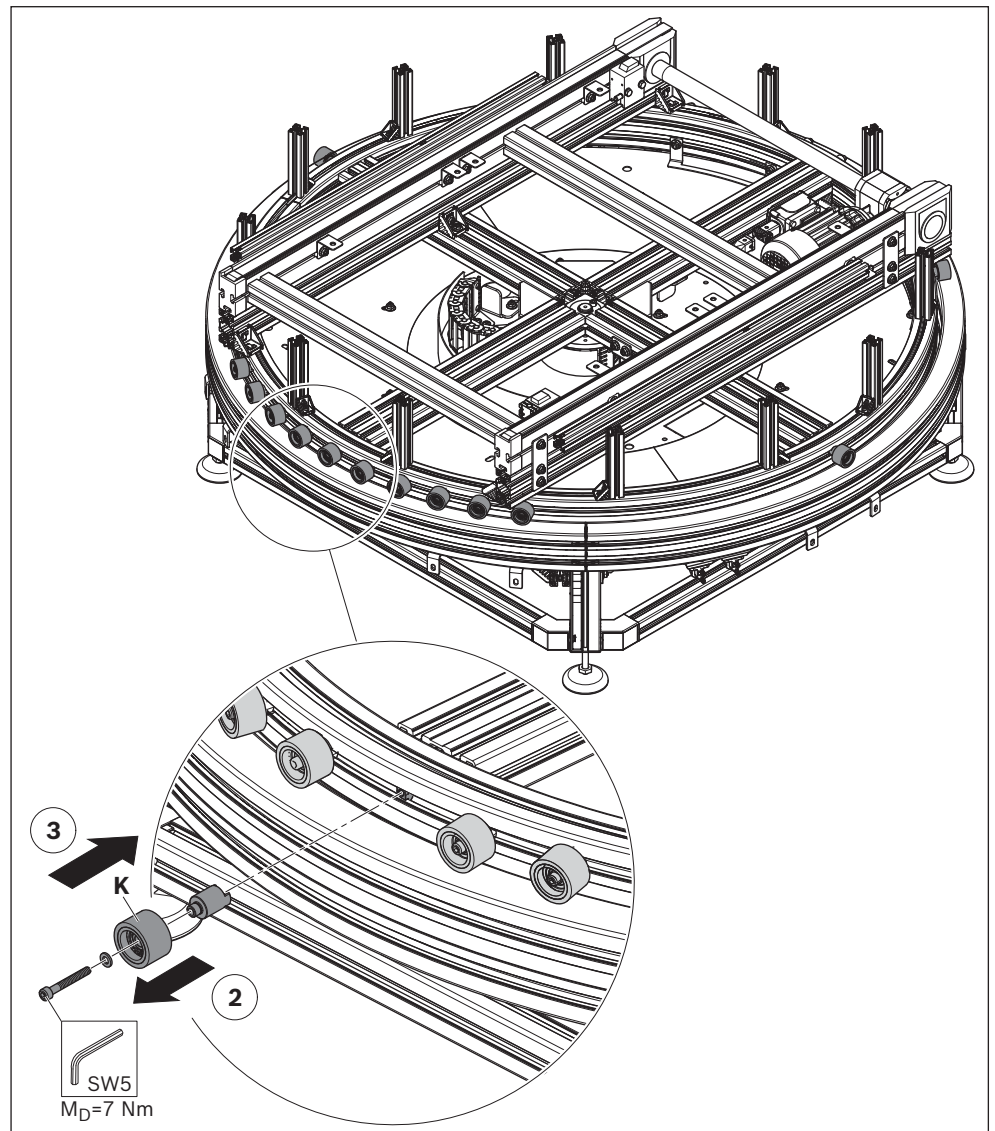


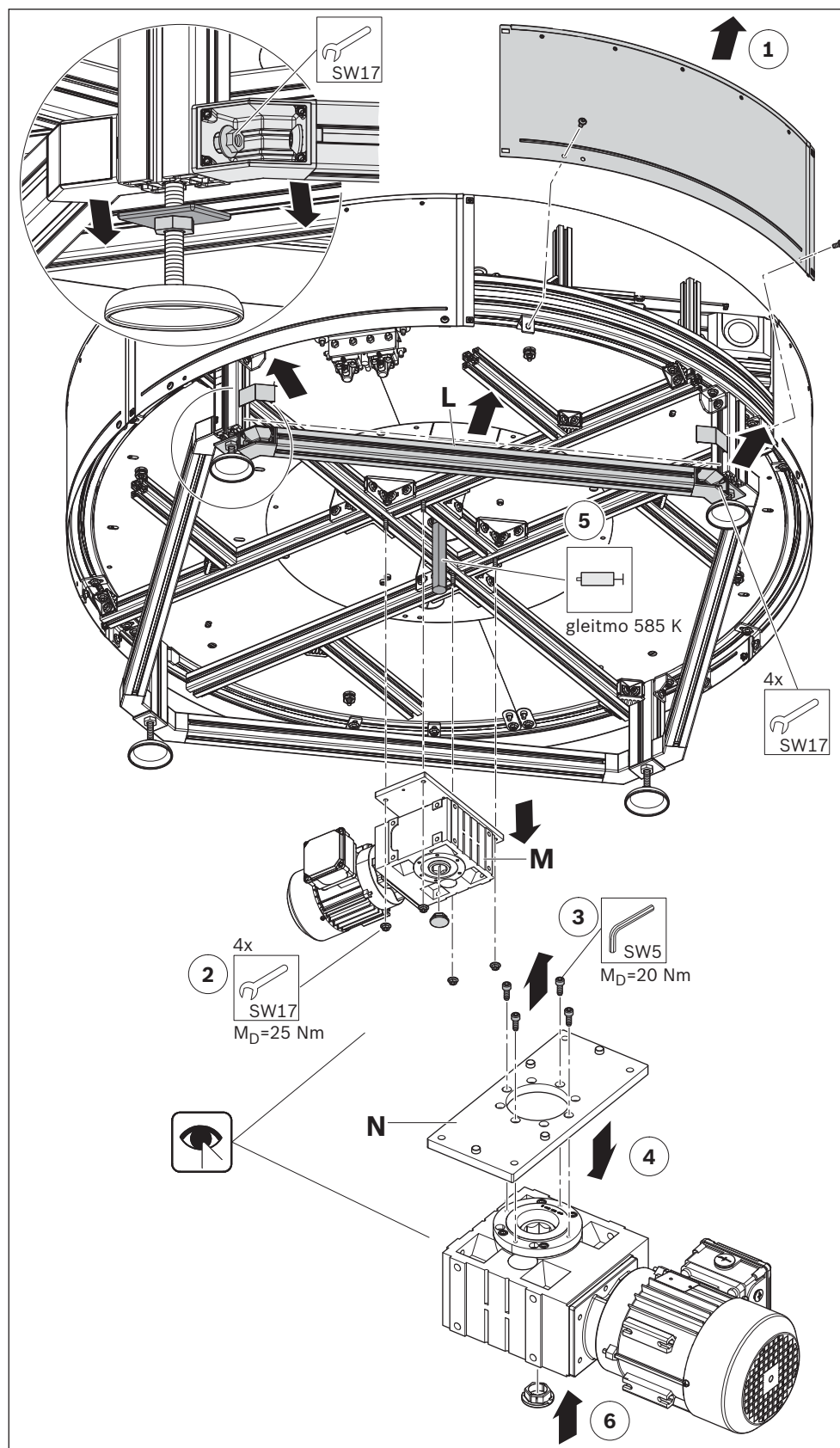
Fig. 48: Replacing the support wheels of the rotate unit

**Please note:**

For disassembly of the gear motor, the hexagonal shaft does not need to be removed.

If the hexagonal shaft needs to be disassembled, the clamping cone of the hexagonal shaft must be tightened with 41 Nm during assembly.

1. Only at a transport height of ≤ 665 mm for better access:
 - If applicable, remove the lateral cover (see page 26).
 - Remove a cross strut (L)
 2. Remove the drive unit (M).
 3. Remove the carrying plate (N).
 4. Install the carrying plate (N) at the new gear motor.
 5. Lubricate the hexagonal shaft.
 6. Insert the old hub cover into the new drive unit.
- Install the drive unit in reverse order.

10.4.6 Replacing the gear motor of the rotate unit

559 188-21

Fig. 49: Replacing the gear motor of the rotate unit

**Please note:**

By loosening of the flange nuts and repositioning of the stop brackets (A), the four actual end positions for 0°, 90°, 180°, 270° can be adjusted in a range of $\pm 5^\circ$.

Proceed as follows:

1. If applicable, remove the top and lateral protective covers (see page 26).
2. Lock the rotary movement in the desired position by engaging the limit stop between the stop gates.
3. Loosen the screws at the locked limit stop and align the section of the rotate unit at the connected section.
4. Tighten the screws at the limit stop.

- Install the protective covers in reverse order.

**Please note:**

- The condition on delivery is a setting of precisely 0°, 90°, 180° and 270°.
- If the stop angle is moved, the deceleration ramp for these positions must be adjusted in the program.

10.4.7 Setting the rotary movement stop bracket (actual end positions at 0°, 90°, 180°, 270°)

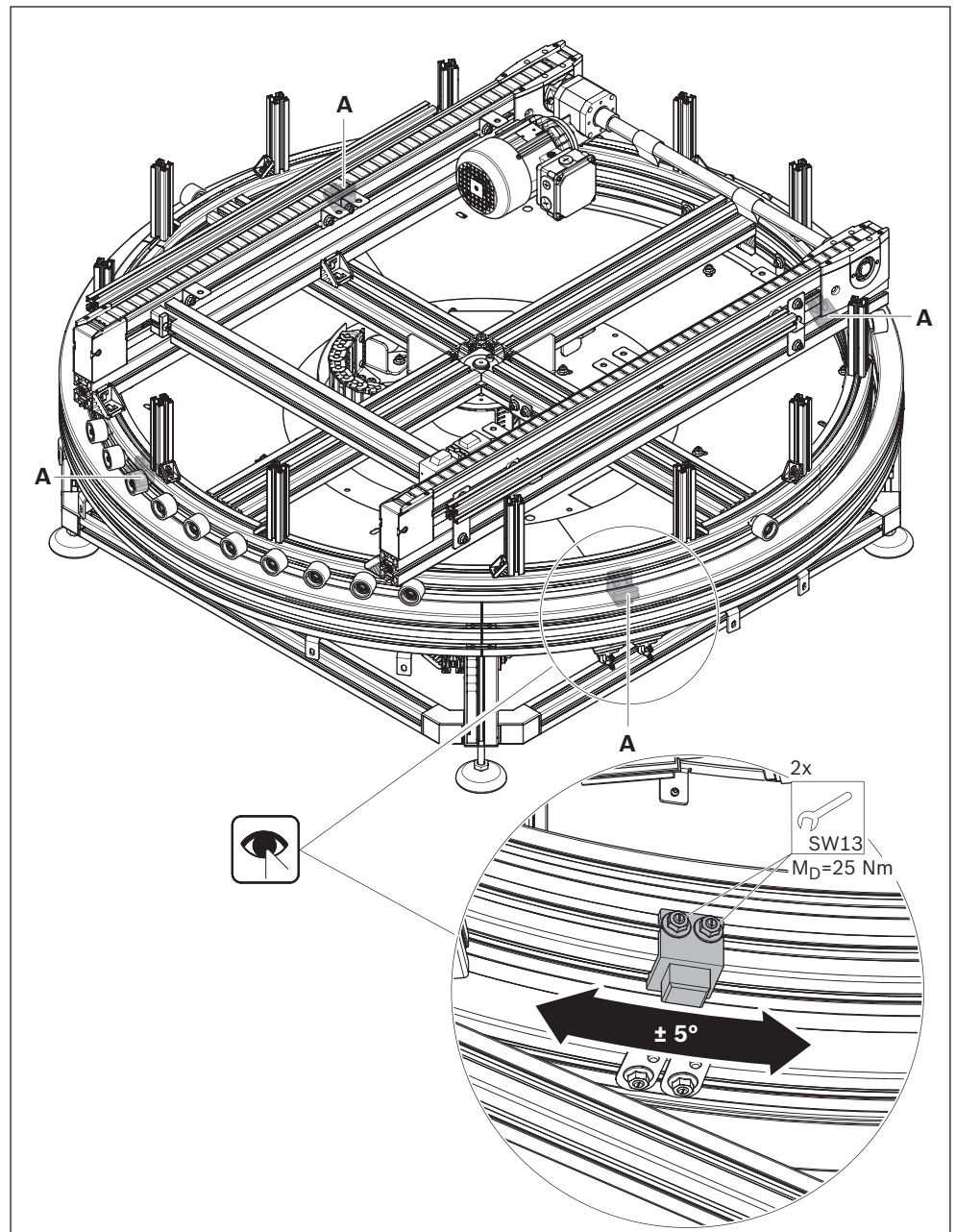


Fig. 50: Setting the rotary movement stop bracket

558 188-43

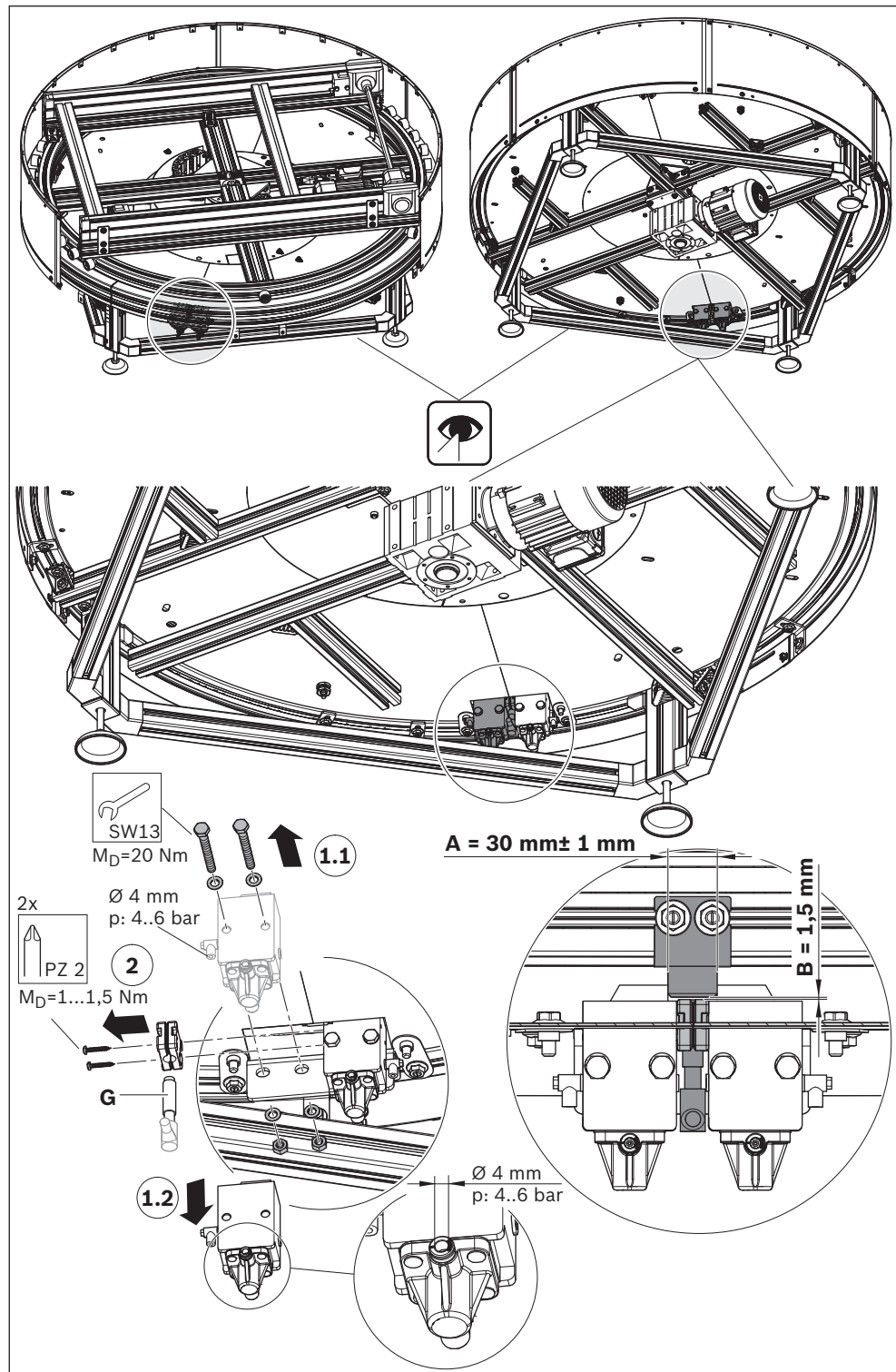
10.4.8 Replacing the rotary movement end position sensor

Rotary movement end position, required sensor:
(G, scope of delivery, installed on delivery)
– 1x M8, Sn 2 mm, flush,
3 842 551 761

- A:** Distance of stop gate latches
30 mm $\pm$ 1 mm
- B:** Distance of sensor to tappets 1.5 mm

1. Remove the stop gate.
2. Install the sensor into the switch bracket.

► Install in reverse order.



559 188-39

Fig. 51: Assembling the sensors for end position, stopping and locking of the rotary movement

10.4.9 Replacing the sensors for rotary movement control

See page 30.

10.4.10 Replacing the sensor/stop gate for stopping and locking of the rotary movement

See page 31.

10.4.11 Replacing the sensors for end position, stopping and locking of the workpiece pallet

See page 32 or page 33.

10.4.12 Replacing the stop gates for end position and workpiece pallet locking

See page 34.

10.5 Spare parts

For a list of spare parts, see spare parts list in MT*pro*, **3 842 539 057** (download: www.boschrexroth.com/mtpro).

11 Decommissioning

This product is a component which does not need to be decommissioned. Accordingly, this section has been left blank.

12 Disassembly and replacement



WARNING

High electrical voltage!

Risk of severe injury or death from electric shock.

- ▶ Disconnect the relevant system component before performing any maintenance or repair work.
- ▶ Secure the system against being switched back on unintentionally.

High pneumatic pressure!

Risk of severe injury or death.

- ▶ Switch off the compressed air supply to the relevant system component before performing any maintenance or repair work.
- ▶ Secure the system against being switched back on unintentionally.

Suspended loads can fall!

Falling objects can result in severe injury (or even death).

- ▶ Use only slings with sufficiently high bearing loads (for product weight, see delivery documents).
- ▶ Make sure the lifting straps are correctly fastened before lifting the product.
- ▶ Secure the product against tipping over when lifting!
- ▶ Make sure that no one but the operator is in the danger zone during lifting and lowering!

12.1 Preparing the product for storage/later use

- Only set the product down on a flat surface.
- Protect the product from mechanical stress.
- Protect the product from environmental influences, such as dirt and moisture.
- Observe the ambient conditions, see page 84.
- For products with a mounted motor: support the product so that the motor is not placed under mechanical load.

13 Disposal

- The materials used are environmentally friendly.
- They can be recycled or reused (components may have to be processed and replaced). Recyclability is ensured by the selection of materials and the ability to take the components apart.
- Careless disposal may lead to environmental contamination.
- Dispose of the product in accordance with the regulations in your country.

14 Upgrading and modification

- Do not modify the product.
- The Bosch Rexroth warranty only applies to the configuration as delivered, and to approved upgrades. The manufacturer will not accept any warranty claims for systems with unapproved modifications or upgrades.

15 Troubleshooting

- If you cannot correct a fault, please contact one of the addresses you can find at www.boschrexroth.com.

16 Technical data

- For the dimensions of the DE 2 rotate unit, refer to the sales catalog TS *2plus*
- Maximum load and section load

Series	Max. load [kg]	Section load [kg/cm surface length]
BS 2	120	1.0
BS 2/C-250	180	1.0
BS 2/G-250	240	2.0
BS 2/R-300	240	1.5 ¹⁾ /2.0 ²⁾
1) Standard version with plastic glide profiles (see sales catalog TS <i>2plus</i>)		
2) Optionally available version with steel glide profiles (see sales catalog TS <i>2plus</i>)		

- Noise emissions: < 70 dB (A)

16.1 Ambient conditions

- The transfer systems have been designed for stationary use in a location that is protected from the elements.
- Operating temperature +5 °C to +40 °C
–5 °C to +60 °C at 20% reduced load
- Storage temperature –25 °C to +70 °C
- Relative humidity 5 % to 85%, non-condensing
- Air pressure > 84 kPa, corresponds to an altitude < 1400 m above sea level
- At altitudes > 1400 m, the load values of the electric drives are reduced by 15%.
- Max. load capacity of floor: 1000 kg/m²
- The area should be kept free of mold, fungus, rodents and other vermin.
- Do not install or operate in the immediate vicinity of industrial equipment producing chemical emissions.
- Do not install or operate near sources of sand or dust.
- Do not install or operate in areas that are regularly subjected to high-energy forces caused, for example, by presses or heavy machinery.
- Resistant to many media that are commonly found in manufacturing, such as water, mineral oil, grease, and detergents. Contact your Rexroth representative if you have any doubts about resistance to specific chemicals, such as test oil, doped oils, corrosive detergents, solvents or brake fluid.
- Avoid prolonged contact with highly reactive acidic or alkaline materials.

16.2 Pneumatics

- Oiled or non-oiled, filtered, dry compressed air.
 - Operating pressure: 4 to 6 bar
 - Solids
 - Particle size $\leq 5 \mu\text{m}$ (Class 6 as per ISO 8573-1:2010)
 - Particle quantity $\leq 5 \text{ mg/m}^3$ (Class 6 as per ISO 8573-1:2010)
 - Humidity – water content
 - Pressure dew point ¹⁾ $\leq +3 \text{ }^\circ\text{C}$ (Class 4 as per ISO 8573-1:2010)
- ¹⁾ The pressure dew point should be at least 15 °C below the ambient temperature.
- Oil content:
 - Oil quantity $\leq 1 \text{ mg/m}^3$ (Class 3 as per ISO 8573-1:2010)

16.3 Permissible gravity center position

During deceleration, start-up, rotation or change of direction, it is important to observe the position of the load center of gravity on the workpiece pallet to ensure that the acceleration forces can be absorbed without any interferences.

We generally recommend that:

- the workpiece pallet is loaded as centrally as possible.
- the load center of gravity should not exceed a height h_s of $\frac{1}{3} b_{WT}$ (with $b_{WT} \leq l_{WT}$).

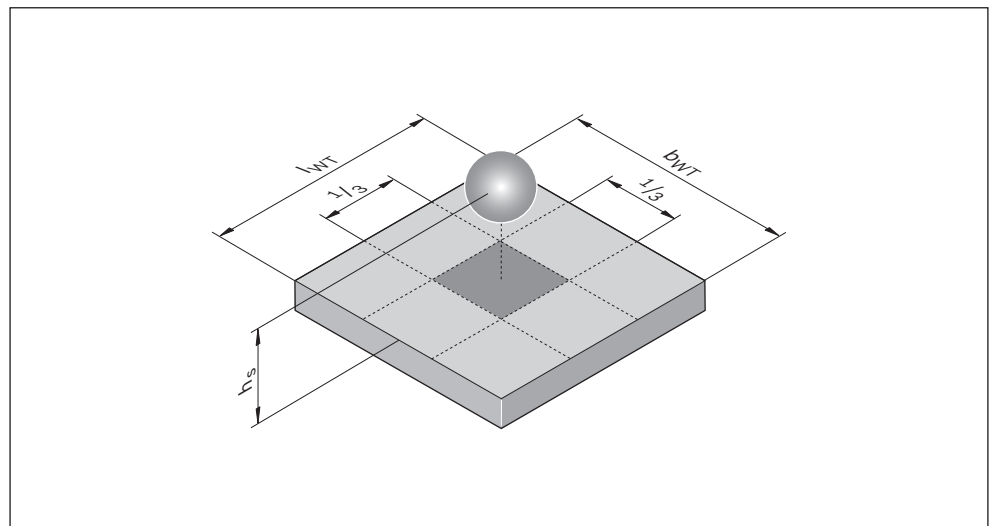


Fig. 52: Position of load center of gravity

17 Appendix

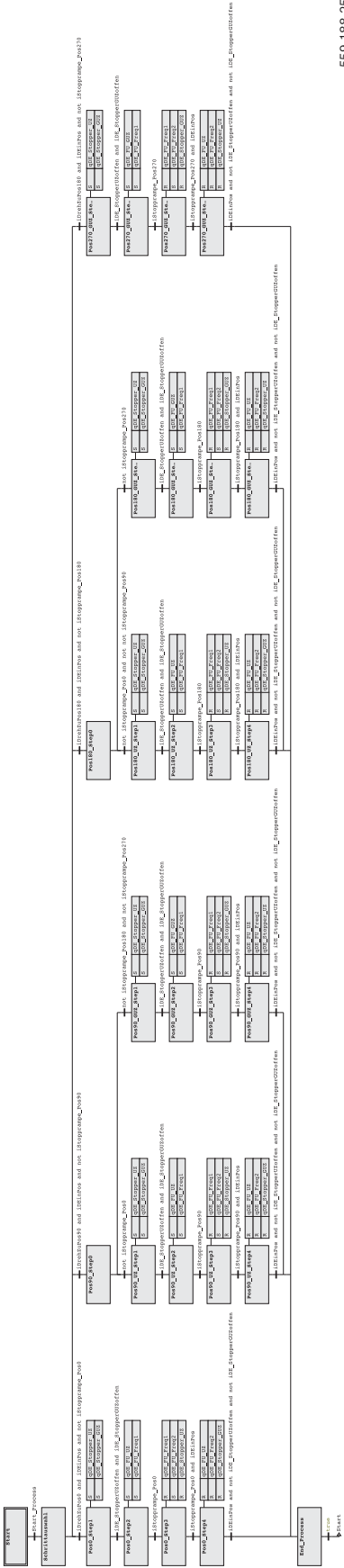
17.1 Function examples

17.1.1 Control diagram

FALSE	TRUE													
Sensors / actuators		Rotate unit in position 0	Operation of iDrehZuPos90	Stopper opening	Stopper open	Starting frequency converter with frequency 1	Rotate unit is moving and leaving iDEinPos	Rotate unit is moving and leaving iStopprampe_Pos0	Rotate unit is moving and exciting iStopprampe_Pos90, qDE_Stopper_GUZ is closed and frequency 1 is switched to frequency 2	Stopper qDE_Stopper_GUZ closed	Rotate unit is moving and exciting iDEinPos	Stopping time in program until rotate unit in end position	Reaching of end position and closing of stopper qDE_Stopper_GUZ	Rotate unit in position 90
A (iDrehZuPos0)		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
B (iDrehZuPos90)		FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
C (iDrehZuPos180)		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
D (iDrehZuPos270)		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
X (iStopprampe_Pos0)		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
X (iStopprampe_Pos90)		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
X (iStopprampe_Pos180)		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
X (iStopprampe_Pos270)		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Y (iDEinPos)		TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE
Y (iDE_StopperUZoffen)		FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
Y (iDE_StopperGUZoffen)		FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE
Z (qDE_Stopper_UZ)		FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
Z (qDE_Stopper_GUZ)		FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Z (qDE_FU_UZ)		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Z (qDE_FU_GUZ)		FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
Z (qDE_FU_Freq1)		FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Z (qDE_FU_Freq2)		FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE

Fig. 53: Control diagram

17.1.2 Program sequence



559 188-25

Fig. 54: Program sequence overview

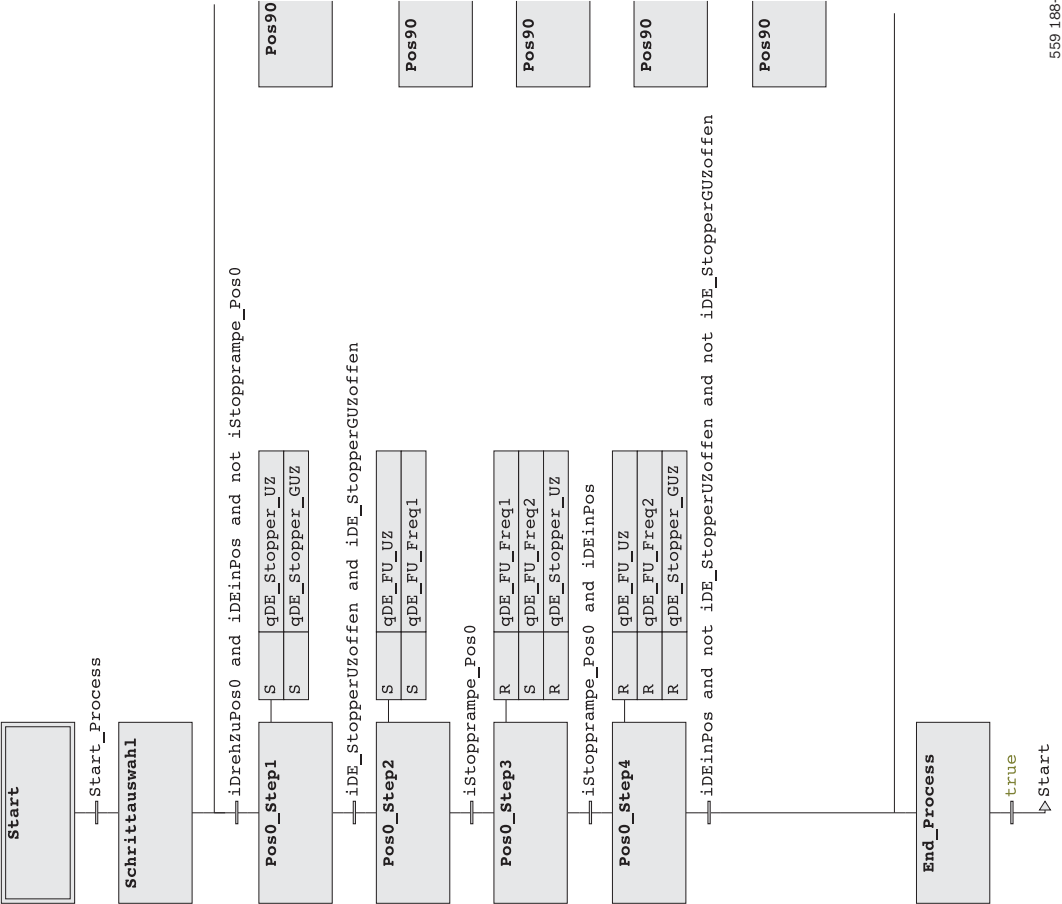
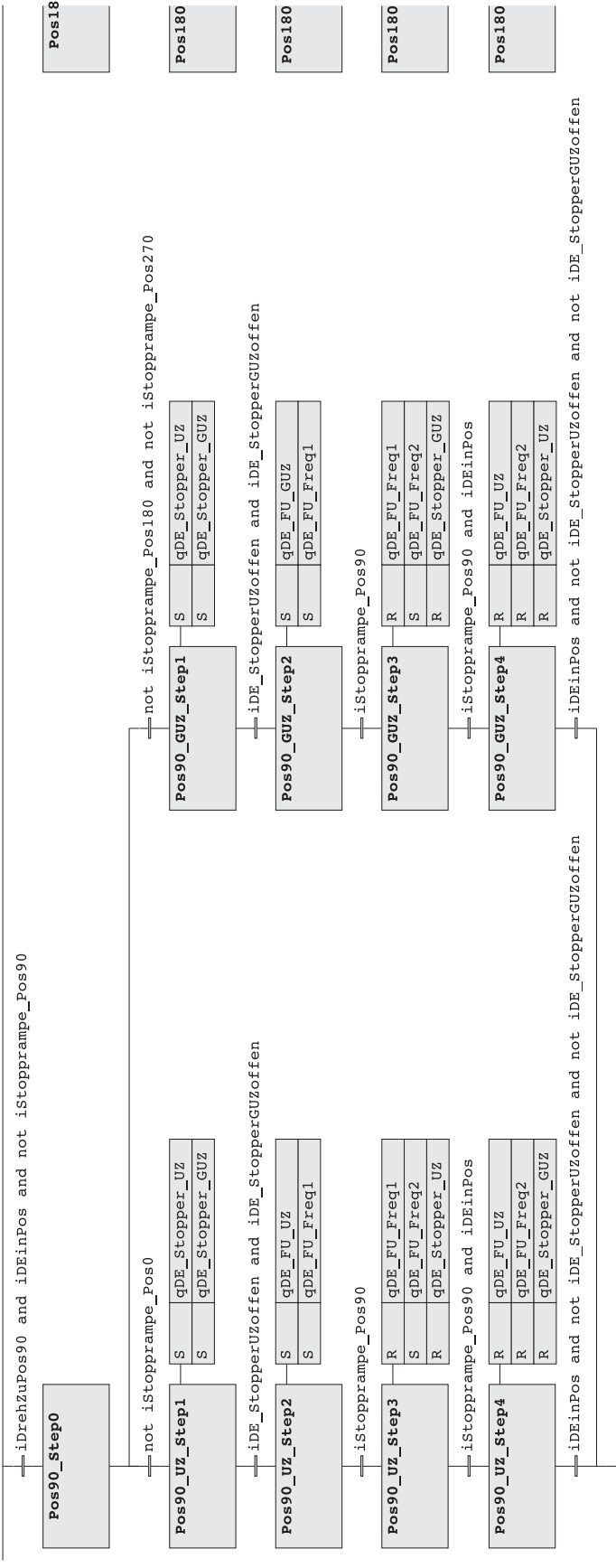


Fig. 55: Program sequence detail rotation to position 0



559 188-27

Fig. 56: Program sequence detail rotation to position 90

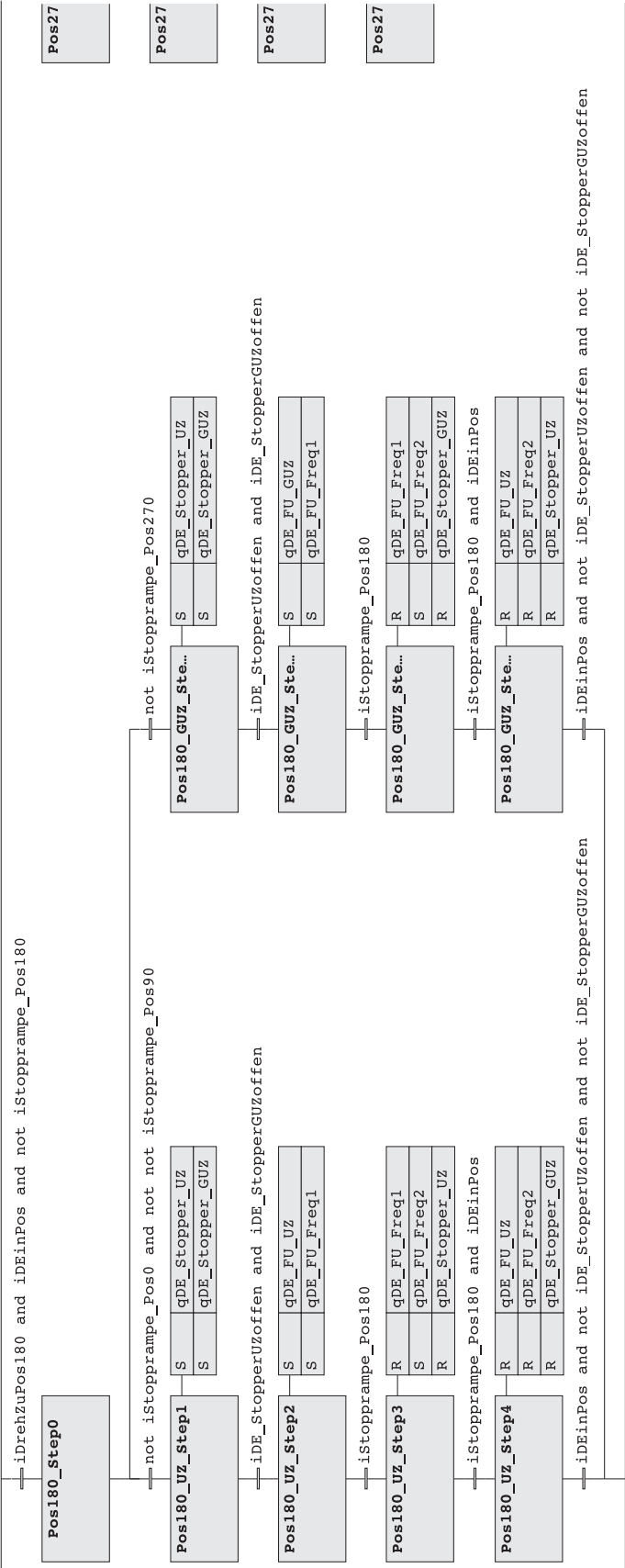


Fig. 57: Program sequence detail rotation to position 180

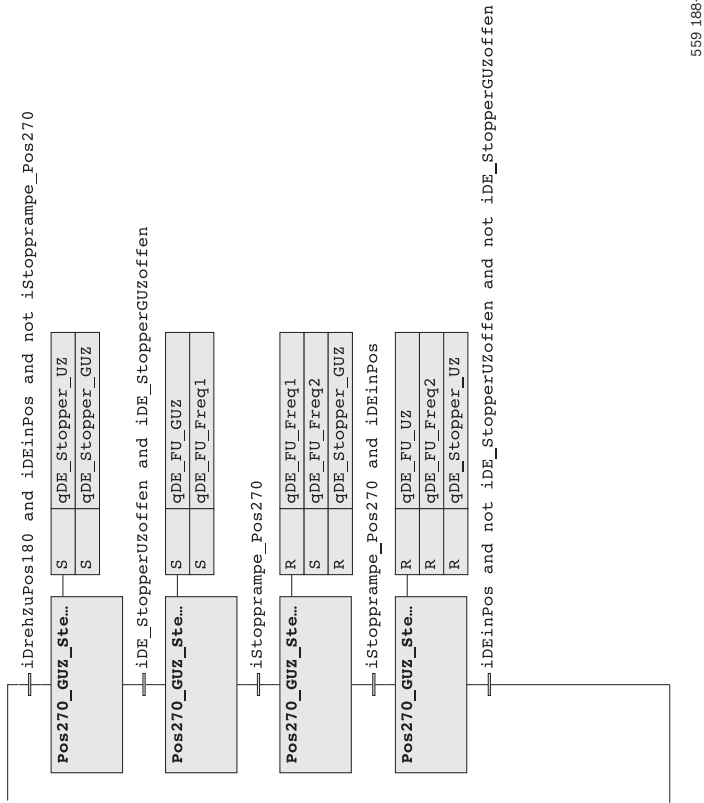


Fig. 58: Program sequence detail rotation to position 270

559 188-29

17.2 Trademark information

- PROFIBUS® is a registered trademark of PROFIBUS Nutzerorganisation e.V.

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