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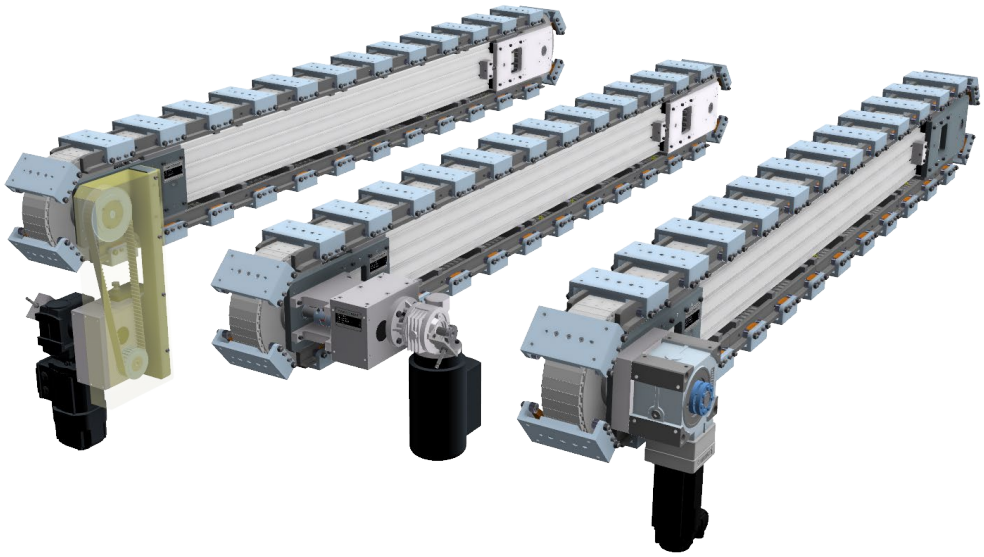

Linear transfer system
RFA075
Assembly instructions

Version 1.0
2022-12-23

Table of contents

1 About these instructions

1.1 Purpose

The purpose of these Assembly Instructions is to provide users with all the necessary information they need for the proper and safe assembly of the linear transfer system into a complete machine.

1.2 Contact information

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1.3 Product designation

Product designation: Linear transfer system

Product type: RFA075

□□□ □□□

Type

Belt width (e.g. 075)

Designation

□□□□□-□□□-□□□-□-□

Code

Drive unit position
A = outside, I = inside, O = top, U = bottom

Drive unit side
L = left, R = right

Cycle time [s]

Feed rate [mm]

Effective working length of RFA

1.4 Symbols

The following symbols are used in these instructions:

Instructions and directions

Requirements for performing an instruction are indicated by a check mark.

The action steps to be executed are numbered.

The results of individual action steps are indicated by a black arrow. The overall result of an instruction is marked by a white arrow in a black circle.

Example

✓ Requirement

1. Instruction (step 1)
2. Instruction (step 2)
   ⇨ Result or response of system to step 2
3. Instruction (step 3)

➲ Overall result of the instruction

Enumerations

Enumerations in no strict order are indicated as follows:

- Property A
  - Detail 1
  - Detail 2
- Property B
  - Detail 1
  - Detail 2

2 Safety

2.1 Safety instructions

General safety instructions

- Read through these instructions completely
- Observe the information and instructions in these instructions
- Keep unauthorized persons away from the working area
- Work on electrical systems may only be carried out by qualified electricians
- Keep the instructions in a safe place and make them available to all employees
- Observe the documentation of the supplier components

2.2 Warnings

2.2.1 Structure of the warnings

All the warnings in these instructions have the following structure:

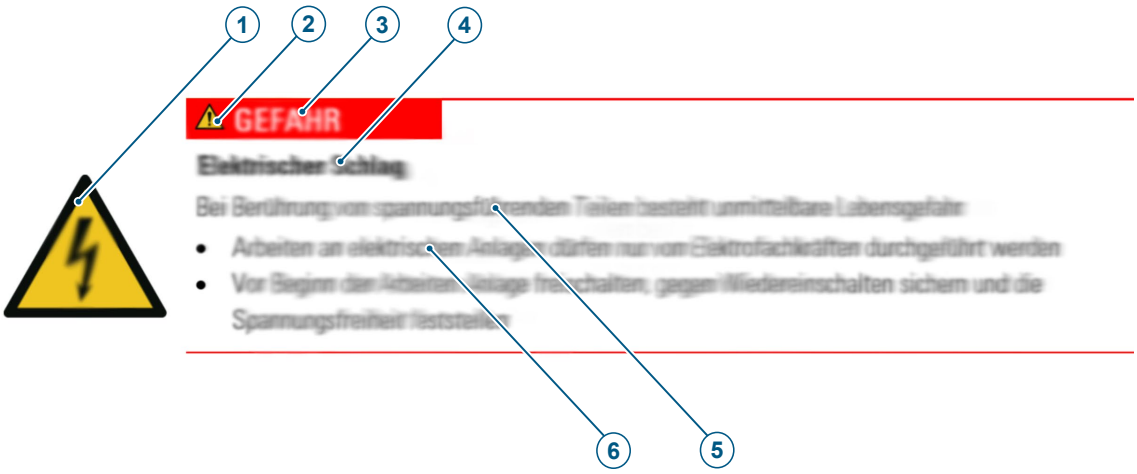

Fig. 1: Structure of the warnings

1	Hazard-specific symbol	2	Hazard symbol
3	Signal word	4	Type and source of danger
5	Possible consequences of non-observance	6	Procedure for hazard prevention

2.2.2 Meanings of the signal words and symbols

The following signal words are used in this document:

Signal word	Meaning
DANGER	Indicates a hazardous situation which will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation which may result in death or serious injury.
CAUTION	Indicates a potentially hazardous situation which may result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which may result in property and environmental damage.

The following symbols for dangers, warnings, mandatory requirements and prohibitions are used in this document:

	General warning sign
	Warning: Electrical voltage
	Warning: Suspended load
	Wear head protection
	Wear eye protection
	Wear foot protection
	Wear hand protection

2.3 Requirements for personnel

The activities described in these instructions may only be performed by qualified personnel.

Qualified personnel are persons who are able to carry out the work assigned to them due to their technical training, knowledge and experience. They are familiar with the relevant standards and regulations and are able to recognize potential hazards on their own.

2.4 Personal protective equipment

Personal protective equipment is used to protect personnel from impairments to safety and health during work. Personnel must wear the personal protective equipment when performing all of the activities described in these instructions. The required personal protective equipment is indicated in the different chapters of these instructions.

2.5 Requirements for incorporation into a complete machine

The linear transfer system is an incomplete machine. Operation of the linear transfer system is only permitted in a complete, CE-compliant machine or system.

The manufacturer of the complete machine or system is responsible for integrating the linear transfer system into the system in such a way that completely safe operation is guaranteed.

- During operation, it is prohibited to remain in the immediate vicinity of the linear transfer system. Staying in the vicinity of the linear transfer system is only permitted within the scope of control activities, maintenance or servicing work by specially trained personnel.
- Maintenance work must be carried out in accordance with the maintenance schedule and the operating instructions.
- All activities at the linear transfer system may only be performed by trained qualified personnel.

3 Product description

3.1 Intended use

The linear transfer system is designed for incorporation in a complete machine or a complete system. The linear transfer system is used to transport workpiece carriers from one processing station to another processing station in the correct position.

All applications deviating from this intended use are not permitted.

- Modifications to the linear transfer system must be approved by TAKTOMAT
- The linear transfer system may only be operated within the defined operating parameters
- The specified load on the workpiece carriers must not be exceeded
- The linear transfer system must not be used in rooms classified as having an explosive atmosphere

3.2 Technical data

3.2.1 Operating conditions

Application range	indoors
Temperature range [°C]	+15 to +40
Relative humidity [%]	20 to 80
Media	do not expose to aggressive media

3.2.2 Storage conditions

Application range	in closed rooms
Temperature range [°C]	-22 to +50
Relative humidity [%]	40 to 70
Media	do not expose to aggressive media
Storage period > 6 months	provide additional corrosion protection

3.2.3 Dimensions

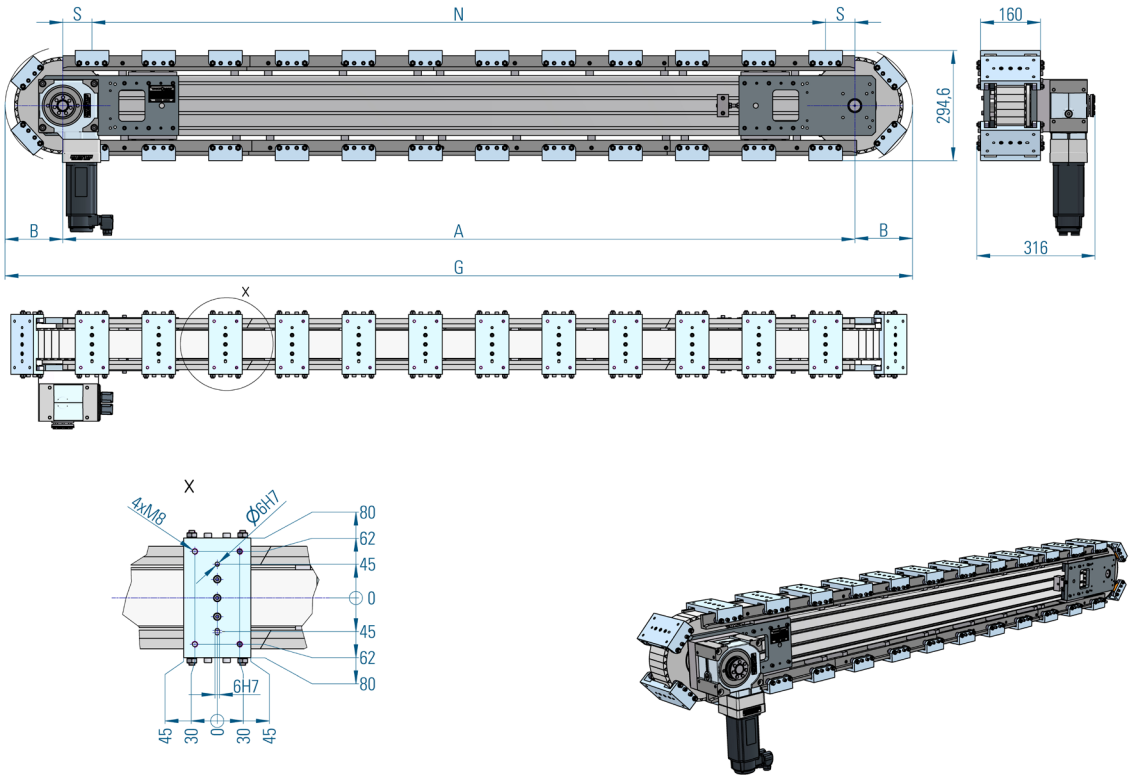

Fig. 2: Dimensional drawing, main dimensions of the linear transfer system

Item	Designation	RFA075
A	Centre distance	N + 2 x S
B	Bore spacing, workpiece carrier (WC) fastening	154 mm
G	Total length	A + 2 x B
S		100 mm
N	Working length	

3.2.4 Space requirement

The space requirement depends on the dimensions of the linear transfer system.

- Provide a clearance of approx. 1 m^2 in the area of the drive unit for maintenance and service activities.
- Provide a clearance of around 1 m^2 in the area of the of the tensioner for setting the belt tension.

3.3 Product overview

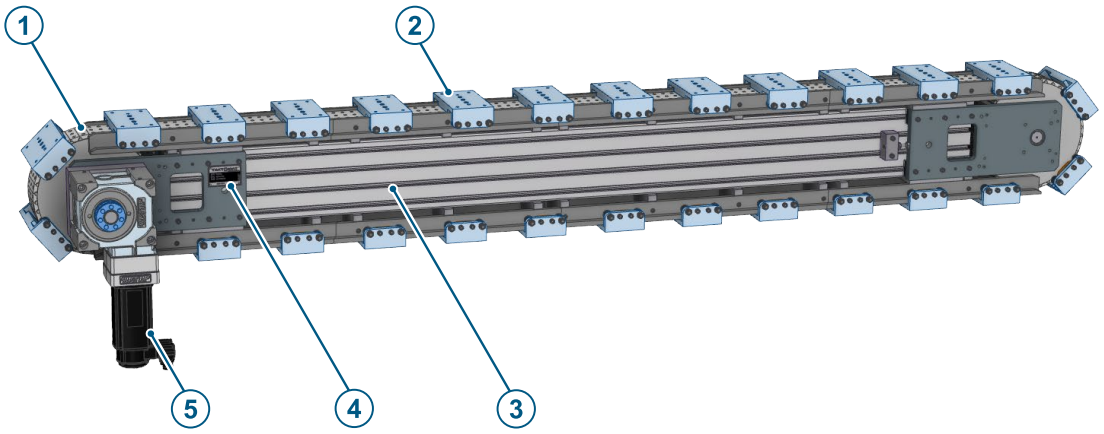

Fig. 3: RFA linear transfer system with direct drive (worm gear and servo motor)

1	Endless toothed belt	2	Workpiece carrier
3	Aluminium profile frame	4	Type plate
5	Direct drive		

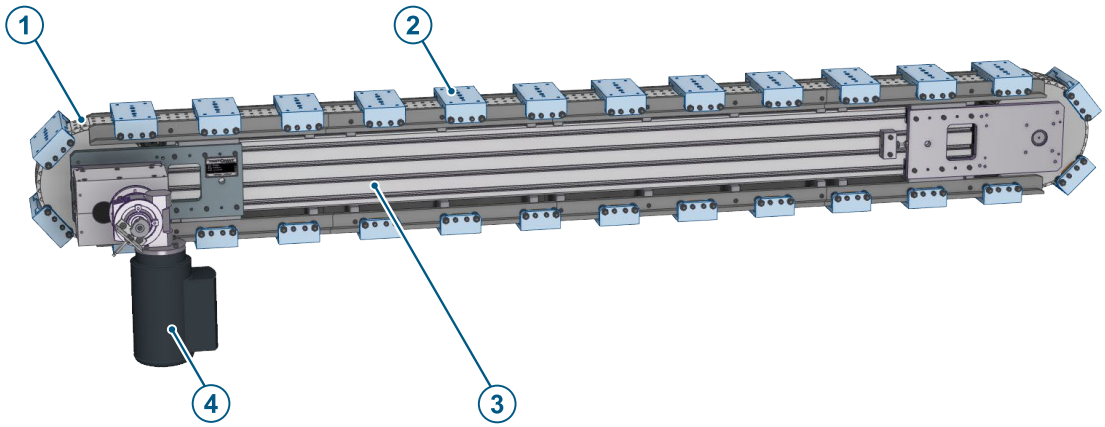

Fig. 4: RFA linear transfer system with XP flat cam gear, worm gear and servo motor

1	Endless toothed belt	2	Workpiece carrier
3	Aluminium profile frame	4	XP flat cam gear, worm gear and motor

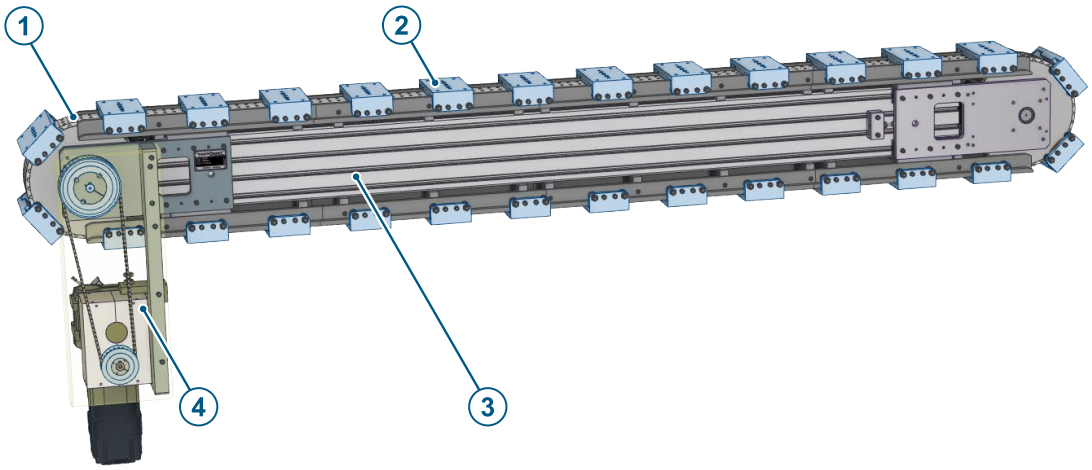

Fig. 5: RFA linear transfer system Belt transmission (toothed belt gear(i = variable), worm gear and motor)

1	Endless toothed belt	2	Workpiece carrier
3	Aluminium profile frame	4	Belt drive

4 Transport

Required personal protective equipment

⚠WARNING

Tipping or falling loads

Suspended loads can tip or fall down. This can cause serious or fatal injuries to persons.

- Do not step under suspended loads
- Keep unauthorized persons out of the danger zone
- Observe the weight and centre of gravity
- Only use suitable, approved and undamaged load handling attachments

NOTICE

Damage to components

Improper transport can cause material damage

- Carry out transport carefully and note the symbols on the packaging
- Align the lifting eyes in the direction of the load
- Follow the operating instructions for the lifting gear

4.1 Transportation options

The linear transfer system is transported vertically using transport feet. The number of transport feet and slings depends on the effective working length of the linear transfer system (see table below).

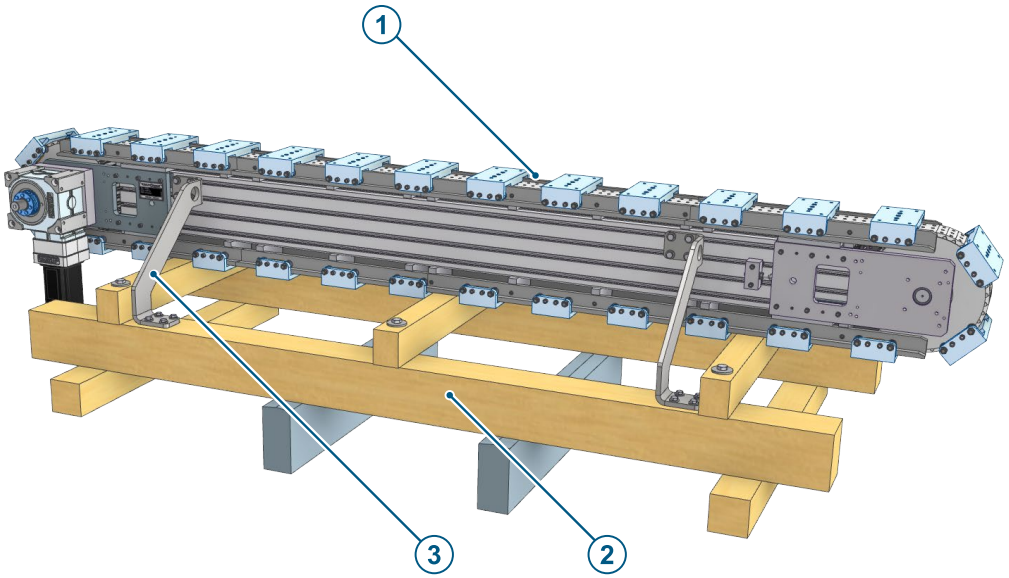

Fig. 6: Linear transfer system on wooden frame with transport feet

1	Linear transfer system	2	Wooden frame
3	Transport foot		

Transporting with industrial trucks

Only transport with industrial trucks using the lifting points (blue arrows) as marked in the figure.

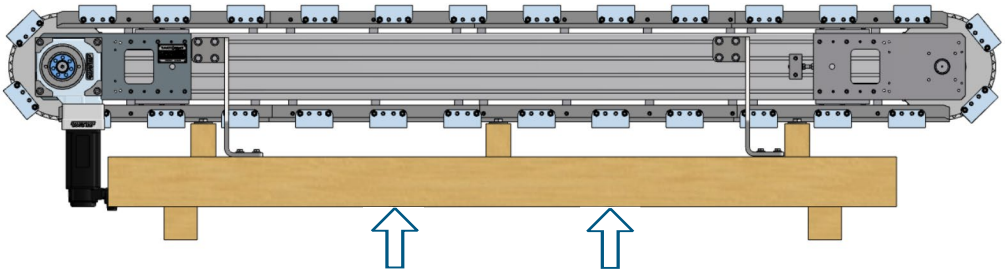

Fig. 7: Linear transfer system and lifting points for industrial trucks

Transporting with slings

Attach the slings to the attachment points as shown below, and make sure they are functioning properly.

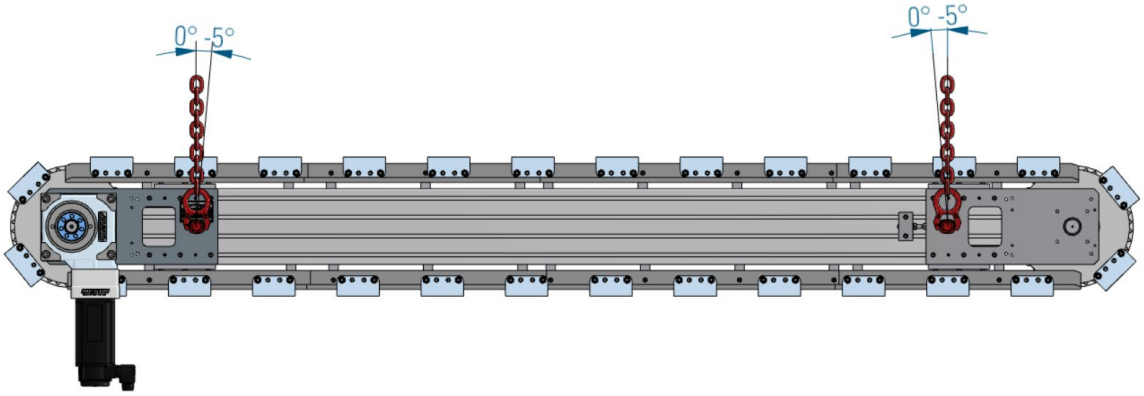

Fig. 8: Linear transfer system attachment points and specified tilt angle

Recommended slings for vertical transportation

Type	Centre distance [mm]	Number of attachment points
RFA	< 3000	4
RFA	> 3000–6000	≥ 6
RFA	> 6000	≥ 8

5 Assembly

Required personal protective equipment

⚠DANGER

Electric shock

Touching live parts poses an immediate danger to life

- Work on electrical systems may only be carried out by qualified electricians
- Before starting work, disconnect the system, secure it against being switched on again and make sure that no voltage is present

5.1 Assembling the RFA linear transfer system

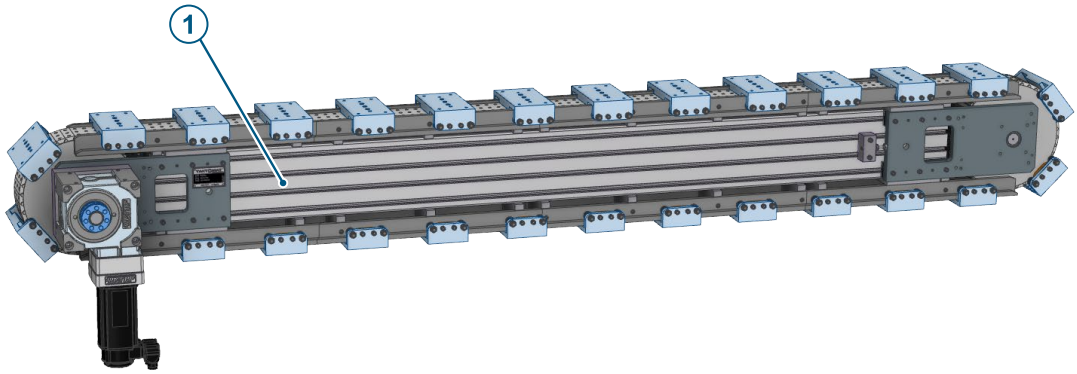

Fig. 9: Installation example for RFA linear transfer system

1	Aluminium profile frame with fastening grooves

For installation in a system, TAKTOMAT recommends fastening the linear transfer system with brackets (not shown).

The brackets are screwed to the aluminium profile with screws, slot nuts and Schnorr safety washers.

If the stepping gears have a large overhang, TAKTOMAT recommends providing the stepping gear with a supporting structure for additional support.

For assembly, proceed as follows:

✓ The mounting surface must be level.

1. Clean the mounting surface.
2. Place the linear transfer system on the mounting surface.
3. Fasten the linear transfer system with screws, slot nuts and Schnorr safety safety washers as specified in the dimension table (see technical data).

5.2 Installing the drives

Attach the drive to the linear transfer system as follows:

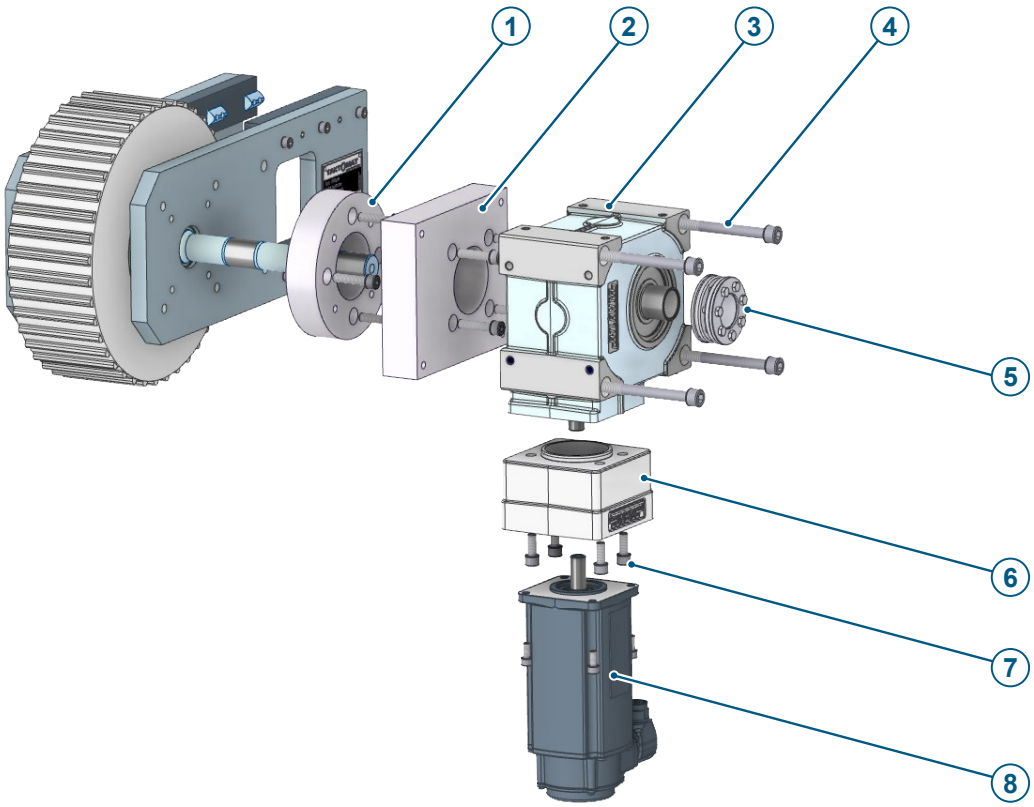

Fig. 10: Attachment sequence for the drive (Atlanta worm gear and servo motor)

1	Intermediate flange	2	Drive plate
3	Servo gear	4	Cylinder head screw * Schnorr safety washer
5	Clamp coupling	6	Adapter for servo motor/motor flange
7	Cylinder head screw * Schnorr safety washer	8	Servo motor

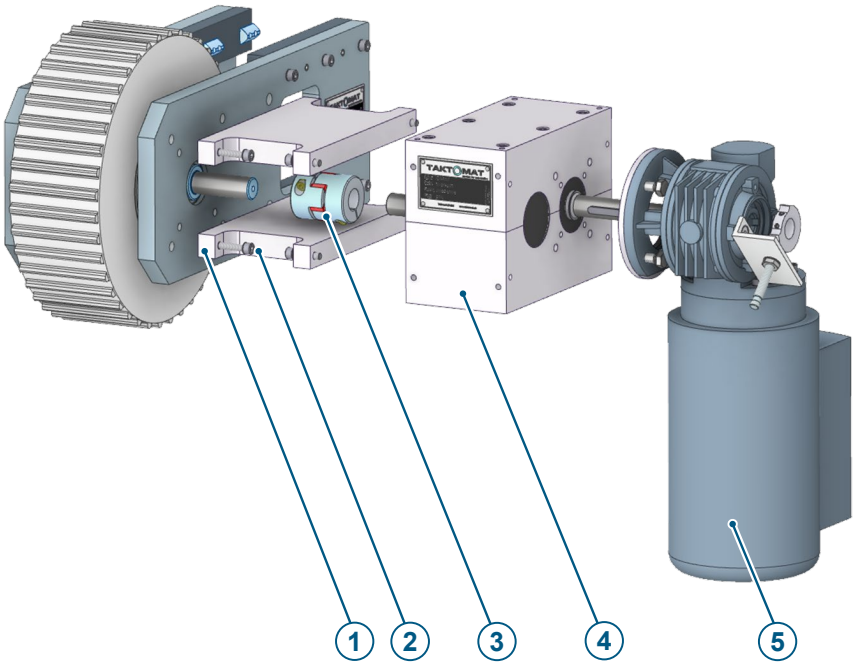

Fig. 11: Attachment sequence for the drive (XP flat cam gear, worm gear and motor)

1	Gear unit bracket	2	Cylinder head bolt (M6 x 30-DIN912)
3	Elastomer coupling	4	Flat cam gear
5	Complete drive		

5.3 Installing the workpieces carrier on the toothed belt

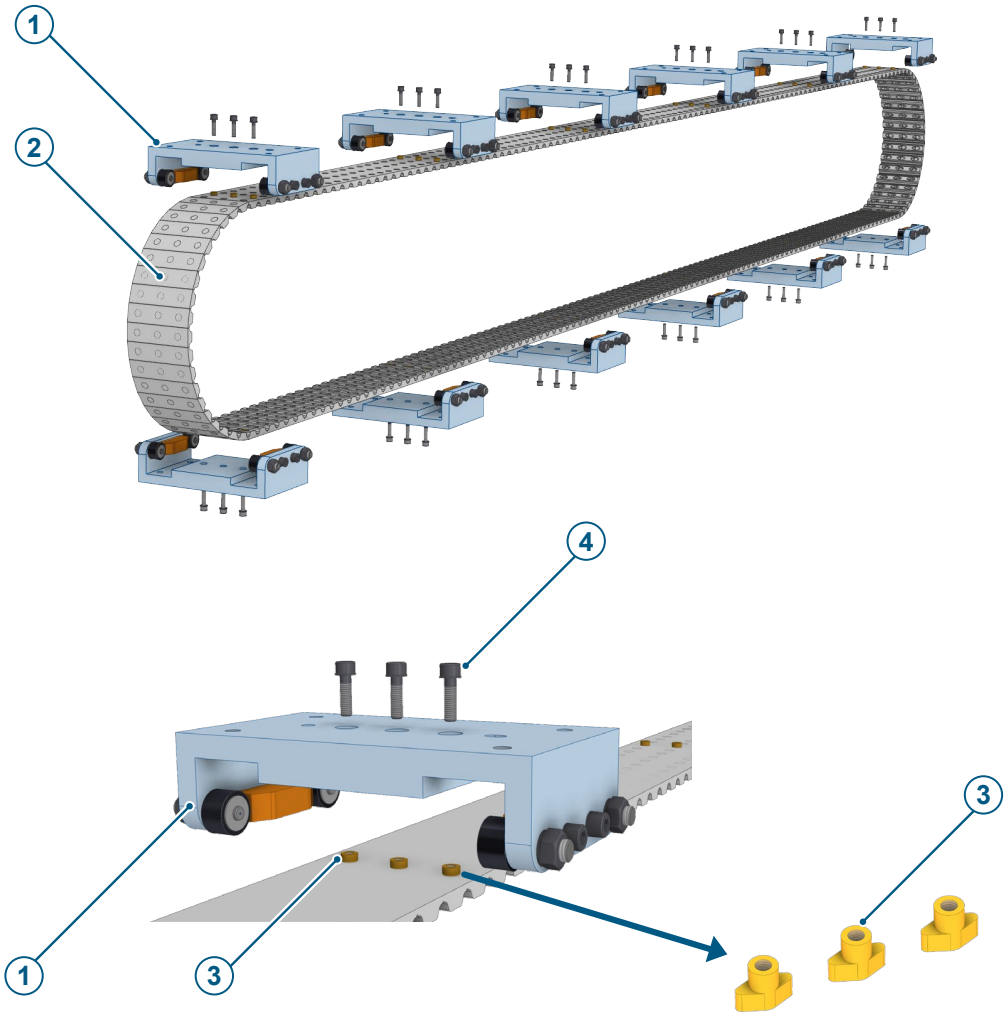

Fig. 12: Installing the workpieces carrier on the toothed belt

1	Workpiece carrier (WC)	2	Toothed belt
3	Brass insert	4	Screw M5 x 18-DIN912 + Schnorr safety washer S5 (3x per WC)

In order to remove the workpiece carriers from the toothed belt, unfasten the screws (4).

When installing the workpiece carriers on the toothed belt, make sure that the bores in the workpiece carriers (1) are positioned exactly above the openings of the brass inserts (3).

Screw the workpiece carriers firmly in place on the toothed belt (2) with the screws (4).

Toothed belt attachments

When working with attachments/workpiece carriers (WC) on the toothed belt, observe the following:

- Maximum mass moved (according to TAKTOMAT project planning)
- Minimum time until positioning (according to TAKTOMAT project planning)
- Maximum overhang (tilting moment) (according to TAKTOMAT project planning)
- Max tightening torque for mounting holes

6 Operation

General requirements for operation

Operation of the linear transfer system is only permitted in a complete, CE-compliant machine or system.

The linear transfer system must not be operated with defective or disabled safety equipment.

6.1 Operating modes

The linear transfer system is designed for different operating modes. These operating modes must be implemented by means of an external controller.

Normal operation

In normal mode, the workpiece carriers are moved cyclically from one stop position to the next.

Intermittent operation

Intermittent operation consists of two phases: the dwell phase and the stepping time.

In the dwell phase, the drive unit stops. External assembly processes can be performed during this time. The dwell time is variable.

During the indexing phase, the endless chain is stepped to the next stop position.

Inching operation

In inching operation, the drive shaft is moved between two dwell positions in small steps.

The barrel cam is unable to accelerate and decelerate the load gently. This results in high accelerations which put a strain on the linear transfer system. Inching must only be carried out with a suitable universal controller. that makes it possible to accelerate and decelerate the load gently so as to protect the gearing. A suitable controller is, for example, the TIC controller (TAKTOMAT Indexing Controller).

Emergency stop

The emergency stop immediately stops the movement of the linear transfer system. The resultant load that is built up puts a strain on the linear transfer system. The emergency stop should therefore only be used in emergency situations.

7 Maintenance

Required personal protective equipment

⚠DANGER

Electric shock

Touching live parts poses an immediate danger to life

- Work on electrical systems may only be carried out by qualified electricians
- Before starting work, disconnect the system, secure it against being switched on again and make sure that no voltage is present

7.1 General

The maintenance intervals are minimum recommendations for three-shift use. Non-compliance with the maintenance instructions and unauthorized modifications will render warranty claims and the manufacturer's liability void.

Comply with all laws, regulations as well as the regulations of the respective country of operation for the protection of people and the environment.

The maintenance instructions are only valid in conjunction with the instructions of the respective manufacturer. The contents are subject to change without notice.

7.2 Maintenance tasks

Carry out switch-on and switch-off procedures in accordance with the instructions for all maintenance and cleaning work.

Observe the adjustment, maintenance and inspection activities prescribed in the operating and maintenance instructions, including the specifications on parts/equipment replacement.

Ensure that the maintenance area is adequately secured if necessary.

Rework

When carrying out maintenance work, always retighten loosened screw connections.

If it is necessary to remove any safety equipment, the safety equipment must be reinstalled immediately after the work has been completed. After installation, check the function of the safety equipment.

Dispose of operating and auxiliary materials as well as cleaning agents and replacement parts safely and in an environmentally friendly manner. Follow the manufacturer's instructions for hazardous substances.

Spare parts

Spare parts must comply with the technical requirements specified by the manufacturer. This is always ensured if genuine spare parts are used.

Environmental protection

Remove leaking or excess grease from lubrication points and dispose of it in accordance with the applicable local regulations.

7.2.1 Maintenance personnel

The operator must clearly regulate and define the responsibilities and procedures for cleaning, maintenance and servicing work.

Only qualified, trained and instructed personnel must carry out maintenance tasks.

7.2.2 Maintenance schedule

Adhere to the information and specifications of the manufacturers or suppliers for externally purchased and in-house components.

Interval	Activity	Personnel
Daily	Check the general condition of the machine, check the system for soiling	Operator
Monthly	Check the cam followers and guide rails to make sure they move freely and check their general condition	Operator
Monthly	Check the condition of the belt, check for nicks, cracks and wear	Operator
Monthly	Check the toothed belts for wear and soiling	Operator
Annually	Maintenance of the stepping gear in accordance with the operating instructions	Qualified personnel

7.2.3 Cleaning

Keep all handles, steps, handrails, platforms and ladders free from dirt.

Compressed air must not be used for cleaning.

Before starting maintenance work, clean all components and especially connections and screw fittings to remove any oil, fuel or cleaning agents. Do not use any aggressive cleaning agents. Use lint-free cleaning cloths.

After cleaning, check all supply lines to ensure that they do not leak, that no connections have come loose, and that they show no signs of abrasion or damage. Immediately rectify any defects.

7.3 Checking and setting the belt tension

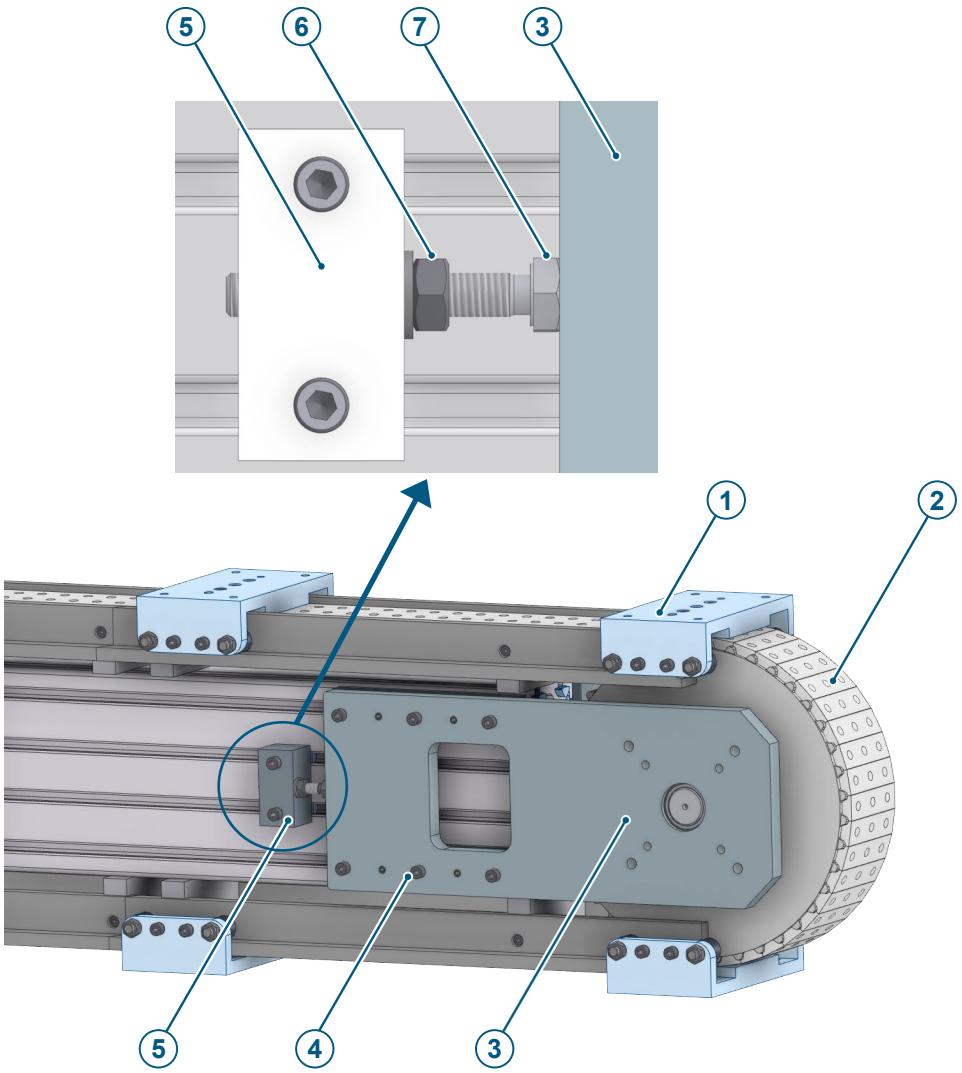

Fig. 13: Detail of belt tensioning on deflection wheel

1	Workpiece carrier	2	Endless toothed belt
3	Side plate 2x (left and right)	4	Screws for side plate 12x (M6 x 40-DIN912)
5	Clamping block 2x (= fixed)	6	Counter nut (M8-DIN934))
7	Tensioning screw (M8 x 55-DIN933)		

The belt tension can only be checked and set on the deflection wheel.

Proceed as follows to tension the belt:

✓ The linear transfer system has been isolated from the electrical power supply.

1. Unfasten the screws for the side plate (4) on both sides.
2. Loosen the counter nut (6).
3. Use the tensioning screw (7) to tension the toothed belt (2) evenly on both sides. Tension by turning anti-clockwise.
4. Check the belt tension as per the figure below (lifting dimension = 0.5 x A/1000).
5. Once the required tension has been achieved, fasten the counter nut (6).
6. Tighten the screws for the side plate (4) with the specified torque.

➲ The belt has been tensioned.

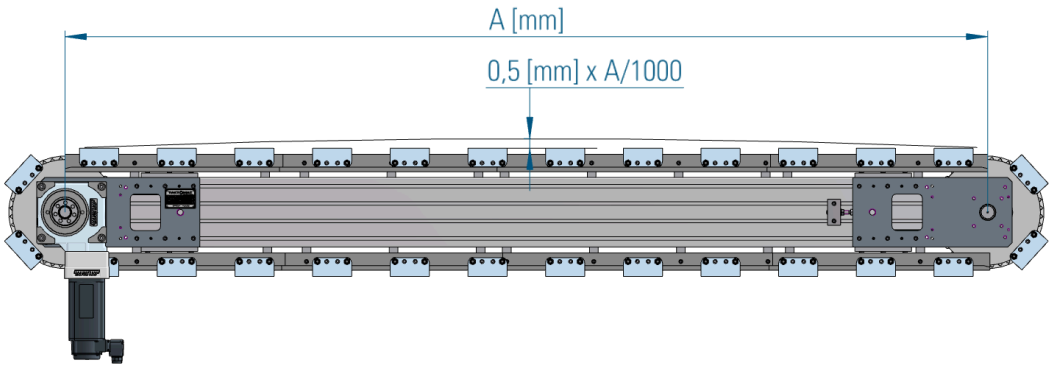

Fig. 14: Specified toothed belt tension

7.4 Removing the toothed belt

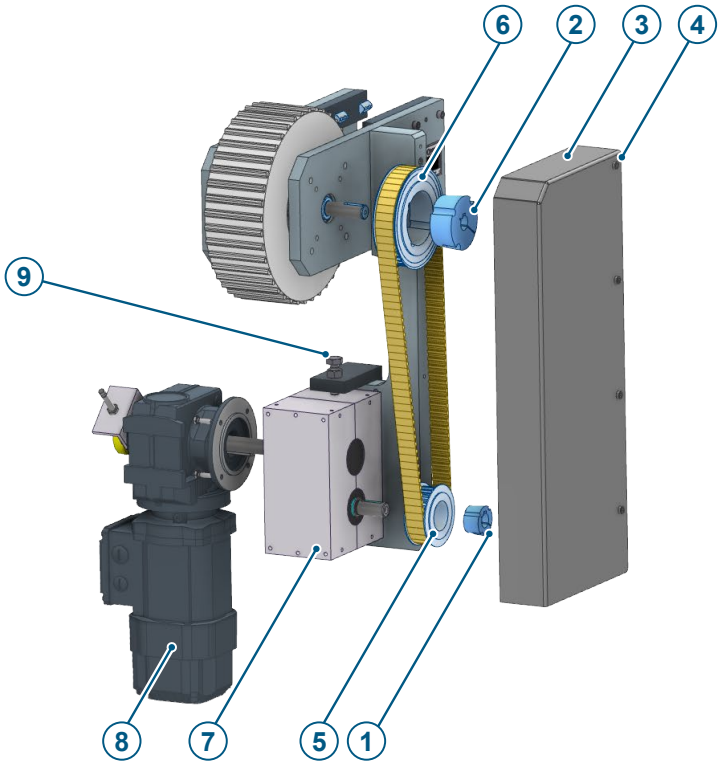

Fig. 15: Removing the belt drive

1	Taper Lock bushing 1	2	Taper Lock bushing 2
3	Guard for belt drive	4	Screw M6 x 10-DIN6912 (4x)
5	Toothed belt pulley 1	6	Toothed belt pulley 2
7	XP flat cam gear	8	Complete drive
9	Toothed belt tensioning device		

Proceed as follows to remove the belt drive:

✓ The linear transfer system has been isolated from the electrical power supply.

1. Unfasten the screws (4) on the guard for the belt drive (3).
2. Remove the guard for the belt drive (3).
3. Unfasten the screw for the tensioning device (9).
4. Push the flat cam gear (7) upwards.

➲ The toothed belt can be replaced.

NOTE

- Install the Taper Lock bushings in accordance with with manufacturer's instructions
- When installing, make sure that the toothed belt pulleys are aligned. Avoid horizontal offset of the toothed belt pulleys

Proceed as follows to install the belt drive:

✓ The linear transfer system has been isolated from the electrical power supply.

1. Unfasten the screw for the tensioning device (9).
2. Push the flat cam gear (7) upwards.
3. Fit the toothed belt to the toothed belt pulleys (5, 6) as shown.
4. Use the screw of the tensioning device (9) to tension the toothed belt.
5. Fasten the guard for the belt drive (3) with the screws (4).

➲ The toothed belt has been installed.

7.5 Tensioning the toothed belt

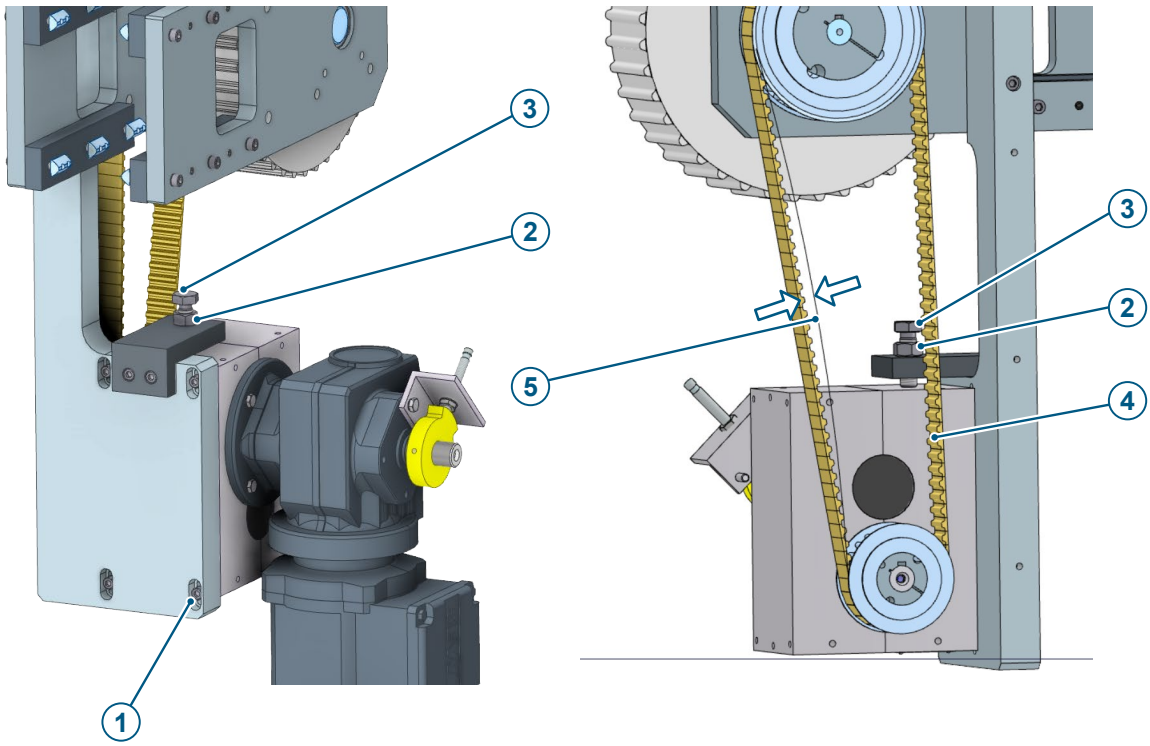

Fig. 16: Tensioning the toothed belt

1	Fastening screws M6 x 30-DIN912 (4x)	2	Lock nut
3	Set screw for belt tension M12 x 40-DIN933	4	Toothed belt
5	Toothed belt sag in accordance with the specifications of the toothed belt manufacturer		

Proceed as follows to tension the toothed belt:

✓ The linear transfer system has been isolated from the electrical power supply.

1. Remove the guard for the belt drive (not shown). To do so, remove the 4 fastening screws M6 x 10-DIN6912.
2. Loosen the fastening screws (1) on the flat cam gear. Do not remove the screws!
3. Loosen the counter nut (2).
4. Turn the set screw for the belt tension (3). Turn clockwise to tension the belt. Turn anti-clockwise to slacken the belt.
5. Check the tension of the toothed belt (4). Adhere to the values for belt tension in accordance with the specifications of the toothed bet manufacturer.
6. Tighten the lock nut (2).
7. Tighten the fastening screws (1). Use the correct torque!
8. Attach the guard for the belt drive (not shown) and tighten the 4 screws M6 x 10-DIN6912.

➲ The belt has been tensioned.

8 Disposal

Required personal protective equipment

DANGER

Electric shock

Touching live parts poses an immediate danger to life

- Work on electrical systems may only be carried out by qualified electricians
- Before starting work, disconnect the system, secure it against being switched on again and make sure that no voltage is present

NOTE

Environmental damage

Improper disposal may result in environmental damage

- Dispose of components and operating materials in accordance with local regulations
- Observe the safety data sheets of the operating materials

Materials used

The components are mainly made of the following materials:

- Copper (complete drive units, electrical cables)
- Steel and grey cast iron (housings, attachments, shafts, bearings)
- Plastic (toothed belt, insulation, bearing)

Preparation for disposal

1. Disconnect the system from all power supplies and secure it against being switched on again.
2. Wait 15 minutes until all live components are completely discharged.
3. Disassemble and dispose of assemblies and components in accordance with local environmental regulations.

9 Spare and wear parts

NOTICE

The use of unsuitable spare parts may result in material damage

Spare parts must comply with the technical requirements specified by the manufacturer

- Only use original spare parts
- Check spare parts for faults or defects prior to installation

Spare and wear parts are always order-specific. A corresponding spare and wear parts list is available from TAKTOMAT on request. When ordering spare parts, always specify the serial number. The serial number is located on the nameplate.

10 Annexes

10.1 Content of the declaration of incorporation

(The original declaration of incorporation is included in the documentation)

Translation of the original declaration of incorporation (in German) for partly completed machinery (Machinery Directive 2006/42/EC, Annex II 1 B)

TAKTOMAT passion for automation

Manufacturer:

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

Description and identification of the partly completed machinery:

Your order No.:	-
Our order No.:	-
Product:	Linear transfer system
Type:	RFA075
Serial number:	-
Commercial name:	Linear transfer system RFA075

The manufacturer declares that the following essential requirements of the Machinery Directive 2006/42/EC have been applied and met:

1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.5.3, 1.5.4, 1.6.1, 1.6.4, 1.7.1, 1.7.4

Reference of the applied harmonised standards according to Article 7 Section 2:
EN ISO 12100:2010 Safety of machinery — General principles for design — Risk assessment and risk reduction

Furthermore, it is declared that the relevant technical documentation for this partly completed machinery has been compiled according to Annex VII Part B. The manufacturer undertakes to transmit in electronic form relevant information on the partly completed machinery within a reasonable time in response to a reasoned request by the national authorities.

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared to be in conformity with the provisions of the Machinery Directive.

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