

EL 2

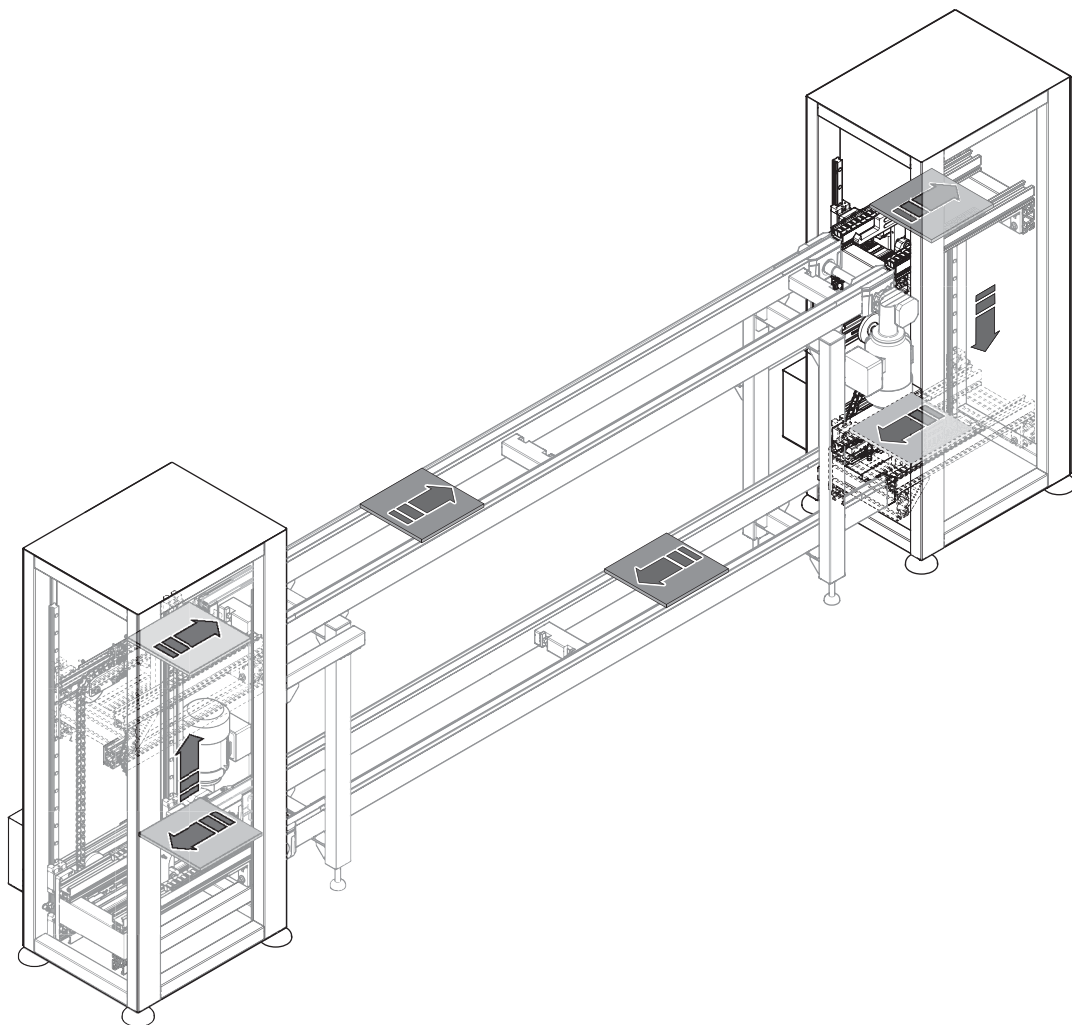
Lift

3 842 998 861

Assembly instructions
3 842 558 372/2021-10

Replaces: 2019-04
ENGLISH

ENGLISH



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The cover depicts a sample configuration. The actual product may vary.

The original assembly instructions are in German.

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3 842 558 371	EL 2 Lift
3 842 558 372	EL 2 Lift
3 842 558 373	EL 2 Elevateur
3 842 558 374	EL 2 Elevatore
3 842 558 375	EL 2 Elevador
3 842 558 376	EL 2 Elevador
3 842 558 377	EL 2 升降机

DE Deutsch
EN English
FR Français
IT Italiano
ES Español
PT Português
ZH 中文

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1 About this documentation

1.1 Validity of the documentation

This documentation applies to the following products:

- 3 842 998 861, Lift EL 2

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

This documentation contains important information relating to the safe and proper assembly, transportation, start-up, 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 start up 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	3 842 527 147	
 Declaration of installation	3 842 559 811	
 IndraDyn S Synchronmotoren MSM (DE)	R 911 329 337	
 IndraDyn S Synchronous Motors MSM (EN)	R 911 329 338	
MTpro ¹⁾	3 842 539 057	With list of spare parts

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

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 serious injury or death if not avoided.
 WARNING	Indicates a hazardous situation that may result in serious 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
EL 2	Lift from the Rexroth transfer system TS <i>2plus</i>
WT 2	Workpiece pallet from the Rexroth TS <i>2plus</i> transfer system

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 this documentation in a location where it is 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 an incomplete machine.

You may use the product as follows:

- for installation in a Rexroth TS *2plus* transfer system
- for vertically transporting Rexroth WT 2 workpiece pallets
- maximum load / section load: see the Technical Data on page 51.
- for the ambient conditions, see page 51.

The product is only 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 loss or 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.
- Using the product without protective covers.
- Transporting people on the product or the transported material.
- Persons climbing onto the product
 - keep off the product.
- Private use.

2.4 Personnel qualifications

The activities described in this document require a basic knowledge of mechanical, electrical and pneumatic systems, as well as familiarity with the corresponding technical terms. Additional knowledge of the use of lifting gear and corresponding slings is required for transporting and handling the product. To ensure safe use, these activities should only be performed by qualified personnel or a person under the direction and supervision of qualified personnel.

“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 to support activities in specific areas. You can find an overview of the training content online under:
<https://www.boschrexroth.com/de/de/academy>

2.5 General safety instructions

- As the operator, please note the following: before the initial start-up 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 start-up of the machine, 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.
- People who assemble, operate, disassemble or maintain Rexroth products must 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 start up the product if it has been determined that the end product (e.g., a machine or system) into which the Rexroth products are installed complies with the country-specific regulations, safety regulations and standards of application.

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.

During transport During installation

- Always secure the product against tipping.
- Observe the transport instructions on the packaging.
- Inspect the product for obvious transport damage.
- Lay the cables and lines so that they are adequately protected against mechanical damage and 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.

During start-up	• Before start-up, make sure that all seals and caps for the plug-in connections are correctly installed and undamaged in order to prevent fluids and debris from infiltrating the product. • Allow the product to acclimatize for a few hours prior to start-up 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 start up a product that has been completely installed. • Make sure that all the safety equipment belonging to 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 adjustment devices on components or parts. • Only allow people to be in the immediate vicinity of the product when it is operating if they are authorized by the operator 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 an error or other irregularities, 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. • After an EMERGENCY STOP or a malfunction, only switch the system back on once you have established and rectified the cause of the fault. • 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.
EMERGENCY STOP, malfunction During maintenance and servicing	• Dispose of the product in accordance with the regulations in your country.
During disposal	

2.7 Personal protective equipment

- Wear appropriate protective clothing when handling the product (e.g., safety shoes, close-fitting clothing, a hair net for long, loose hair).
- As the system user or operator, you are personally responsible for ensuring the use of appropriate protective equipment when using the product.
- All components of the personal protective equipment must be intact.

2.8 Operator's obligations

- Before the initial start-up or re-commissioning of a conveyor system, carry out a risk assessment in accordance with DIN EN ISO 12100.
- Before the initial start-up, make sure there are no protruding or sharp-edged parts that may be a hazard to personnel working or moving in the area.
- Provide the operating personnel with safety-related instructions before the initial start-up or restarting, 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 faulty installation, start-up and operation, as well as improper use and/or improper handling.
- Prevent cleaning agents from getting into the system.
- Never use solvents or corrosive cleaning agents.
- Do not use a pressure washer for cleaning.

4 Scope of delivery

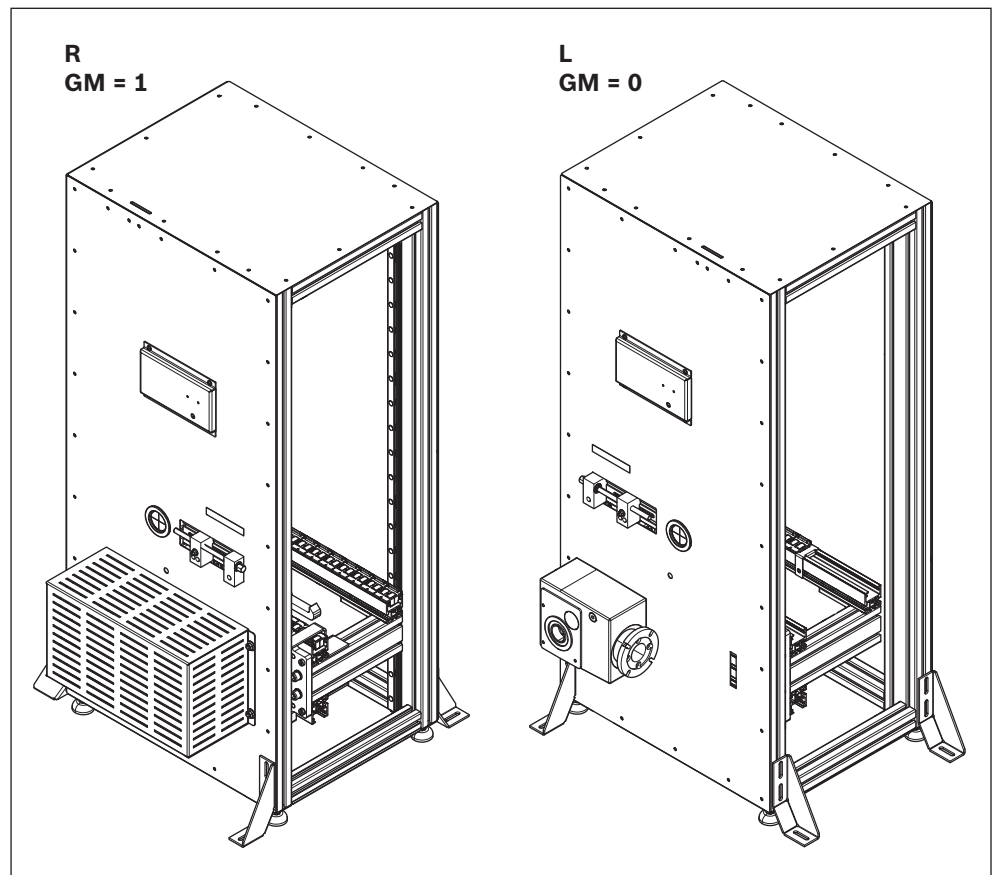
The scope of delivery includes the following:

- 1 Lift EL 2, 3842998861
- 1 auxiliary kit cover set/lift, 3842998884
- 1 auxiliary kit cover fastener/lift, 3842998885
- 1 connection kit EL 2, 3842559810
- 1 adapter LU 2 for EL 2, 3842559809
- only if ordered (GM=1): auxiliary kit servo control/ lift, ,
 - CP=1: R988123198
 - CP=2: R988123199
 - CP=3: R988123201
 - CP=4: R988123203
 - CP=5: R988123204
- only if ordered (GM=1): attachment kit sensor fasteners/EL2, R988107158
- only if ordered (GM=1): auxiliary kit Battery Box, R988114621
- only if ordered (GM=1 & IT=400,480,640,800): braking resistor EL 2, R988123135
- 1 assembly instructions "EL 2, lift".

4.1 Condition on delivery

- Lift EL 2 comes assembled with a transport securing device and protective covers mounted on the motor side, base and top (cover set/lift)
- Auxiliary kit cover set/lift, unassembled (front and back)
- Auxiliary kit cover fastener/lift, unassembled
- connection kit EL 2, unassembled
- adapter set LU 2 for EL 2, unassembled
- (only if ordered, GM=1) auxiliary kit servo control/lift, unassembled
- (only if ordered, GM=1) attachment kit sensor fasteners/EL2, unassembled
- (only if ordered, GM=1 & IT=400,480,640,800): braking resistor EL 2, unassembled
- only if ordered (GM=1): auxiliary kit Battery Box

R: Right version
L: Left version
GM = 1: with motor
GM = 0: without motor



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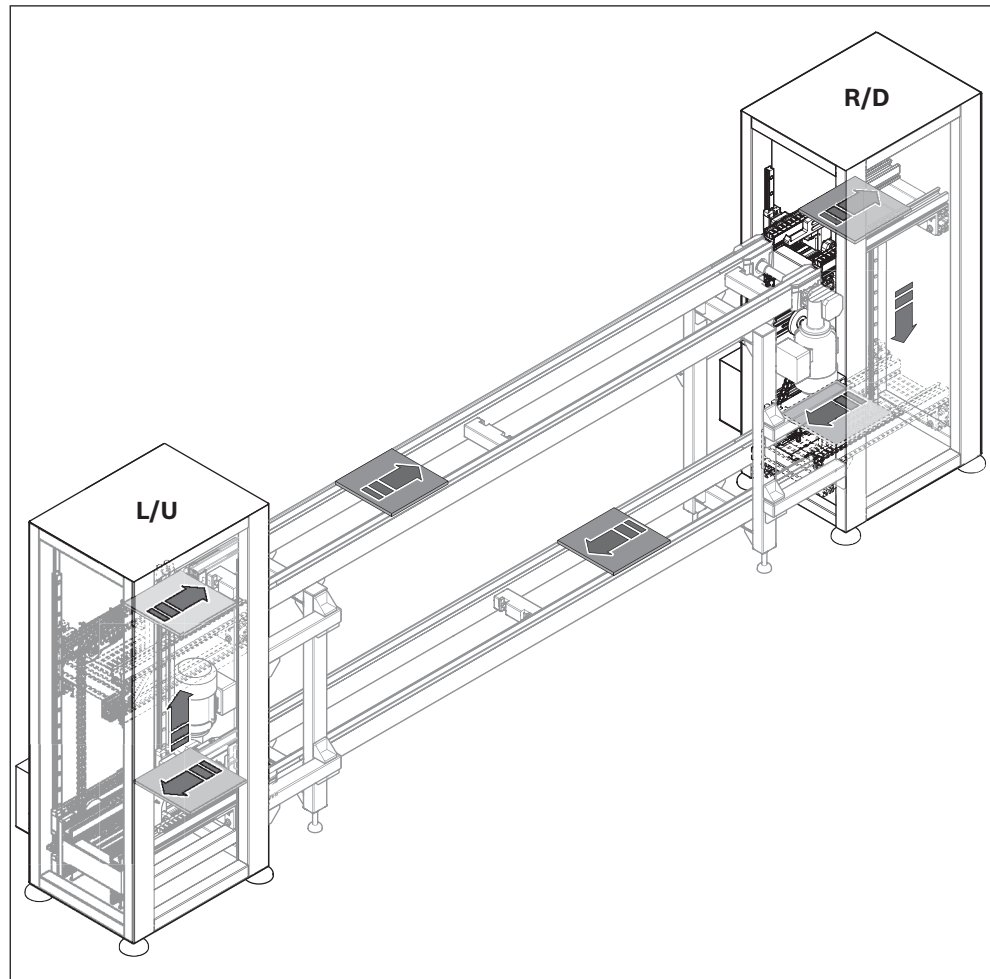
Fig. 1: Examples of the lift's condition on deliveryEL 2

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5 About this product

5.1 Performance specifications

- L:** Left version
U: Vertical transport upwards
R: Right version
D: Vertical transport downwards



558 371-01

Fig. 2: Performance specifications of the Lift EL 2

5.1.1 Use of the Lift EL 2

- For installation in a Rexroth TS 2*plus* transfer system.
- For vertically transporting WT 2 workpiece pallets.

5.1.2 Design of the Lift EL 2

- Extremely compact construction.
- Conveyor medium: infeed and outfeed by means of a cleat (hook).

5.2 Product description

- A:** WT return below working height
- B:** WT return above working height
- L:** Left version
- U:** Vertical transport upwards
- R:** Right version
- D:** Vertical transport downwards

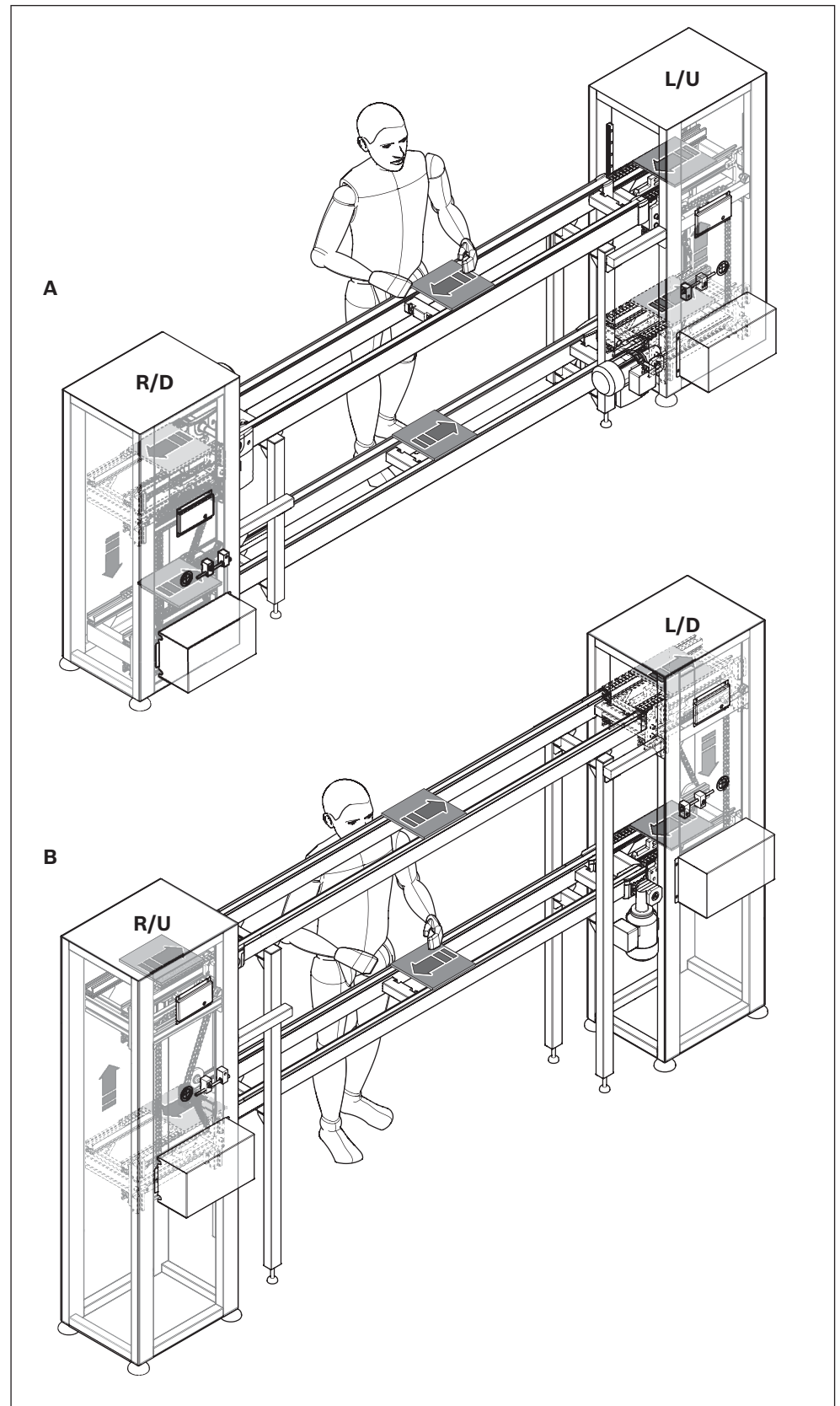
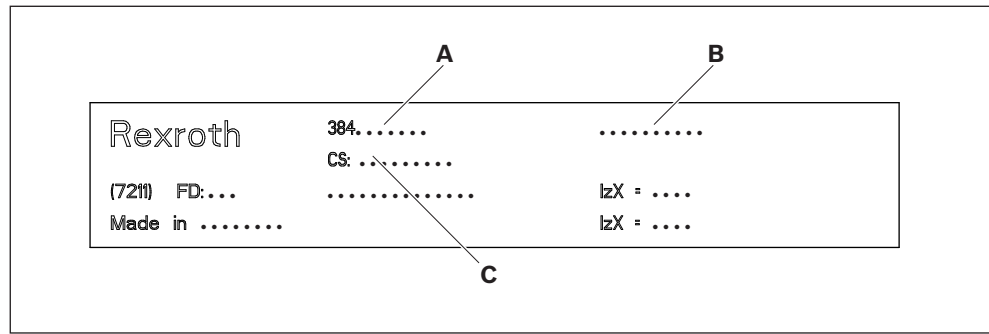


Fig. 3: Lift EL 2

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5.3 Identification of the product

- A:** Material number
(order number)
- B:** Designation
- C:** Design and dimensions



Typschild

Fig. 4: Name plate

6 Transport and storage

- Observe the transport instructions on the packaging.
- Transport weight: see delivery documents.
- Secure the product against tipping!
- Always maintain the ambient conditions during storage and transport, see page 51.

6.1 Transporting the product



WARNING

Suspended loads can fall!

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

- ▶ Only use slings with a sufficiently high bearing load capacity (see delivery documents for the product weight).
- ▶ Make sure the lifting straps are correctly fastened before lifting the product!
- ▶ Secure the product against tipping when lifting!
- ▶ Make sure that no one but the operator is in the danger zone when lifting and lowering!

6.2 Storing the product

- Only set the product down on a flat surface.
- Protect the product from mechanical influences.
- Protect the product from environmental influences, such as dirt and moisture.
- Observe the ambient conditions, see page 51.
- Support the product so that suspended motors/actuators/cylinders will not be burdened.

7 Assembly

7.1 Unpacking

NOTICE

Malfunctions due to incorrect assembly and start-up

The product can get damaged and its service life shortened.

- ▶ When unpacking the product, do not lift it by the platform.

- ▶ Lift the product out of its packaging.
- ▶ The protective covers are covered with protective film. Only remove this once the protective covers have been installed
- ▶ 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 51).

7.2.1 Installation position

- ▶ Install the product level and plumb, at right angles, and axially parallel.
This ensures proper functioning and prevents premature wear.

7.3 Required tools

- Hex wrenches (open-ended spanners) SW8, SW10, SW13, SW17, SW19.
- Hex socket wrenches SW3, SW4, SW5.
- Hexagon socket wrenches (Torx™) T30, T50
- Phillips screwdriver, PZ2
- Hammer
- Spirit level
- Combination pliers
- Flat smooth file

7.4 Symbols used

Table 5: Symbols used

	Connection with T-bolt and flange nut. Make sure the T-bolt is in the correct position when inserting into the slot and tightening. The notch at the head of the bolt 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
 $M_D = 20\text{Nm}$	Hex wrench SW = wrench size ... mm M_D = required tightening torque in Nm
 $M_D = 8\text{Nm}$	Hexagon socket wrench SW = wrench size ... mm M_D = required tightening torque in Nm
	Screwdrivers for cross-head screws PZ ... = Pozidriv cross recess, size ... PH ... = Phillips cross recess, 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
	Oil/oil with specific lubricant: • GHD: Lubricate with Structovis GHD, 0 842 904 229 • V 68: Mineral oil viscosity 68 according to DIN (e.g. Aral, Shell)
	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 installation steps. The numbers correspond to the sequence of assembly, in accordance with the instructions of the accompanying text.
	Graphical depiction 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.

7.5 Installing the product

7.5.1 Installing the Lift EL 2



Please note:

- Delivery condition of the Lift EL 2:
The lift is secured in its lower lifting position for transport and assembly (☞ C).
- ▶ Only remove the securing device (C) once the assembly has been completed.
Storage of transport locking device (☞ X).
- Installing the section supports:
 - ▶ The distance between the upper and lower transverse profile of the section supports (☞ S) must be equal to the lifting height (☞ S) of the Lift EL 2.

1) Condition on delivery: protective covers are mounted on the motor side, top and base.

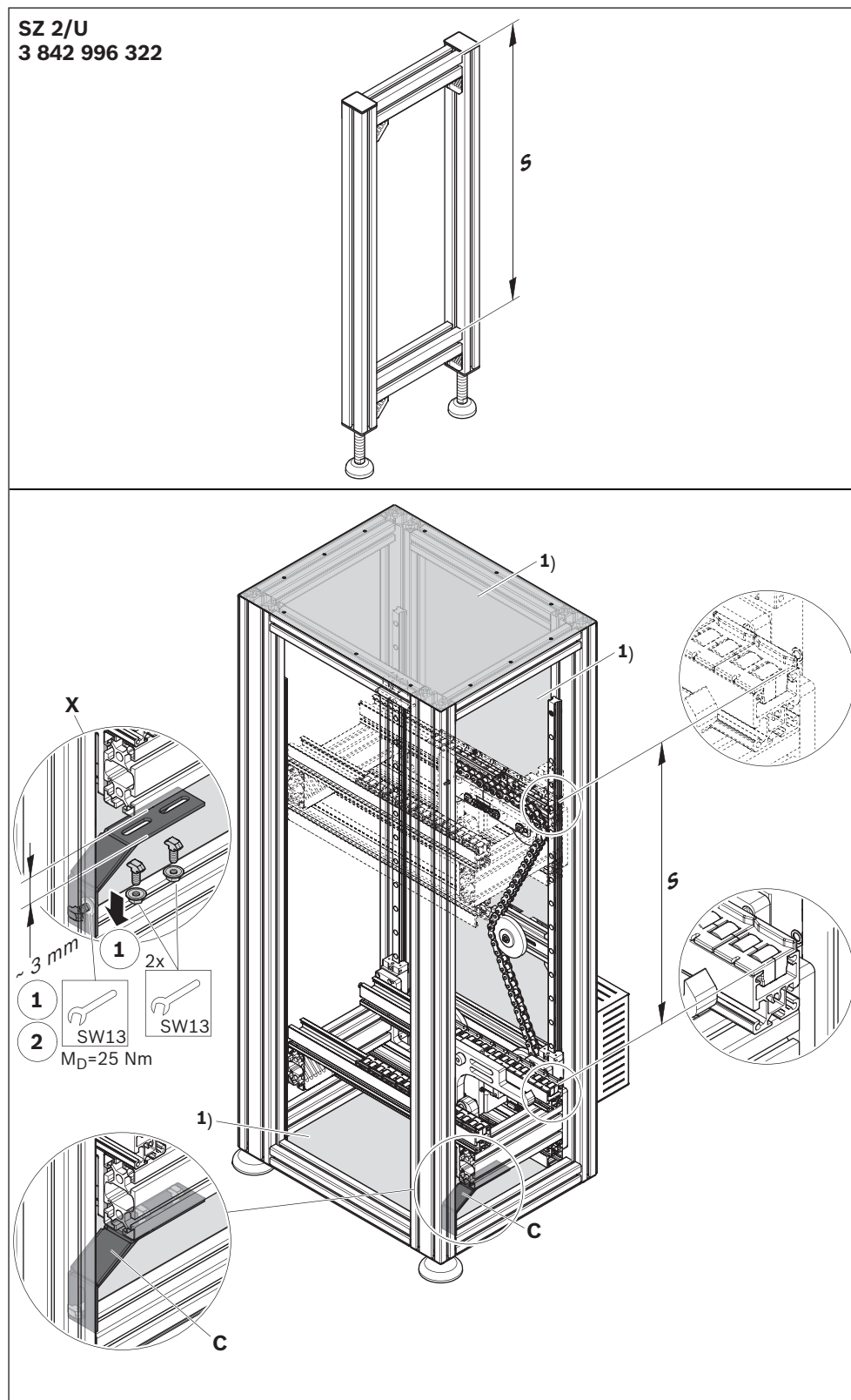


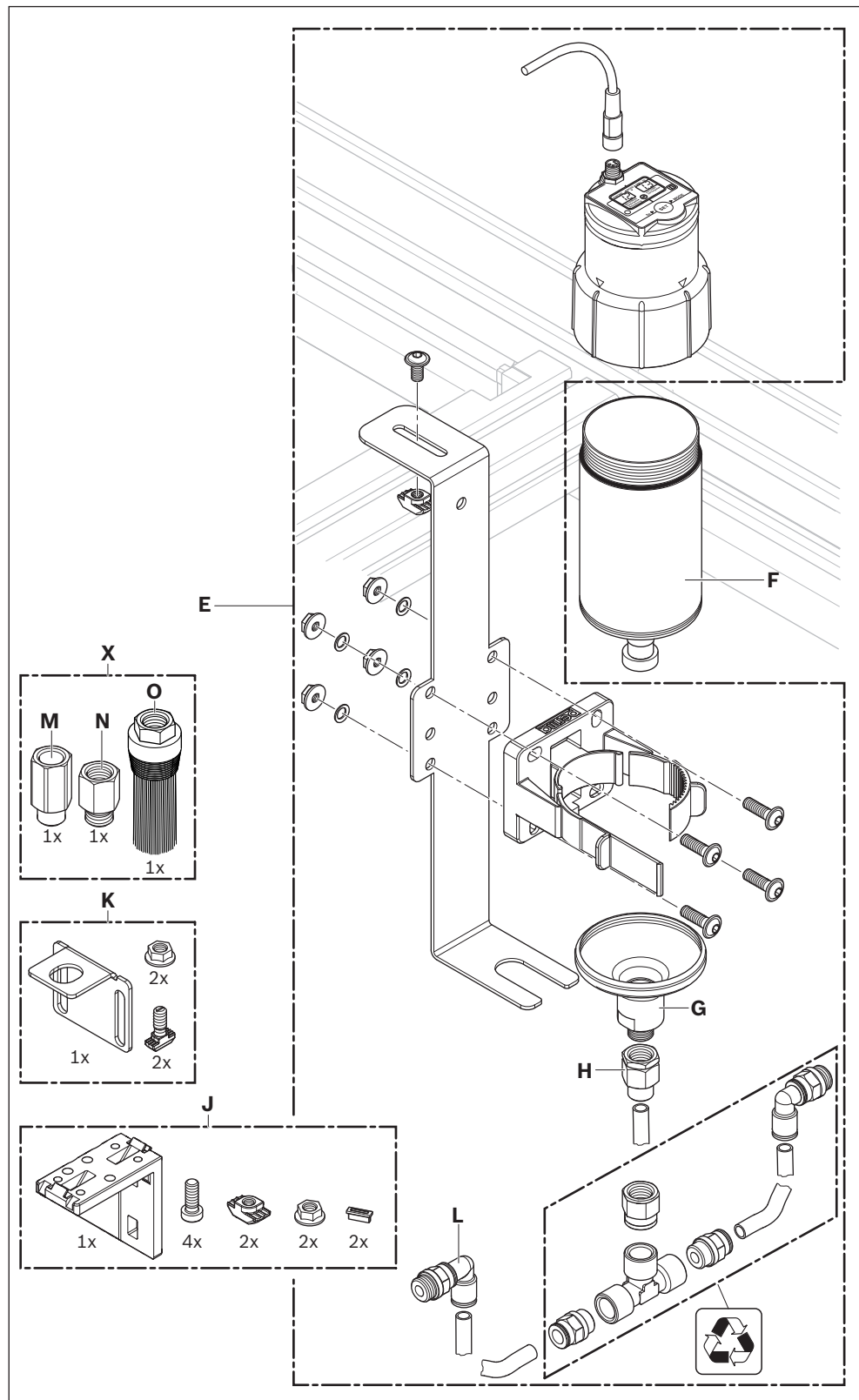
Fig. 5: Installing the section supports

LU 2 automatic lubrication unit**Required accessories:**

- E:** LU 2 lubrication unit,
3 842 543 482
- F:** LC 2 oil container,
3 842 543 469
- J,** EL 2 adapter set,
K: 3 842 559 809
- X:** LU 2/EL 2 mounting kit,
3 842 562 287

**Please note:**

The marked parts of the LU 2 lubrication unit are not needed.



558 371-07

Fig. 6: Installing the LU 2 automatic lubrication unit (1/2)



Please note:

- For further details see the LU 2 automatic lubrication unit assembly instructions

- Install the lubricating brush (O).
- Install the LU 2 lubrication unit.
- Install the cable bushing (P).
- Attach the lubrication unit hoses.

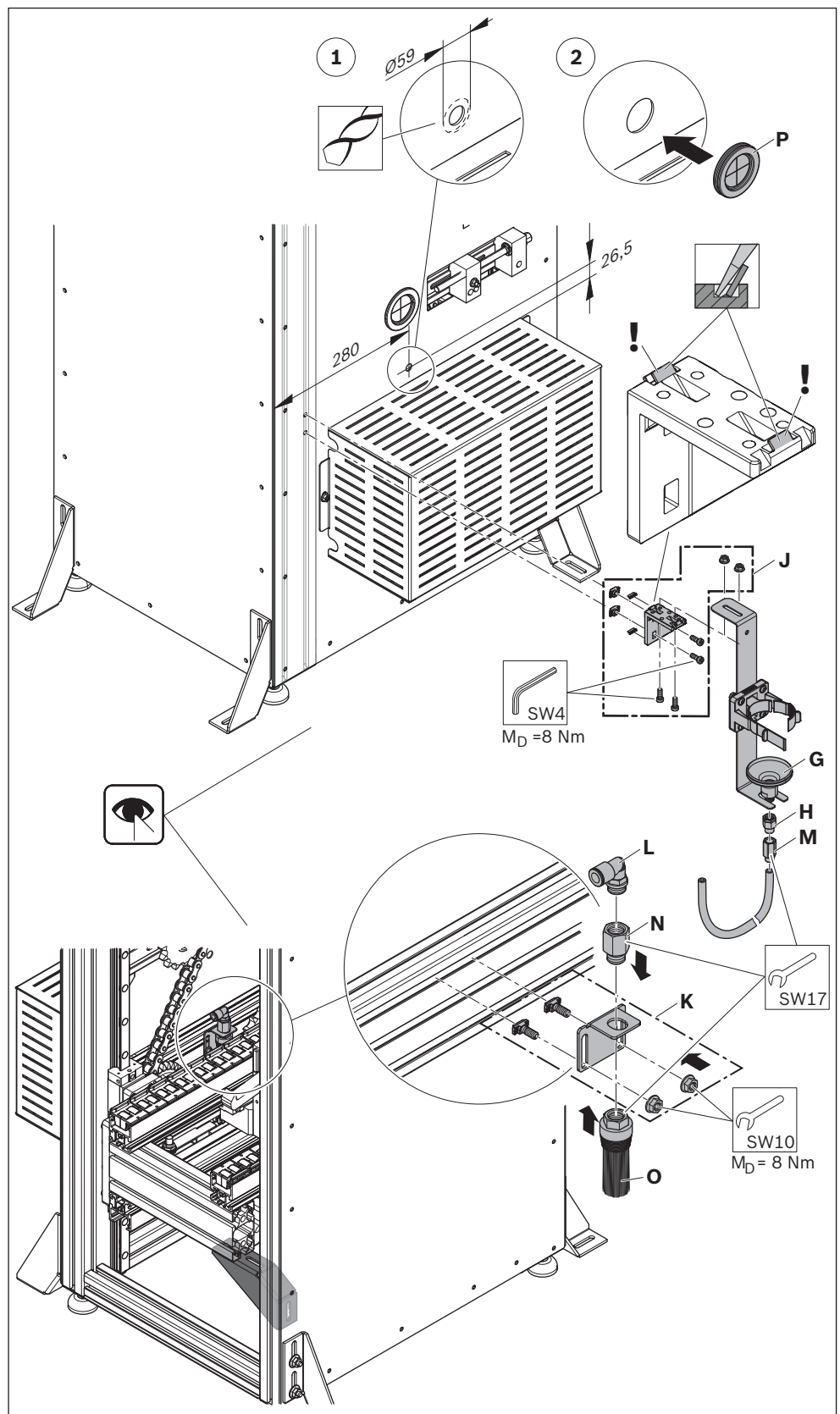


Fig. 7: Installing the LU 2 automatic lubrication unit (2/2)

558 371-15

1. Mount the belt sections on the section supports and align them so they are flush, horizontal, and at the height of the upper conveying level (👉 **1**).

Type	X ₃ (mm)
BS 2	335
BS 2/C-100	335
BS 2/C-250	335
BS 2/C-H	335
BS 2/R-300	335
BS 2/R-700	335
BS 2/R-H	335



Please note:

Depending on the lifting height of the lift, the conveyor width of the belt sections, and the spatial environment, it may be necessary:

- to modify the mounting position of the motor-gear combination or the gear motor of the belt sections (see page 21)
- to modify the mounting position of the terminal box (see page 22).

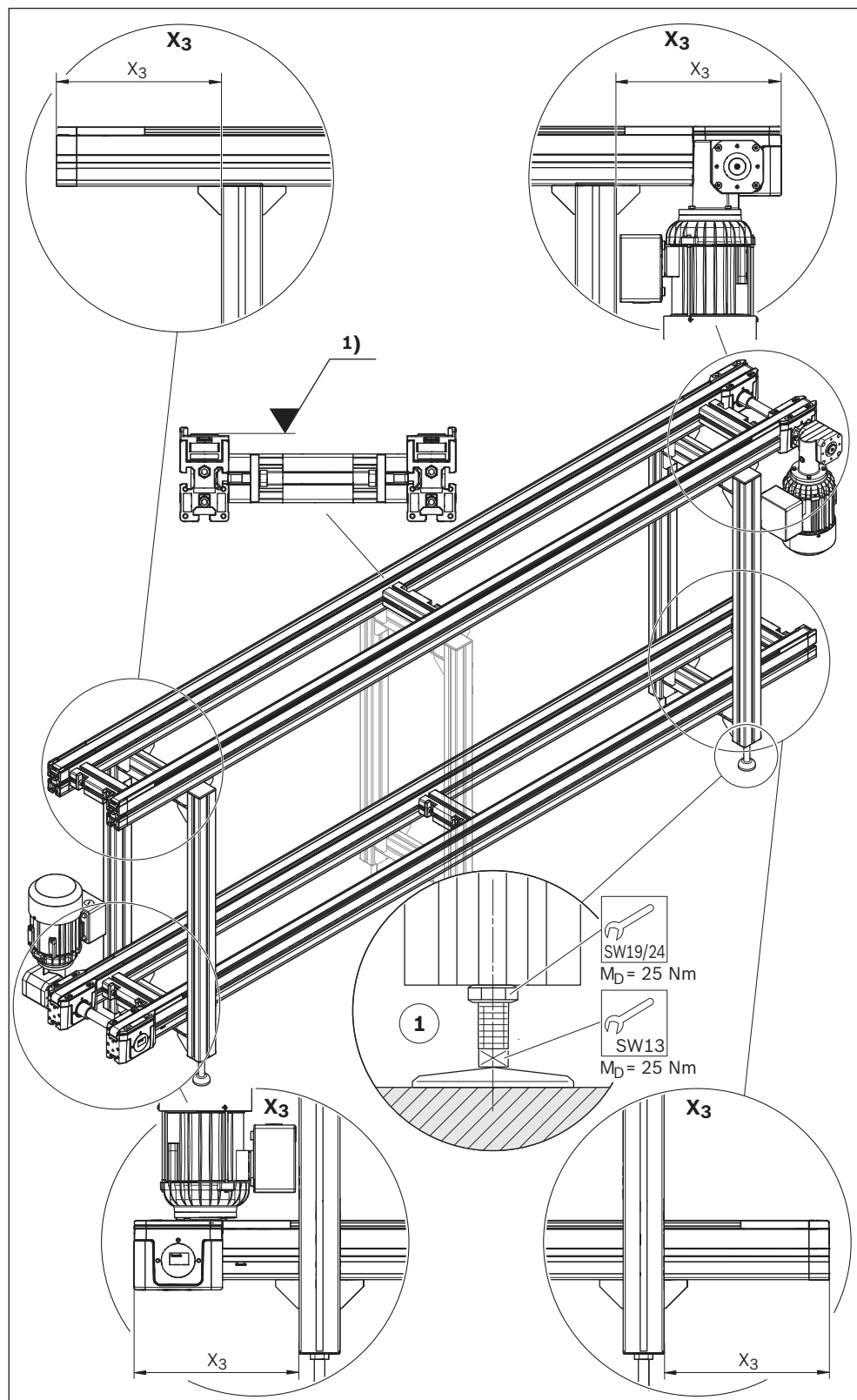


Fig. 8: Installing the belt sections

Modifying the mounting position of the motor-gear combination or the gear motor

1. Remove the screws (A / B).
2. Swivel the motor-gear combination or the gear motor around the drive axle in 90° intervals.
3. Install the screws (A / B).

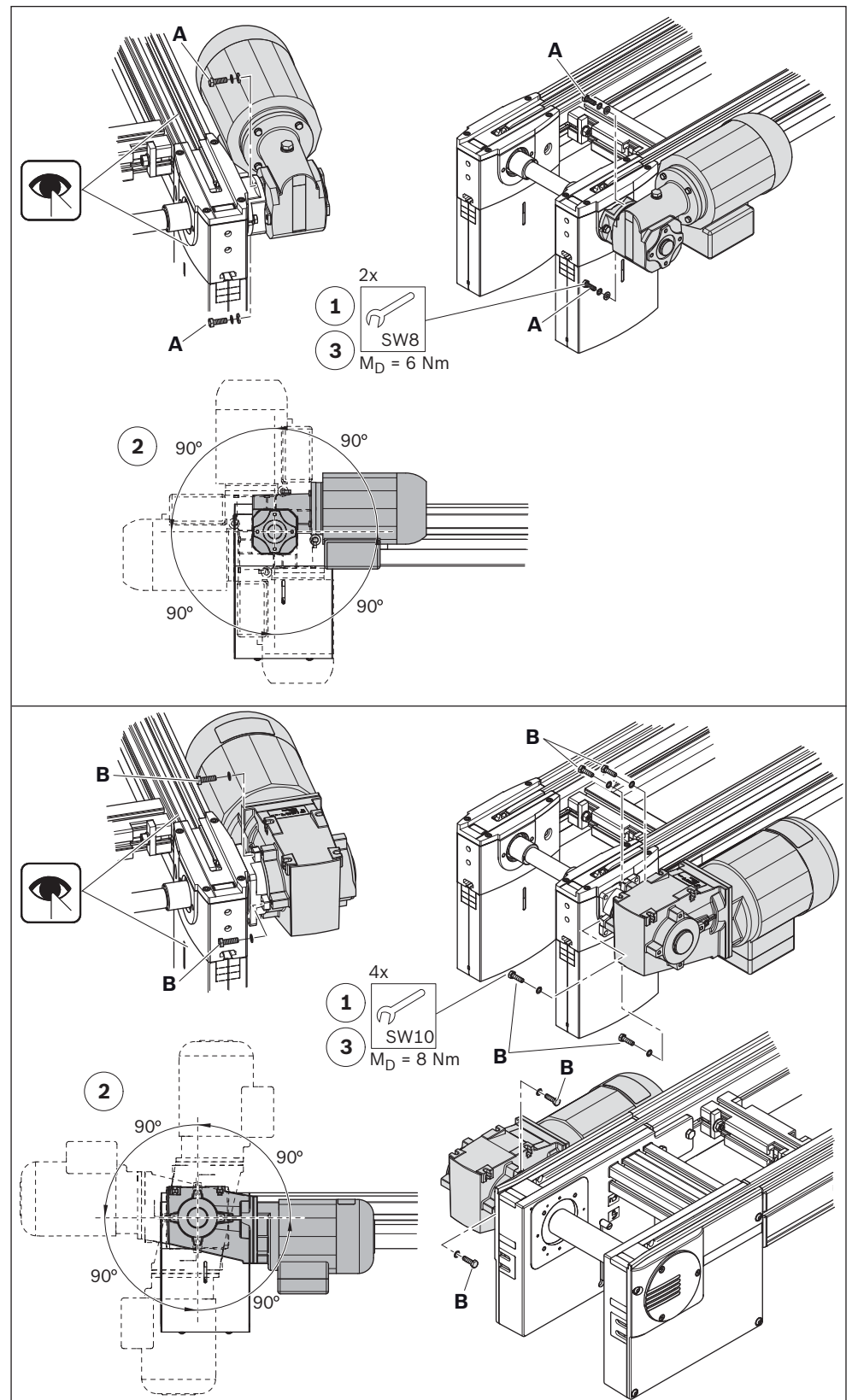


Fig. 9: Swivel the motor-gear combination or gear motor around the drive axle

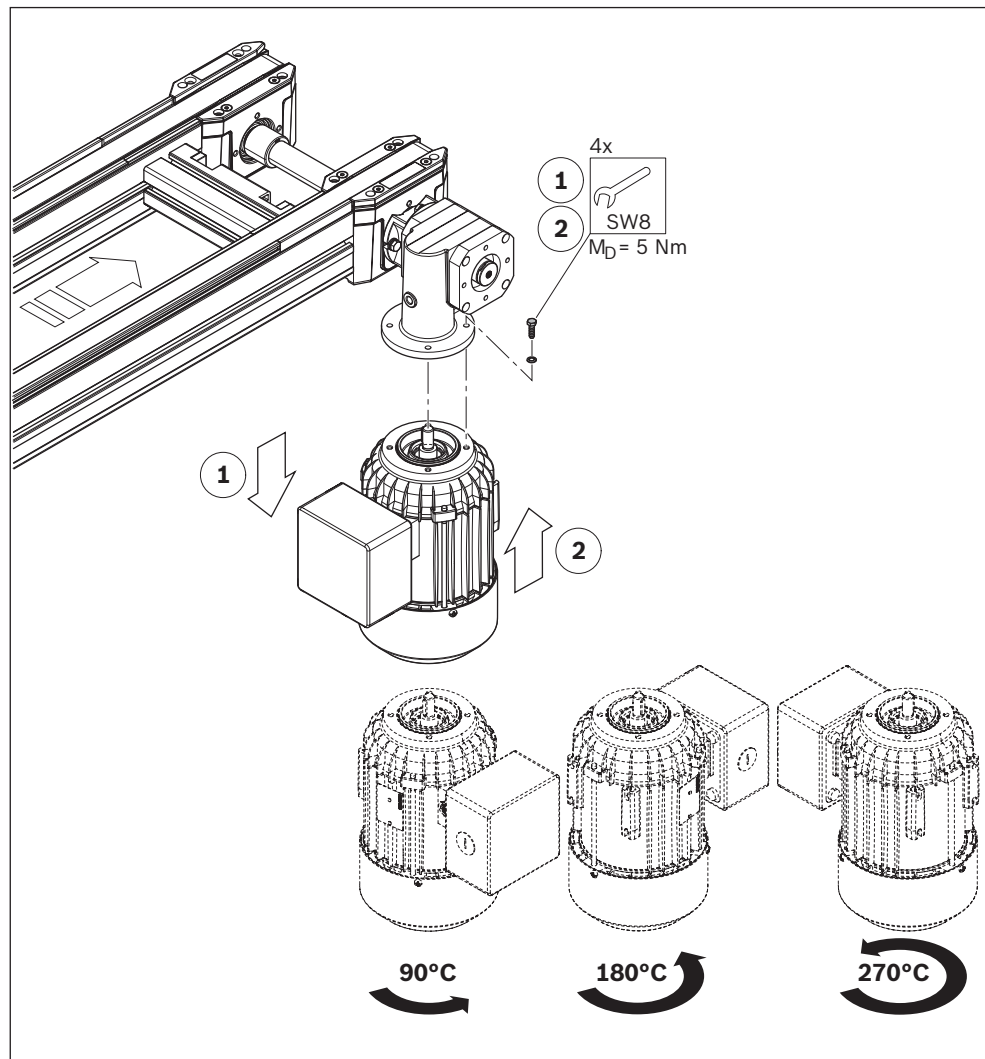
Modifying the mounting position of the terminal box

1. Remove the motor from the gear.
2. Install the motor in the correct position (terminal box).



Please note:

- Do **not** tilt the motor and make sure it has the necessary clearance area for installation.
- Install the motor in the proper position (terminal box) and connect it to the gear.
- If the motor is not in the proper position: do **NOT** rotate the motor. Disconnect the motor from the gear and reconnect it.



558 371-16

Fig. 10: Modifying the mounting position of the terminal box

3. Align the first Lift EL 2 so it is flush, horizontal, and at the height of the lower conveying level.
4. Connect the lift to the section supports

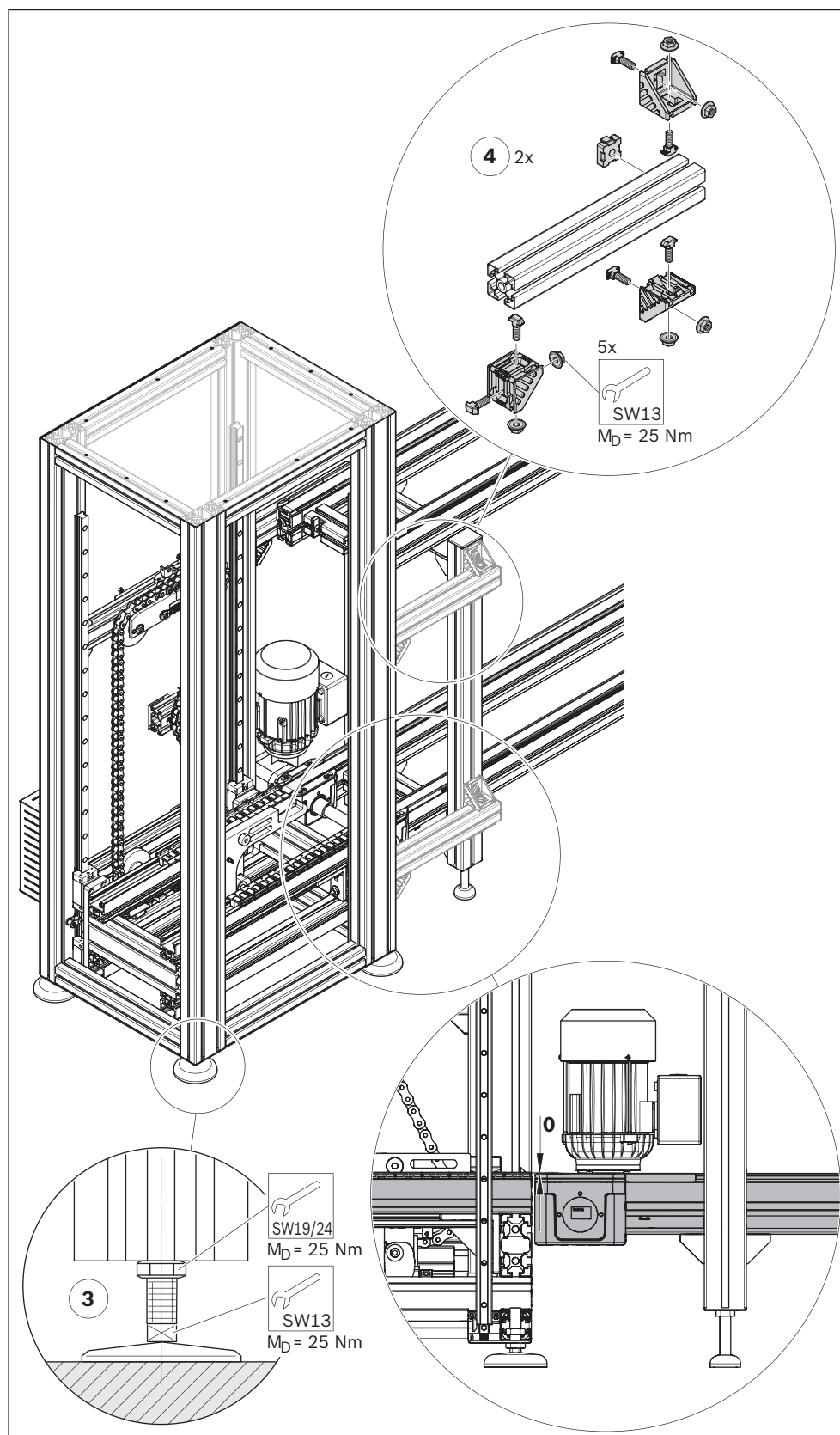


Fig. 11: Installing the Lift EL 2 (1/4)

558 371-12

5. Align the second Lift EL 2 so it is flush, horizontal, and at the height of the lower conveying level.
 6. Connect the lift to the section supports
- 1) Depending on the travel of the lift and the mounting position of the motor, this profile may not be mounted.

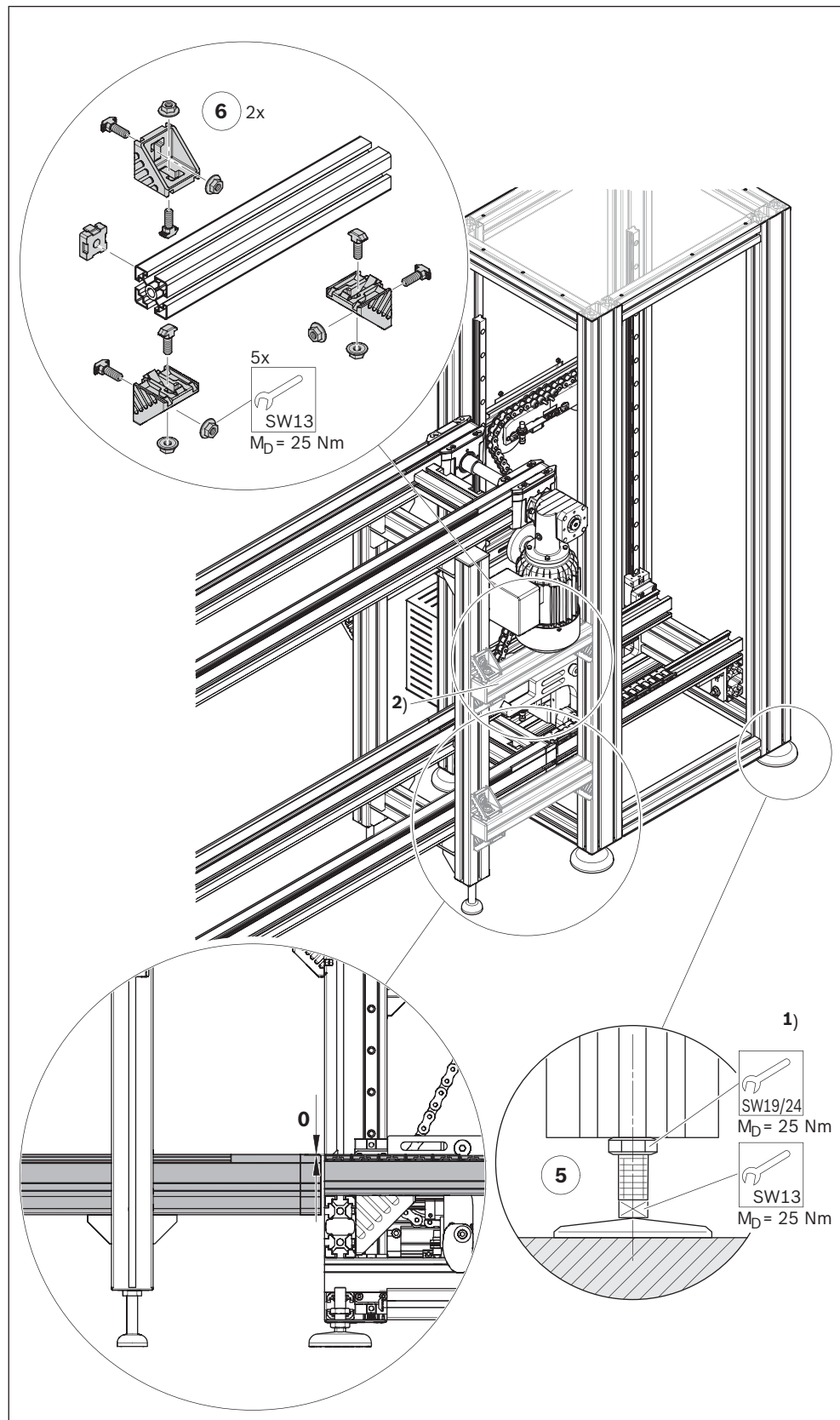


Fig. 12: Installing the Lift EL 2 (2/4)

558 371-13

7. Screw the belt section and the lifts to the floor.
For each connection, you will need:
- 1x foundation bracket,
3 842 146 815
 - 1x dowel, **3 842 526 560**
 - 2x T-bolts,
3 842 528 718
 - 2x flange nuts,
3 842 345 081

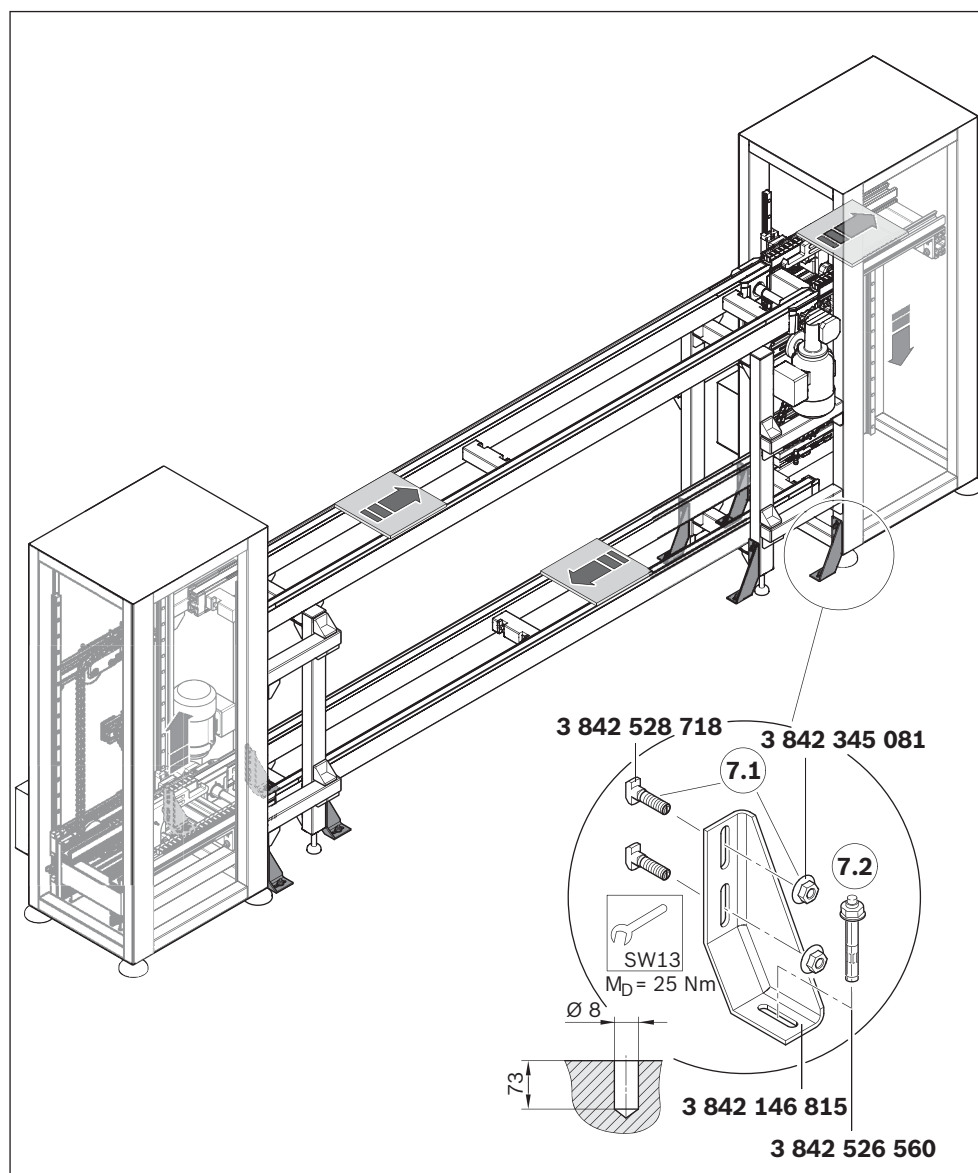


Fig. 13: Installing the lift EL 2 (3/4)

558 371-05

8. Install the protective covers.
9. **Only if required:** Install the LU 2 automatic lubrication unit (see page 18)
10. Remove the transport securing device (C).
11. Install the transport locking device (C) as fall protection under the lower position of the lift. Keep the T-bolts and flange nuts.
12. Check that the drive chain has the correct tension (see page 27).

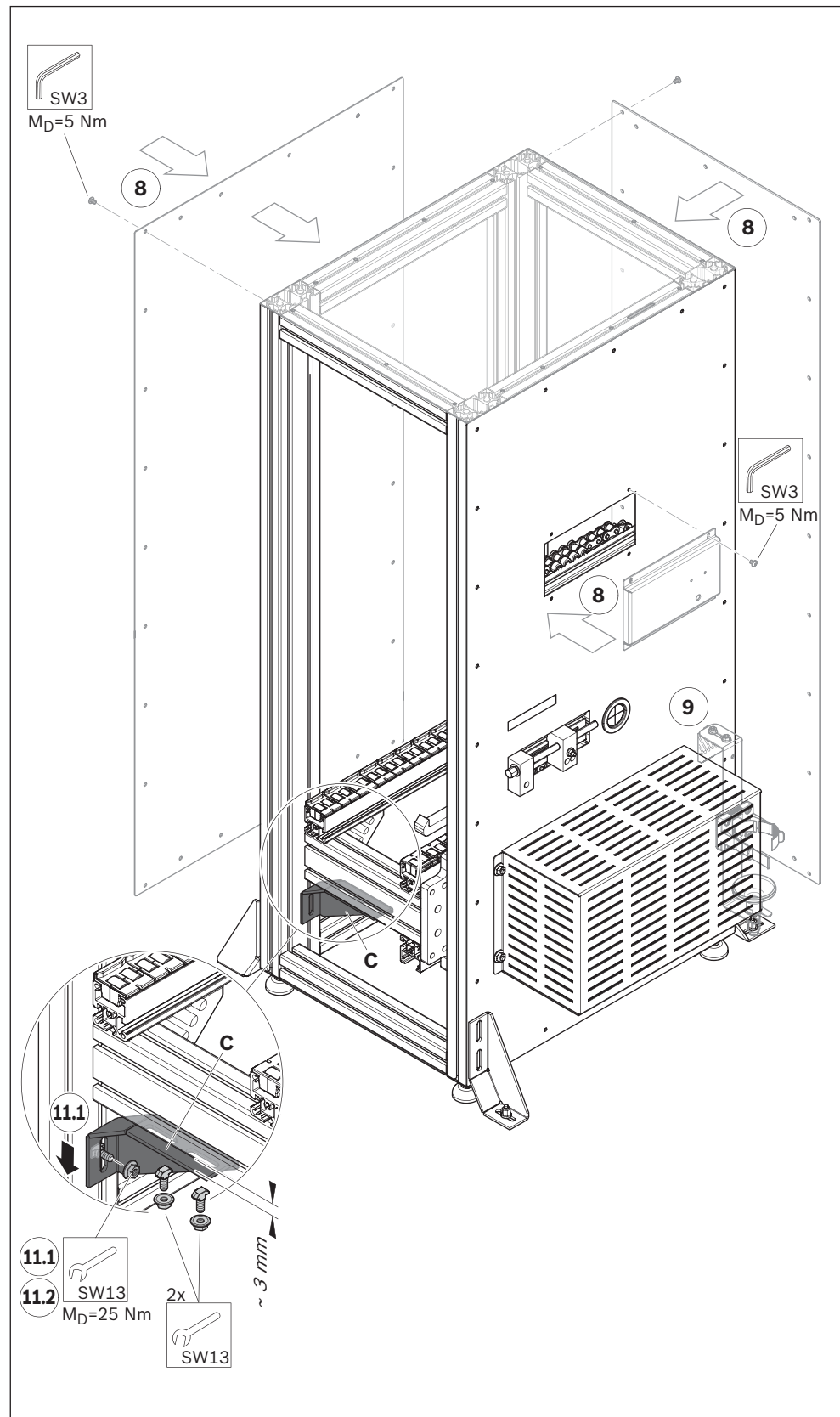


Fig. 14: Installing the Lift EL 2 (4/4)

558 371-14



Check after assembly and then regularly every 1,000 hours:

1. Move the lift to the lower position.
2. Loosen the fixing screw (D).
3. Tension the chain tensioner (E):

$M_D = 1.5 \text{ Nm}$

Tighten the fixing screw (D):

$M_D = 8.7 \text{ Nm}$

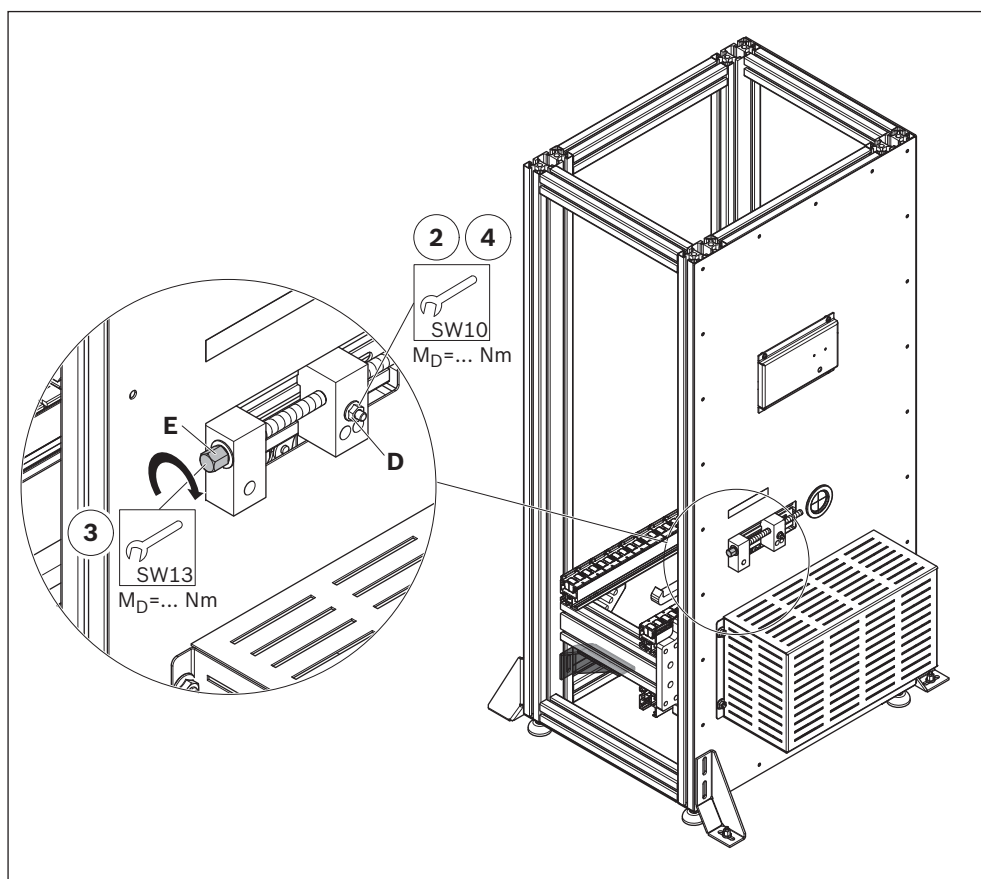


Fig. 15: Correct tensioning of the drive chain

558 371-19

7.5.2 Making the electrical connection to the product



WARNING

High electrical voltage!

Risk of serious injury or death from electric shock.

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

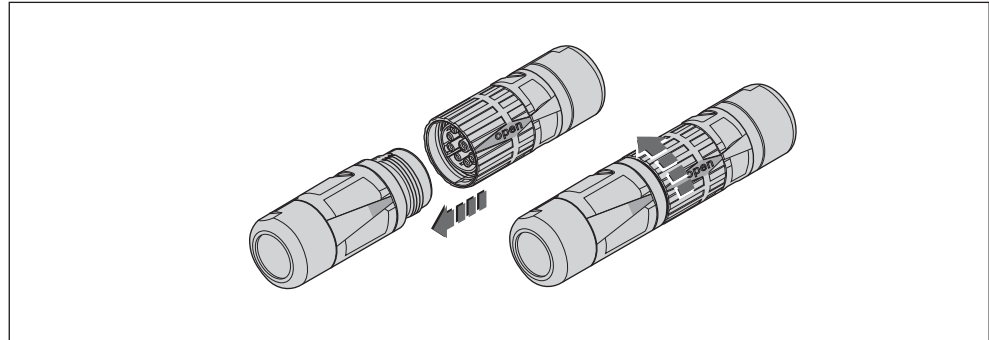
- Select the control and sensor elements according to EN ISO 13849. Factor in the load to be transported and the transport speed.
- Electrical work may only be carried out by qualified personnel! (e.g. connecting the motor)
- Observe the DIN EN 60204 standard (previously: VDE regulation VDE 0100) for Germany, or corresponding regulations in the country of use.

Motor connection

- See assembly instructions “IndraDyn S Synchronous Motors MSM”, R 911 329 337.

SpeedCon quick locking system

1. Plug the cable connectors together in the open position.
2. Hand-tighten the cable connector by turning it 90°.



558 371-35

Fig. 16: SpeedCon quick locking system

Circuit diagram MSM

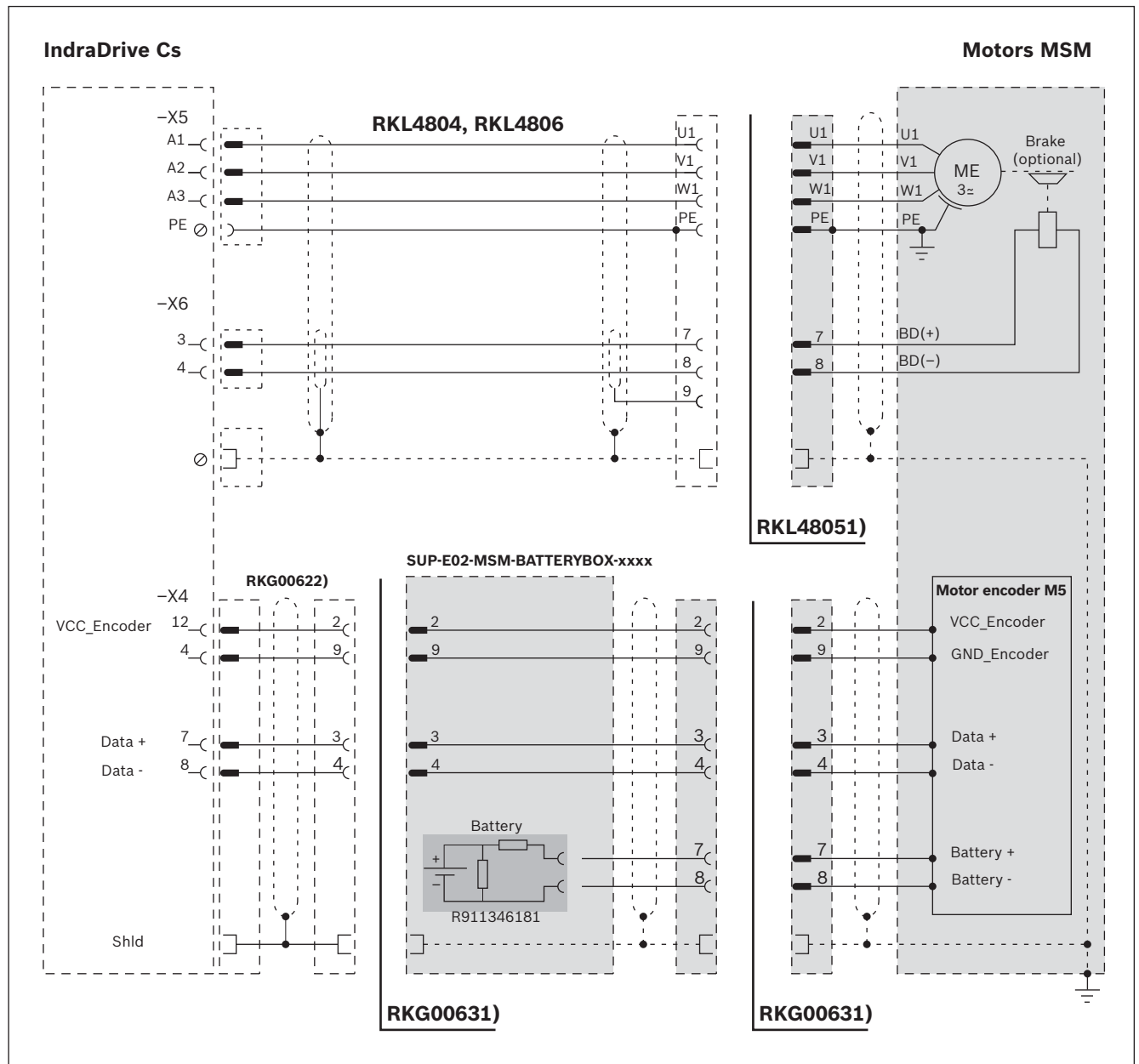


Fig. 17: Circuit diagram MSM

8 Start-up

8.1 Initial start-up



CAUTION

Sudden movements, falling workpiece pallets

- ▶ Injuries caused by 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 start-up

The product can get damaged and its service life shortened.

- ▶ Start-up requires basic mechanical, pneumatic and electrical knowledge.
- ▶ The product may only be started up by qualified personnel (see page 8)

- Before the initial start-up 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 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 competent person using tip switches and if there is no possibility of interference from other switching devices.
- Only start up the product if all safety equipment has been installed in the system and is functional.
- Only start up a product that has been completely installed.

NOTICE

Prescribed functional test carried out by the user before initial start-up

Testing for vertical stackers in accordance with DIN EN 619, subsection 6.3.4:

- ▶ The carriage of vertical stackers is to be loaded with a load during initial start-up which corresponds to 1.1 times the nominal carrying capacity. A full cycle up and down is to be run with this load to show that the carriage correctly stops at all designated stopping positions and the load is transferred from and to the adjoining continuous conveyers with error.

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** Dismantling, decommissioning and disposal
- 5** Set up
- 6** Testing
- 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

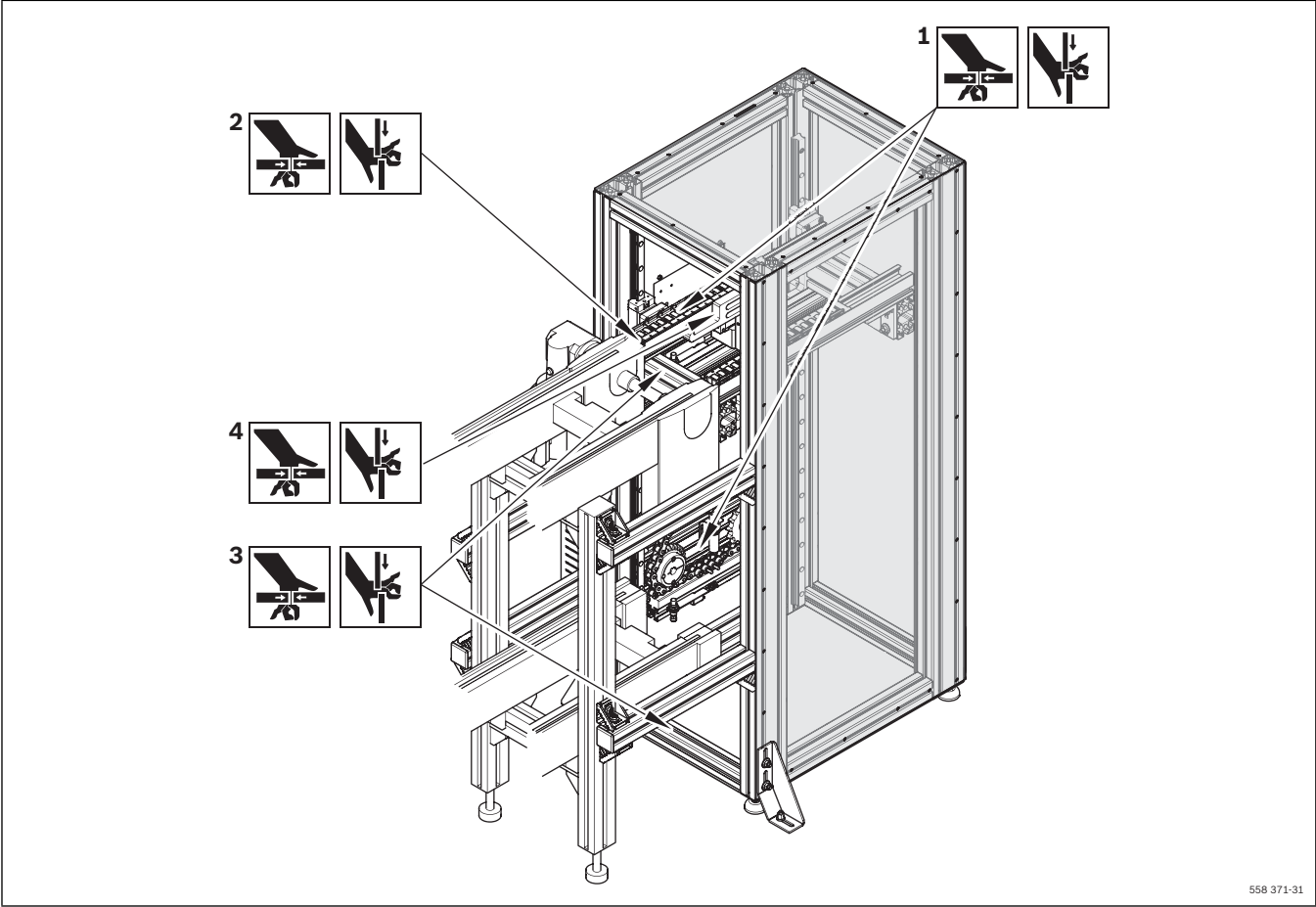
Operating states of the machine, Sect. 5.4 b

- 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 parts 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** Environmental conditions (e.g. damaged floors)

8.2
Residual risks

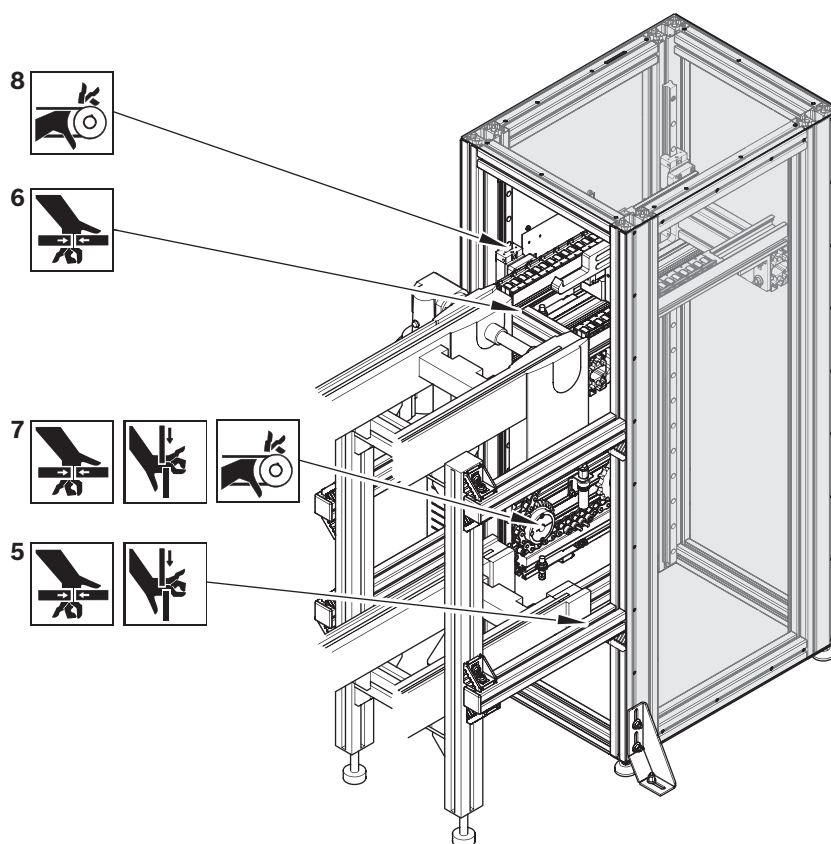
Life stage 1), location		Situation	Hazard		Action		
1	1	Between the platform of the lift and the frame when lifting / lowering.	Body parts can become trapped		Crushing,	Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.	
					Shearing		
2	2	Between the platform of the lift and the incoming / outgoing belt section when lifting / lowering.	Body parts can become trapped		Crushing,	Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.	
	3				Shearing		
	6						
	10						
	15						
3	2	Between the approaching workpiece pallet and cleat.	Body parts can become trapped		Crushing,	Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.	
	3				Shearing		
	6						
	10						
	15						
4	2	Between the platform of the lift and the incoming workpiece pallet when lifting / lowering.	Body parts can become trapped		Crushing,	Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.	
	3				Shearing		
	6						
	10						
	15						

¹⁾ Life stages of the machine according to EN 12100 Sect. 5.4 a/b (No. 1- 27), Sect. 5.4 a (see page 9)



	Life stage ¹⁾ , location	Situation	Hazard	Action
5	2 Between the approaching 3 workpiece pallet and the 6 frame of the lift. 10 15	Body parts can become trapped	 	Crushing, Shearing Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.
6	2 Between the frame of the 3 lift and the cleat when the 6 workpiece pallet is fed in. 10 15	Body parts can become trapped	 	Crushing, Shearing Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.
7	2 Between the rotating 3 drive chain, sprockets 6 and chain supports. 10 15	Body parts can become trapped	  	Crushing, Shearing, Entanglement Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.
8	2 Between the runner 3 block and guide rail when 6 lifting / lowering. 10 15	Body parts can become trapped		Entanglement Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.

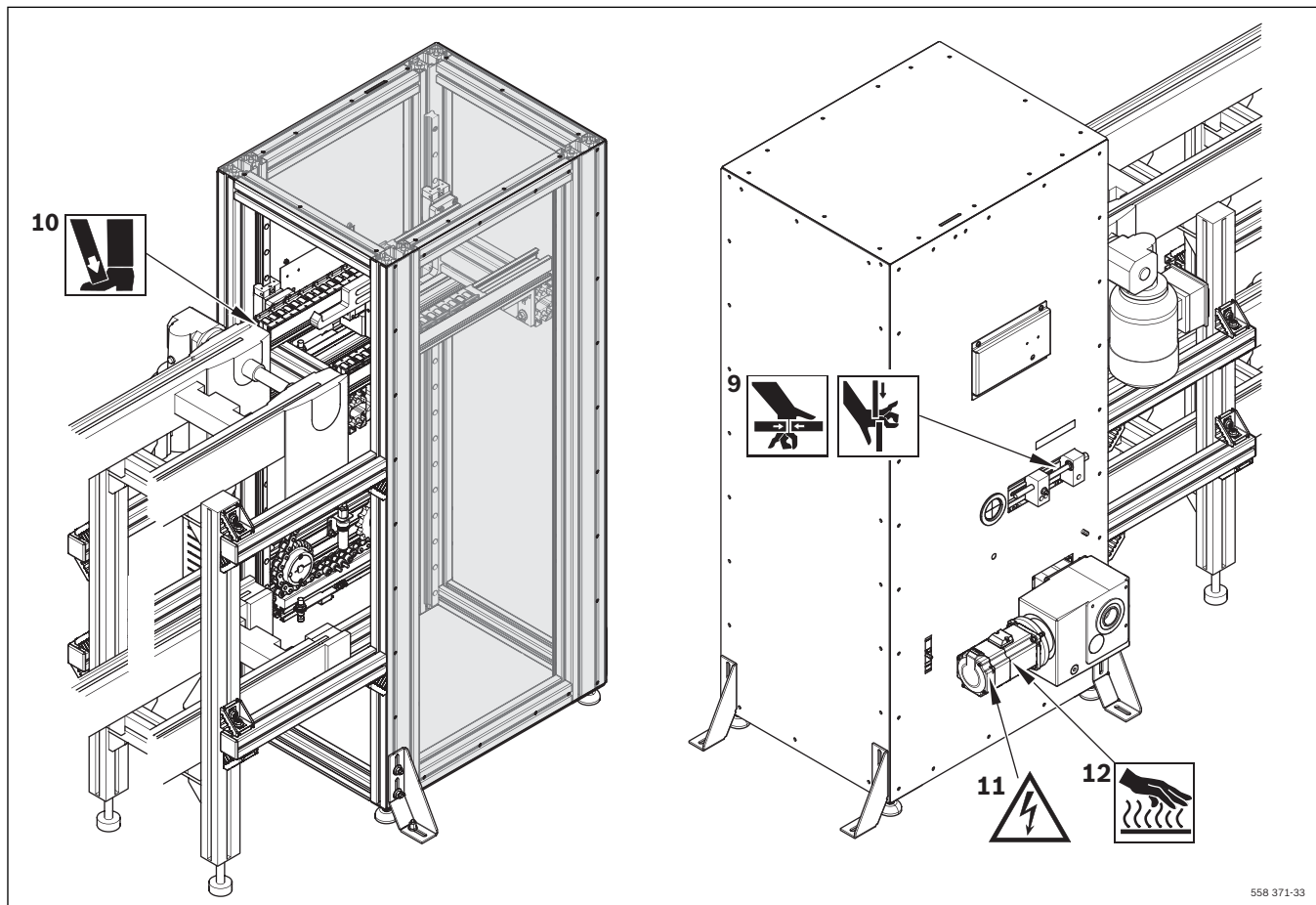
¹⁾ Life stages of the machine according to EN 12100 Sect. 5.4 a /b (No. 1- 27), Sect. 5.4 a (see page 9)



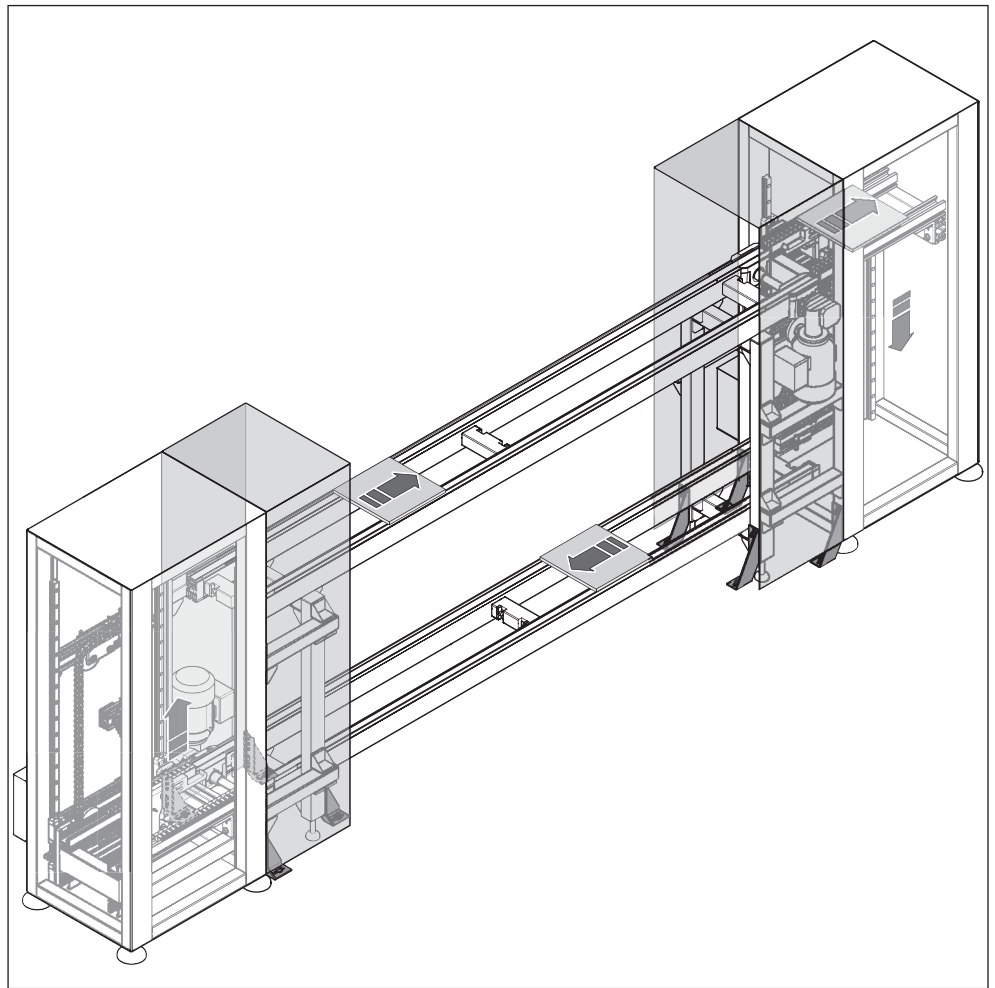
558 371-32

Life stage ¹⁾ , location			Situation	Hazard	Action	
9	5	Chain tensioner when tensioning.	Body parts can become trapped		Crushing, Shearing	Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.
	19 20					
10	13 14 19 20	Transferring the workpiece pallet between the belt section and lift.	Body parts can become trapped		Crushing	Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.
11	2 3 6 10 15	Motor without protective cover.	Exposed voltage conductor		Electric shock	Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.
12	2 3 6 10 15	Motor without protective cover.	Motor temperature > 65 °C		Burning	Eliminate the hazard by taking constructive measures, for example, by using a separating safety guard.

¹⁾ Life stages of the machine according to EN 12100 Sect. 5.4 a /b (No. 1- 27), Sect. 5.4 a (see page 9)



558 371-33

Example of separating safety guards ("tunnel") provided by the customer**Fig. 18: Example of separating safety guards ("tunnel")**

558 371-20

**Please note:**

When designing separating safety guards, take into account the minimum distances according to DIN EN 349, Table 1.

Minimum distances according to DIN EN 349 , Table 1

Body part	Minimum distance a (mm)	Illustration
Body	500	
Head (most unfavorable position)	300	
Leg	180	
Foot	120	
Toes	50	
Arm	120	
Hand Wrist Fist	100	
Fingers	25	

8.3 Re-commissioning after a standstill

Follow the steps outlined for the initial start-up.

- ▶ Check whether the transport securing device has been installed and needs to be removed.

9 Operation

CAUTION

Hot electric motor and braking resistance surfaces during operation!

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

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

ENGLISH

9.1 Notes regarding 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 commonsense measures will reduce wear:

- Switch off the conveyor section when the system is not in use, e.g., during breaks, at night and at weekends.
- Do not select a higher speed for the conveyor section than that required for the corresponding function.
- Particularly important: 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:

- the permitted accumulation length before stop gates.
- damper functionality.
- dampened stop gates.

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 – particularly 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, lost parts, etc.). Maintenance intervals should be significantly reduced 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 serious injury or death from electric shock.

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

High pneumatic pressure!

Risk of serious 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 unintentionally switched on again.



CAUTION

Hot electric motor surfaces during operation!

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

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

- 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 competent person using tip switches and if there is no possibility of interference from other switching devices.

10.1 Cleaning and care

NOTICE

Failure of the bearings

Applying grease-dissolving substances to the bearing points, e.g. when cleaning, leads to bearing failure. There is a risk of damage to property, and 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 (belt section)

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 aggressive cleaning agents away from the toothed belt!
- Only clean the product with a damp cloth.

10.2 Inspection

Drive chain



Regularly perform a check every 1,000 hours:

1. Move the lift to the lower position.
2. Loosen the fixing screw (D).
3. Tension the chain tensioner (E):

$M_D = 1.5 \text{ Nm}$

Tighten the fixing screw (D):

$M_D = 8.7 \text{ Nm}$

- 3) Inspection and maintenance opening for lubricating the drive chain

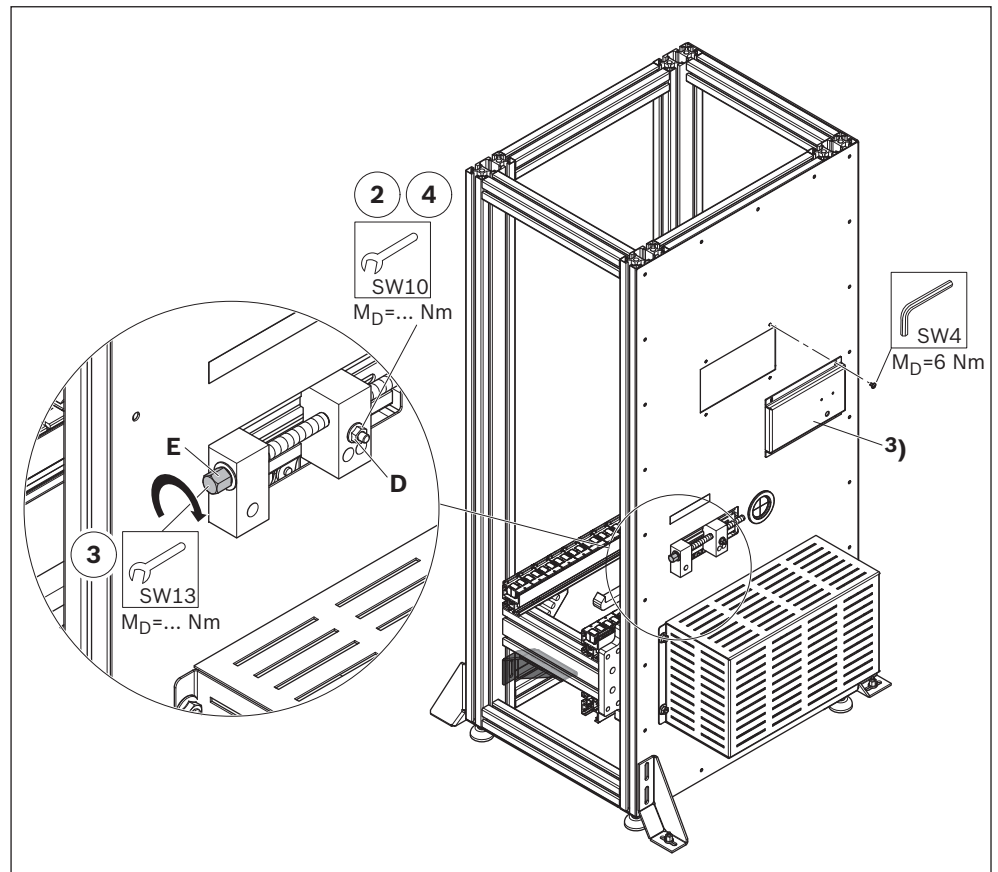


Fig. 19: Correct tensioning of the drive chain

- Regularly perform a check every **1,000** hours:
 - to visually inspect whether the conveying level of the lift is aligned with the conveying level of the infeed and outfeed belt sections and that the workpiece pallets are fed in and out correctly.
 - to see whether the drive chain has the correct tension by tensioning the chain.

- ▶ Regularly perform a visual inspection every 3,000 hours to check:
 - whether the drive chain has enough lubrication (see page 42).
 - the drive chain for wear.
 - ▶ Replace the drive chain after 15,000 hours (see page 45).
 - the sprockets for wear.
 - ▶ Replace the sprockets if you see visible wear.
 - the support block and support rails for wear.
 - ▶ Replace the support block and support rails after 15,000 hours.
 - the cleat (hook) for wear (see page 48).
 - ▶ Replace the cleat (hook) if the workpiece pallet is no longer fed in or out correctly (see page 44).
 - the damping element for wear (see page 44).
 - ▶ Replace the damping element if the wear is > 3 mm.
 - whether the bolt spring is fractured (see page 44).
 - ▶ Replace the bolt spring if the hook does not reset correctly (see page 44).
 - the drive shaft for wear.
 - the bearing block for wear.
 - the roller elements for wear.
 - ▶ Replace the roller elements if they are sluggish or worn on the side (see page 44).
 - the slide bearings for wear.
- ▶ Every 10,000 hours, regularly perform a visual inspection to check:
 - the drive motor and gear for leaks.
 - ▶ Replace the drive motor and gear after 20,000 hours (see page 48).

10.3 Maintenance

Bearings

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

Gears

The gears are maintenance-free during their service life (20,000 hours).

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.

Ball rail system, BSCL runner blocks

- Lubricate the BSCL runner blocks with grease (NLGI 2):

Apply with Manual grease gun

Recommendation Dynalub 510

- Lithium-based high-performance grease, NLGI class 2 according to DIN 51818 (KP2K-20 according to DIN 51825)
- Good resistance to water
- Anti-corrosive
- Temperature range: -20 to +80 °C

Approved alternative products • Castrol Longtime PD2
 • Elkalub GLS 135/N2

- Initial lubrication: The BSCL runner blocks are initially lubricated.
- Re-lubrication:
 - lubricate the runner blocks regularly every 1,400 hours.
 - lubricate them at least every 2 years due to aging grease.
 - Install the lubricating element.



Please note:

- Remove the lubricating element after every lubrication.

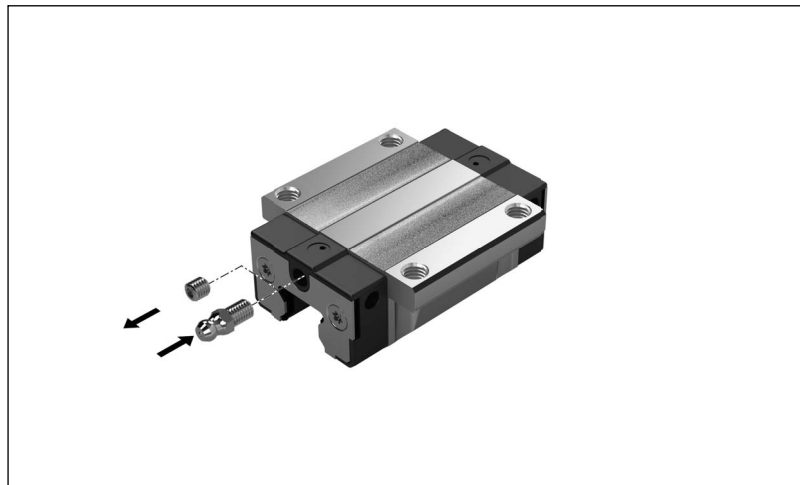


Fig. 20: Installing / removing the lubricating element

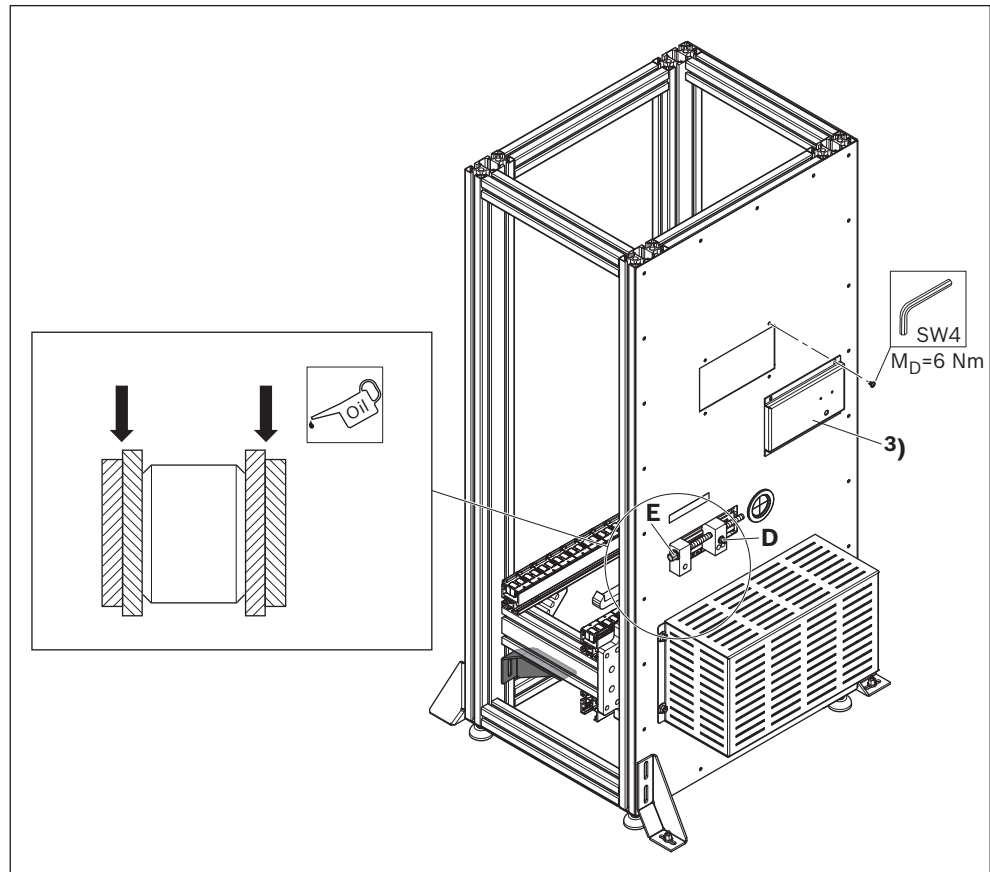
- Remove the lubricating element.

Drive chain

The drive chain used in this product comes lubricated. Lubricate the drive chain before the initial start-up 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.

Due to the system, the lubricant may be discharged.

3) Inspection and maintenance opening for lubricating the drive chain



558 371-18

Fig. 21: Lubricating points

It is important to adhere to the maintenance intervals as a lack of lubrication will lead to malfunctions due to chain failure or even crash the system, causing considerable property damage.

Keep a maintenance schedule.

The running times during the system's set-up and start-up count towards the first maintenance interval.

If you do not know the running times during the system's setup and start-up, lubricate the drive chain at the start of production.

Lubricate the drive chain after downtimes > 6 months (e.g. long set-up time or temporary shutdown).

Clean excess grease, dirt or other contaminants from the drive chain before lubricating. Check the drive chain for wear and elongation.

We recommend: the LU 2 automatic lubrication unit optimally and evenly lubricates the drive chain while in operation. See page 18.



10.4 Replacing wear parts

Required tools

- Hex wrench SW13.
- Hex socket wrenches SW3, SW4, SW5.
- Phillips screwdriver, PZ2
- Caliper, 500 mm
- Hammer
- Drift punch



Please note:

- Move the lift to the middle position without any load (workpiece pallet).
- Install the transport securing device (C).

Before carrying out any repair work

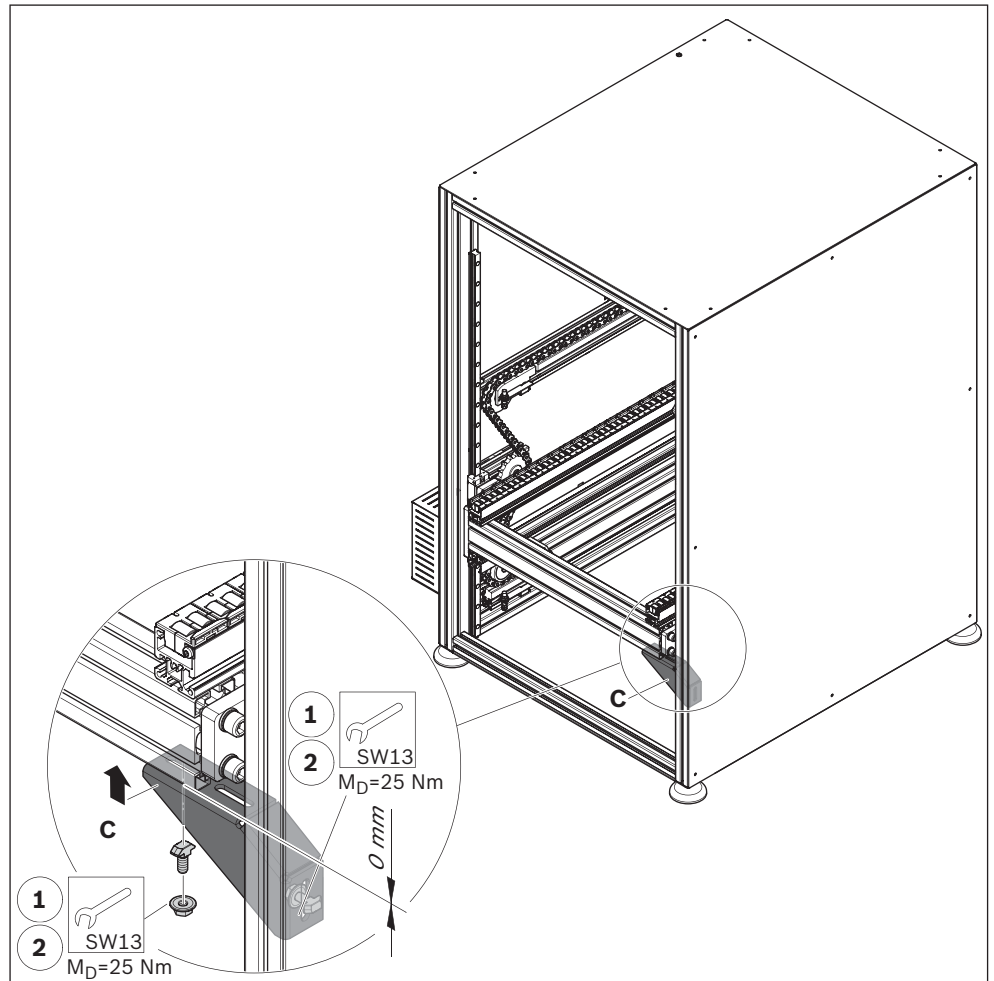


Fig. 22: Install the transport securing device

558 371-21c

Replacing wear parts of the cleat (hook)

- Replace the cleat (hook) if the workpiece pallet is no longer fed in or out correctly.
- Replace the damping element (L) if the wear is > 3 mm.

- Move the lift to the upper position.
- Install the transport securing device (see page 43).

1. Remove the cleat (hook, K).
- Only if required:
- Replace the damping element (L).
- Only if required:
- Replace the roller elements (M).
- Only if required:
- Replace the bolt spring (O).
2. Install the new cleat (hook, K).
- 1) Cleat (hook), C-Form
2) Cleat (hook), O-Form

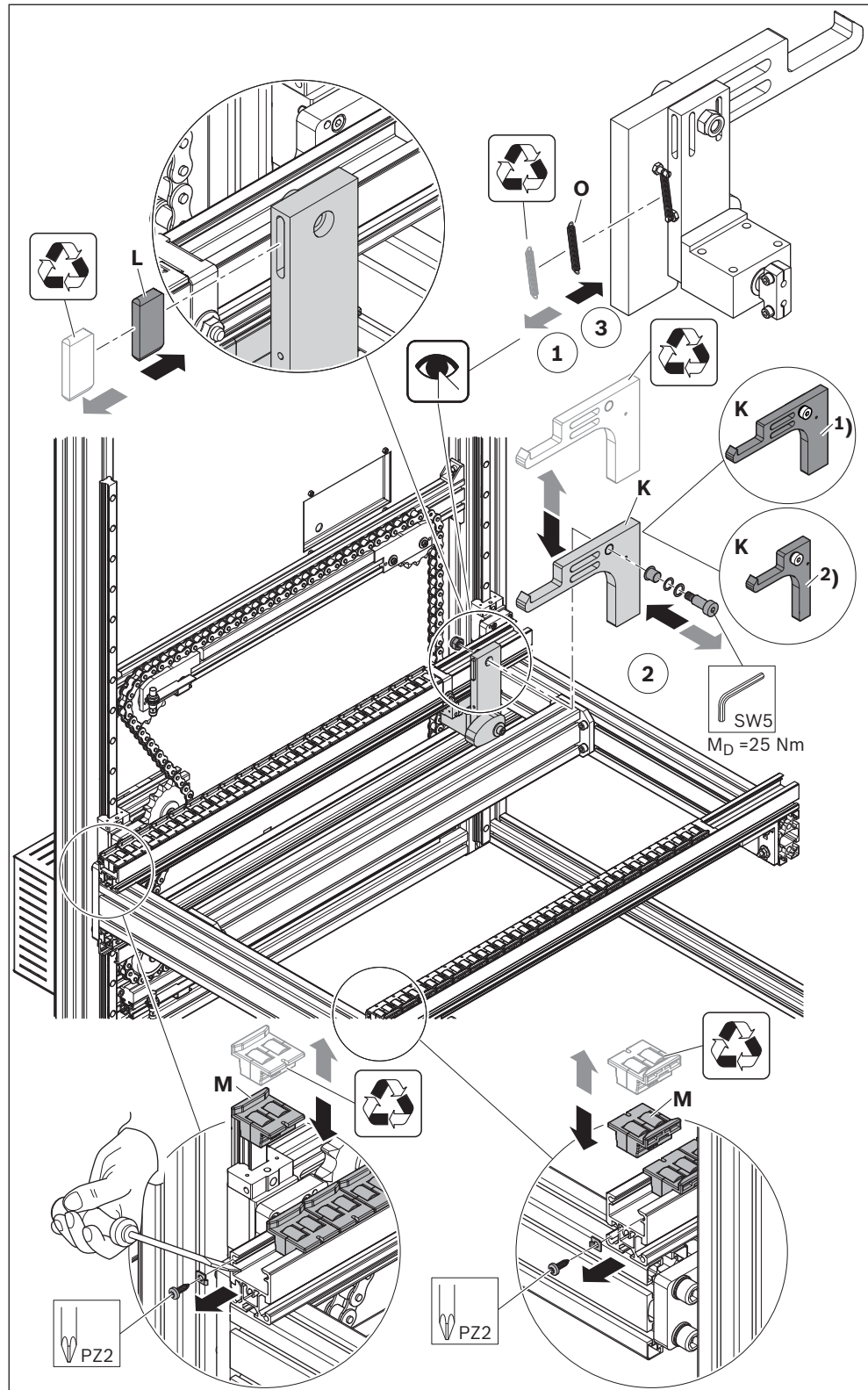


Fig. 23: Replacing the cleat (hook)

558 371-30

Replacing the drive chain

- Replace the drive chain every 15,000 hours.

- Move the lift to the middle position.
- Install the transport securing device (see page 43).

1. Loosen the fixing screw (D).
2. Loosen the chain tensioner (E).

After assembling the new drive chain:

- Move the lift to the lower position.
3. Tension the chain tensioner (E):
 $M_D = 1.5 \text{ Nm}$
 4. Tighten the fixing screw (D):
 $M_D = 8.7 \text{ Nm}$

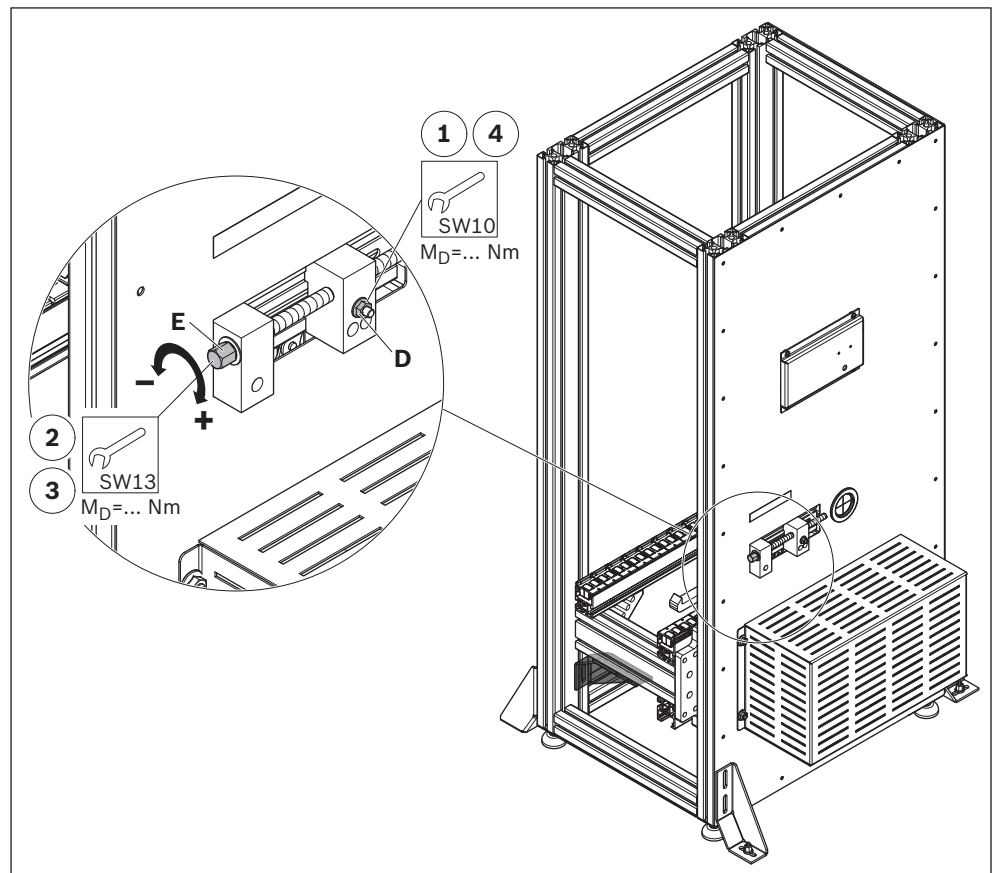


Fig. 24: Replacing the drive chain (1/2)

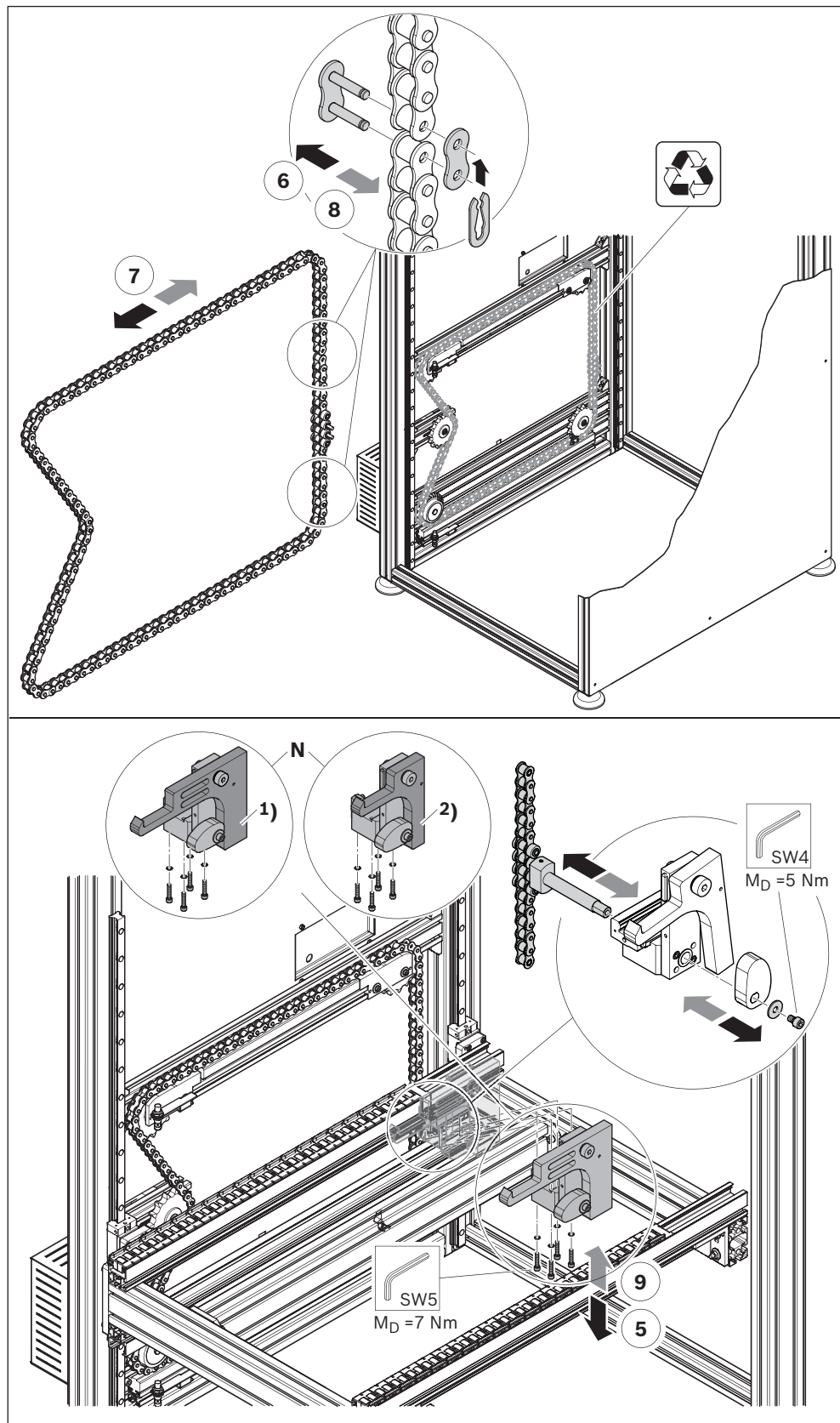
5. Remove the cleat (hook) assembly (N).
6. Open the drive chain and remove it.
 - Check the sprockets for visible wear. Replace worn sprockets if necessary.
7. Put on the new drive chain.
8. Close the drive chain.
9. Install the cleat (hook) assembly (N).

- 1) Cleat (hook), C-Form
- 2) Cleat (hook), O-Form

- Tension the drive chain (see page 45)


Please note:

- Reference the zero point after every repair.



558 371-28

Fig. 25: Replacing the drive chain (2/2)

Replacing wear parts of the chain guide

- Replace the supporting parts of the chain guide every 15,000 hours.

- Move the lift to the lower position.
- Install the transport securing device (see page 43).
- Remove the drive chain (see page 45).

1. Remove the return units (F).
2. Remove the upper support rail 1) (G) only, if $l_{WT} > 320$ mm
3. Remove the lower support rail (H).
4. Remove the sprockets (J) from the worn return units (F) and install them in the new ones.
5. Install the new upper (G) and lower (H) support rails.
6. Install the new return units (F).



Please note:

- Reference the zero point after every repair.

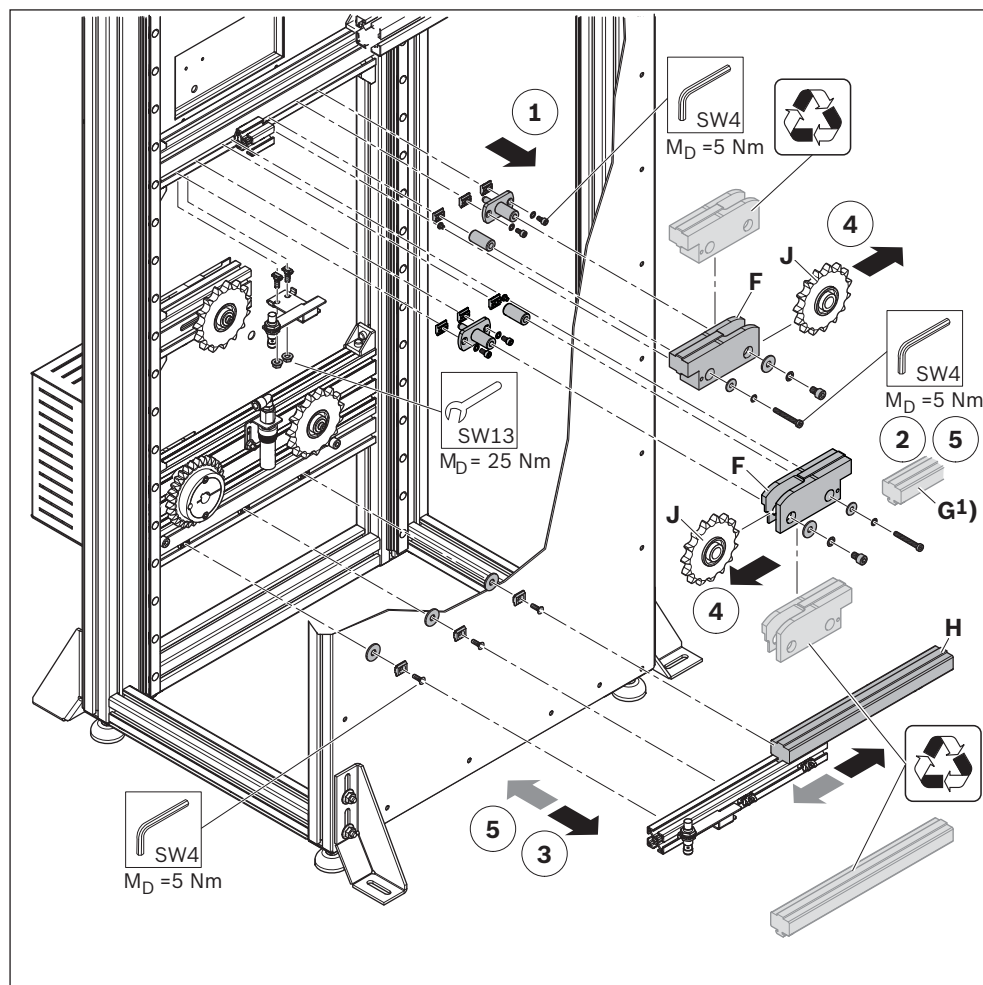


Fig. 26: Replacing wear parts of the chain guide

558 371-23

Replacing the motor and gear

- Replace the motor and gear every 20,000 hours.

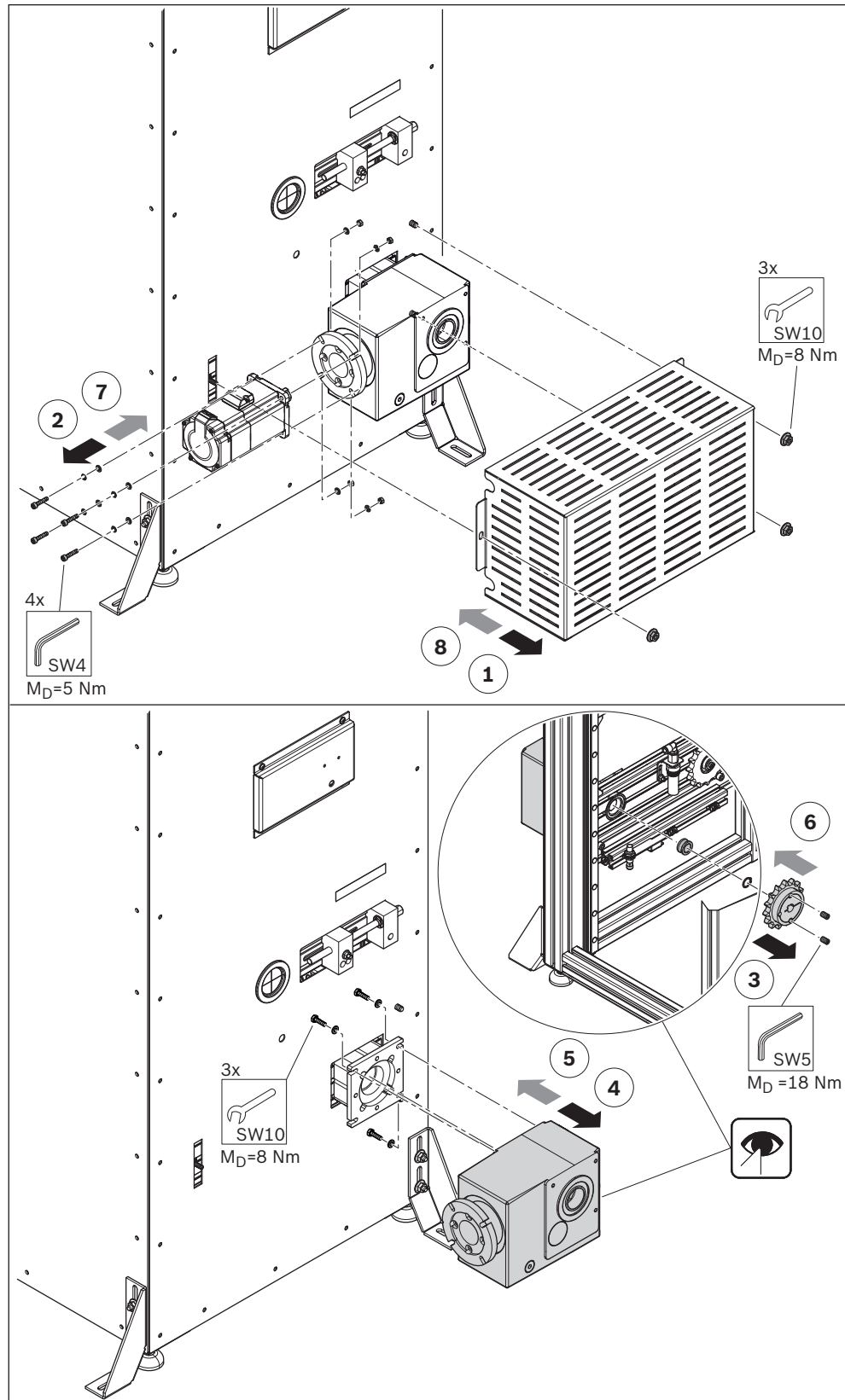
- Move the lift to the lower position.
- Install the transport securing device (see page 43).

1. Remove the protective casing.
2. Remove the motor.
3. Remove the sprocket.
4. Remove the gear.
5. Install the new gear.
6. Install the sprocket.
7. Install the new motor.
8. Install the protective casing.



Please note:

- Reference the zero point after every repair.



558 371-24

Fig. 27: Replacing the motor and gear

10.5 Spare parts

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

11 Decommissioning

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

12 Disassembly and replacement

WARNING

High electrical voltage!

Risk of serious injury or death from electric shock.

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

High pneumatic pressure!

Risk of serious 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 unintentionally switched on again.

Suspended loads can fall!

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

- ▶ Only use slings with a sufficiently high bearing load capacity (see delivery documents for the product weight).
- ▶ Make sure the lifting straps are correctly fastened before lifting the product.
- ▶ Secure the product against tipping 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 influences.
- Protect the product from environmental influences, such as dirt and moisture.
- Observe the ambient conditions, see page 51.
- 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 and repair

- If you cannot correct a fault, go to www.boschrexroth.com to find the address to contact.

16 Technical data

- For dimensions, see sales catalog TS 2plus
- Maximum load: 60 kg
- Section load: 1.0 kg/cm support surface length
- Speed of the chain / cleat (hook): ≤ 24 m/min
- Noise emission: < 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
- Max. load capacity of floor: 1000 kg/m^2
- At altitudes > 1400 m, the load values of the electric drives are reduced by 15%.
- 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.

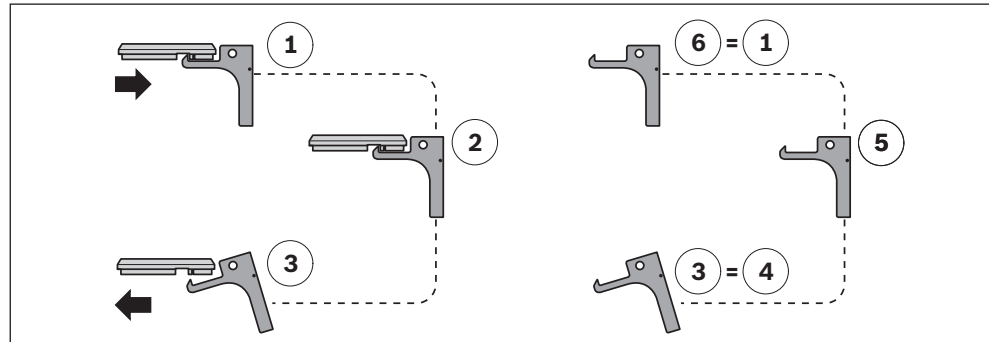
16.2 Pneumatics

- 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 point¹⁾ $\leq +3$ °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)

17 Appendix

17.1 Operating modes

17.1.1 C-Form



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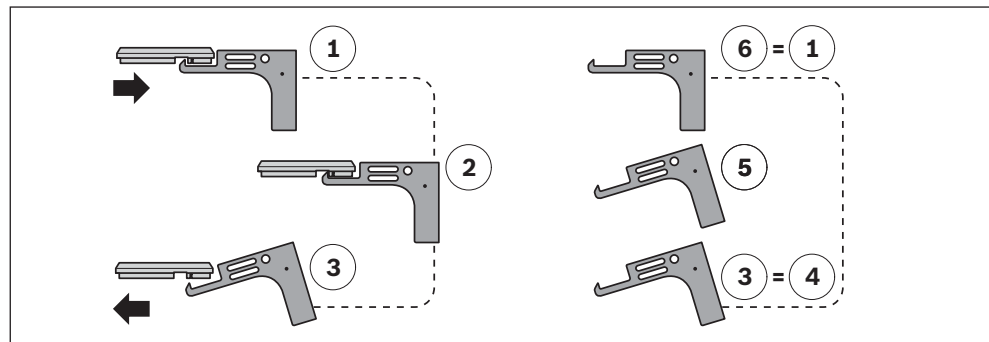
¹⁾ **TD = D** (= downwards), direction of transport from the upper conveying level to the lower conveying level.

TD = U (= upwards), direction of transport from the lower conveying level to the upper conveying level. Then perform steps 1 to 3 as per the illustrations.

Fig. 28: C-Form (TD = D) ¹⁾

1. Cleat (hook) pulls the WT on the upper conveying level into the lift.
2. Cleat (hook) with WT is transported on the back panel to the lower conveying level.
3. Cleat (hook) releases the WT on the lower conveying level.
4. Empty cleat (hook) is withdrawn.
5. Empty cleat (hook) is transported on the back panel to the upper conveying level.
6. Empty cleat (hook) pulls a WT on the upper conveying level into the lift.

17.1.2 O-Form



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Fig. 29: O-Form (TD = D)

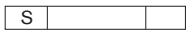
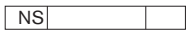
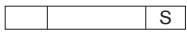
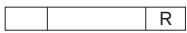
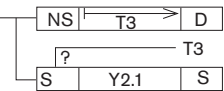
1. Cleat (hook) pulls the WT on the upper conveying level into the lift.
2. Cleat (hook) with WT is transported on the back panel to the lower conveying level.
3. Cleat (hook) releases the WT on the lower conveying level.
4. Empty cleat (hook) remains at the front.
5. Empty cleat (hook) is transported at the front to the upper conveying level.
6. Empty cleat (hook) pulls a WT on the upper conveying level into the lift.

17.2 Function plans

On the following pages, you can find proven fundamental function plans for control tasks in transfer systems.

Characters are used in the action blocks that deviate from DIN IEC 61131--3. They are explained in the following table.

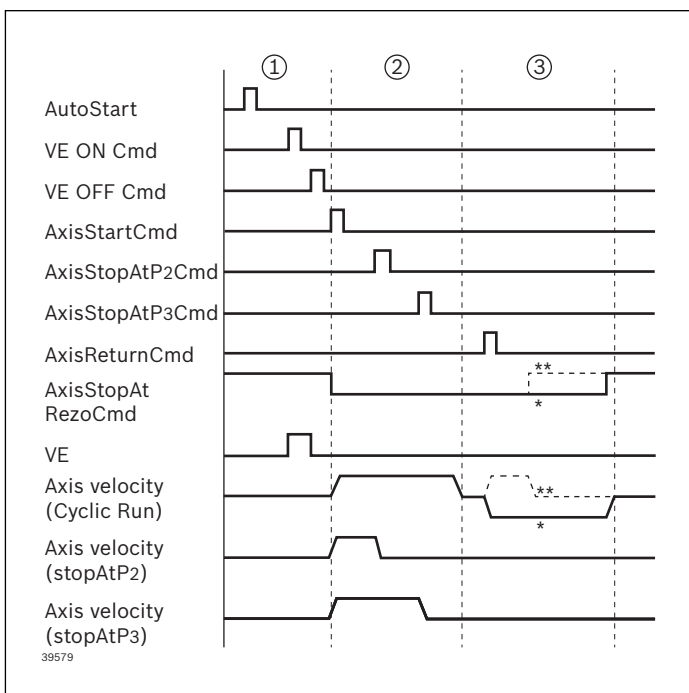
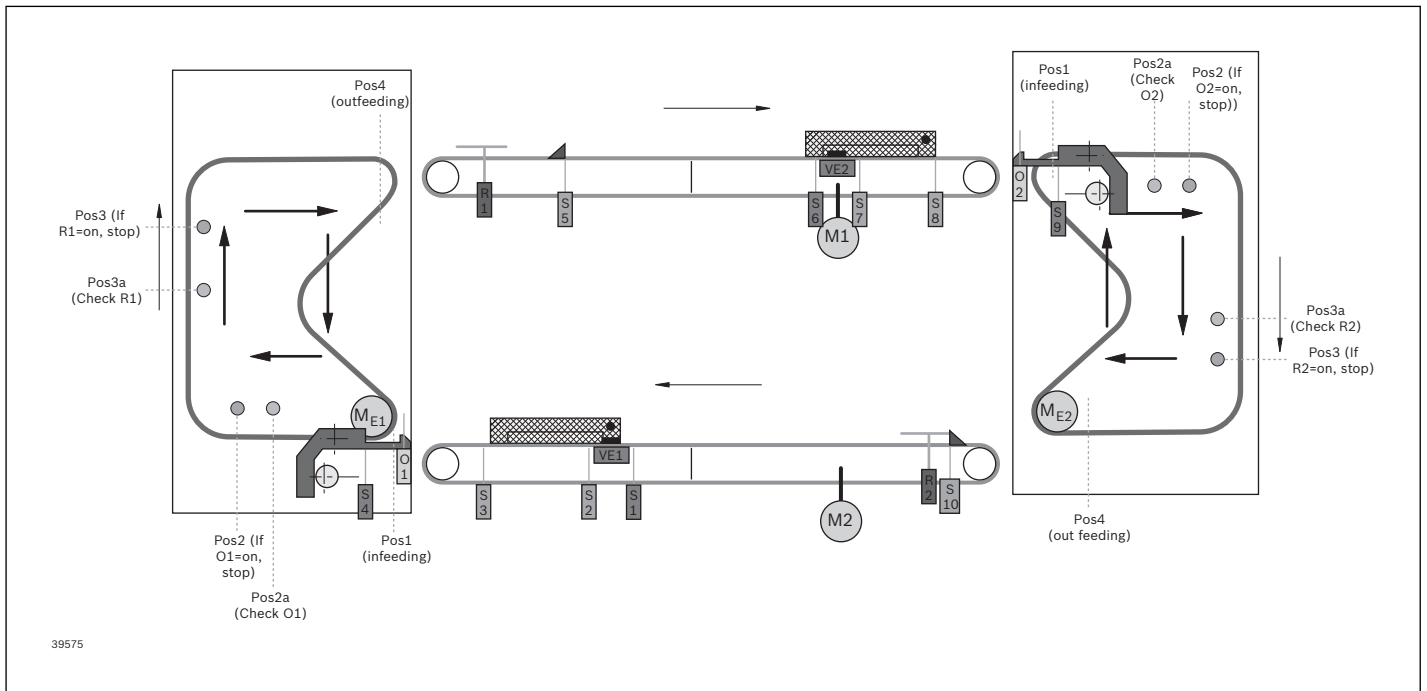
Simple VE 2 stop gates are used to stop the workpiece pallets. The position of the workpiece pallets is determined using separate proximity switches.

Action block	Explanation
	Storing
	Non-storing
	Set
	Reset
	Non-storing triggering of a time function (with runtime T), after which a switching function is triggered.

General abbreviations

- WT = Workpiece pallet
- VE = Stop gate
- S ... = Signal transmitter
- Y ... = Valve
- Z ... = Cylinder
- LT = Longitudinal conveyor (main section)
- QT = Transverse conveyor (secondary section)
- ① = Start pulse after end of start-up
- ② = Enable cyclic travel

17.2.1 Lift EL 2 (infeed + outfeed)

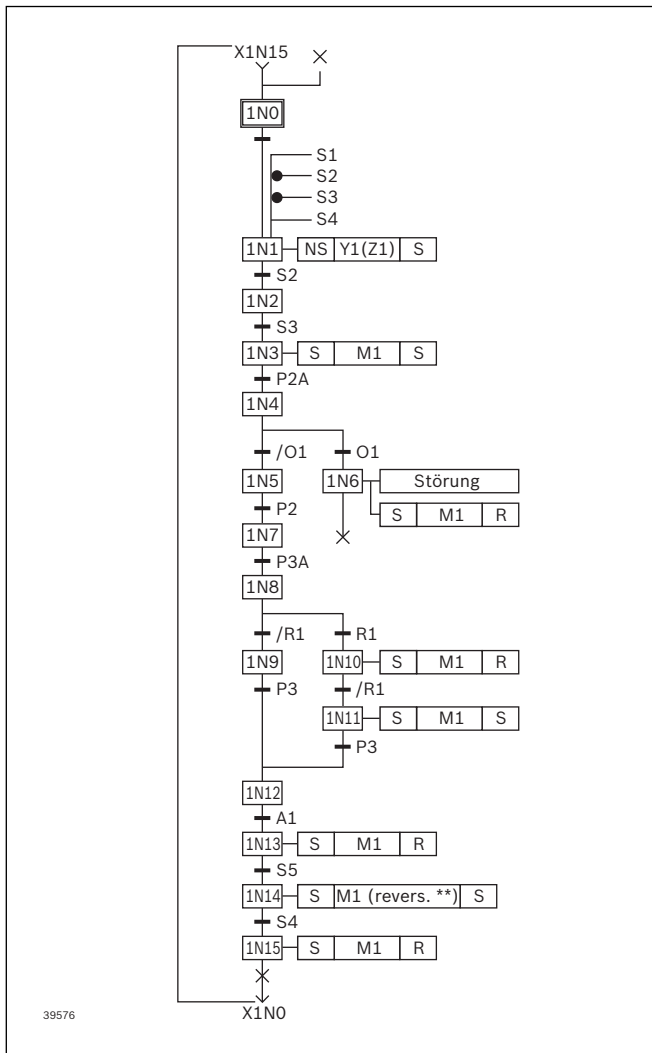


- ① = WT moves from TS2 to EL2
- ② = Gripper arm takes load moving from zero point to unload point (Axis in position mode)
- ③ = Gripper arm returns to zero point (Axis in velocity mode)

Name	Related sensors or actuators	
	E1	E2
AutoStart	AutoStart button	AutoStart button
VEONCmd	S1	S6
VEOFFCmd	S2	S7
AxisStartCmd	S3	S8
AxisStopAtP2Cmd	When axis at Pos2a, O1 status	When axis at Pos2a, O2 status
AxisStopAtP3Cmd	When axis at Pos3a, R1 status	When axis at Pos3a, R2 status
AxisReturnCmd	S5	S10
AxisStopAtZeroCmd	S4	S9
VE	VE1	VE2

* C-Form

** O-Form



- ① = Start pulse after end of start-up
- ② = Enable cyclic travel
- S1 = WT before VE 1
- S2 = WT after VE 1
- S3 = WT on the hook
- S4 = Hook zero point
- Y1 = Main section VE 1 (Z1)
- M1 = Servomotor
- O1 = Optical sensor
- P2A = WT at control point before the vertical movement
- P2 = WT at stopping point before the vertical movement
- P3A = WT at control point before the horizontal movement
- P3 = WT at stopping point before the horizontal movement
- R1 = Outlet area occupied (rocker actuated)
- S5 = WT has left lift completely, start return
- A1 = Position mode, steps reached

*) O-Form

**) C-Form

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