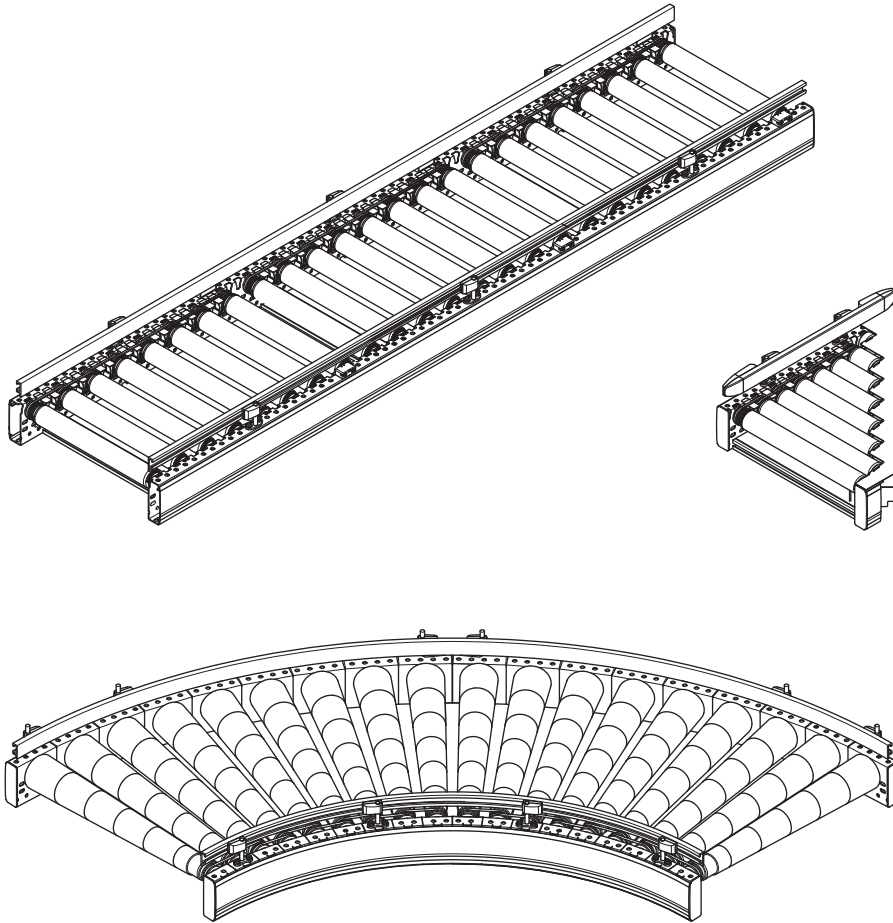


INSPIRED BY EFFICIENCY



Installation and Operating Instructions

Interroll 24-V Roller Conveyor

RM 8310

RM 8320

RM 8330

Manufacturer's address

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Introduction

Notes about working with the installation and operating instructions

The Interroll 24 V Roller Conveyor RM 8310, RM 8320, RM 8330 is generally referred to as "module" in this document.

**Contents of these
installation and operating
instructions**

These installation and operating instructions contain important notes and information about the various operating phases of the module:

- Transport, assembly and startup
- Safe operation, required maintenance tasks, removal of any faults
- Spare parts, supplementary accessories

**Integrated part of the
product**

The installation and operating instructions describe the module at the time of its initial delivery after manufacturing.

In addition to this manual, special contractual agreements and technical documents apply to special versions of the module and its additional equipment.

**Installation and operating
instructions are part of
the module**

- ▶ To ensure trouble-free and safe operation as well as the settlement of possible warranty claims, always read these installation and operating instructions first and observe all the information contained herein.
- ▶ Keep the installation and operating instructions close to the module.
- ▶ Pass the installation and operating instructions on to any subsequent operator or occupant. Interroll does not accept any liability for faults or defects due to non-observance of these installation and operating instructions.

If you have any questions after reading the installation and operating instructions, please contact the Interroll customer service. Contact persons close to you can be found on the Internet under: www.interroll.com/contacts.

Warning notices in this document

The warning notices refer to risks which may arise while using the module. They are available in four danger levels identified by the signal word:

Signal word	Meaning
DANGER	Identifies a danger with high risk that can lead to death or serious injury if it is not avoided.
WARNING	Identifies a danger with medium risk that can lead to death or serious injury if it is not avoided.
CAUTION	Identifies a danger with low risk that can lead to minor or medium injury if it is not avoided.
NOTICE	Identifies a danger that can lead to property damages.

Introduction

Symbols



This symbol marks useful and important information.

Requirement:

- This symbol represents a prerequisite to be met prior to assembly and maintenance work.
- ▶ This symbol marks the steps to be carried out.

Safety

State of the art

The module has been built to comply with the state of the art. Nevertheless, users may encounter hazards during its use.



Disregarding the notices in this manual may lead to serious injury.

- ▶ Carefully read the manual and follow its content.

Intended use

The module may only be used for industrial applications and in an industrial environment to convey roller conveyor-ready goods such as small packages, cartons or boxes.

The module is an incomplete machine and must be integrated into a complete system prior to operation.

Field of use

The module is dimensioned only for a certain field of use (see Technical Data) and may not be operated outside of these specific limits.

Any other use is considered inappropriate. Deviating operating conditions require additional clarifications, a special release of the module and new contractual agreements.

Changes to the module

Any modifications that affect the safety are not permitted.

Personnel qualification

Unqualified personnel cannot recognize risks and, as a result, is subject to greater dangers.

- ▶ Authorize only qualified personnel with the activities described in these operating instructions.
- ▶ The operating company must ensure that the personnel follows locally applicable regulations and rules during their work with regard to safety and dangers.

The following target groups are addressed in these operating instructions:

Operators

Operators have been instructed in the operation and cleaning of the module and follow the safety guidelines.

Service personnel

The service personnel features a technical training and performs the maintenance and repair tasks.

Electricians

Persons working on electrical equipment must have undergone technical training and training provided by the manufacturer.

Safety

Dangers



The following list informs you about the various types of danger or damage that may occur while working with the module.

Safety devices

- ▶ Perform any maintenance and repair work on the module only in de-energized state and ensure that it cannot be started accidentally.
- ▶ In the passage area of persons or if persons can reach between transported materials, additional protective measures may apply.
- ▶ Do not remove protective covers or housing.
- ▶ Regularly check the safety devices.

Electricity

- ▶ Reach into the module only if the module is de-energized.

Rotating parts

- ▶ Never wear loose clothing.
- ▶ Never wear jewelery, such as necklaces or bracelets.
- ▶ If you have long hair, always wear a hair net.

Parts lying around or falling off

- ▶ Remove equipment or material which is not required from the workspace.
- ▶ Wear safety shoes.
- ▶ Specify and monitor careful placement of the goods on the conveyor.

Risk of injury due to faults during operation

- ▶ Regularly check the module for visible damage.
- ▶ Immediately shut down the module and ensure that it cannot be started accidentally in case of:
fire vapors, unusual, noise, blocked or defective conveyor belt, defective supports, side guides or accessory devices, unauthorized removal of safety covers and with a defective suspension.
- ▶ Immediately determine the cause of the fault by qualified personnel.
- ▶ Immediately remove any escaping gear oil.
- ▶ Do not step on the module during operation.

Maintenance intervals

- ▶ Regularly perform maintenance and inspection work.
- ▶ Use only OEM spare parts.

Interfaces to other devices

New hazardous positions may occur while integrating the module into a complete system. These positions are not part of this manual and have to be analyzed during the assembly and startup of the complete system.

- ▶ When combining the module with other modules or machinery, check for new hazards before startup. In particular, observe the infeed point at the deflection shaft.
- ▶ Additional constructive measures may be required.



Safety

Operating modes

Normal mode The module is installed at the customer in a complete system and operated as part of the system.

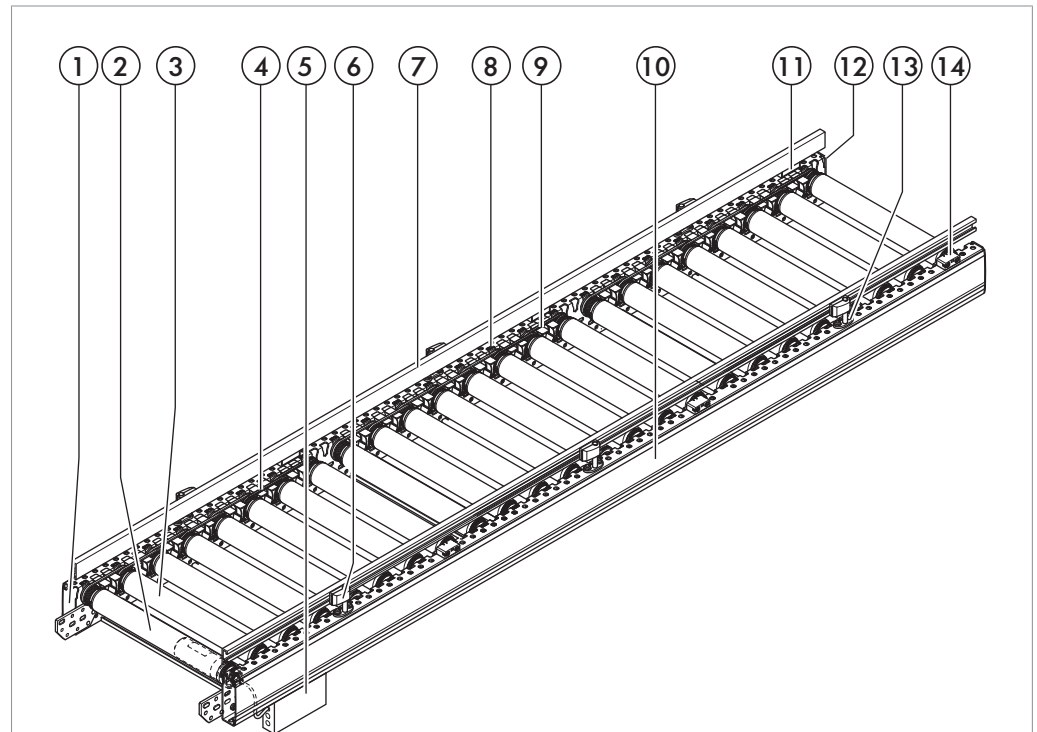
Special mode Special operation refers to all operating modes which are required to guarantee and maintain regular operation.

Special operating mode	Explanation	Comment
Transport/Storage	Loading and unloading, transport and storage	-
Assembly/Initial start-up	Installation at the end customer and performing the test run	-
Cleaning	External cleaning without removing protective devices	When de-energized
Maintenance/Repairs	Maintenance and inspection tasks	When de-energized
Troubleshooting	Troubleshooting in the event of a fault	-
Fault elimination	Eliminating the fault	When de-energized
Shutdown	Removing from the complete system	When de-energized
Disposal	Removing from the complete system and disassembly	When de-energized

Product identification

24-V Roller Conveyor Straight (RM 8310)

Components



24-V roller conveyor straight RM 8310

- | | | | |
|---|-------------------------------|----|-------------------------|
| 1 | Side frame | 8 | Closing clip |
| 2 | RollerDrive (drive roller) | 9 | Finger guard |
| 3 | Carrying idler | 10 | Side cover |
| 4 | Drive belt (roller-to-roller) | 11 | Photo cell |
| 5 | Control | 12 | End cap (of side frame) |
| 6 | Side guide support | 13 | Universal support |
| 7 | Side guide profile | 14 | Reflector |

Property

The 24 V roller conveyor enables zero pressure accumulation transport of unit loads with the help of a controller. Each zone is powered by a RollerDrive that is connected to a fixed number of idlers via PolyVee belts.

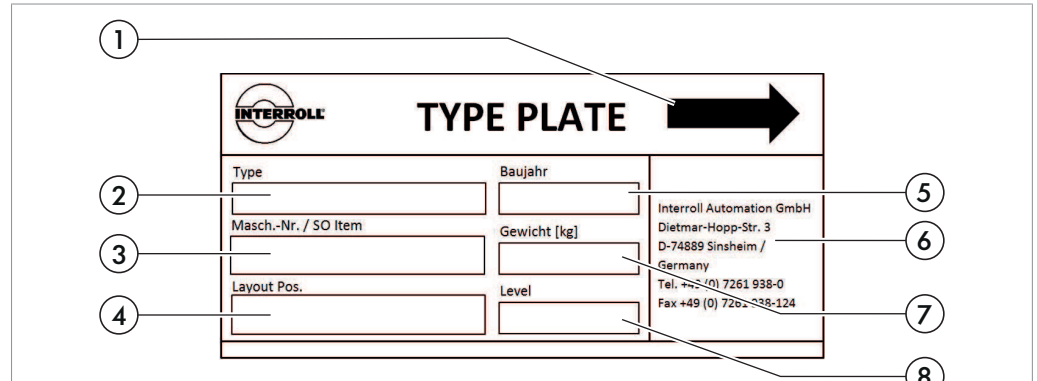
Product identification

Technical Data

	Straight RM 8310
Max. load capacity per zone	50 kg
Conveyor speed	0.1 to 1.0 m/s (at 35 kg) 0.1 to 0.8 m/s (at 50 kg)
Ambient temperature	+5 to +40 °C
Rollers	Series 3500
Roller diameter	50 mm
Roller material	Steel 1.5 mm, zinc-plated
Roller material option	PVC sheathed (straight only) Stainless steel rollers Hardened rollers
Number of zones per module (N)	1, 2, 3 or 4
Motor type	Interroll RollerDrive EC310
Rated voltage	24 V
Torque transmission	Roller-to-Roller
Drive medium	PolyVee belts
Control variants	MultiControl
Incline/decline	Max. 4°
Side profile	115 x 35 mm, without side guide
Between frames	300 to 1020 mm
Module length (ML)	$ML = ZL \text{ (zone length)} \times Z \text{ (number of zones)}$ to 4,080 mm
Roller pitch (P)	60 mm 90 mm 120 mm
Side guide	Without, fixed or flexible, left or right
Side of electrical system	Left or right
Drive side	Left or right
Zone length (ZL)	$ZL = \text{number of rollers} \times P$
Noise level	$Leq \leq 70 \text{ dB(A)}$

Product identification

Nameplate



TYPE PLATE

Type	Baujahr	Interroll Automation GmbH Dietmar-Hopp-Str. 3 D-74889 Sinsheim / Germany Tel. +49 (0) 7261 938-0 Fax +49 (0) 7261 938-124
Masch.-Nr. / SO Item	Gewicht [kg]	
Layout Pos.	Level	

Nameplate (with arrow in transport direction)

1	Arrow in transport direction	5	Year of construction
2	Type designation	6	Company address
3	Machine no.	7	Weight in kg
4	Layout item no.	8	Level

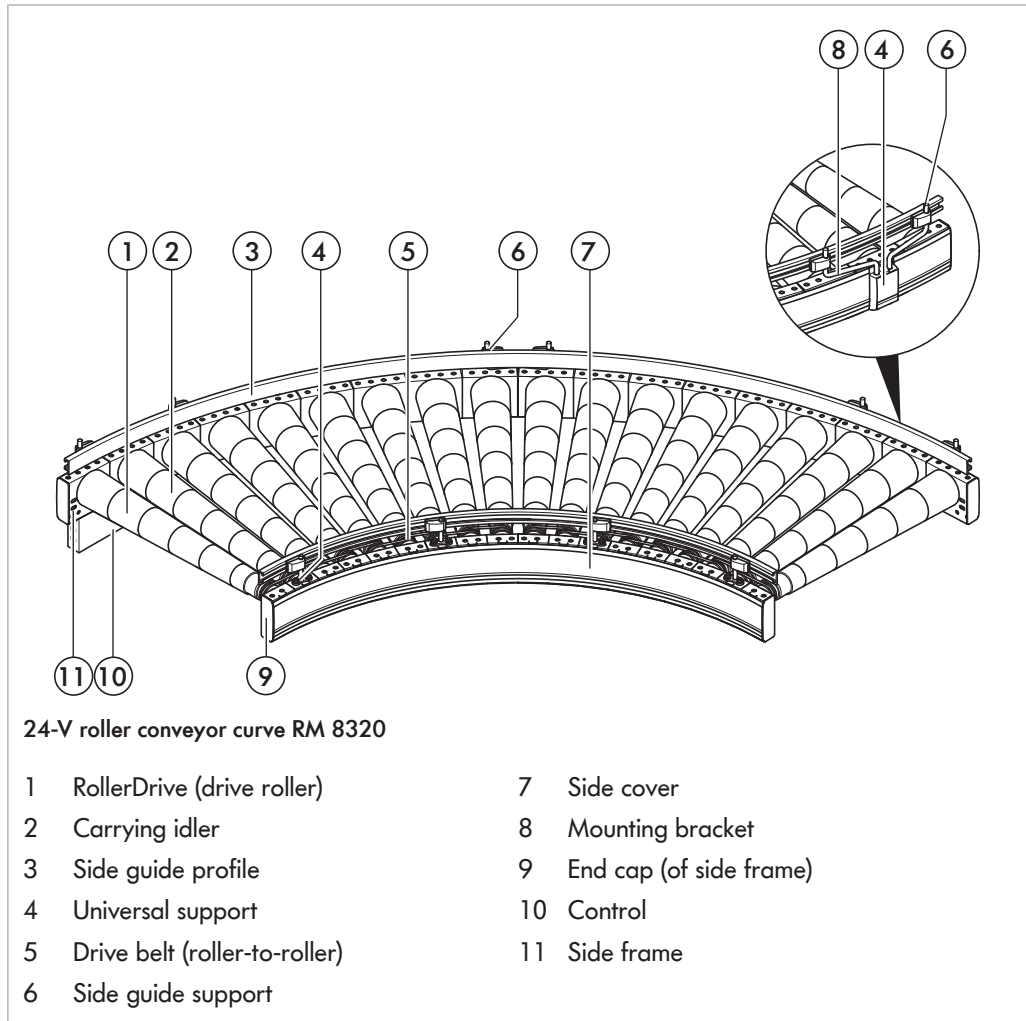
The information on the nameplate is used to identify the conveyor. The type designation is required to use the conveyor according to its intended use.



The nameplate is located at the end of the conveyor in the right side frame in transport direction.

24-V Roller Conveyor Curve (RM 8320)

Components



Property

The 24 V roller conveyor curves change the direction of transport of the material. The conical rollers retain the alignment of the materials between side frames. A controller enables zero pressure accumulation transport. Each zone is powered by a 24 V RollerDrive that is connected to a fixed number of idlers via round belts.

Product identification

Technical Data

	Curve RM 8320
Max. load capacity per zone	50 kg
Conveyor speed	0.1 to 1.0 m/s (at 35 kg) 0.1 to 0.8 m/s (at 50 kg)
Ambient temperature	+5 to +40 °C
Rollers	Series 1700
Roller diameter	50 mm
Roller material	Steel 1.5 mm, zinc-plated
Roller material option	Stainless steel rollers
Max. number of rollers per zone	6 for 30° 9 for 45° 12 for 60° 18 for 90°
Number of zones per module (N)	1 or 2
Motor type	Interroll RollerDrive EC310
Rated voltage	24 V
Torque transmission	Roller-to-Roller
Drive medium	Round belt
Control variants	MultiControl
Side profile	115 x 35 mm, without side guide
Between frames	300 to 1020 mm
Roller pitch inside (Pi)	~72 mm, 1st pitch: 36 mm
Roller pitch outside (Pa)	~(0.087 mm x BF) + Pi
Cam angle	30° 45° 60° 90°
Inside radius	825 mm
Direction of rotation	Clockwise / counterclockwise
Side guide	Without, fixed or flexible, left or right
Noise level	Leq ≤ 70 dB(A)

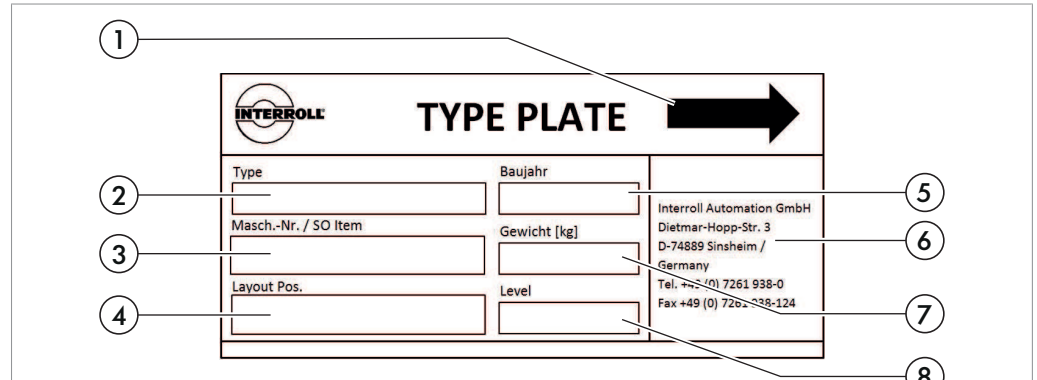


Product identification

Roller pitch outside, roller diameter	Clearance (BF)	1. Pitch outside (P1)	Roller pitch outside (P)	Roller diameter outside (D1)
300	49.035	98.07	71.2	71.2
420	54.255	108.51	77.6	77.6
540	59.475	118.95	84	84
620	62.955	125.91	90.4	90.4
720	67.305	134.61	96.8	96.8
840	72.525	145.05	103.2	103.2
960	77.745	155.49	109.6	109.6
1020	80.355	160.71	109.6	109.6

Product identification

Nameplate



TYPE PLATE

Type	Baujahr	Interroll Automation GmbH Dietmar-Hopp-Str. 3 D-74889 Sinsheim / Germany Tel. +49 (0) 7261 938-0 Fax +49 (0) 7261 938-124
Masch.-Nr. / SO Item	Gewicht [kg]	
Layout Pos.	Level	

Nameplate (with arrow in transport direction)

1	Arrow in transport direction	5	Year of construction
2	Type designation	6	Company address
3	Machine no.	7	Weight in kg
4	Layout item no.	8	Level

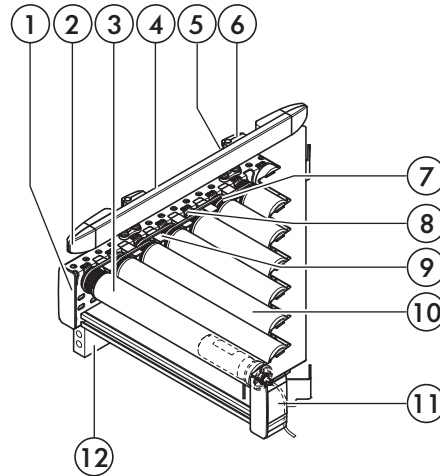
The information on the nameplate is used to identify the conveyor. The type designation is required to use the conveyor according to its intended use.



The nameplate is located at the end of the conveyor in the right side frame in transport direction.

24-V Roller Conveyor Merge (RM 8330)

Components



24-V roller conveyor merge RM 8330

1	End cap (of side frame)	7	Drive belt (roller-to-roller)
2	End cap (of side guide)	8	Closing clip
3	RollerDrive (drive roller)	9	Finger guard
4	Side guide profile	10	Carrying idler
5	Universal support	11	Side cover
6	Side guide support	12	Control

Property The merge merges two conveyor lines by placing products in the gaps in the material flow. Alternatively, the merge diverts products from a straight conveyor, e.g., by using an HPD (High Performance Divert).

Product identification

Technical Data

	Merge RM 8330
Max. load capacity per zone	50 kg
Conveyor speed	0.1 to 1.0 m/s (at 35 kg) 0.1 to 0.8 m/s (at 50 kg)
Ambient temperature	+5 to +40 °C
Rollers	Series 3500
Roller diameter	50 mm
Roller material	Steel 1.5 mm, zinc-plated
Roller material option	PVC sheathed (straight only) Stainless steel rollers Hardened rollers
Motor type	Interroll RollerDrive EC310
Rated voltage	24 V
Torque transmission	Roller-to-Roller
Drive medium	PolyVee belts
Control variants	MultiControl
Side profile	115 x 35 mm, without side guide
Between frames	300 mm to 1020 mm
Roller pitch (P)	60 mm
Side guide	Without, fixed or flexible, left or right
Merging angle	30° 45°
Noise level	Leq ≤ 70 dB(A)

Product identification

Roller merge dimensions

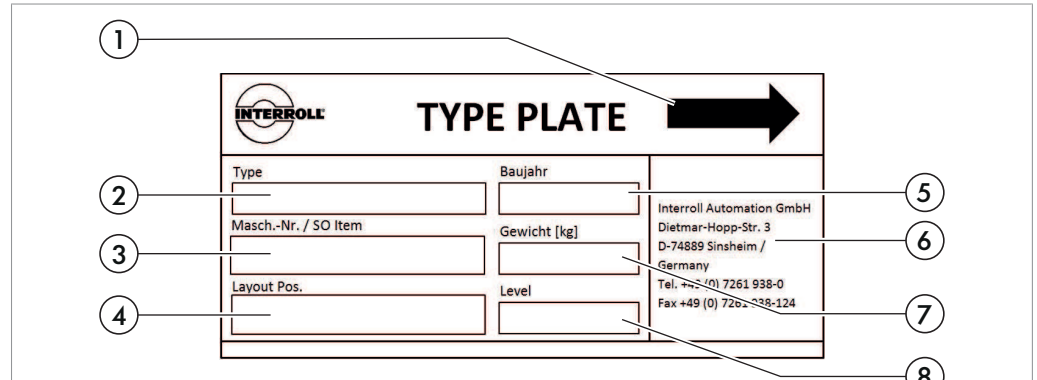
The angle and lane width of a merge or diverter module define the dimensions of the module.

The following table shows the standard dimensions of the merge/diverter modules (merges).

Between frames BF in mm	Module length ML in mm	Module length ML in mm
	For angle $\alpha = 45^\circ$ and roller pitch $P = 60$ mm	For angle $\alpha = 30^\circ$ and roller pitch $P = 60$ mm
	24 V	24 V
420	510	810
620	690	1140
840	930	1540

Product identification

Nameplate



TYPE PLATE

Type	Baujahr	Interroll Automation GmbH Dietmar-Hopp-Str. 3 D-74889 Sinsheim / Germany Tel. +49 (0) 7261 938-0 Fax +49 (0) 7261 938-124
Masch.-Nr. / SO Item	Gewicht [kg]	
Layout Pos.	Level	

Nameplate (with arrow in transport direction)

1	Arrow in transport direction	5	Year of construction
2	Type designation	6	Company address
3	Machine no.	7	Weight in kg
4	Layout item no.	8	Level

The information on the nameplate is used to identify the conveyor. The type designation is required to use the conveyor according to its intended use.



The nameplate is located at the end of the conveyor in the long side frame.

Product identification

Zones

The modules are divided into zones. Every zone features at least one drive and sufficient space for at least one piece of material.

All the rollers of a zone are connected via PolyVee or round belts.

Control

Control card

Every module features its own control card or is connected to the control card of its adjacent module.

The 24 V roller conveyor can be delivered with a decentral control logic.

No master control system is required for operating the complete conveyor system.

Fieldbus

The 24 V roller conveyor features a fieldbus as an option, so that it can be completely controlled via a PLC (programmable logic controller).

Every module is wired with all internal cables and can easily be installed on site. Communication cables are available as options, such as bus cables.

Scope of supply

The 24 V roller conveyor is completely assembled and wired in its delivery state. The scope of supply includes:

- Rack, including side frames, cross ties, side covers
- RollerDrive
- Carrying idlers
- Drive belt (PolyVee or round belt)
- Finger guards
- Closing clips
- Power supply cable
- Control
- Light barrier and reflector
- (Optional) Side guide profiles, side guide support and universal supports

The side guide profiles (if ordered) can optionally be delivered assembled or unassembled.

The scope of delivery does not include:

- Supports
- End caps
- Bus (communication) cables

Product identification

Determining permissible dimensions

NOTICE

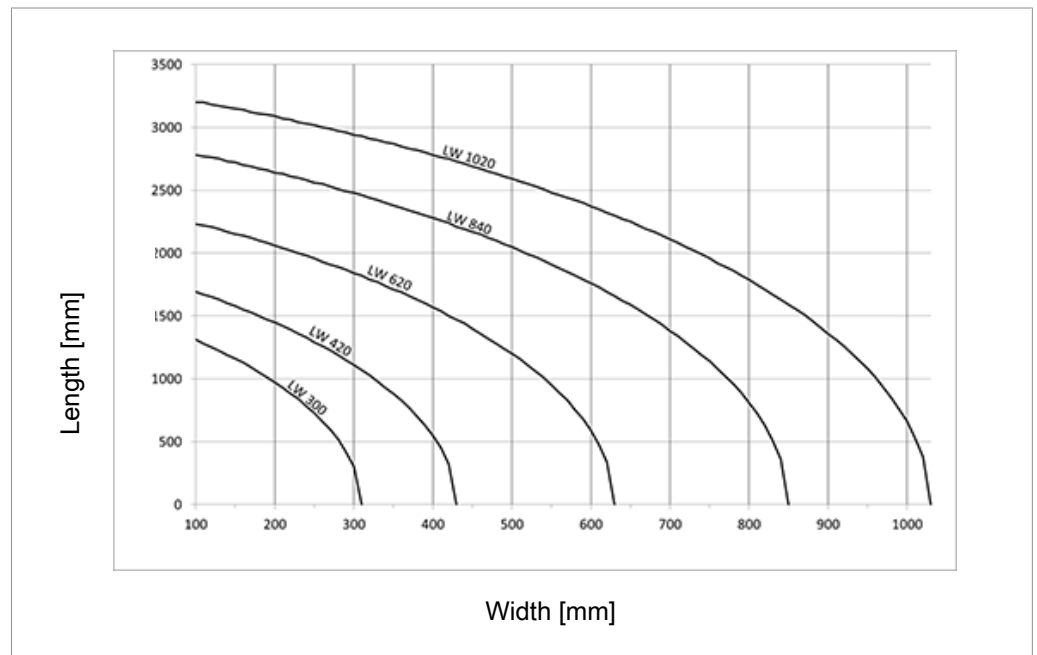
Damage to the module or material!

Transport only materials with permissible dimensions.

- ▶ Determine the clearance (BF) based on ordering documents. Check dimensions, if necessary.
- ▶ Select chart with matching lane width (LW).
- ▶ Check whether the dimensions of the material are located below the characteristic curve for the lane width (LW).
- ▶ The lane width can also be determined with the formula: $R_o = \sqrt{(R_i + W)^2 + (L / 2)^2}$.
- ▶ If necessary, adjust lane width using the flexible side guides according to the material dimensions.

Material dimensions characteristic curves RM 8320

Lane width (LW) 300 -
1020 mm



Transport and storage

Transport

WARNING

Risk of injury during transport

- ▶ Fix the module securely and slip-proof for the transport.
- ▶ Ensure that the lifting device (crane, fork lift, etc.) is rated for the weight of the module.
- ▶ Ensure that no persons are located under the suspended load while lifting and moving the module.

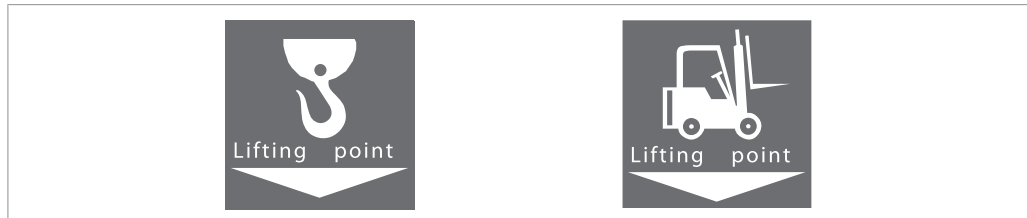


Additional information about the transport are located on an information sheet that accompanies the motor.

- ▶ Data about weight and requirements for loading capacity and lifting tackle are located on the information sheet.
- ▶ Remove any persons from the danger zone.
- ▶ Wear safety shoes.
- ▶ Check the correct fastening for the transport.

The load lifting points are marked on the packet. Individual modules must be gripped at the bottom profile edge at the ends. Gripping at the top edge is not allowed since it can lead to inaccuracies of the sensor.

Identification of load lifting points



After the delivery

- ▶ Inspect module for transport damages.
- ▶ Immediately notify the carrier and manufacturer in case of damages to avoid losing any claims for compensation.

Transport and storage

Storage

 WARNING

Risk of injury due to improper storage

- ▶ Do not stack modules. Do not place any other objects on the module.
 - ▶ Check module for stability.
-
- ▶ If the module is not immediately placed in operation, store it at a location protected against humidity and dust.

Installation

WARNING

Risk of injury due to improper assembly

- ▶ Mechanical assembly tasks should be performed only by service personnel. Observe the safety information.
 - ▶ Electrical assembly tasks should be performed only by authorized electricians. Observe the safety information.
 - ▶ Carefully install all terminals and connections, such as cables, hoses and pipework, and check for correct fit.
-

The module is delivered to the location site as a pre-assembled unit and must be set up, connected and integrated into a system on site.

In principle, photo cell and reflector as well as the control are already pre-assembled and connected with each other. The side guides (universal support, side guide support and side guide profiles) are delivered, either assembled or unassembled, according to customer specifications.

The following steps are required for the installation and integration in a complete system:

- Installing supports, see *"Installing supports"*, page 28
- Connecting the modules, see *"Connecting the modules"*, page 29

If one of the following components is not yet installed, the respective steps must be performed:

- Install photo cell and reflector,
see *"Installing the photo cell and reflector"*, page 31
- Installing side guide profiles,
see *"Installing the side guide profiles"*, page 33
- Install side cover and end caps,
see *"Installing side cover and end caps"*, page 39
- Install the finger guard (PolyVee),
see *"Installing the finger guard (PolyVee guard)"*, page 40

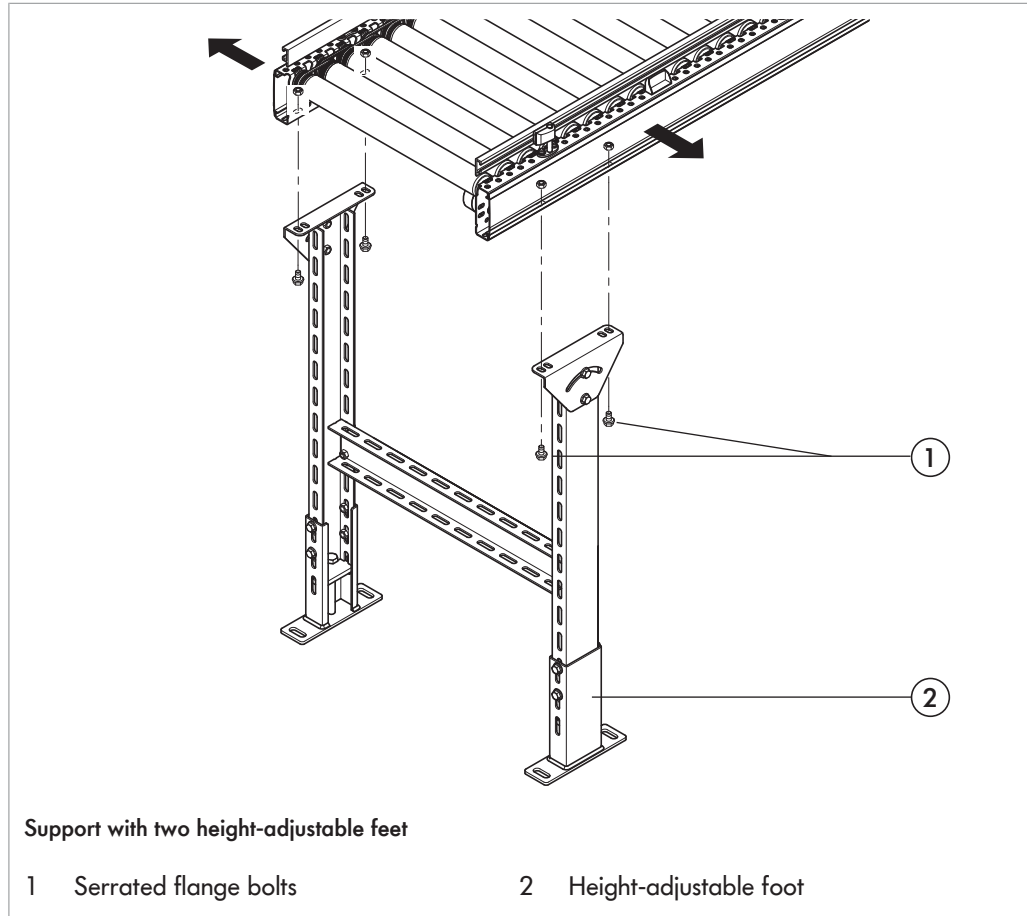
Installation

To be observed during installation

- | | |
|---|---|
| Torque | When tightening screws and nuts, always observe the standard tightening torque, unless specifically indicated otherwise. Standard screw lockers should be replaced as needed. |
| Grounding | During the installation of the module, its grounding must be observed. Among other things, the profile connectors are used for this purpose. If no profile connector is used for connecting the modules, alternate measures must be taken. |
| Orientation | <ul style="list-style-type: none">▶ Align the module at the height-adjustable feet of the support. The decisive item for aligning the modules is the roller top edge (for roller conveyors) or the belt top edge (for belt conveyors).
Secure the adjusted height. Use suitable tools for the alignment (spirit level or rotation laser).▶ During the alignment of the module, ensure that no moving parts are touching. |
| Connection | <ul style="list-style-type: none">▶ Connect the individual modules with each other using the profile connector.▶ During the setup of the module, check the passageways for the personnel. Install transitions as necessary. |
| Anchoring | <ul style="list-style-type: none">▶ Anchor or fasten the module torsion-free, e.g. to the floor or adjacent components. |
| Integration into complete system | <ul style="list-style-type: none">▶ When integrating the module into the complete system, consider possible danger spots, particularly infeed locations and interfaces. |

Installation

Installing supports



⚠ CAUTION

Risk of injury when lifting heavy loads

- ▶ During the installation and replacement of conveyor modules or heavy spare parts, work in pairs or use a suitable carriage.

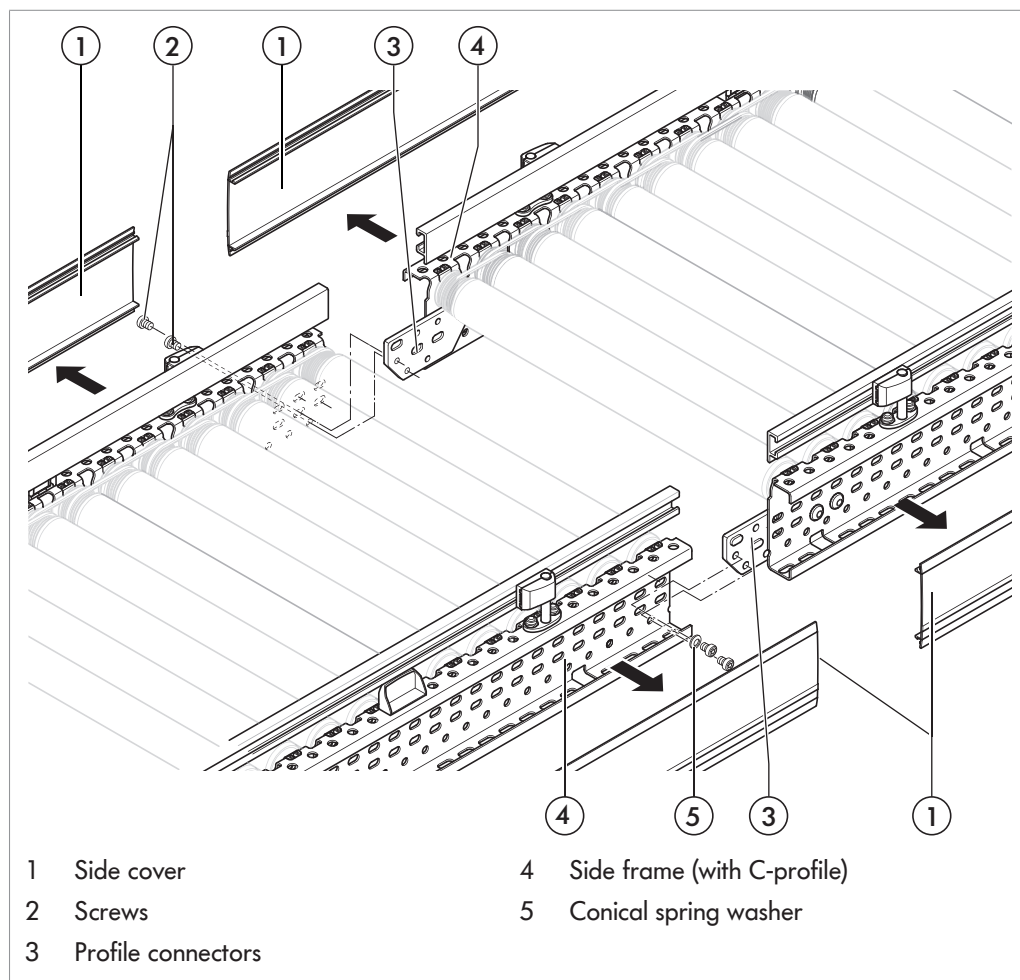
The module sits on at least one support. Every support has two height-adjustable feet (2).

- ▶ Place the module on the support.
- ▶ Position the supports underneath the module.
- ▶ Fasten every support to the perforation profiles of the side frames with four serrated flange bolts (1) and nuts.

For further information about the adjustment options, see the installation instructions of the support.

Installation

Connecting the modules



⚠ CAUTION

Risk of crushing and injuries from cuts

- ▶ When integrating the module into a complete system, consider possible danger spots, particularly infeed locations and interfaces.



During the setup of the conveyor system, check the passageways for the personnel. Install transitions as necessary.

The individual modules of a complete conveyor system are screwed together using profile connectors (3):

- ▶ To connect straight sections and curves, use profile connectors with punch pressing and regular pitch.
- ▶ To connect sections for irregular pitches, use profile connectors with elongated holes and without punch pressing.

Installation



The roller top edge is decisive for the alignment of the modules. Suitable tools for the alignment are spirit level or rotation laser.

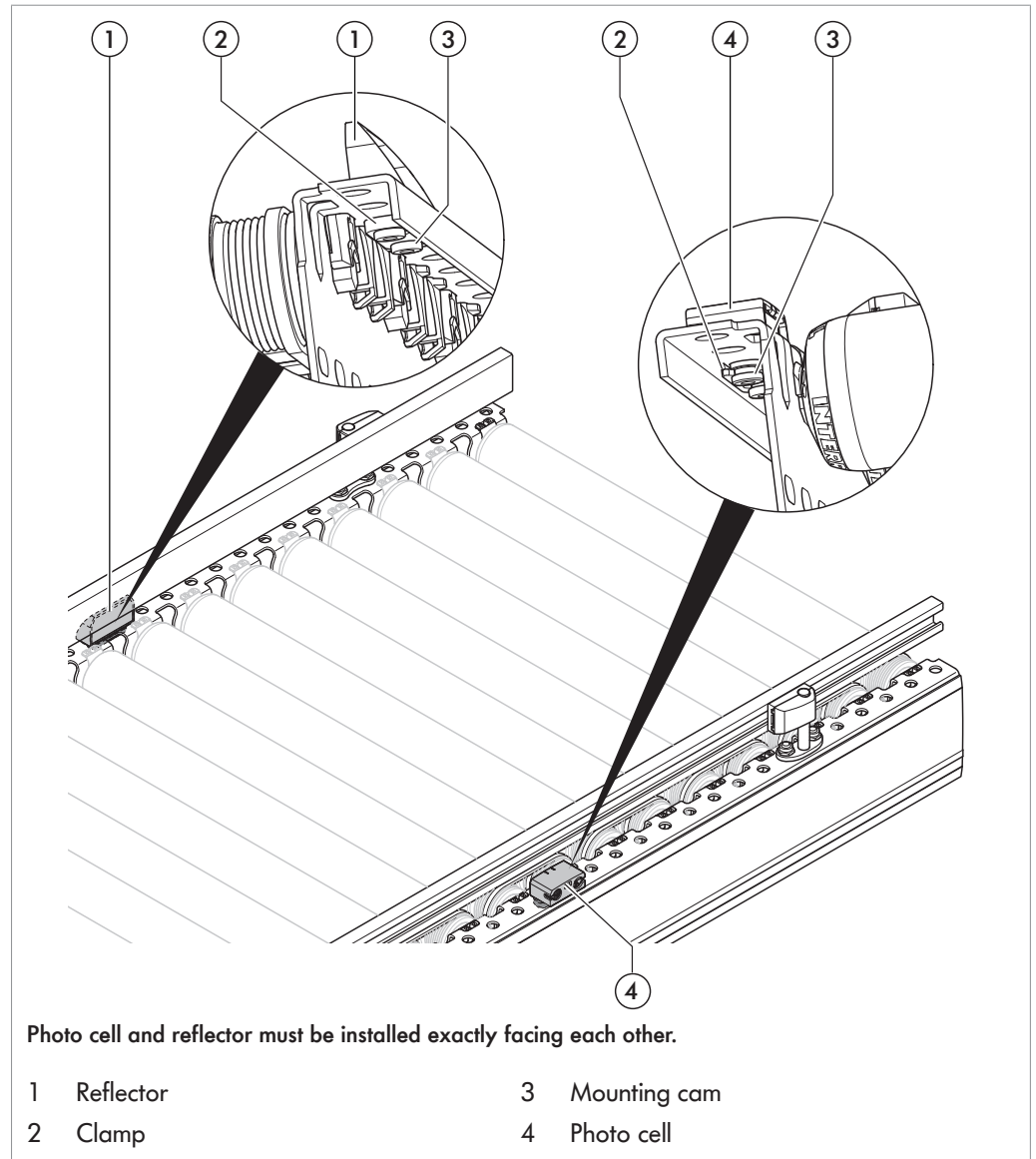
- ▶ Position the modules to be connected so that the side frames (4) are aligned.
- ▶ On the insides of the modules to be connected, place one profile connector (3) each at the side frames. The noses of the profile connectors must catch in the elongated holes of the side frames.
- ▶ Fasten profile connectors to the perforated profiles at the side frames using screws (2). Use two screws for every module. Place a conical spring washer (5) under screws that are used in elongated holes.
- ▶ Anchor or fasten the module torsion-free, e.g. to the floor or adjacent components.

Installation

Installing the photo cell and reflector

The photo cell and the reflector are each delivered as a finished unit:

- The photo cell is in the photo cell holder.
- The reflective tape is affixed to the reflector holder.



The photo cell can be installed on the module at different points: On the side frame (sheet metal thickness $t = 2.5$ mm), on the assembly sheet metal ($t = 2.5$ mm) or on the side guide ($t = 4.5$ mm).

Requirement:

- The module is out of operation.
- ▶ Separate strap (2) as well as photo cell (4) and/or reflector (1) from the sprue clip.
- ▶ Professionally dispose of the sprue.

Installation

- ▶ Place the photo cell on the module at the desired location. Reverse the strap when installing it on a side guide.
- ▶ Place the strap (2) on the mounting cam (3) at the underside of the photo cell and snap it into place.

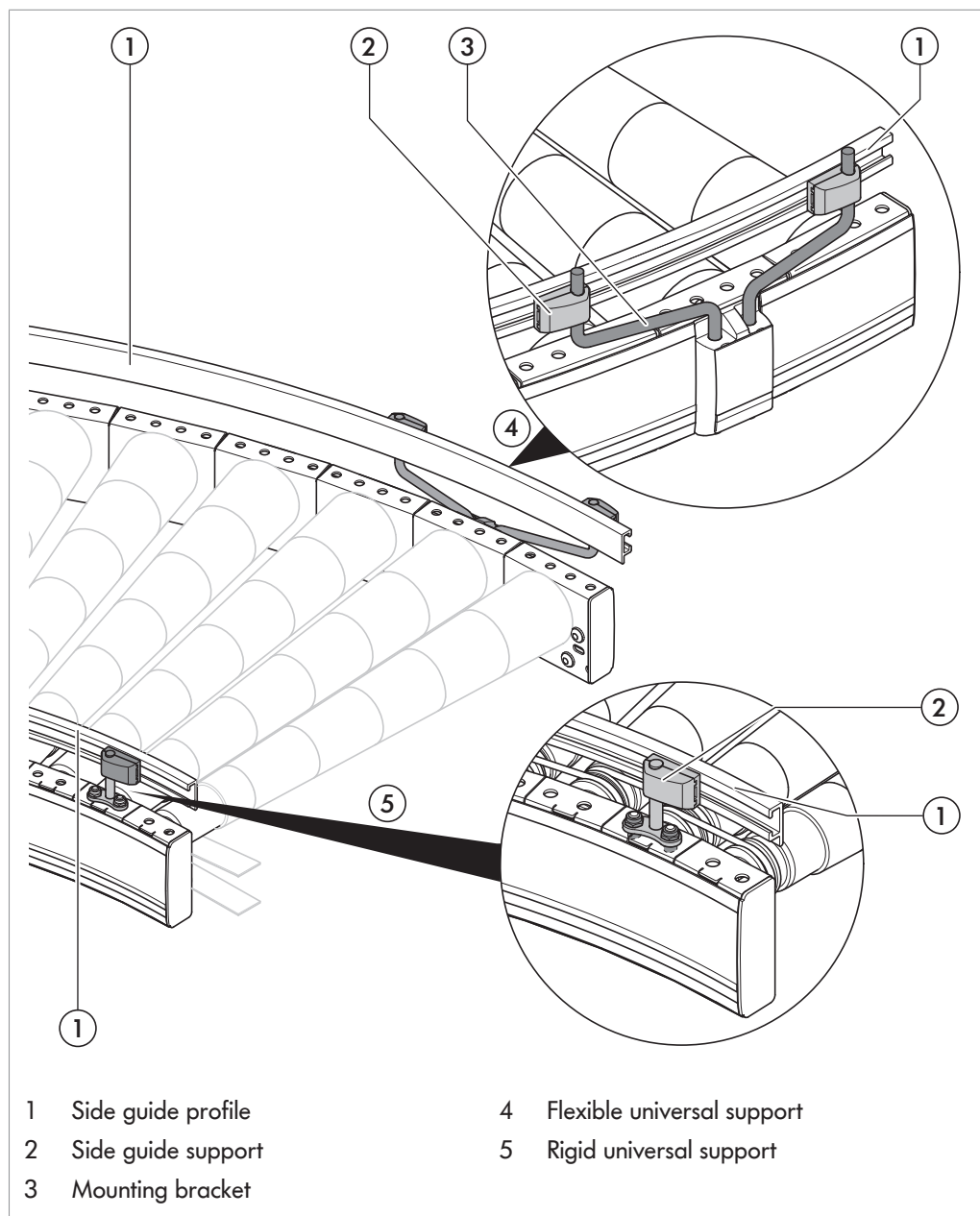


A setscrew in the foot of the photo cell holder is intended for the fine adjustment of the photo cell. Turning the setscrew in slightly raises the photo cell until it "sees" the reflector.

- ▶ Install the reflector opposite the photo cell.
- ▶ Analogous to the photo cell holder, place the strap (2) onto the mounting cams at the underside of the reflector and snap it into place.
- ▶ After installing the photo cell and reflector: Connect the photo cell to the control system of the module with a cable.
- ▶ Check whether both LEDs are lit.
- ▶ If the yellow LED flashes, position reflector and photo cell to each other.

LED green	LED yellow	Meaning
On	Off	Photo cell is operational. No signal from reflector.
On	On	Photo cell is correctly adjusted. Light beam is well reflected.
On	Flashing	Photo cell is operational. Weak signal. Reflector is dirty, damaged or not correctly adjusted.

Installing the side guide profiles

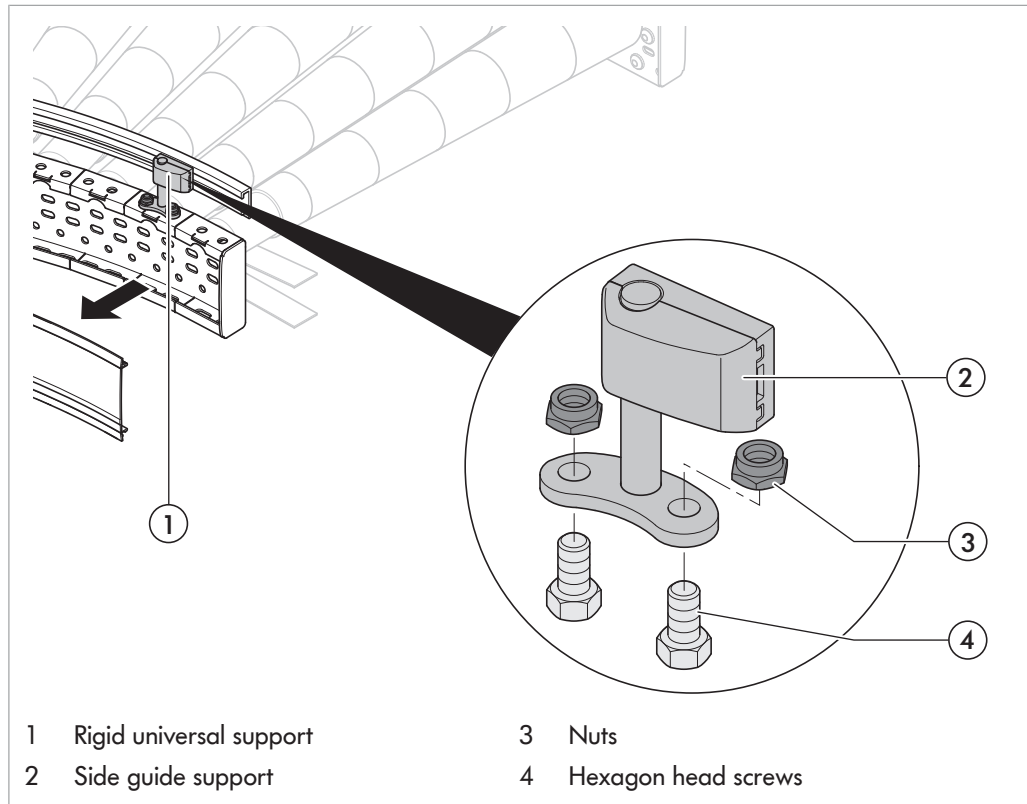


The installation of the side guide profiles (1) is done in several steps:

- ▶ Attach rigid universal support (5) to side frames, install rigid universal support see "Installing the rigid universal support", page 34.
- ▶ Attach flexible universal support (4) to side frames, install flexible universal support see "Installing the flexible universal support", page 35.
- ▶ Place side guide support (2) on mounting bracket (3) of universal support.
- ▶ Fasten side guide profiles to side guide supports, install side guide profile on universal support see "Fastening the side guide profile on the universal support", page 37. If needed, it is also possible to attach two side guide profiles above each other.

Installation

Installing the rigid universal support



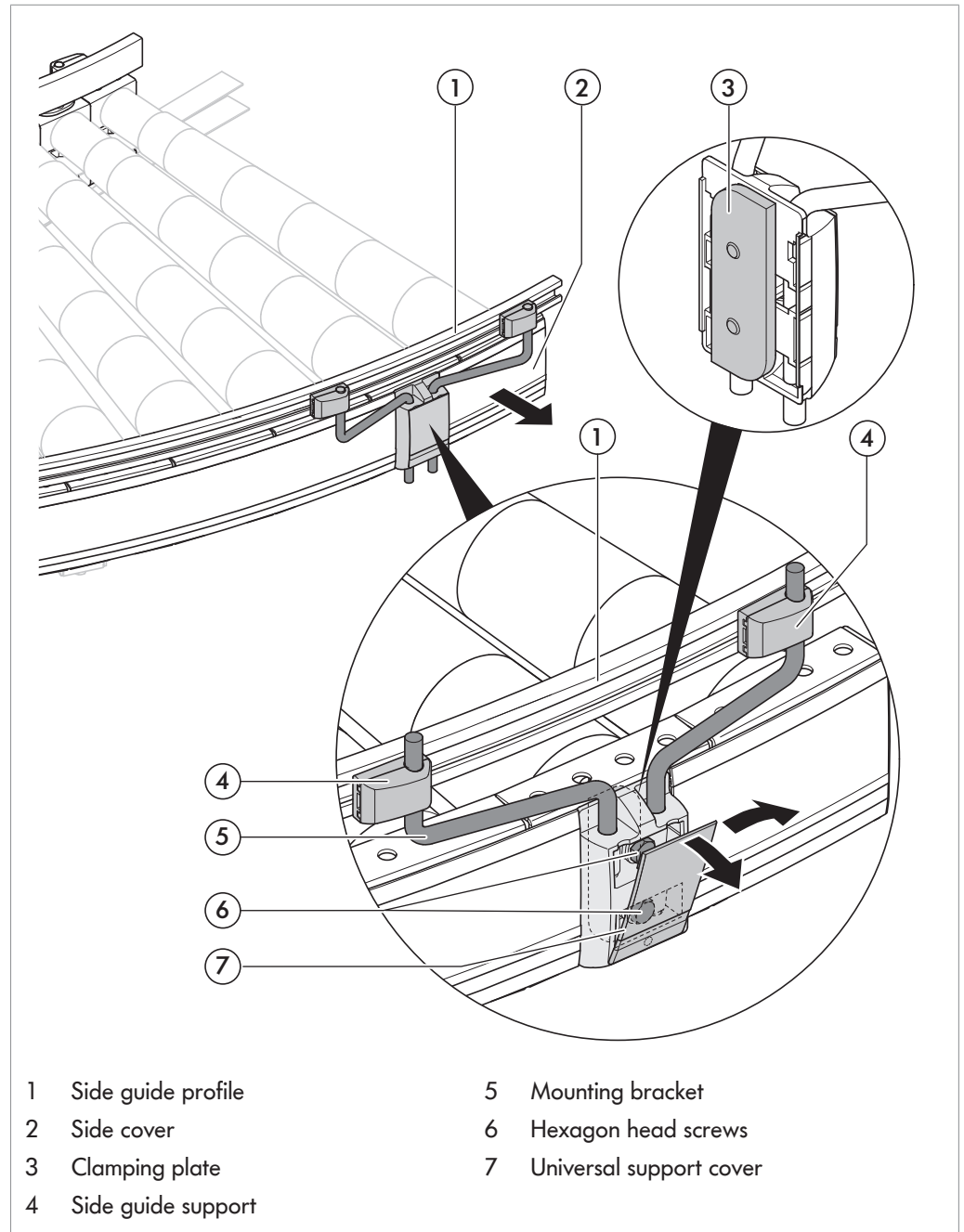
The rigid universal support is installed on the perforated profile of the side frame from the top.

Requirement:

- The module is out of operation.
- ▶ Loosen the side cover at the module.
- ▶ Position the rigid universal support and place it on the perforated profile of the side frame.
- ▶ Fasten the rigid universal support with two hexagon head screws and two nuts.
- ▶ Reattach the side cover.

Installation

Installing the flexible universal support



The flexible universal supports can be delivered pre-assembled upon request. In this case, the universal supports are turned to the conveyor center for the transport and still have to be positioned before startup depending on their use (for the installation of adjustable side guide, photo cell or reflector).

Installation

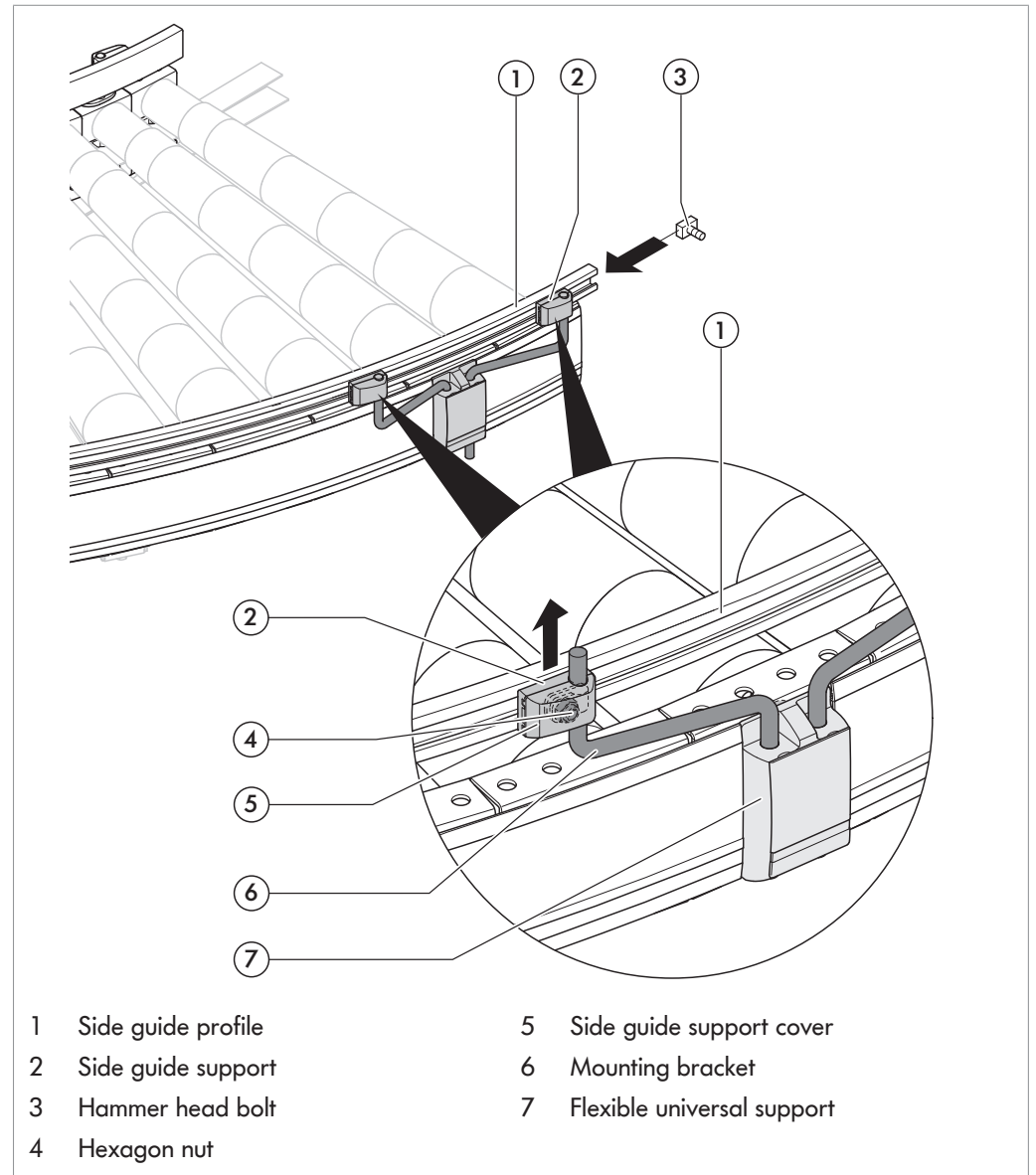
The flexible universal support is laterally inserted into the C-profile of the side frame and clamped in place.

Requirement:

- ☑ The module is out of operation.
- ▶ Loosen side cover (2) from the side frame.
- ▶ Swing up the cover (7) of the universal support.
- ▶ Loosen hexagon head screws (6) in the universal support, but do not remove them.
- ▶ Insert the clamping plate (3) into the side frame at the rear side of the universal support by slightly turning the support.
- ▶ Position the universal support on the side frame and slightly tighten the two hexagon head screws at the desired location.
- ▶ Align the mounting bracket (5).
- ▶ Firmly tighten the hexagon head screws.
- ▶ Swing up the cover (7) of the universal support until you hear it snap in.
- ▶ Attach the side cover. Cut the side cover apart at the locations at which the universal support is installed and shorten it accordingly. Snap in the individual parts of the side cover on the right and left of the universal support.

Installation

Fastening the side guide profile on the universal support



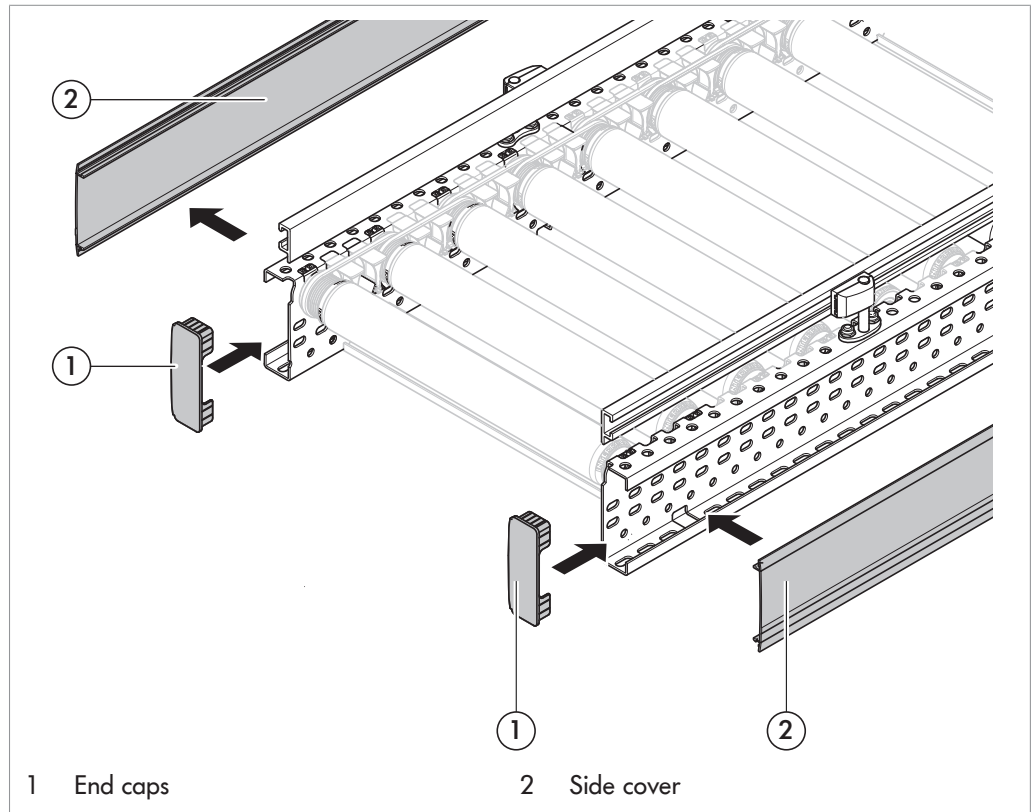
Installation

Requirement:

- ☑ The module is out of operation.
- ▶ Push side guide support (2) onto one of the mounting brackets (6) of the universal support (7). If needed, break out the upper hole cover in the side guide support, e.g. to use two side guides above each other.
- ▶ Tip up the cover of the side guide support (5).
- ▶ Slightly loosen hexagon nut (4) in side guide support.
- ▶ Place side guide profile (1) at side guide support (2) and position it.
- ▶ Slightly turn the hammer head bolt (3) located in the side guide support and insert it into the side guide profile.
- ▶ Tighten the hexagon nut.
- ⇒ The hammer head bolt is fixed. The side guide support sits firmly at the universal support.
- ▶ Close the cover of the side guide support and snap it in place.

Installation

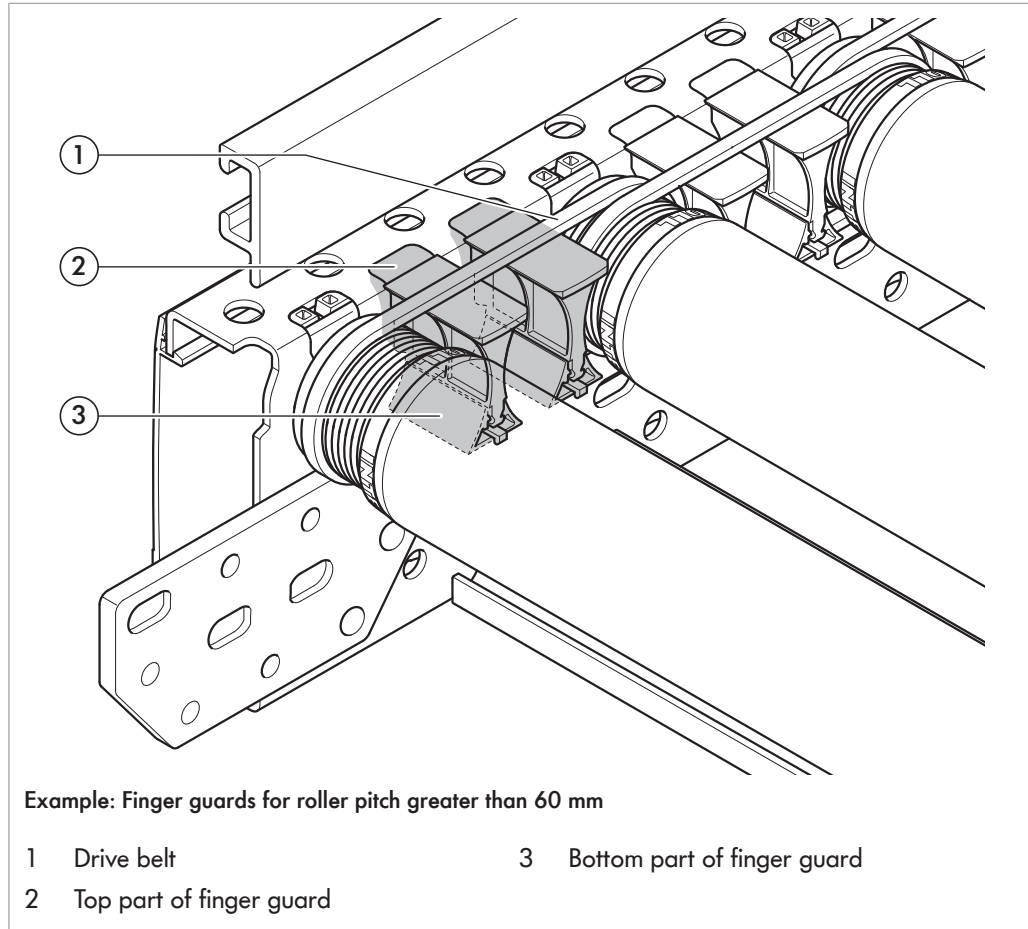
Installing side cover and end caps



- ▶ Snap side cover (2) into the C-profile of the side frame.
- ▶ Push end caps (1) into the C-profile of the side frame.

Installation

Installing the finger guard (PolyVee guard)



⚠ CAUTION

Risk of crushing from rotating parts

- ▶ Before any assembly and maintenance work, the respective devices must be decommissioned and disconnected from the voltage supply.
- ▶ Secure the respective devices against accidental activation.
- ▶ When integrating the module into a complete system, consider possible danger spots, particularly infeed locations and interfaces.

The finger guard protects against injuries as well as damage to the belt.

The finger guard consists of a top part (2) and a bottom part (3). The parts are combined via a form fit.

For pitches equal to 60 mm, install the finger guard in two steps:

- ▶ First, clip the top part (2) into a pocket hole.
- ▶ Next, push the bottom part (3) onto the top part. This requires access to the conveyor belt from below.

Installation

For pitches greater than 60 mm, it is possible to install the pre-assembled top and bottom part as a complete unit. In this case, two complete finger guards are required.

- ▶ Install the complete finger guards directly adjacent at the roller in each case.

For pitches greater than 90 mm, a gap is created between two finger guards.

CAUTION

Possible pinching by reaching into the gap between roller and belt / finger guard.



The gap dimension between rollers and belt or finger guard does not correspond to the specifications of DIN EN 349 / DIN EN ISO 13857. The manufacturer subjected this situation to a risk assessment: A risk to employees and users is unlikely. Nevertheless, a minor injury risk remains when working on the conveyor module in running operation.

- ▶ Do not reach into the gap between rollers and belt or finger guard.
 - ▶ When manually placing or removing material in running operation, always reach to the middle of the conveyor belt from the top.
-

Installation

Using the diverter connection kit

When using a diverter to guide materials out of a conveyor belt within a conveyor system, height differences of up to 12 mm are possible. These differences can be compensated using a diverter connection kit.

- ▶ Install the diverter connection kit on the outgoing conveyor belt.
- ▶ Adjust the diverter connection kit either to the roller height (+ 0 mm) or to the height of the diverter belt (+ 12 mm).

Initial startup and operation

Initial startup

WARNING

Risk of injuries due to incorrect handling

- ▶ Check electrical connections and protective devices.
- ▶ Remove the materials from the module.
- ▶ Remove unauthorized persons from the danger zone.
- ▶ Wear safety shoes and work clothing.

The module has been checked at the factory.

Operation

Before every operation start

- ▶ Check the module for visible damage. In particular, observe belt, guides and supports.
- ▶ Ensure that all safety devices operate flawlessly.
- ▶ Ensure that only authorized personnel is in the operating area of the module.
- ▶ Ensure that it is running freely and that no parts are jammed.
- ▶ Remove material or equipment which is not required from the workspace.
- ▶ Guide and monitor correct placement of the materials on the conveyor.

During operation

WARNING

Danger from rotating parts

Crushing and serious injuries from parts of the body and clothing being pulled into the module!

- ▶ Do not remove the protective covers.
- ▶ Wear close-fitting clothing, avoid jewelry and bands/ribbons.
- ▶ If you have long hair, always wear a hair net.



Procedure in case of accident or fault

- ▶ If materials are jammed between side guides, switch off the module and ensure that it cannot be started accidentally, then remove the fault.
- ▶ Stop the module and ensure that it cannot be started accidentally.
- ▶ In case of an accident: Render first aid and make an emergency call if necessary.
- ▶ Inform qualified personnel.
- ▶ Have the fault removed by qualified personnel.
- ▶ Restart the module only after this has been approved by qualified personnel.

Cleaning

⚠ WARNING

Risk of injuries due to incorrect handling

- ▶ Only perform cleaning work on the module after you have switched off the power.
Switch off the voltage supply and ensure that it cannot be started accidentally.
 - ▶ Do not remove protective devices.
 - ▶ Wear safety shoes and close-fitting work clothing.
-
- ▶ Clean belts only dry.
 - ▶ For the remaining parts of the module, use only suitable cleaning agents (water-soluble, free of phosphate, silicone and potassium, non-acidic). Observe the manufacturer's instructions.

Maintenance and repair

Observe the following for maintenance and repair

WARNING

Risk of crushing and injuries

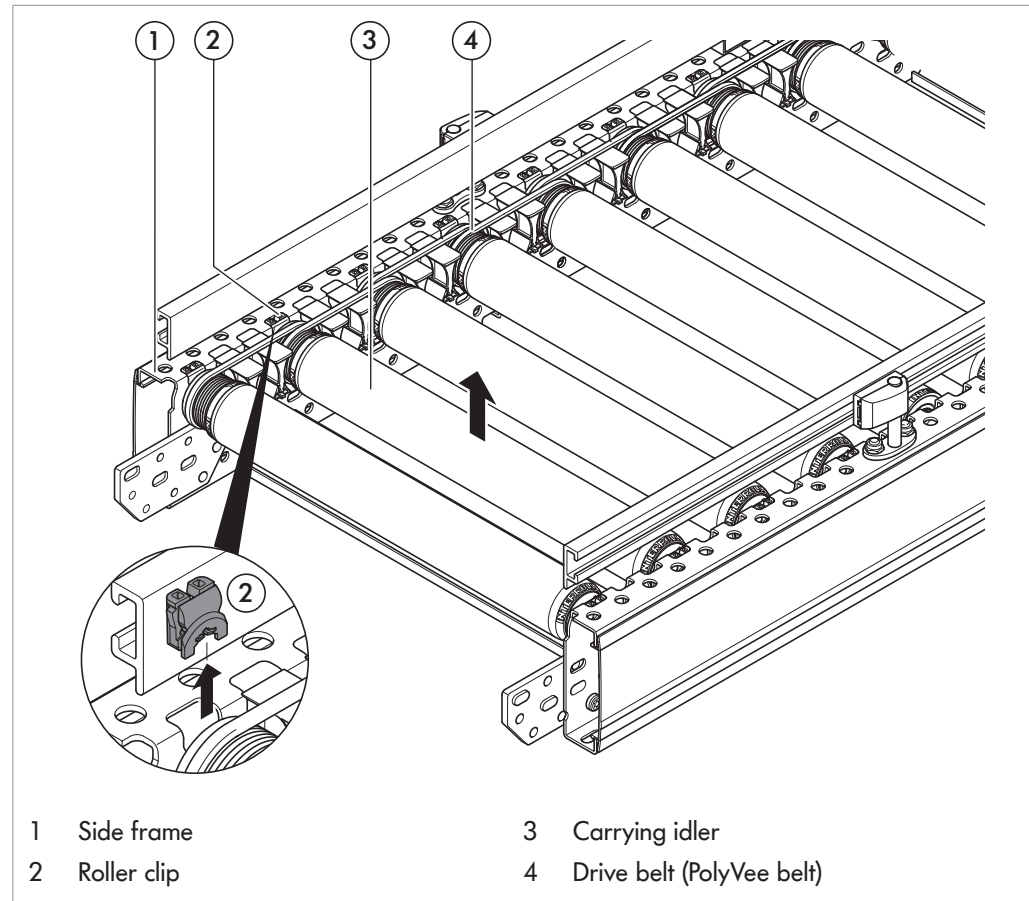
- ▶ Ensure that the personnel involved in maintenance and repair have secure footing and sufficient room to move.
 - ▶ Mechanical maintenance and repair work may only be performed by service personnel. Observe the safety information.
 - ▶ Electrical maintenance and repair work should be performed only by authorized electricians. Observe the safety information.
 - ▶ Observe the weight of the module (see nameplate); if necessary work in pairs.
 - ▶ Use suitable loading and lifting equipment. Secure the module against falling or tipping.
-



When tightening screws and nuts, always observe the standard tightening torque, unless specifically indicated otherwise. Standard screw lockers should be replaced as needed.

- ▶ Set up warning signs that indicate maintenance and repair work.
- ▶ Block off the area around the module.
- ▶ Inform persons who have to enter the blocked-off area about the risks.

Replacing the carrying idler in the straight line and merge



⚠ CAUTION

Risk of crushing from rotating parts

- ▶ Before any assembly and maintenance work, the respective devices must be decommissioned and disconnected from the voltage supply.
- ▶ Secure the respective devices against accidental activation.
- ▶ When integrating the module into a complete system, consider possible danger spots, particularly infeed locations and interfaces.



The pocket holes for carrier rollers and RollerDrive are closed with clips after the installation:

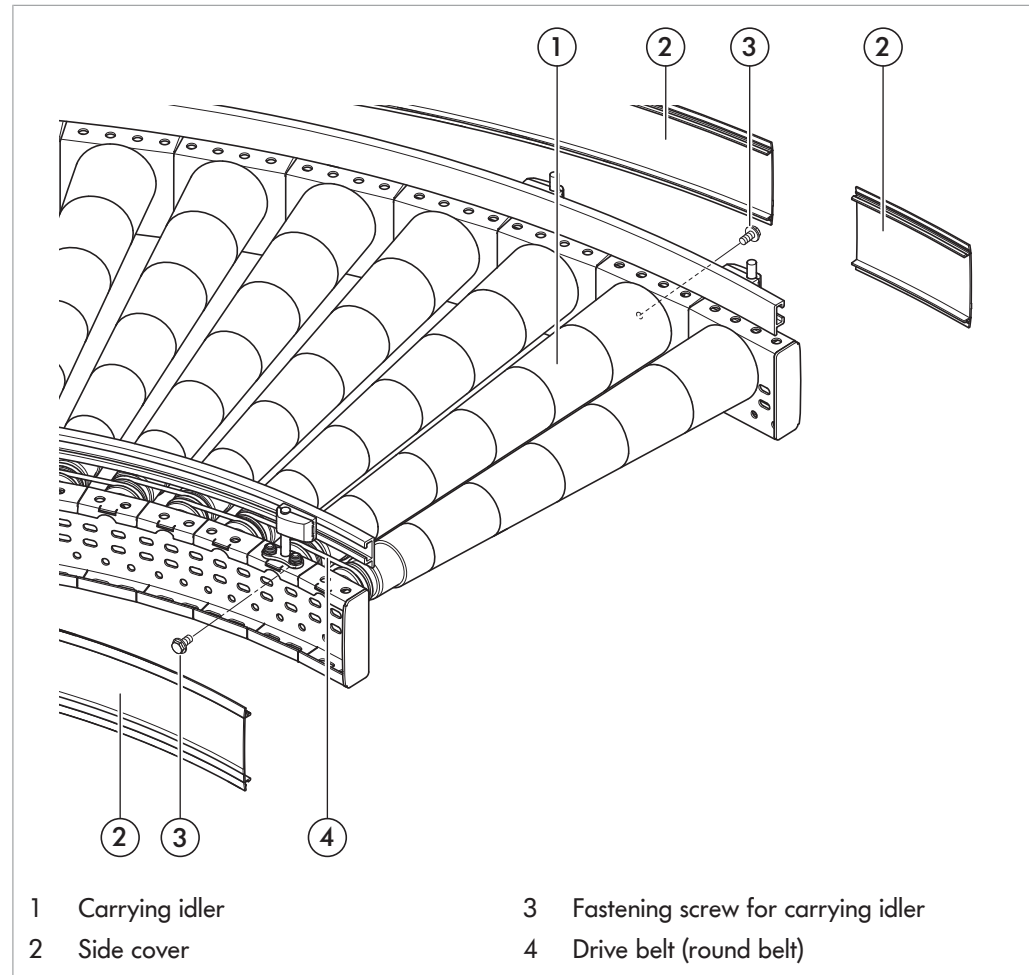
- ▶ Close the pocket holes over the carrier rollers using roller clips.
- ▶ Close one of the pocket holes over the RollerDrive with a suitable clip. (The pocket hole on the opposite side is closed by the tab.)
- ▶ Optional: Close empty pocket holes with a dummy clip.

Maintenance and repair

Requirement:

- The module is out of service.
- ▶ Remove the roller clip (2) using needle-nose pliers.
- ▶ Slightly turn carrying idler (3) horizontally.
- ▶ Remove drive belt (4) from carrying idler.
- ▶ Lift and remove the carrying idler.
- ▶ Place a new carrying idler in the open elongated hole. Pull the drive belt onto the carrying idler in the process.
- ▶ Insert the roller clip until it snaps into place.

Replacing the carrying idler in the curve



CAUTION

Risk of crushing from rotating parts

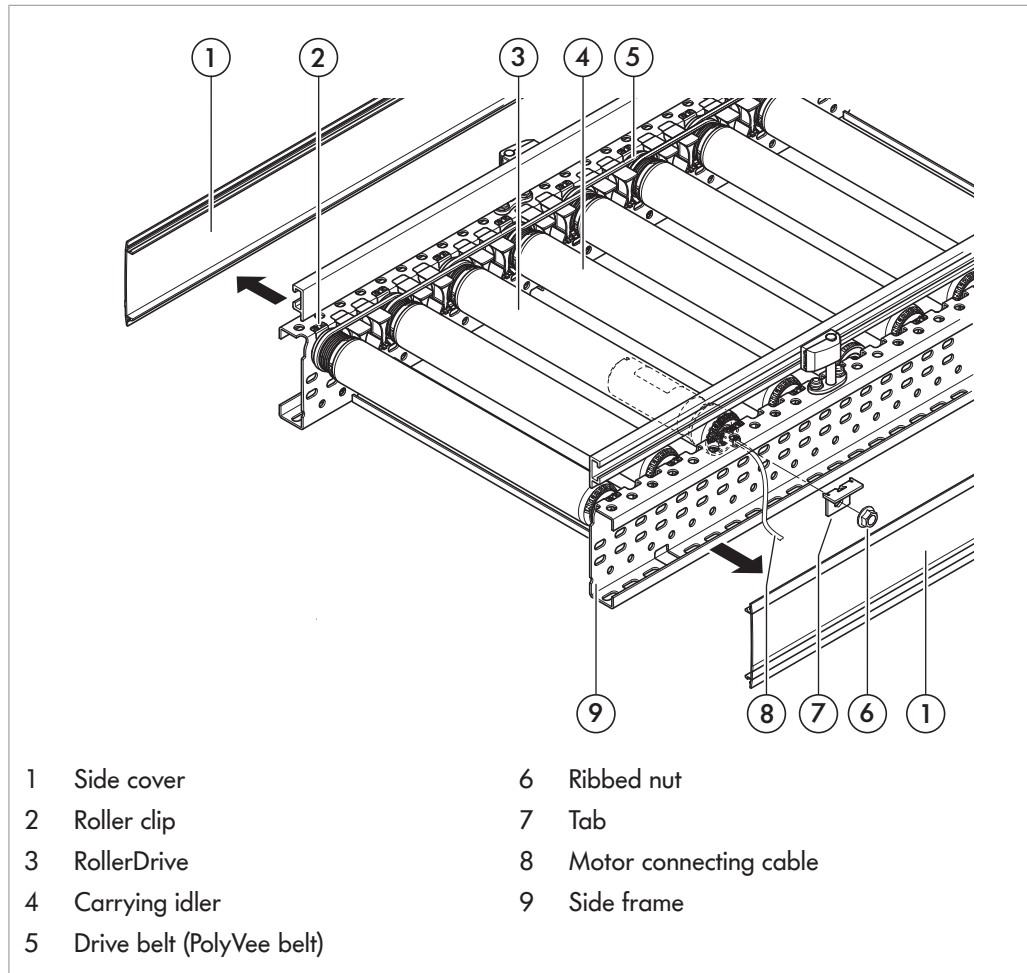
- ▶ Before any assembly and maintenance work, the respective devices must be decommissioned and disconnected from the voltage supply.
- ▶ Secure the respective devices against accidental activation.
- ▶ When integrating the module into a complete system, consider possible danger spots, particularly infeed locations and interfaces.

Maintenance and repair

Requirement:

- The module is out of operation.
- ▶ Remove the side cover (2).
- ▶ Unscrew the fastening screws (3) of the carrying idler.
- ▶ Slightly turn carrying idler (1) horizontally.
- ▶ Remove drive belt from carrying idler.
- ▶ Take out the carrying idler.
- ▶ Install the new carrying idler in reverse order.

Replacing the RollerDrive (straight and merge)



CAUTION

Risk of crushing and electric shock

Installation and maintenance tasks on a conveyor system during its operation can lead to crushing and electric shock.

- ▶ De-energize the module and ensure that it cannot be started accidentally.



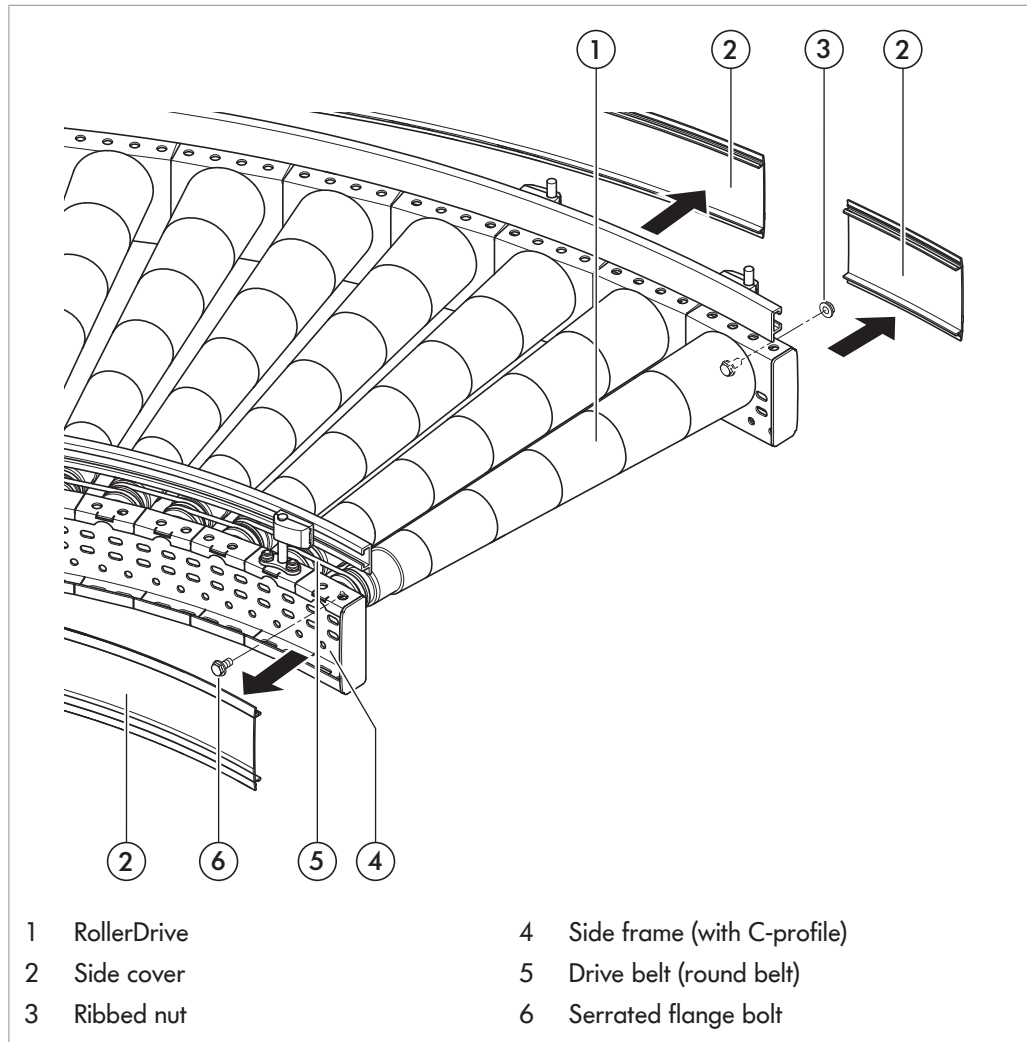
The pocket holes for carrier rollers and RollerDrive are closed with clips after the installation:

- ▶ Close the pocket holes over the carrier rollers using roller clips.
- ▶ Close one of the pocket holes over the RollerDrive with a suitable clip. (The pocket hole on the opposite side is closed by the tab.)
- ▶ Optional: Close empty pocket holes with a dummy clip.

Maintenance and repair

- ▶ Remove the side cover (1).
- ▶ Pull motor connecting cable (8) out of the control system or extension cable.
- ▶ Remove the roller clip (2) using needle-nose pliers.
- ▶ Unscrew ribbed nut (6) on the cable side of the RollerDrive (3) and remove together with the tab (7).
- ▶ Slightly turn RollerDrive horizontally.
- ▶ Remove drive belt (5) from RollerDrive.
- ▶ Remove RollerDrive.
- ▶ Install new RollerDrive in reverse order. Insert tab (7) and tighten ribbed nut (6) with torque wrench, observe the maximum torque of 70 Nm.

Replacing the RollerDrive (curve)



CAUTION

Risk of crushing and electric shock

Installation and maintenance tasks on a conveyor system during its operation can lead to crushing and electric shock.

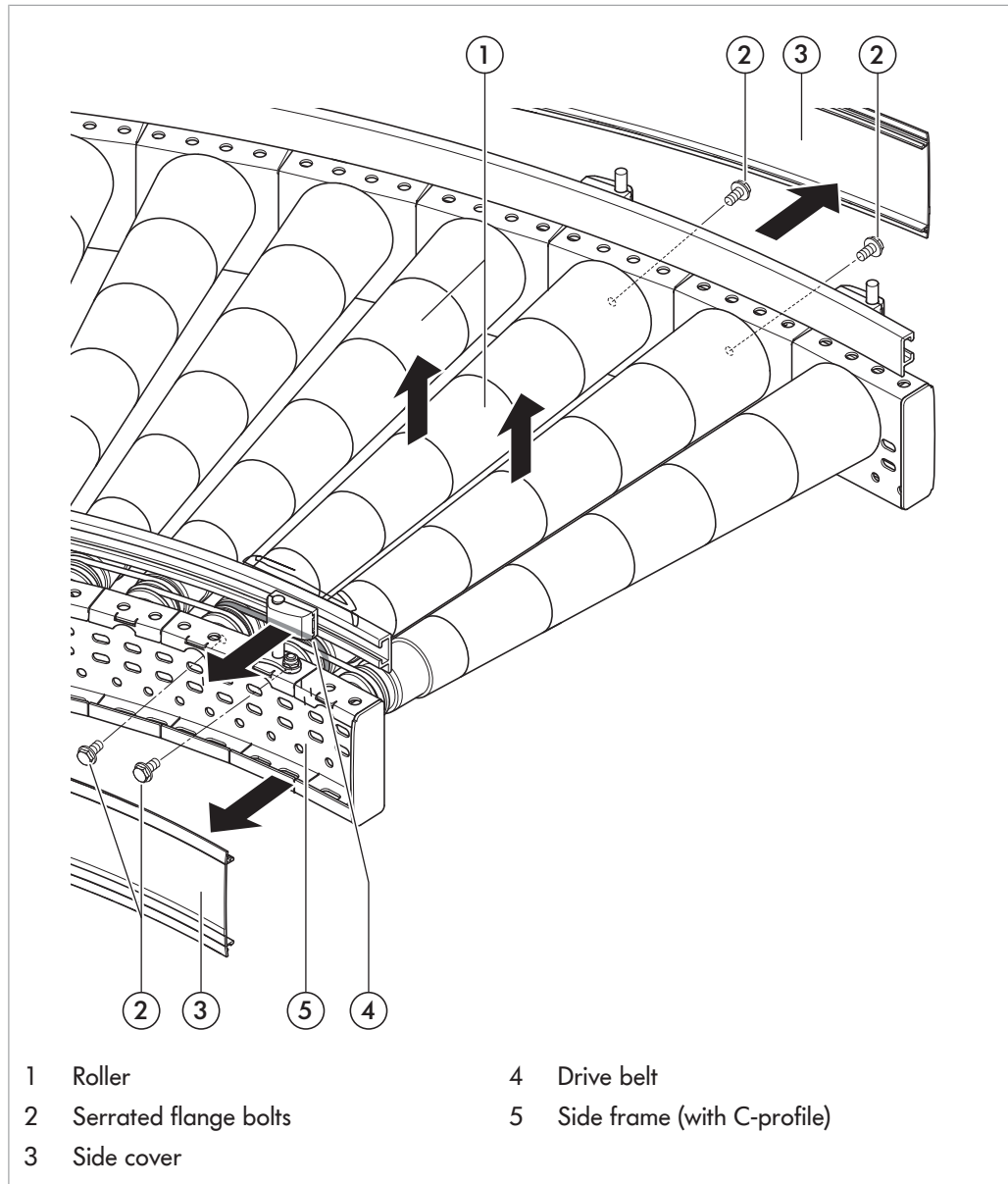
- ▶ De-energize the module and ensure that it cannot be started accidentally.

- ▶ Remove side cover (2) on both sides.
- ▶ From the outside of the C-profile of the side frame (4): Unscrew serrated flange bolt (6) on the inside of the curve of the RollerDrive (1).

Maintenance and repair

- ▶ Unscrew ribbed nut (3) on the outside of the curve (cable side) of the RollerDrive.
- ▶ Slightly turn RollerDrive horizontally.
- ▶ Remove drive belt (5) from RollerDrive.
- ▶ Remove RollerDrive (1).
- ▶ Install new RollerDrive in reverse order.
- ▶ Tighten serrated flange bolt and ribbed bolt with torque wrench, observe the maximum torque of 70 Nm.

Replacing the drive belt



CAUTION

Risk of crushing and electric shock

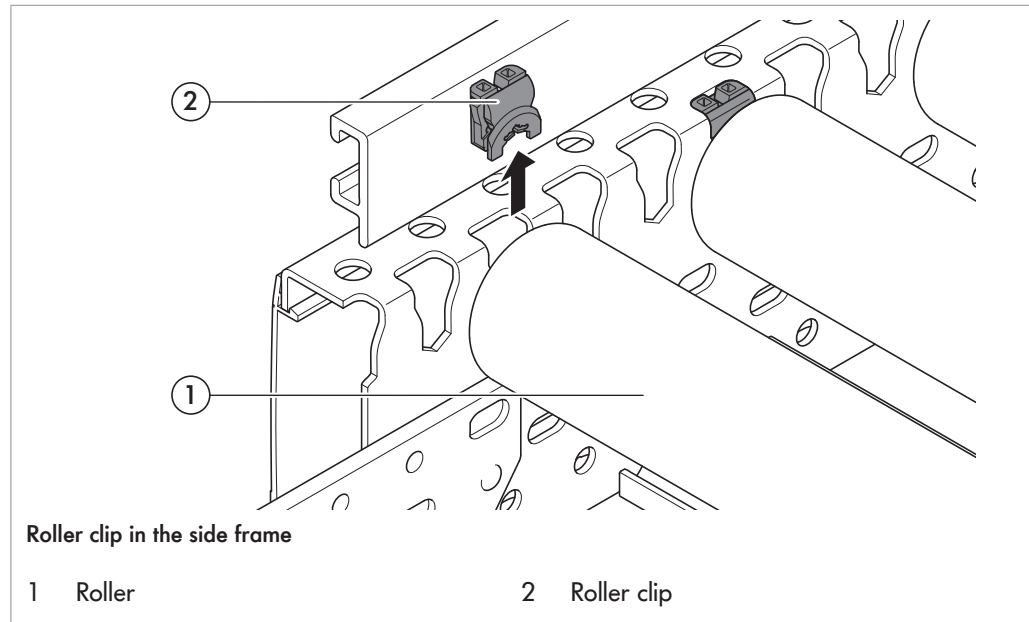
Installation and maintenance tasks on a conveyor system during its operation can lead to crushing and electric shock.

- ▶ De-energize the module and ensure that it cannot be started accidentally.

Maintenance and repair

- ▶ Remove side cover (3) on both sides.
- ▶ Uninstall the respective rollers (1):
- ▶ Straight: Uninstall carrying idler, Replacing the carrying idler in the straight line and merge, and uninstall RollerDrive, see "*Replacing the RollerDrive (straight and merge)*", page 50.
- ▶ Curve: Uninstall carrying idler, Replacing the carrying idler in the curve, and uninstall RollerDrive, see "*Replacing the RollerDrive (curve)*", page 52.
- ▶ Merge: Uninstall carrying idler, Replacing the carrying idler in the straight line and merge, and uninstall RollerDrive, see "*Replacing the RollerDrive (straight and merge)*", page 50.
- ▶ Slightly turn rollers horizontally and remove the drive belt (4).
- ▶ Insert the new drive belt.
- ▶ Reinstall the respective rollers in reverse order.
- ▶ Install side cover on side frame.

Replacing the roller clip



The pocket holes for carrier rollers and RollerDrive are closed with clips after the installation:

- ▶ Close the pocket holes over the carrier rollers using roller clips.
- ▶ Close one of the pocket holes over the RollerDrive with a suitable clip. (The pocket hole on the opposite side is closed by the tab.)
- ▶ Optional: Close empty pocket holes with a dummy clip.

Requirement:

- The module is out of service.
- ▶ Remove the roller clip (2) with needle-nose pliers from the opening in the side frame.
- ▶ After inserting the roller (1), insert the new roller clip in the opening of the side frame until it completely snaps into place.

Replacing the photo cell

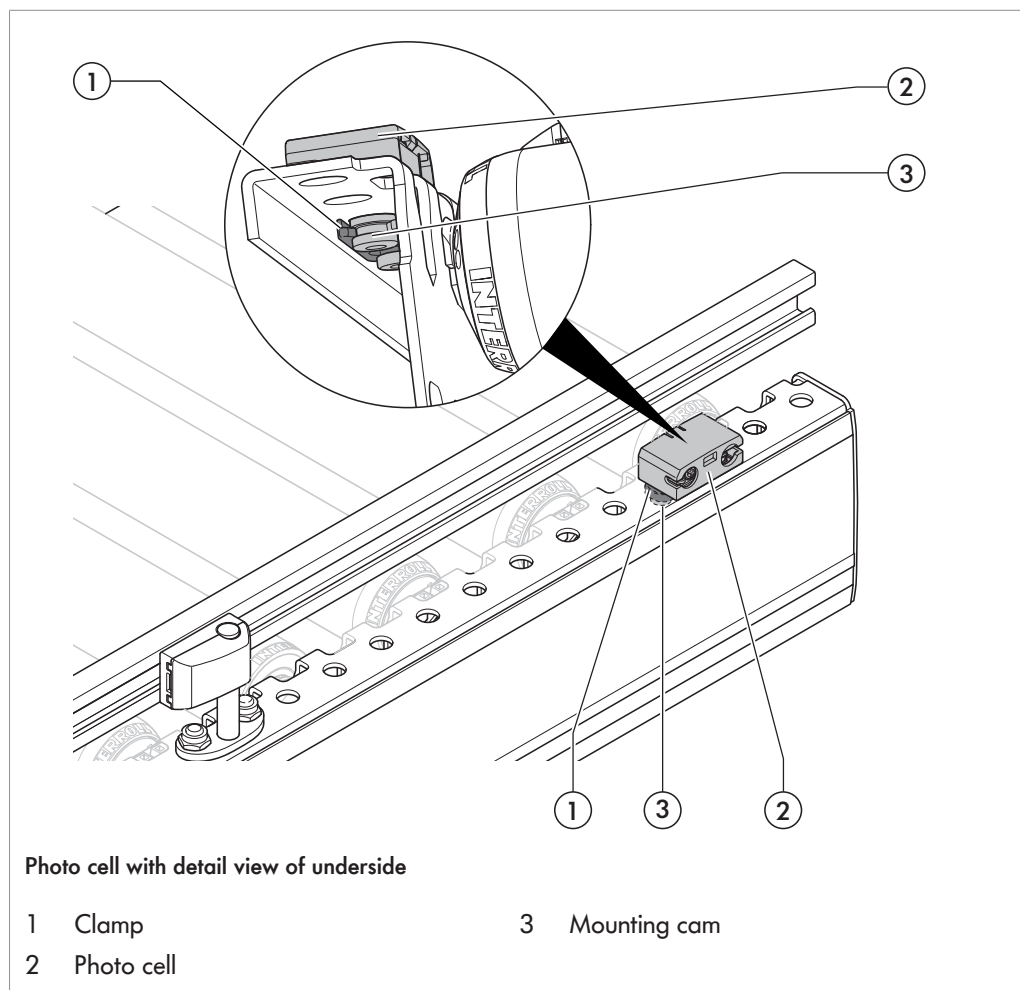


Photo cell with detail view of underside

- 1 Clamp
- 2 Photo cell
- 3 Mounting cam

The photo cell is replaced together with the photo cell holder:



A setscrew in the foot of the photo cell holder is intended for the fine adjustment of the photo cell. Turning the setscrew in slightly raises the photo cell until it "sees" the reflector.

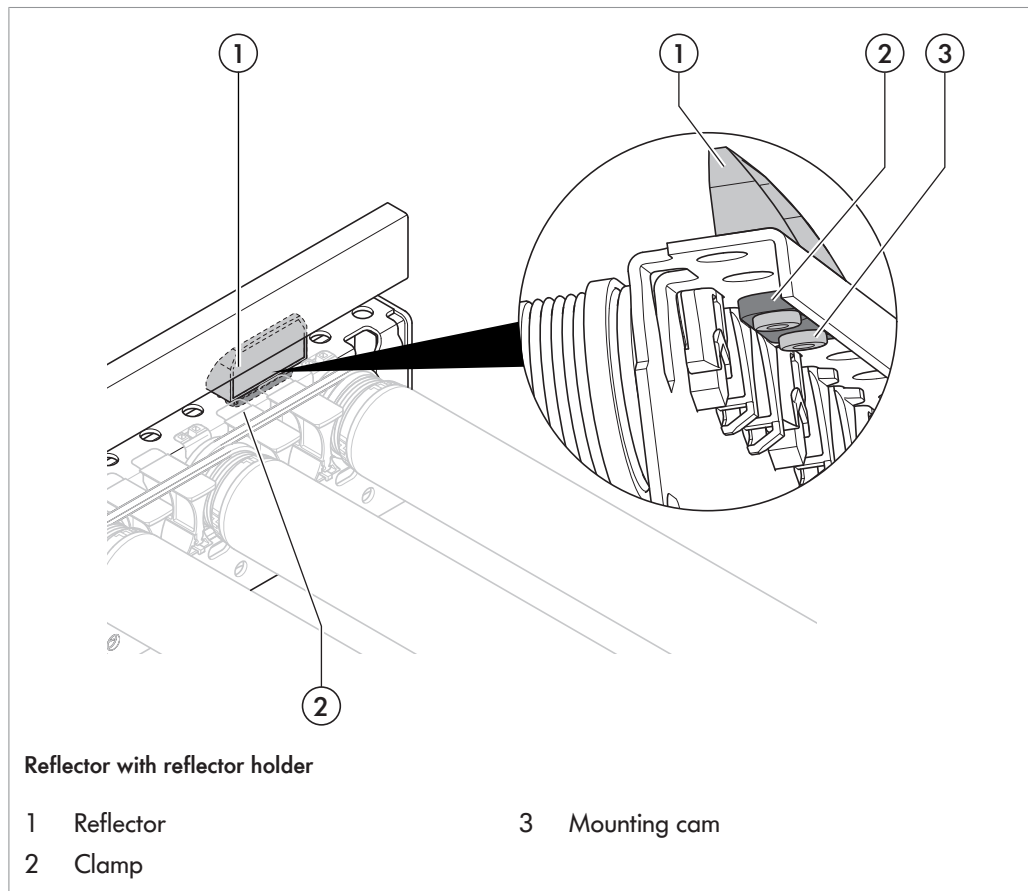
- ▶ Pull strap (1) off of the fastening cams (3) of the photo cell.
- ▶ Take old photo cell (2) out of side frame, mounting plate or side guide profile.
- ▶ Insert the new photo cell at the same point.
- ▶ Snap the strap fully into the mounting cams of the photo cell from below.
- ▶ Connect the photo cell to the control system of the module with a cable.
- ▶ Check whether both LEDs are lit.
- ▶ If the yellow LED flashes, position reflector and photo cell to each other.

LED green	LED yellow	Meaning
On	Off	Photo cell is operational. No signal from reflector.

Maintenance and repair

LED green	LED yellow	Meaning
On	On	Photo cell is correctly adjusted. Light beam is well reflected.
On	Flashing	Photo cell is operational. Weak signal. Reflector is dirty, damaged or not correctly adjusted.

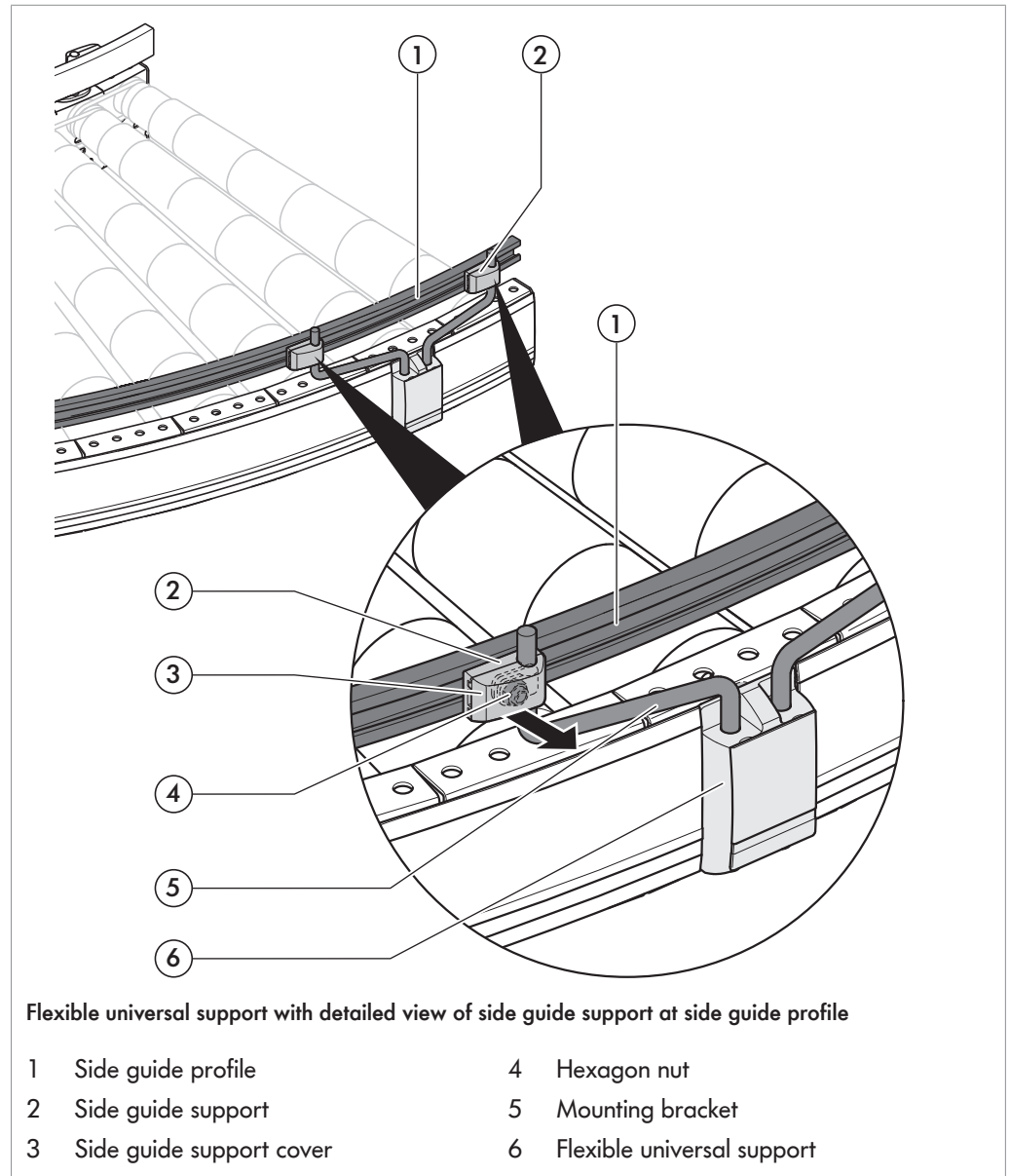
Replacing the reflector



Reflector and reflector holder are replaced together:

- ▶ Pull strap (2) off of the fastening cams (3) of the reflector.
- ▶ Remove old reflector (1).
- ▶ Place new reflector on the side frame, mounting plate or side guide at the desired location.
- ▶ Snap the strap fully into the mounting cams of the reflector from the underside.

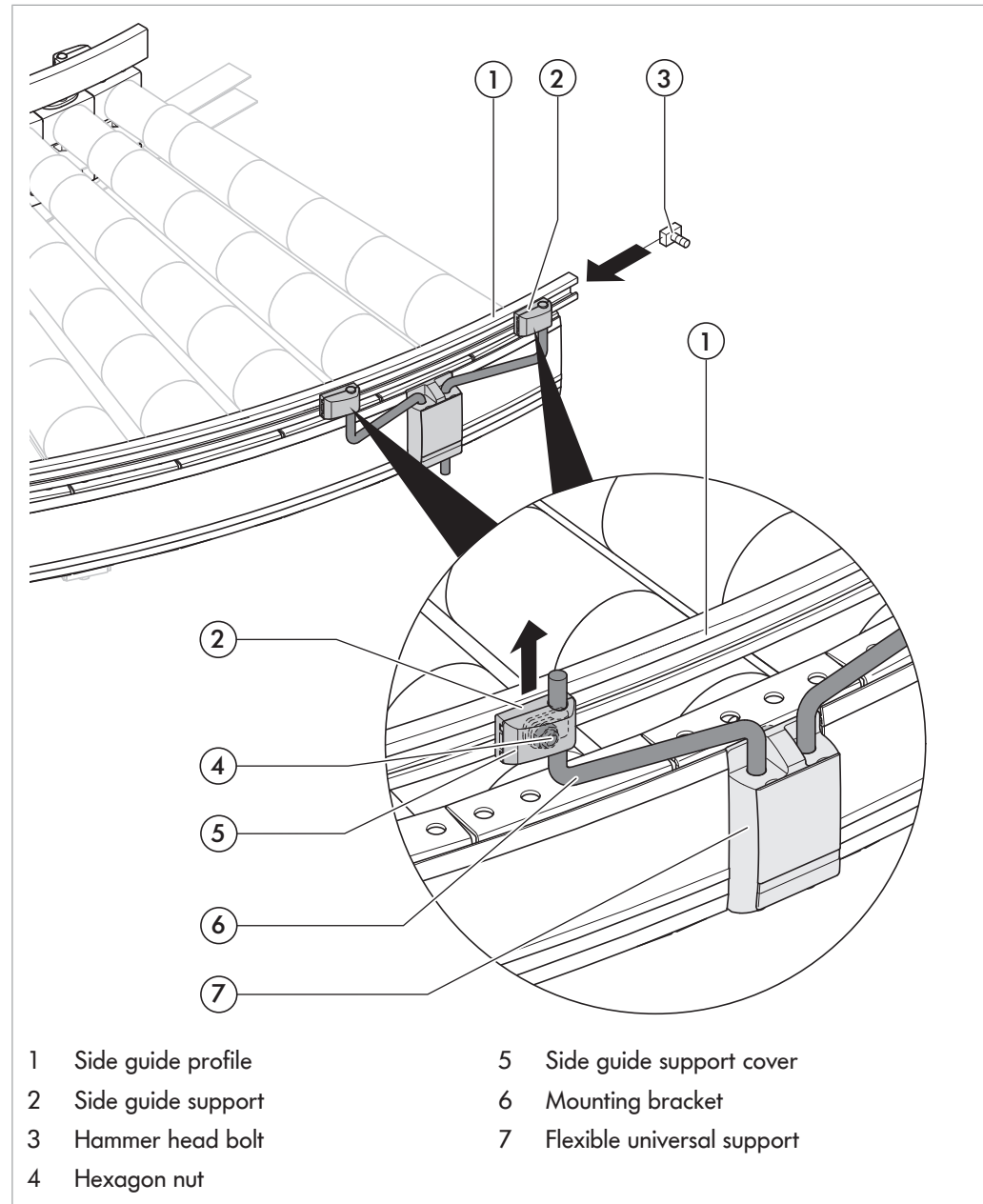
Replacing the side guide profile



Requirement:

- The module is out of operation.
- ▶ Open the cover of the side guide support (3) with a tool (e.g. screwdriver).
- ▶ Loosen the hammer nut (4) in the side guide support (2) to the point when the hammer head bolt can be removed from the side guide profile (1) by slightly turning it.
- ▶ Replace the side guide profile.

Replacing the side guide support



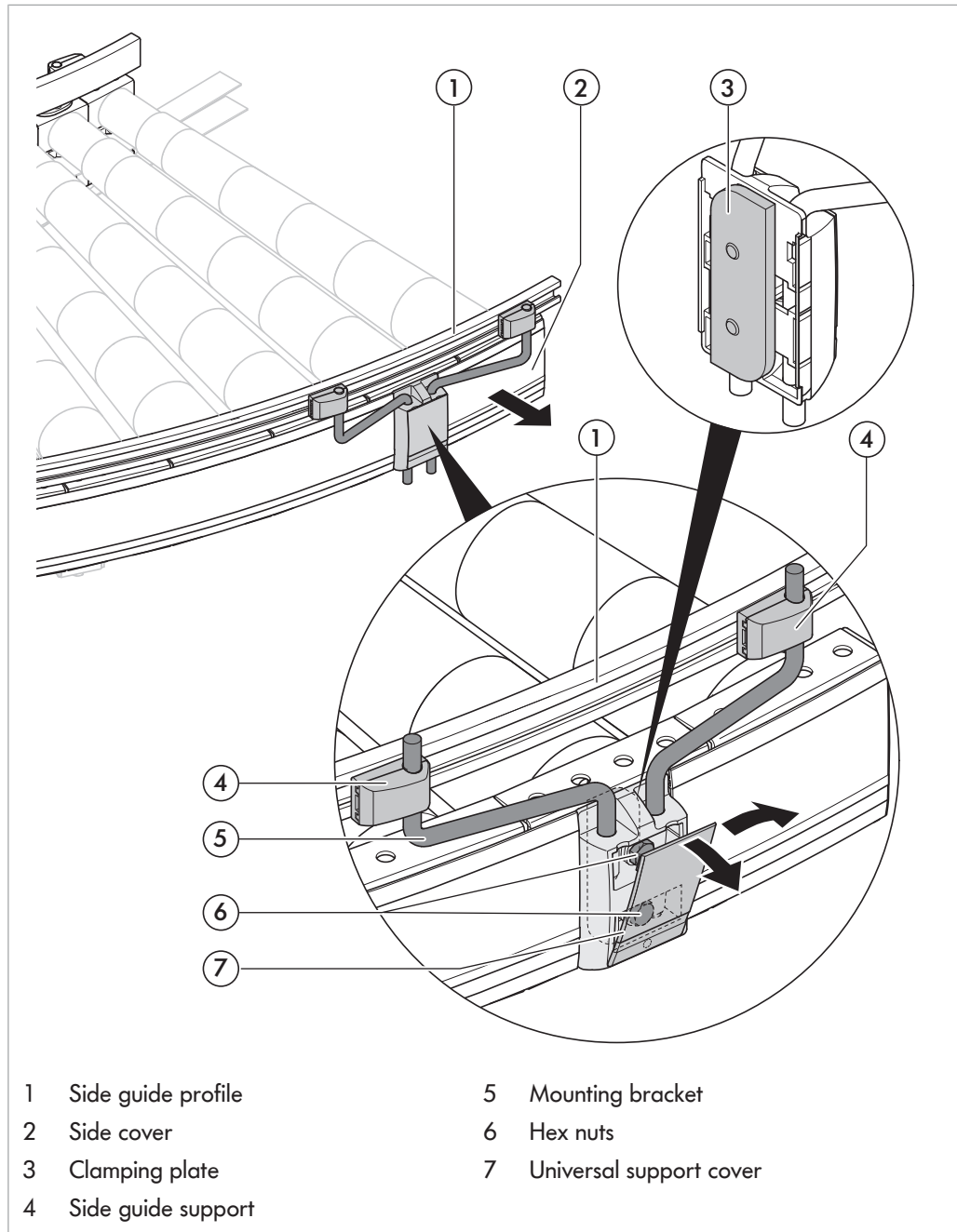
Requirement:

- The module is out of operation.
- ▶ Open the cover of the side guide support (5) with a tool (e.g. screwdriver).
- ▶ Loosen the hexagon nut (4).
- ▶ Move the hammer head bolt (3) inside the side guide support to the horizontal position by turning it and pull it out of the side profile.
- ▶ Pull the side guide support (2) off of the mounting bracket (6) of the universal support (7).

Maintenance and repair

- ▶ Loosen the hexagon nut at the new side guide support, but do not remove it. Create sufficient clearance so that the hammer head bolt can later be inserted into the side profile and the clamp can be pushed onto the mounting bracket.
- ▶ Push the new side guide support onto the mounting bracket of the universal support. If needed, break out the upper hole cover.
- ▶ Insert the hammer head bolt into the side profile by slightly turning it.
- ▶ Tighten the hexagon nut.
- ⇒ The hammer head bolt is fixed. The side guide support sits firmly at the universal support.
- ▶ Close the top cover and snap it in place.

Replacing the flexible universal support



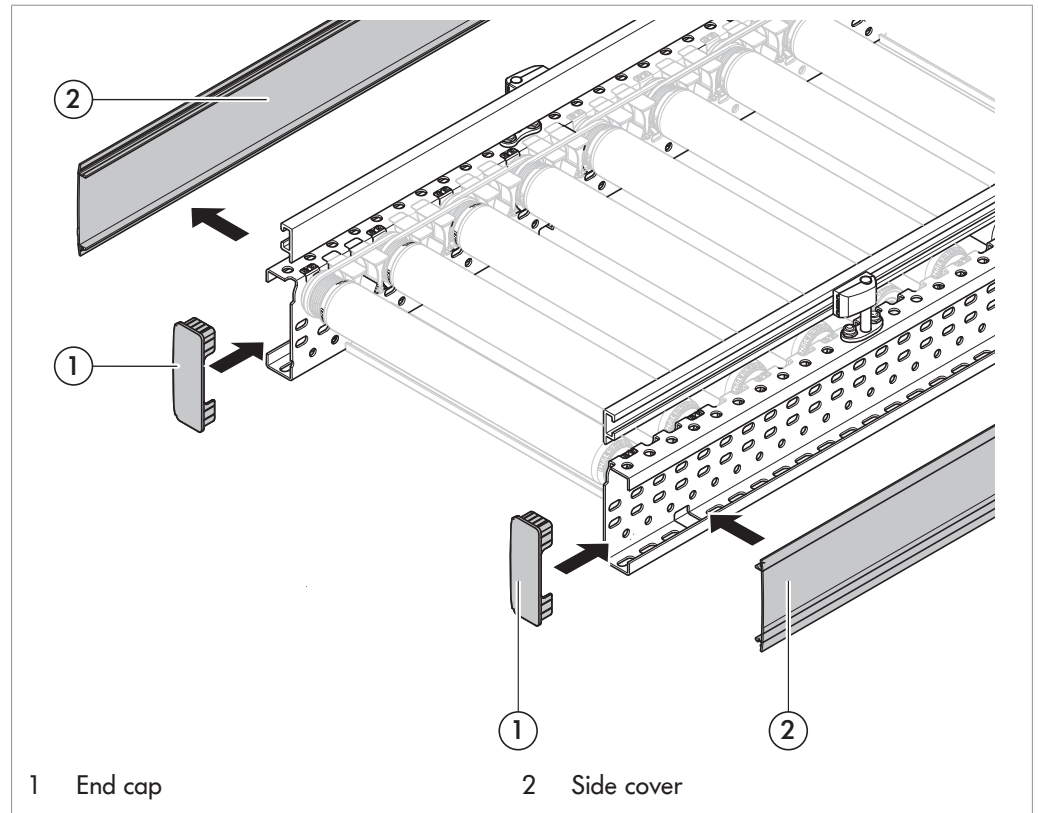
Requirement:

- The module is out of operation.
- ▶ Loosen side cover (2) from the side frame.
- ▶ Remove the side guide support (4), see "Replacing the side guide support", page 60.
- ▶ Open the cover of the universal support (7) with a tool (e.g. screwdriver) and swivel it down.
- ▶ Loosen the hexagon nuts (6), but do not remove them.

Maintenance and repair

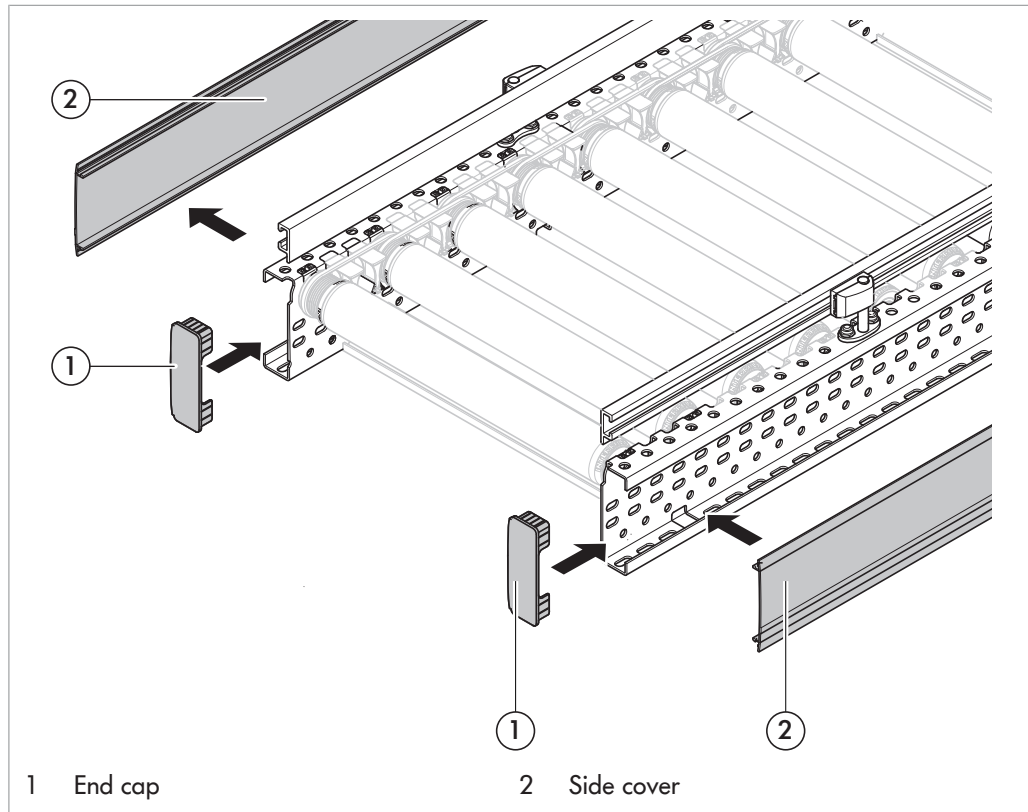
- ▶ Slightly turn the clamping plate (3) with the complete universal support and remove it from the C-profile of the side frame.
- ▶ Loosen the hexagon head screws at the new universal support, but do not remove it.
- ▶ Insert the clamping plate into the side frame by slightly turning the complete universal support.
- ▶ Position the universal support on the side frame and slightly tighten the hexagon nuts at the desired location.
- ▶ Install the side guide support, replace the side guide support see "Replacing the side guide support", page 60.
- ▶ Align the angles of the mounting brackets (5).
- ▶ Firmly tighten the hexagon nuts.
- ▶ Swing up the cover of the universal support until you hear it snap in.

Replacing the side cover



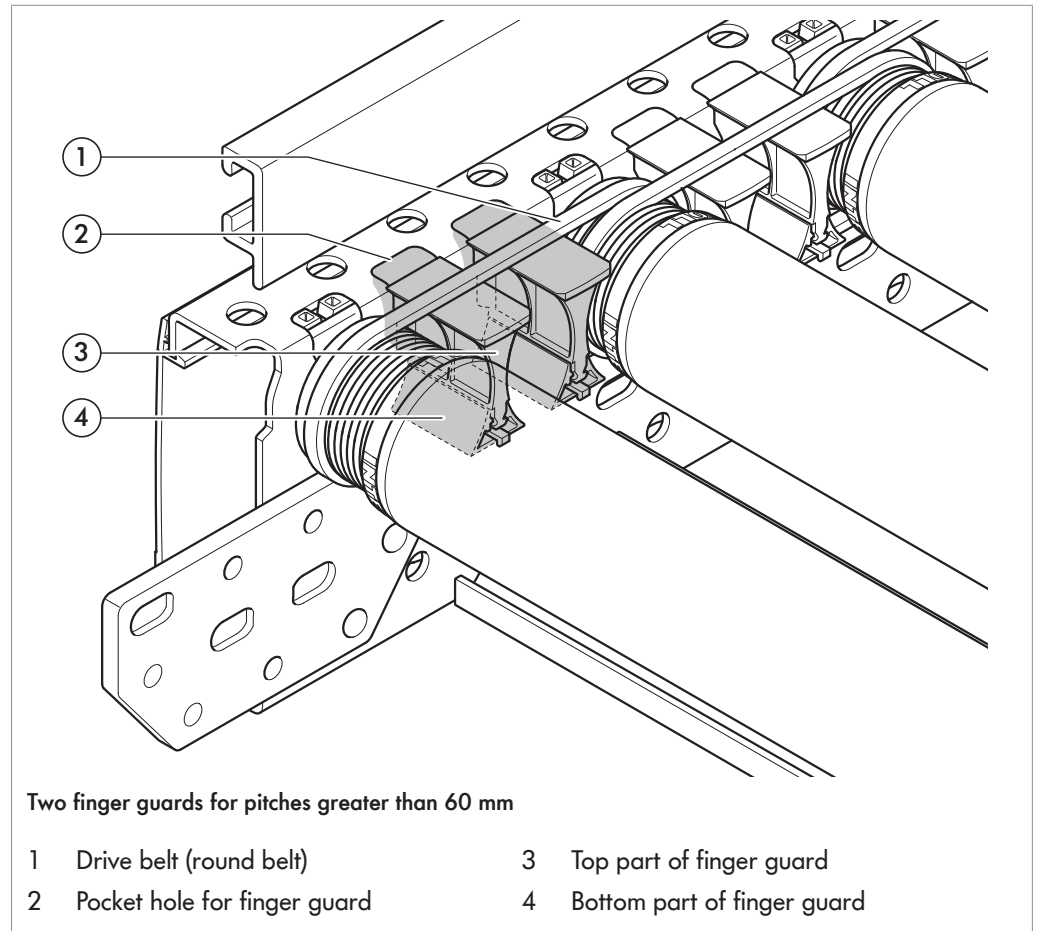
- ▶ Carefully pry out the side cover (2) out of the side profile at one end using a tool (e.g. screwdriver).
- ▶ Starting at this point, loosen the complete side cover from the side profile.
- ▶ Snap new side cover into the C-profile of the side frame.

Replacing the end cap



- ▶ Remove end caps (1) from the side frame using a tool (e.g. screwdriver).
- ▶ Push the new end caps into the C-profile of the side frame.

Replacing the finger guard (PolyVee guard)



⚠ CAUTION

Risk of crushing from rotating parts

- ▶ Before any assembly and maintenance work, the respective devices must be decommissioned and disconnected from the voltage supply.
- ▶ Secure the respective devices against accidental activation.
- ▶ When integrating the module into a complete system, consider possible danger spots, particularly infeed locations and interfaces.

Uninstall the old finger guard:

- ▶ Remove side cover.
- ▶ From the outside of the C-profile, push up the snap-in nose of the finger guard so that the finger guard pops out.
- ▶ For pitches greater than 60 mm, lift the complete guard between the rollers and remove it.
- ▶ For pitches equal to 60 mm, push the bottom part (4) off of the top part (3) to be able to remove the guard. This requires access to the conveyor belt from below.

Maintenance and repair

Install the new finger guard:

For pitches equal to 60 mm, the finger guard must be installed in two steps.

- ▶ Clip the top part (3) of the finger guard into a pocket hole (2).
- ▶ Push the bottom part (4) of the finger guard onto the top part. This requires access to the conveyor belt from below.



For pitches greater than 60 mm, the pre-assembled top and bottom part must be installed as a complete unit. This requires two complete guards.

- ▶ The two guards must be installed directly adjacent to the rollers in each case.

For pitches greater than 90 mm, a gap is created between two guards.

Maintenance and repair

Maintenance intervals

-  If maintenance is not performed according to schedule, it may lead to damages and failures. If maintenance intervals are not followed, the warranty will be void.
-  All bearings of the module feature a life-time lubrication and are maintenance-free within the operating parameters.

Maintenance and inspection list

Component	Interval	Tasks/check	Work to be performed	Performed by
Complete module	Weekly	General visual and acoustic remote check		
Complete module	Annually	Check screw connections	Tighten to applicable standard as required	
RollerDrive	Every 6 months	Check temperature*	Replace as required	
RollerDrive	Every 6 months	Check for noise	Replace as required	
RollerDrive	Every 6 months	Check for damages	Replace as required	
RollerDrive	Every 6 months	Ensure that axle is secured in the transport frame		
Carrying idlers / drive belt	Every 6 months	Check running behavior and tension of drive belts	Replace as required	
Carrying idlers / drive belt	Every 6 months	Check for wear / damages	Replace as required	
Carrying idlers / drive belt	Every 6 months	Check for cleanliness	Clean as required	

* For permissible temperatures, see the operating manual of the motor.

Troubleshooting

In case of a fault



⚠ DANGER

Danger - electrocution

- ▶ Only perform maintenance and repair work after you have switched off the power.
- ▶ Faults on electrical equipment may be removed only by a trained electrician!

Requirement:

- ☑ The danger spots on the module are covered by protective plates and other protective devices.
- ▶ Immediately de-energize the complete conveyor system and ensure that it cannot be started accidentally.
- ▶ Remove material and blocking objects.
- ▶ Before switching it on again, ensure that no persons are at risk.
- ▶ Professionally dispose of any gear oil that has leaked out. Have the motor replaced by qualified personnel if necessary.

Troubleshooting

Fault	Cause	Remedy
Transport process cannot be started and motor does not start up	Main switch and/or control system switched off (is LED lit on DriveControl?)	• Check switch position, switch on main switch and/or key switch of the control system as required
	Supply line damaged	• Check supply line
Transport shows jerky movements	Foreign objects in roller area	• Remove foreign objects
Materials are not being transported	Drive belt torn	• Replacing the drive belt
	Control board defective	• Replace control board
	RollerDrive defective	• Replace RollerDrive
	Motor plug connection interrupted	• Check motor plug connection, replace as required
	Drive belt tension too low	• Replacing the drive belt
Zone starts up sporadically (10-second cycle)	Supply voltage out of range	• Adjust voltage at power supply (24 V to 26 V)

Spare and wear parts

All spare and wear parts are available from Interroll. Maintenance and repair work may be performed only by qualified personnel. Interroll offers training sessions about required maintenance and repair tasks upon request.

Ordering information

Ordering spare and wear parts requires the exact identification of the module, Nameplate.

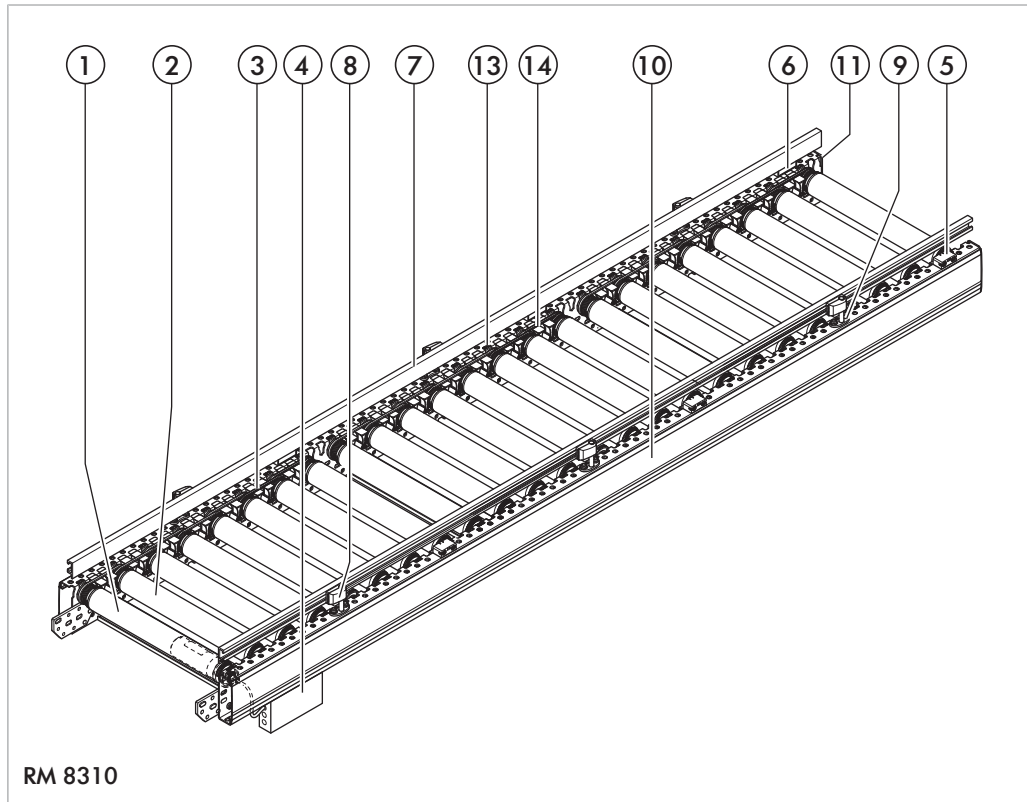
The following information is required for an order:

- Machine number
- Type
- Item number of spare parts list
- Designation
- Comment

For additional information about the spare parts portfolio, please contact your supplier.

24-V Roller Conveyor Straight (RM 8310)

Spare part designation



Spare and wear parts

Spare parts list

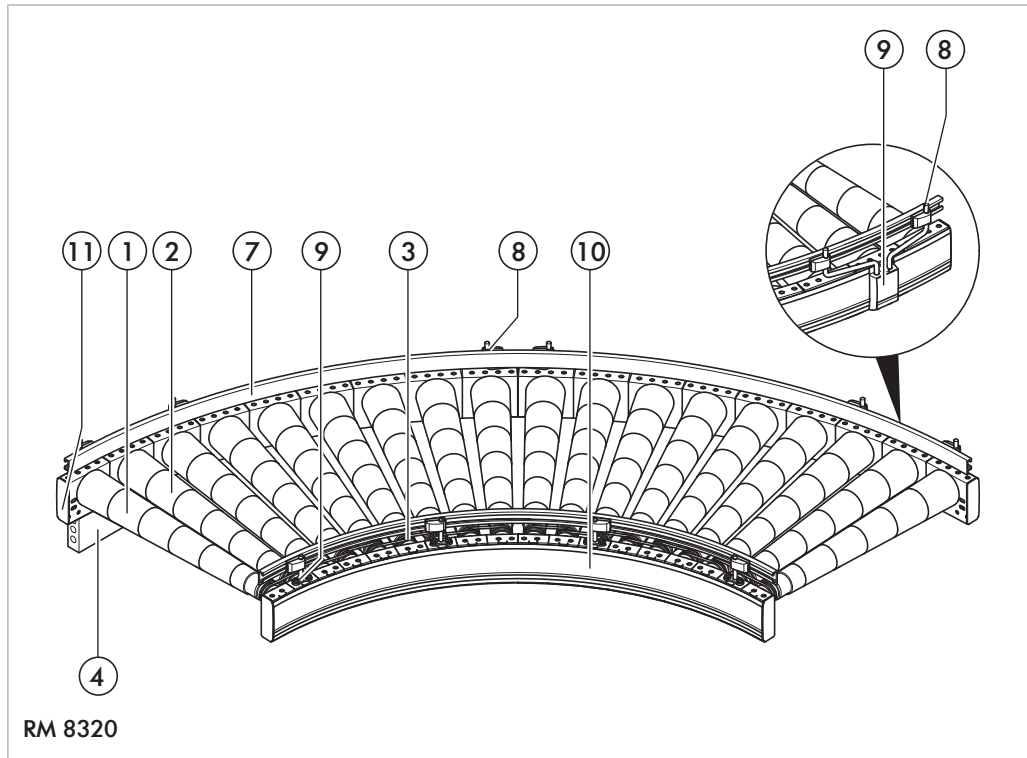
S = spare part, W = wear part, T = tool

Type: 8310

Item no.	Designation	Comment	S/W/T
1	RollerDrive (drive roller)	EC 310	S
2	Carrying idler		S
3	Drive belt (roller-to-roller)	PolyVee	W
4	Control		S
5	Photo cell incl. holder		S
6	Reflector incl. holder		S
7	Side guide profile		S
8	Side guide support		S
9	Universal support		S
10	Side cover		S
11	End cap (side frame)		S
12	End cap (side guide)		S
13	Closing clip		S
14	Finger guard		S

24-V Roller Conveyor Curve (RM 8320)

Spare part designation



Spare and wear parts

Spare parts list

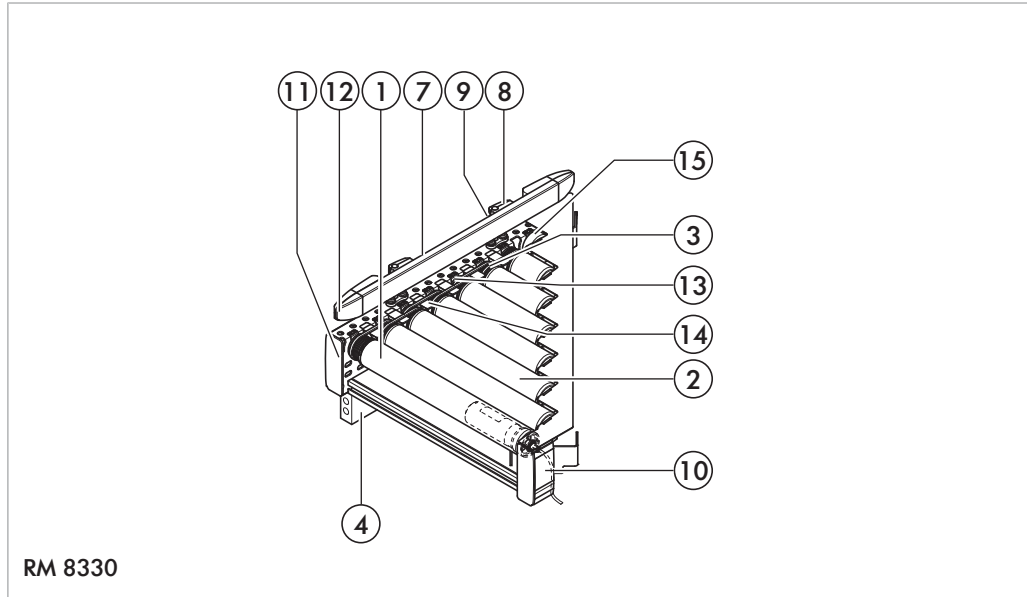
S = spare part, W = wear part, T = tool

Type: 8320

Item no.	Designation	Comment	S/W/T
1	RollerDrive (drive roller), conical	EC 310 KXO	S
2	Conical carrying idler	KXO	S
3	Drive belt (roller-to-roller)	Round belt	W
4	Control		S
5	Photo cell incl. holder		S
6	Reflector incl. holder		S
7	Side guide profile		S
8	Side guide support		S
9	Universal support		S
10	Side cover		S
11	End cap (side frame)		S
12	End cap (side guide)		S

24-V Roller Conveyor Merge (RM 8330)

Spare part designation



Spare and wear parts

Spare parts list

S = spare part, W = wear part, T = tool

Type: 8330

Item no.	Designation	Comment	S/W/T
1	RollerDrive (drive roller)	EC 310	S
2	Carrying idler		S
3	Drive belt (roller-to-roller)	PolyVee	W
4	Control		S
5	Photo cell incl. holder		S
6	Reflector incl. holder		S
7	Side guide profile		S
8	Side guide support		S
9	Universal support		S
10	Side cover		S
11	End cap (side frame)		S
12	End cap (side guide)		S
13	Closing clip		S
14	Finger guard		S
15	Small metal roller	Ø 48 mm	S

Decommissioning and disposal

- ▶ When disposing the motor oil, observe the disposal documents of the motor manufacturer.
- ▶ The packaging must be recycled to provide environmental relief.

Environmental protection regulations

For all work on and with the module, the legal regulations concerning waste avoidance and proper disposal and recycling must be followed.

NOTICE



Substances with a water hazard class, such as greases and oils, hydraulic oils, coolants or cleaning agents with solvents may not be allowed to come into contact with the ground or reach the sewer system!

- ▶ Store, transport, catch and dispose these substances in suitable containers!
 - ▶ Observe the notices on the supply containers.
 - ▶ Observe any additional national regulations.
-

Installation declaration

In accordance with the EC Machinery Directive 2006/42/EC, Appendix II 1 B.

The manufacturer:

Interroll Automation GmbH
Dietmar-Hopp-Straße 3
D-74889 Sinsheim, Germany

herewith declares that the conveyor module described below is an incomplete machine in accordance with the EU Machinery Directive:

- Interroll 24-V Roller Conveyor Straight RM 8310
- Interroll 24-V Roller Conveyor Curve RM 8320
- Interroll 24-V Merge Roller Conveyor RM 8330

Important Note! The incomplete machine may only be put into operation if it has been determined that the overall machine/system, into which the incomplete machine is to be installed, meets the requirements of this directive.

The following safety requirements as stated in Appendix I have been applied:

- 1.1.2, 1.1.3, 1.1.5, 1.1.6, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8, 1.4.1, 1.5.4, 1.5.8, 1.5.9, 1.6.1, 1.6.4, 1.7.4

The special technical documents mentioned in Appendix VII B have been prepared and will be sent to the responsible authority if necessary. The transmission is done electronically.

Responsible for EC documentation: Interroll Automation GmbH, Dietmar-Hopp-Straße 3, D-74889 Sinsheim, Germany

Applicable EC Directives:

- Machinery Directive 2006/42/EC
- EMC Directive 2014/30/EU

Applicable harmonized standards:

- EN ISO 12100:2011-03 "Safety of machinery - Basic concepts - risk assessment and reduction"
- EN ISO 13857:2008-06 "Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs"
- EN 349:2008-09 "Safety of machinery - Minimum gaps to avoid crushing of parts of the human body"
- EN 60204-1:2007-06 "Safety of machinery - Electrical equipment of machines - Part 1: General requirements"

Sinsheim, dated

12.10.16


Robert Lögauer
(Manager)





