# OPERATING INSTRUCTIONS

## Belt Conveyor System

## Manual 6

## Maintenance

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# 1 MAINTENANCE

## 1.1 Basic Safety Notes

**IMPORTANT**

**Please note the information in the manual 1 “Use of machine according to intended purpose” and manual 2 “Basic safety requirements”.**

**The supplied documentation of attachment parts (e.g. gearbox, motors etc.) supplements the following statements and should be understood as obligatory.**

Make sure to adhere to the setting, maintenance and inspection activities and intervals plus data on replacement of parts and components contained in the operation manual. All those activities should be accomplished only by **qualified personnel** (skilled work force).

**Qualified personnel** (skilled work force) are persons who have been authorized by the responsible for maintaining the safety of the components/ plant, to perform such activities and to detect and avoid possible dangers as a result of their training, experience, instruction or familiarity with the relevant Standards, regulations, accident prevention measures and operating conditions.

**NOTE**

**Data on lubrication points, lubricants, filling volume and frequency of lubrication may be found in the lubrication chart in Appendix 1.**

**Data on maintenance actions and frequencies may be found in the maintenance plan in Appendix 2.**

**During all work with or on the equipment the rules on the avoidance of wastes and the correct disposal or recycling of wastes shall be observed.**

**Substances like**

- **Hydraulic fluids**
- **Oils and greases**
- **Coolants**
- **Solvent-containing cleaning agents**

**required for installation, repair and maintenance work must not get into the soil or enter the sewage system.**

**These fluids must be collected in suitable vessels before they are disposed of properly.**

WARNING

**WARNING! OVERPRESSURE**

**Prior to repair or maintenance, the equipment items and pressure lines to be opened must be relieved from pressure.**

**Work should be carried out only by skilled workers.**

WARNING

**CAUTION, HOT LIQUIDS AND VAPOURS**

**Be careful when handling hot substances. Risk of skin burns and scalds.**

DANGER

DANGER

**POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER**

**POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE**

**Only qualified electricians should carry out work on the power supply system.**

**Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.**

**Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.**

**All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!**

DANGER

**DANGER FOR THE DRIFT STABILITY**

**Suitable measures must be taken to ensure at any time that all repair and maintenance work can be safely accomplished without impairing the stability of the overall machine. If brakes are removed, additional fixtures (e.g. clamping devices) must be used that have the same effect.**

WARNING

**WARNING, DANGER OF SQUEEZING INJURIES**

**Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.**

DANGER

**CAUTION, SUSPENDED LOADS!**

**Nominate only well-experienced persons for suspension of loads and for giving instructions to the crane operator. The person giving instructions to the crane operator must be positioned so that it is in sight contact with the crane operator or may communicate with him through a radiotelephone set.**

**When replacement of single parts or larger components is required, the parts must be safely fitted to the hoisting gear and handled so that all risks are excluded. Only suitable hoisting gears and load carrying attachments in technically sound condition and with sufficient hoisting capacity shall be used.**

**For handling of plant components only the provided suspension points and marked eyebolts shall be used.**

**Persons must not stay or work under suspended loads.**

**It is prohibited to transport persons together with the load or on the load suspension devices.**

DANGER

**ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!**

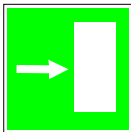
**Never use equipment parts for climbing.**

**When work in overhead positions is required, use only tested and approved equipment for protection against falling down.**

**In case of repair or maintenance work in elevated positions the workforce may fall down and suffer heavy injuries or even death.**

**Therefore, use only approved climbing aids and working platforms.**

DANGER



**DANGER DUE TO BLOCKED ESCAPE ROUTES**

**Keep escape routes free from all obstacles: never put down or store components in escape routes and observe the applicable safety rules.**

IMPORTANT

**Damage to the paint must be eliminated according to the paint specification after having finished maintenance works.**

## 1.2 Ropes and Rope Fixtures

- Ropes must be kept under supervision while they are in operation and while they are not used. This is applicable not only to the ropes but also to the rope fixtures, rope connections and rope guides.
- In case of wire rope fixtures, the specified number of rope clips must not be reduced.

| Nominal size (rope) | Required torque for tightening [Nm] | Tensile force required in the rope clip thread [N] | Required number of wire rope clips |
|---|---|---|---|
| 5 | 2,20 | 2300 | 5 |
| 6,5 | 3,85 | 3200 | 5 |
| 8 | 6,60 | 4700 | 6 |
| 10 | 9,90 | 7100 | 6 |
| 13 | 36,30 | 15400 | 6 |
| 16 | 53,90 | 21000 | 6 |
| 19 | 74,47 | 28900 | 6 |
| 22 | 117,70 | 40800 | 7 |
| 26 | 161,70 | 47600 | 7 |
| 30 | 233,20 | 62300 | 8 |
| 34 | 325,60 | 79200 | 8 |
| 40 | 399,30 | 89800 | 8 |

## 1.3 Torques for Tightening of Bolts

| Bolt size | Bolt property class 10.9 Tightening moment to be applied $M_A$ [Nm] | Bolt property class 8.8 Tightening moment to be applied $M_A$ [Nm] |
|---|---|---|
| M8 | | 20 |
| M10 | | 40 |
| M12 | 100 | 70 |
| M16 | 250 | 170 |
| M20 | 450 | 300 |
| M22 | 650 | 450 |
| M24 | 800 | 600 |
| M27 | 1250 | 900 |
| M30 | 1650 | 1200 |
| M36 | 2800 | 2100 |

MA = Required torque for tightening with torque wrench
All torques for tightening are applicable to bolts with metric thread according DIN 13, nut with $MoS_2$ treated

## 1.4 Repair

### 1.4.1 Basic Safety Notes

DANGER

**DANGER FOR THE STABILITY!**

**All repair work must be realized only at wind speeds up to maximum 5 m/s. During the repairs, the wind speed must not exceed 10 m/s!**

DANGER

**DANGER DUE TO UNINTENDED RE-START!**

**Prior to repair, the conveying routes affected and upstream conveyors of machines must be made empty. Suitable actions are required to ensure that such equipment cannot be started by mistake.**

**Starting of the electrical or hydraulic drives of the assembly groups that are being worked on, must be excluded.**

DANGER

**DANGER FOR THE STABILITY!**

**In case repair work technology makes it necessary to erect piles between ground level and machine, the load carrying capacity of soil must be calculated before the piles are erected (the permitted ground pressure need to be complied).**

**The piles must be erected on a ground level sufficiently able to take the maximum load.**

**The size of the piles must be selected according to the permitted ground pressure and the imposed load.**

**The piles must be secured against overturning.**

**In this process need to be ensured that the piles are positioned vertically and centrically under the support points.**

DANGER

**DANGER FOR THE STABILITY!**

**In case of using mobile lifting devices, the load carrying capacity of soil must be calculated before (the permitted ground pressure need to be complied).**

DANGER

**DANGER DUE TO OBJECTS FALLING DOWN!**

**For all repair works it is forbidden to stay under the repair area! This area has to be closed off across a large area.**

**Falling objects may cause severe bodily injury or loss of life.**

DANGER

**WARNING! RISK OF INJURIES CAUSED BY SPRING TENSION/CHAIN TENSION!**

**When installing or removing components under mechanical stresses, persons might suffer injuries and equipment parts may become damaged or even destroyed.**

**Before performing work on such components suitable action should be taken to exclude such potential risks.**

DANGER

**RISK OF SQUEEZING-OFF LIMBS**

**The conveying belt is always under tension, even while a belt conveyor is switched off. In the case of works where the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.**

DANGER

**RISK OF SQUEEZING-OFF LIMBS**

**For all belt-drive repair works suitable measures (e.g. belt clamps) have to be used to secure the conveyor belt against self-actuated movement.**

DANGER

**DANGER DUE TO MISSING OR NOT CORECTLY INSTALLED SAFETY APPLIANCES**

**After repair all safety devices must be checked for mounting and function and a start-up test without transported material must be realized!**

DANGER

**DANGER FOR THE STABILITY!**

**Repair works at**

- **Spherical bearings of the bridge segments**
- **Hoisting -and levelling cylinder**
- **Main carrying construction**

**As well as the disassebly of machine parts of the crawler drive notably affect the stability of the entire plant. That is why these works may only be carried out after having consulted the company FAM and only by qualified maintenance personnel.**

**Non-observance of this instruction may lead to damages at the plant, severe or even fatal injuries.**

**IMPORTANT**

**In case of repair where fitting bolts or fitting bolt connections are to be removed, the parts concerned shall be properly marked so that they can be re-installed in the correct positions!**

**If the fitting bolt connections have been removed, in the course of reassembly they should be replaced by new bolts with a thicker fitting shaft. Conjointly the holes should be bored to a larger size.**

## 1.5 Belt Conveyors U1 – U5

### 1.5.1 Replacement of Conveyor Belt

**NOTE**

**For documentation of the conveyor belt refer to Manual 7, Register 4.**

**DANGER**

**RISK OF SQUEEZING-OFF LIMBS**

**The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.**

The conveyor belt must be constantly monitored for damages due to foreign substances. Any damage to the conveyor belt should be repaired as soon as possible. Minor damage can be repaired directly on the belt. Damage to the belt edges is also part of such immediate repairs.

More extensive damage to the conveyor belt must be eliminated by the removal of the damaged belt section.

**IMPORTANT**

**Work to the conveyor belt, vulcanisation and improvement of the damaged location(s) are to be carried out by certified specialist contractors.**

**All connection and vulcanisation works must be executed by following precisely the instructions of the belt and fastening material manufacturer.**

**Replacement of conveyor belt**

- Run the conveyor belt empty
- If emptying is not possible, remove material from the belt manually

**DANGER**

**ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!**

**Maintenance personnel realizing cleaning work on the conveyor belt must use a catching safety belt and/or personal safety equipment for protection against falling!**

**Failure to observe this precaution could result in severe bodily injury or loss of life.**

- Move the conveyor belt in such a way that the intended sectioning point is well accessible.
- Relieve the scrapers from tension and fold them back.
- Lift the inner belt cleaner from the belt and fix it
- Relieve the conveyor belt completely from tension (U1 see section 1.5.2.1, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Disengage clamping plates with rubber sealings of the feeding hopper or, if necessary, remove them.
- Disassemble protective devices and covers to the extent required.
- Clamp the conveyor belt next to the intended sectioning point in both directions to prevent it from sliding.
- Align the belt coil with the new belt on two brackets with tubular axis to the belt axis

**IMPORTANT**

**Platform for the belt coil:**

**It must be ensured that the platform is placed horizontally with a safe standing position.**

- Disconnect the conveyor belt
- Attach the new conveyer belt of the same quality to the old belt ending.

**IMPORTANT**

**Make sure that the running and the carrying sides are not mistaken when positioning the conveyor belt!**

**When installing the conveyor belt, it must be able to move freely in the direction of conveyance (running direction) over the carrying rollers as well as over all belt pulleys. For this purpose, it must be constantly checked, via visual inspection, that the conveyor belt cannot get jammed at any point or come into contact with sharp-edged parts of the frame structure!**

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**When mounting the conveyor belt, make sure that hands, arms or other limbs are not between the conveyor belt and the carrying rollers or between the conveyor belt and the belt pulley!**

- The installation of the conveyor belt may be carried out under observation of the instructions mentioned above. In case of different belt lengths, it may be necessary to install the conveyor belt in steps in order to ensure the vulcanising of the required belt joints. Here, it should also be ensured that, when making the conveyor belt endless from several individual lengths, a belt type test of each individual length must be carried out.
- The installed conveyor belt must be secured against sliding back.
- After the entire conveyor belt is positioned and braced firmly at one end, the other belt end is tightened until the conveyor belt tightly embraces all belt pulleys and rests evenly on the carrying rollers.
- After the other end is also safely connected, the conveyor belt can be made endless / vulcanized. For this purpose, see assembly instructions of the belt suppliers.
- Remove all devices (belt clamps) after production of the splice connection.
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
  - Before tensioning the conveyor belt, check again the ease of movement. The belt is then tensioned according to the instructions provided for the take-up station (U1 see section 1.5.2.1, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3).
  - Adjust the clamping plates with rubber sealings on the feeding hopper.
  - Adjust the scrapers (see the manufacturer´s instructions).
  - Remove the inner belt cleaner fixation.

**Overview:**

| Material number / Designation | Weight/m | Conveyor |
|---|---|---|
| 20109468 Fördergurt 2000.EP500/4-X-6:3 | 30,8 kg | U1 |
| 20109467 Fördergurt 1200.EP1250/4-X-6:3 | 22,8 kg | U2 |
| 20109467 Fördergurt 1200.EP1250/4-X-6:3 | 22,8 kg | U3 |
| 20109467 Fördergurt 1200.EP1250/4-X-6:3 | 22,8 kg | U4 |
| 20109467 Fördergurt 1200.EP1250/4-X-6:3 | 22,8 kg | U5 |

## 1.5.2 Relieving / Tensioning the Conveyor Belt

### 1.5.2.1 Spindle take-up station

NOTE

**Applicable to the conveyor U1**

**Tension the belt**

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove the take-up pulley guard.

WARNING

**WARNING, DANGER OF SQUEEZING INJURIES**

**No limbs must be within the range of movement of the take-up pulley between the take-up pulley and the take-up frame.**

**There is a risk that limbs may be squeezed off or crushed!**

- Undo the lock nuts on both sides.
- Re-position the tensioning nuts on the take-up spindles evenly on both sides.

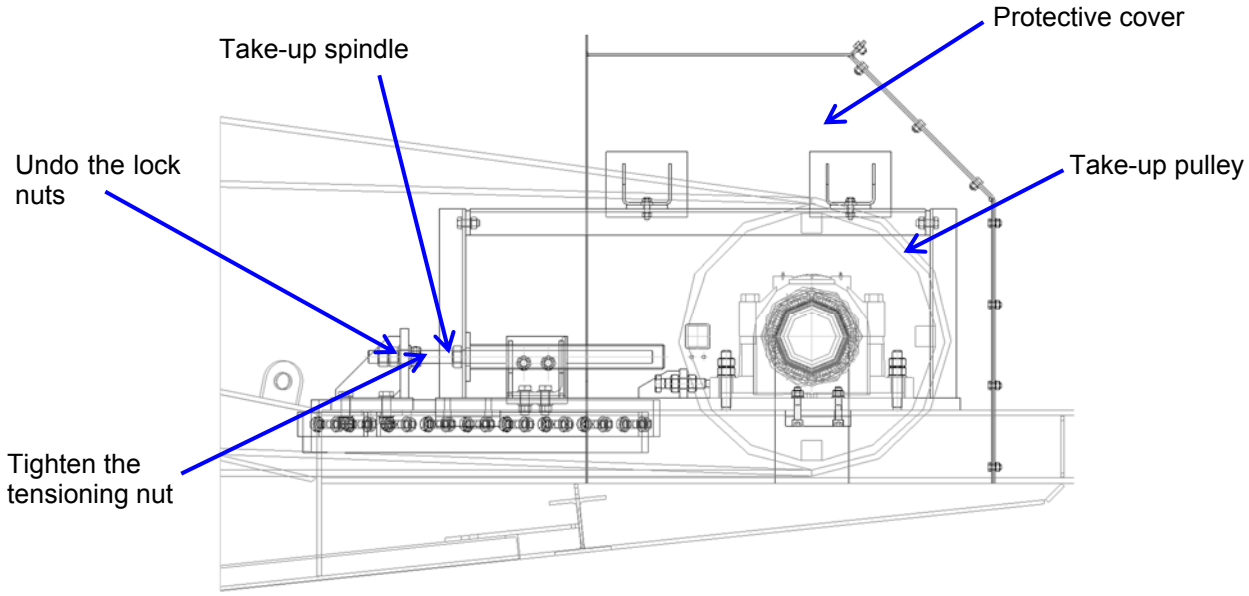



Figure 1: Take-up station U1

- Once the required tensioning force is reached (see Table 1), tighten the lock nuts. While tensioning the conveying belt, make sure that the take-up bearings cannot become jammed.
- Greater tensioning lengths require relocation of take-up yoke.

Table 1 Belt pre-tension U1

| Conveyor | Type of tensioning | Pre-tension at take-up pulley, **nominal value** [kN] | ¤ Belt tension [kN] | Belt weight [kg/m] | Belt sag in case of idler spacing (lower run) **3 m** [mm] | ¤¤ **formula** for simplified calculation in case of other idler spacing | Belt sag **nominal value** [mm] |
|---|---|---|---|---|---|---|---|
| U1 | by spindle | 79,3 | 39,65 | 29,7 | 8,3 | 0,9182 x (idler spacing)$^2$ | |

¤ by adjusting near take-up unit – half of the pre-tension
¤¤ factor = belt weight • 9.81 / (tension * 8)
belt sag = belt weight • 9.81 / (tension * 8) * idler spacing²

**IMPORTANT**

**After completion of the tensioning operation (with regard to the pre-tension length), the belt sag in lower run must be checked!**

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**When installing the components, note that distances are changing. The risk of squeezing the limbs is present.**

## Relieve the belt from tension

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove the take-up pulley guard.
- Undo the tensioning nuts evenly on both sides until the belt is relieved from tension.

### 1.5.2.2 Motor-operated take-up pulley mounted on take-up carriage

NOTE

**Applicable to the conveyors U2, U3, U4.**

**Tension the belt**

- Run the conveyor belt empty
- Operate the rope winch to move the take-up carriage in the belt tensioning direction. The tensioning procedure is completed when the tensioning-force meter displays the set-point value (see Table 2)
- Check if the rope is properly placed on the rope sheaves.

WARNING

**WARNING, DANGER OF SQUEEZING INJURIES**

**During the tensioning operation it must be ensured that the rope is properly pulled through all rope sheaves.**

**Be careful when attaching or threading the rope in the rope sheaves. There is a risk of squeezing off limbs!**

**All maintenance personnel must wear gloves!**

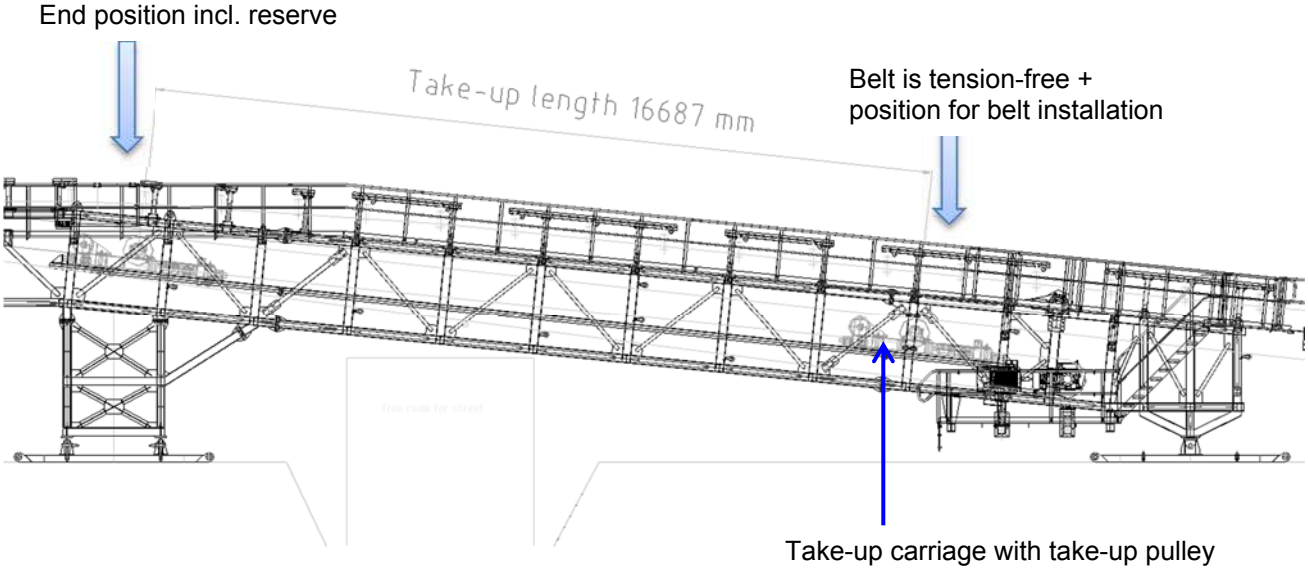



Figure 2: Example – take-up station U2

**NOTE**

**A measuring device (rope guard) in the tension ropes constantly monitors the belt tension.**

Table 2 Belt pre-tension U2-U4

| Conveyor | Type of tensioning | Pre-tension at take-up pulley, **standstill** [kN] | Check value **empty** [kN] | Operation | | Starting / braking | |
|---|---|---|---|---|---|---|---|
| | | | | **MIN** [kN] | **MAX** [kN] | **MIN** [kN] | **MAX** [kN] |
| U2 | by winch | 98,4 | 78,9 | 56,0 | 90,0 | 34,0 | 114,0 |
| U3 (initial length – one drive) | by winch | 64,4 | 54,4 | 50,0 | 60,0 | 40,0 | 74,0 |
| U3 (final length – three drives) | by winch | 82,6 | 54,4 | 43,5 | 70,5 | 28,0 | 106,0 |
| U4 | by winch | 111,3 | 91,5 | 82,0 | 103,0 | 69,0 | 126,5 |

**Relieve the belt from tension**

- Run the conveyor belt empty
- Relieve the belt completely from tension by uncoiling the tensioning rope until the belt is free
- If necessary, pull the take-up carriage in the foremost position using appropriate hoisting devices
- Check if the rope is properly placed to the rope sheaves.

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**During the tensioning operation it must be ensured that the rope is properly pulled through all rope sheaves.**

**Be careful when attaching or threading the rope in the rope sheaves. There is a risk of squeezing off limbs!**

**All maintenance personnel must wear gloves!**

**IMPORTANT**

**When the maximum take-up length is reached, the belt needs to be shortened. If the dimension sinks below this value, the rope will not be properly wound on the rope drum anymore!**

### 1.5.2.3 Weight-tensioned take-up pulley

**NOTE**

**Applicable to the conveyor U5.**

The conveying belt is tensioned via a weight-operated take-up station. This station ensures a constant tension of the conveying belt without any re-adjustment of the take-up system.

**Relieving / tensioning the belt**

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Lift and remove the take-up weight to relieve the belt from tension (use the middle mounting beam). See also section 1.5.4.6.
- Tensioning of the belt is performed in reversed order. Note following instructions:
  - Exact alignment of belt pulleys is necessary to ensure correct straight run of the conveying belt.

Table 3 Belt pre-tension U5

| Conveyor | Type of tensioning | **nominal value** at take-up pulley [kN] | take-up pulley GT.A630 [kN] | take-up sledge [kN] | ballast box [kN] | ballast mass [kN] |
|---|---|---|---|---|---|---|
| U5 | by gravity | 38,1 | 7,95 | 4,4 | 5,5 | 20,25 |

**IMPORTANT**

**When lifting the take-up frame with the dead weight box, ensure that it can be easily moved in the guiding rails on the entire take-up length.**

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**When installing the components, note that distances are changing. The risk of squeezing the limbs is present.**

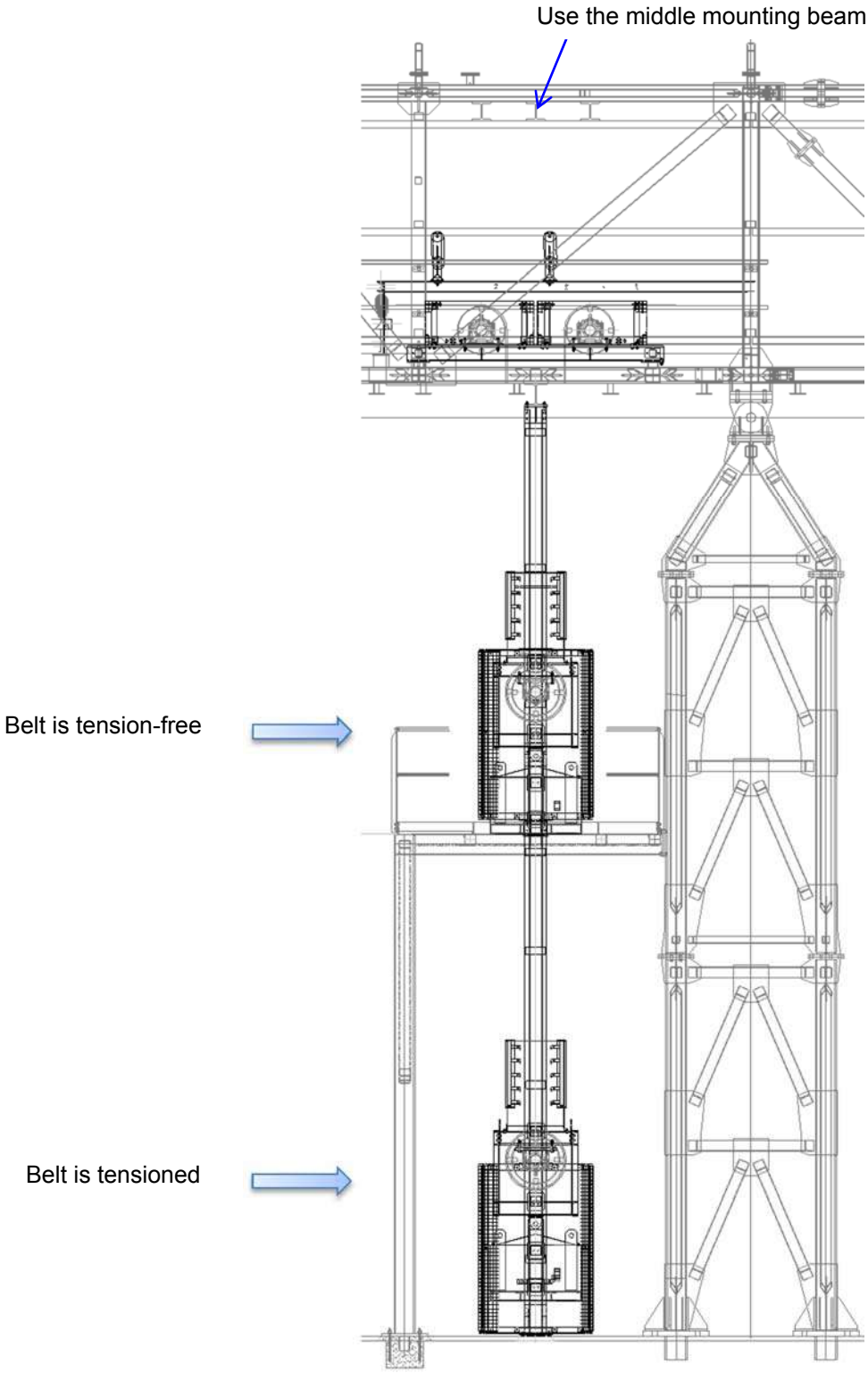



Figure 3: Take-up station U5

## 1.5.3 Repair Work at Conveyor Drives

### 1.5.3.1 Disassembly of drive unit

NOTE

**For documentation of the conveyor drive units refer to Manual 7, Register 1.**

DANGER

DANGER

**POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER**

**POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE**

**Only qualified electricians should carry out work on the power supply system.**

**Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.**

**Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.**

**All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!**

DANGER

**Prior to repair and maintenance work, the respective conveying line and the upstream conveying line must be made empty.**

**Isolate conveyor from power supply and secure it against unauthorized, erroneous and unintended start-up.**

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Disconnect the supply cables of the drive unit
- Remove the protective cover of the flange coupling

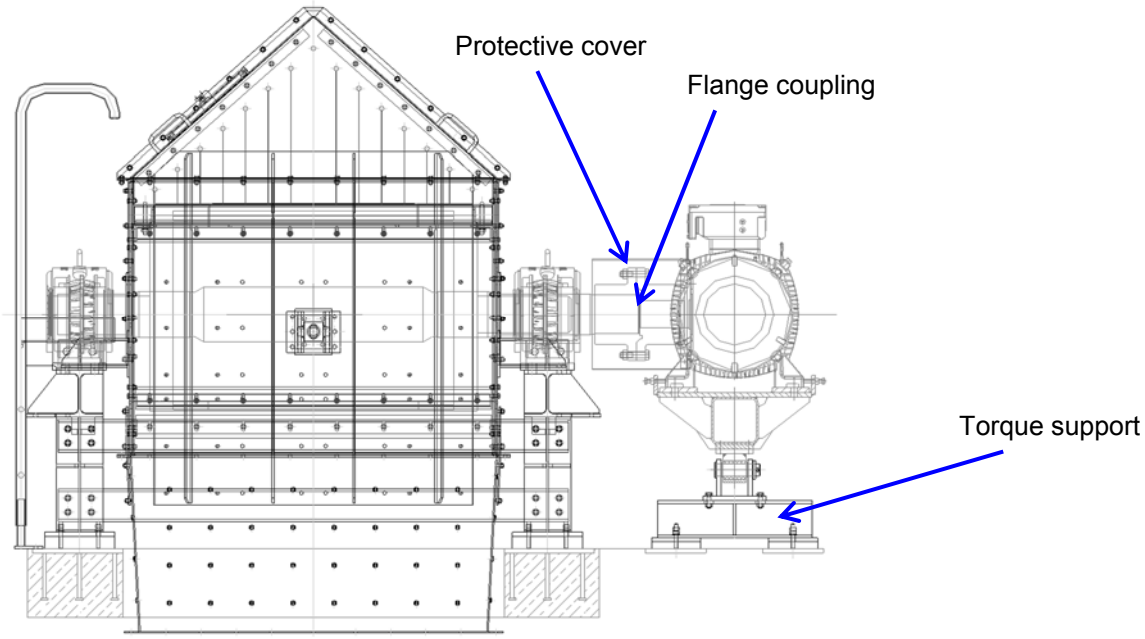



Figure 4 Example – Drive station U5

- Sling the drive unit (for weight and lifting lugs see dimension drawing of the drive unit in manual 7 register 1) to the suitable lifting device and secure it against tilting
- Lift slightly the drive unit until the drive shaft and torque support are relieved.
- Undo the connecting elements of the flange coupling
- Undo the connecting elements of the torque support
- Pull off the drive unit along with simultaneous movement of the lifting device until the shaft is free.
- Hoist the complete drive unit and lower it onto a suitable means of transportation

**DANGER**

**In case of necessity, the drive unit may only be placed at locations where the load capacity for the acceptance of the drive unit weight is provided. There, the drive unit must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

**DANGER**

**CAUTION, SUSPENDED LOADS!**

**Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.**

- Further transport to the service station and there possibly disassembly of the components
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
  - Note the tightening torques for bolted connections.

**IMPORTANT**

**When installing the drive unit, note that the coupling halves must be in alignment and the coupling screws must be tightened with the following torque (screws and nuts are untreated or slightly oiled, μ=0,14): 1050 Nm.**

**Re-mount all protective devices.**

  - Reconnect the supply cables of the drive unit
  - Test operation of the conveyor without material

**IMPORTANT**

**For information regarding assembly/disassembly of the drive unit components please refer to the manufacturers operating instructions in Manual 7, Register 7.1.**

**IMPORTANT**

**After reassembly inspect the gear unit oil level in accordance with the lubrication schedule. Add oil if needed.**

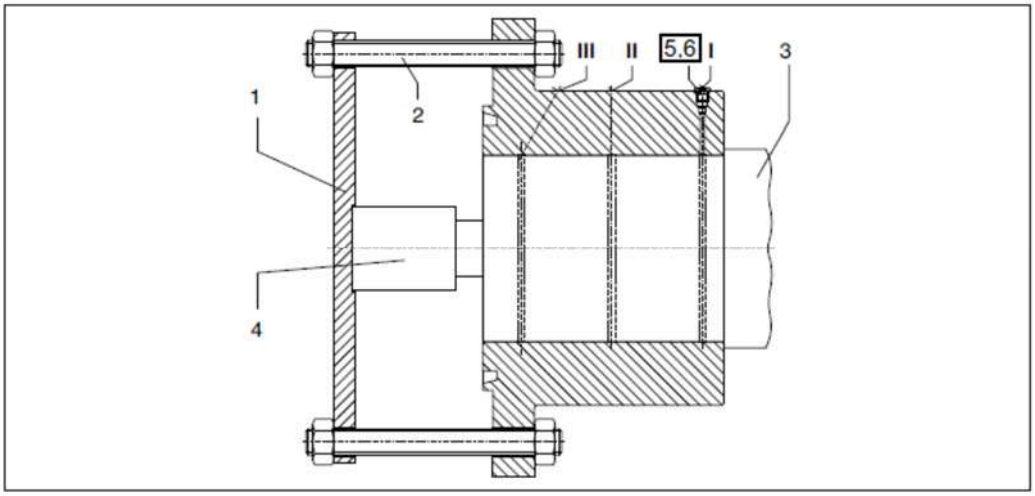
### 1.5.3.2 Replacement of a coupling half of the flange coupling

- Dismount the drive unit (see section 1.5.3.1)
- For disassembly of the coupling halves following tools are needed:
  - For each oil channel (3 for each coupling half with connection thread G1/4“) an oil pump with pressure gauge (min. 2 500 bar) or a motor pump with suitable number of independently closable connections
  - Suitable connections and pipes.
  - 1 suitable detaching device or retaining plate with retaining screws or threaded spindles with nuts (material of screws and spindles min. 10.9, material of nuts identical to that of the screws).
  - 1 suitable hydraulic cylinder with oil pump. Note displacement and pressure of the hydraulic cylinder (pressure of the cylinder only after consultation with FAM)

**IMPORTANT**

**Observe manufacturer's instructions for using forcing-off/detaching device and pumps.**

- Prior to detaching of the coupling half, the detaching device must be mounted as shown in Figure 5 or in a similar way




1 Retaining plate
2 Threaded spindle
3 Shaft
4 Hydraulic cylinder
5 Plug screw
6 Sealing ring

Figure 5: Disassembly of coupling halves

- Using suitable lifting tools, secure coupling halves and retaining device (weights see Figure 6 and Figure 7).
- Remove screw plugs (Figure 5, Pos. 5) from the oil channels.

- One oil pump must be bled, connected up to the oil channel, which is positioned underneath the largest external diameter (in Figure 5: oil channel III).
- Then apply pressure (see Oil pressures for the coupling halves 1 and 2) to the pump until oil emerges from the adjacent connection.

**IMPORTANT**

**The maximum pressure must not be exceeded.**

**Oil pressures for coupling halves 1 and 2**

**Coupling half 1:**

| | | |
|---|---|---|
| Oil channel IV, V: | max. permissible oil pressure for hydraulic hub removal | =1700 bar |
| | min. oil pressure for hydraulic hub removal | =1550 bar |
| Oil channel IV: | max. permissible oil pressure for hydraulic hub removal | =1400 bar |
| | min. oil pressure for hydraulic hub removal | =1300 bar |

**Coupling half 2:**

| | | |
|---|---|---|
| Oil channel I, II: | max. permissible oil pressure for hydraulic hub removal | =1450 bar |
| | min. oil pressure for hydraulic hub removal | =1350 bar |
| Oil channel III: | max. permissible oil pressure for hydraulic hub removal | =1700 bar |
| | min. oil pressure for hydraulic hub removal | =1600 bar |

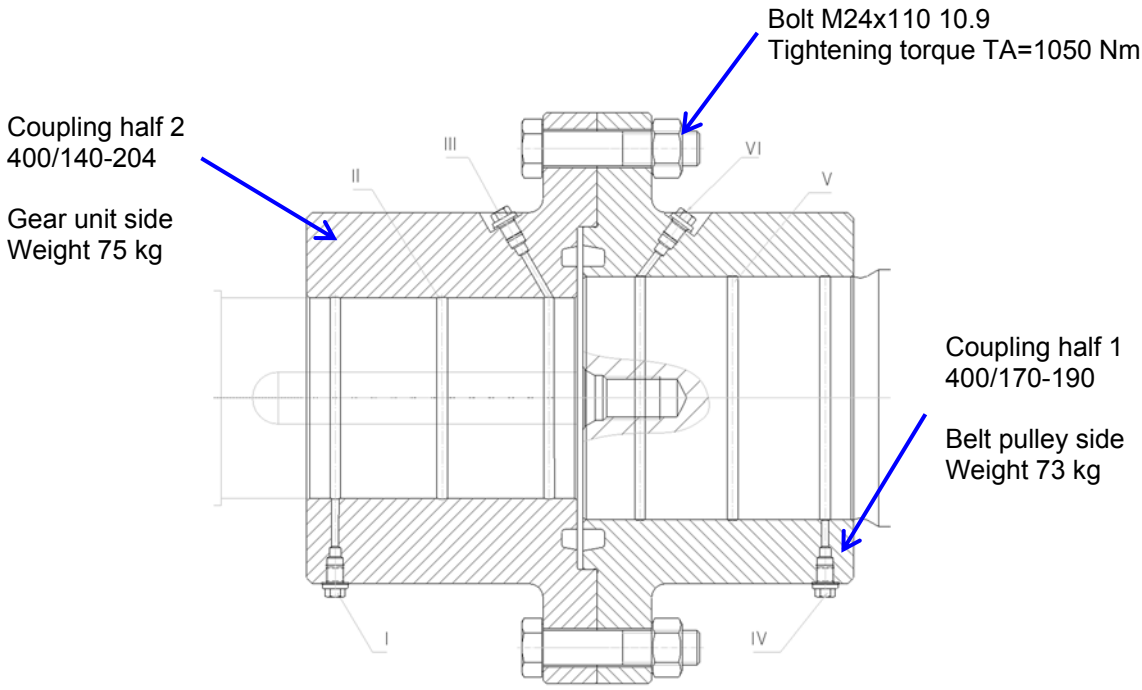



Figure 6: Flange coupling U1

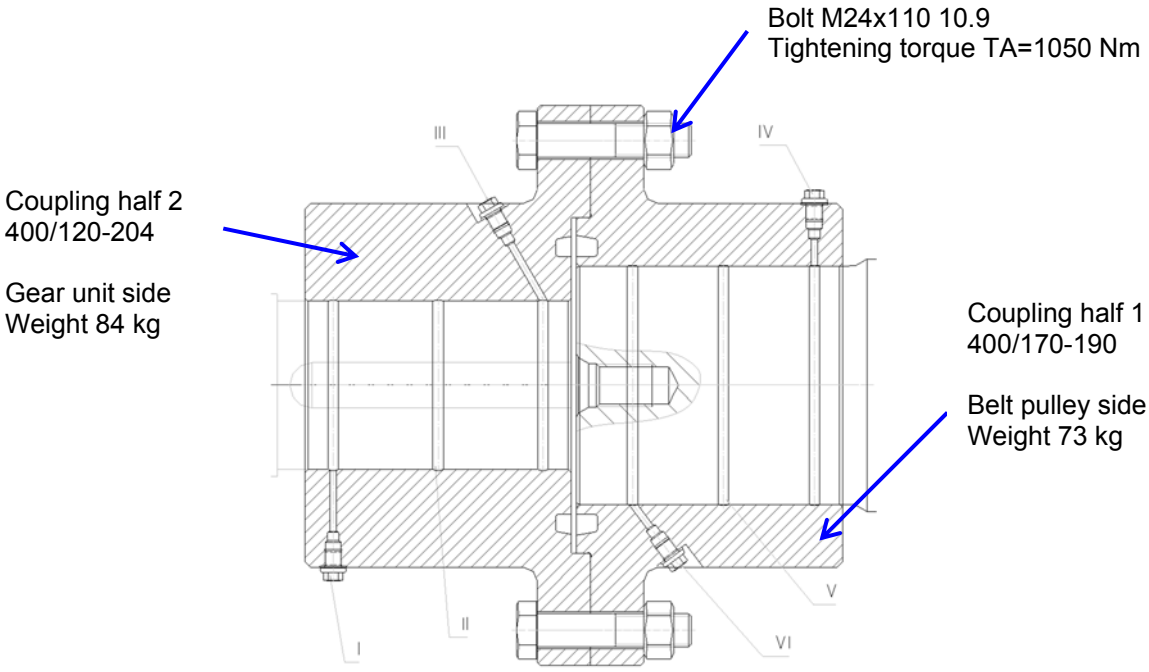



Figure 7: Flange coupling U2-U5

- Bleed the next oil pump and connect it up to the next oil channel (in Figure 5: oil channel II)
- Apply pressure (see Oil pressures for coupling halves 1 and 2) to the oil channel, until oil emerges from the adjacent oil channel (in Figure 5: oil channel I).
- Bleed the next oil pump and connect it up to the next oil channel (in Figure 5: oil channel I).
- Apply pressure (see Oil pressures for coupling halves 1 and 2) to the oil pump until a ring of oil emerges at both end faces.

**IMPORTANT**

**Note the sequence!**

**During the entire operation the pressure must be maintained at a constant level on all the oil channels to which pressure is applied.**

**If, when pressure is applied, oil emerges to the extent that pressure cannot be maintained, a thicker oil type must be specified.**

- Only when an unbroken ring of oil emerges from both end faces and a subsequent waiting period of approx. 30 minutes is over, pressure can be applied to the hydraulic cylinder to slide the coupling hub smartly off the shaft.

**IMPORTANT**

**Note stroke of hydraulic cylinder! If re-adjustment is necessary, the end face of the hydraulic cylinder must stop between 2 oil channels.**

- After detaching, the oil pumps and retaining device must be removed from the coupling hub.
- The hub bore and the shaft should be examined for damage and protected against rust. Damaged parts must be replaced.

Re-assembly of a flange coupling half

- At the beginning of the mounting operation sufficient hoisting gears must be available.
- Undo the plug screws G ¼ from the coupling half (see Figure 5, Pos. 5) and thoroughly clean all parts and shaft ends. The parts to be joined must be absolutely dry and free from grease. The oil channels and the oil circulation grooves may not show any contaminations.

**IMPORTANT**

**Under no circumstances lubricate the fitting surfaces with grease containing molybdenum sulphite (Molykote, etc.).**

**DANGER**

**Protection against burning is required due to hot parts. Wear protective clothing!**

**Avoid heat loss (determination during mounting process)!**

- The coupling halves must be placed in warm condition:
  - Heat the coupling half 1 to approx. 255°C before shrink fitting.
  - Heat the coupling half 2 to approx. 245°C before shrink fitting.
- Protect seal rings (see Figure 5, Pos. 6) from heat.
- The warming up can be carried out inductively or in the oven.

**IMPORTANT**

**The joining temperature must not exceed 300°C!**

- The coupling must be quickly pulled onto the shaft until it is flush with the shaft front. Use suitable hoisting gears. Ensure that no fit seats are damaged.
- Secure the coupling hub on the shaft with a suitable face plate or holding device until it has cooled.
- The cooling of the joined parts must take place as even and slow as possible (use heat-insulating bases and cover the joint, if possible).
- After cooling of the coupling hub to the ambient temperature, the oil channels must be filled with clean oil (e.g. ISO VG 150) and closed with the plug screws G ¼ for purposes of rust protection (see Figure 5, Pos. 5, 6).
- Tighten the connecting bolts of the coupling halves with the specified tightening torque of 1050 Nm.

## 1.5.4 Replacement of Belt Pulleys

### 1.5.4.1 Basic principles

**NOTE**

**For documentation of the belt pulleys refer to Manual 7, Register 5.**

**DANGER**

**Prior to repair and maintenance work, the respective conveying line and the upstream conveying line must be made empty.**

**Isolate conveyor from power supply and secure it against unauthorized, erroneous and unintended start-up.**

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- If emptying is not possible, remove material from the belt manually

**DANGER**

**ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!**

**Maintenance personnel realizing cleaning work on the conveyor belt must use a catching safety belt and/or personal safety equipment for protection against falling!**

**Failure to observe this precaution could result in severe bodily injury or loss of life.**

**Table 4: Weights of belt pulleys**

| Belt conveyor | Weight Discharge pulley with drive [kg] | Weight Discharge pulley without drive [kg] | Weight Drive pulley [kg] | Weight Return pulley [kg] | Weight Take-up pulley [kg] | Weight Deflection pulley [kg] |
|---|---|---|---|---|---|---|
| U1 | 2125 | | | | 1270 | |
| U2 | 1905 | | 1825 | 1015 | 1015 | |
| U3 | | 1905 | 1825 | 1015 | 1015 | |
| U4 | 1825 | | 1825 | 1015 | 1015 | |
| U5 | 1825 | | | 1015 | 795 | 2x 595 |

### 1.5.4.2 Disassembly of discharge pulley U1-U5

- Run the conveyor belt empty
- Relieve the scrapers from tension and fold them back.
- Relieve the conveyor belt completely from tension (U1 see section 1.5.2.1, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Secure the belt in the vicinity of discharge pulley against slipping (clamps or lifting)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Sling the drive unit (U1 x1, U2 x2, U3 x0, U4 x1, U5 x1) to a suitable hoisting device, separate the flange coupling, dismount the drive unit (as per instructions in section 1.5.3.1) and lower it onto a suitable base.

**DANGER**

**In case of necessity, the drive unit may only be placed at locations where the load capacity for the acceptance of the drive unit weight is provided. There, the drive unit must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

- Remove obstructing parts of the cover (U5) and of the side walls of discharge box
- Position the baffle plate as far back as possible from the discharge pulley, if necessary, dismantle the baffle plate (see section 1.5.12)
- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the discharge pulley is free
- Attach a suitable load suspension device to the hoisting gear and position it above the discharge pulley (see its weight in Table 4)
- Put webbing slings around the discharge pulley, attach to the load suspension device and secure the discharge pulley against moving
- Loosen pedestal bearing screws of the discharge pulley
- Pull the discharge pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

**CAUTION, SUSPENDED LOADS!**

**Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.**

- Further transport to the repair site, depositing on the pulley body

- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the discharge pulley.

**IMPORTANT**

**Before tightening the bearing base screws, the discharge pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!**

- Re-installation of the drive unit (U1, U2, U4; U5), following the manufacturers´ instructions (see Manual 7, Register 7.1).
- Tension the belt (U1 see section 1.5.2.1, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Adjust the scrapers.

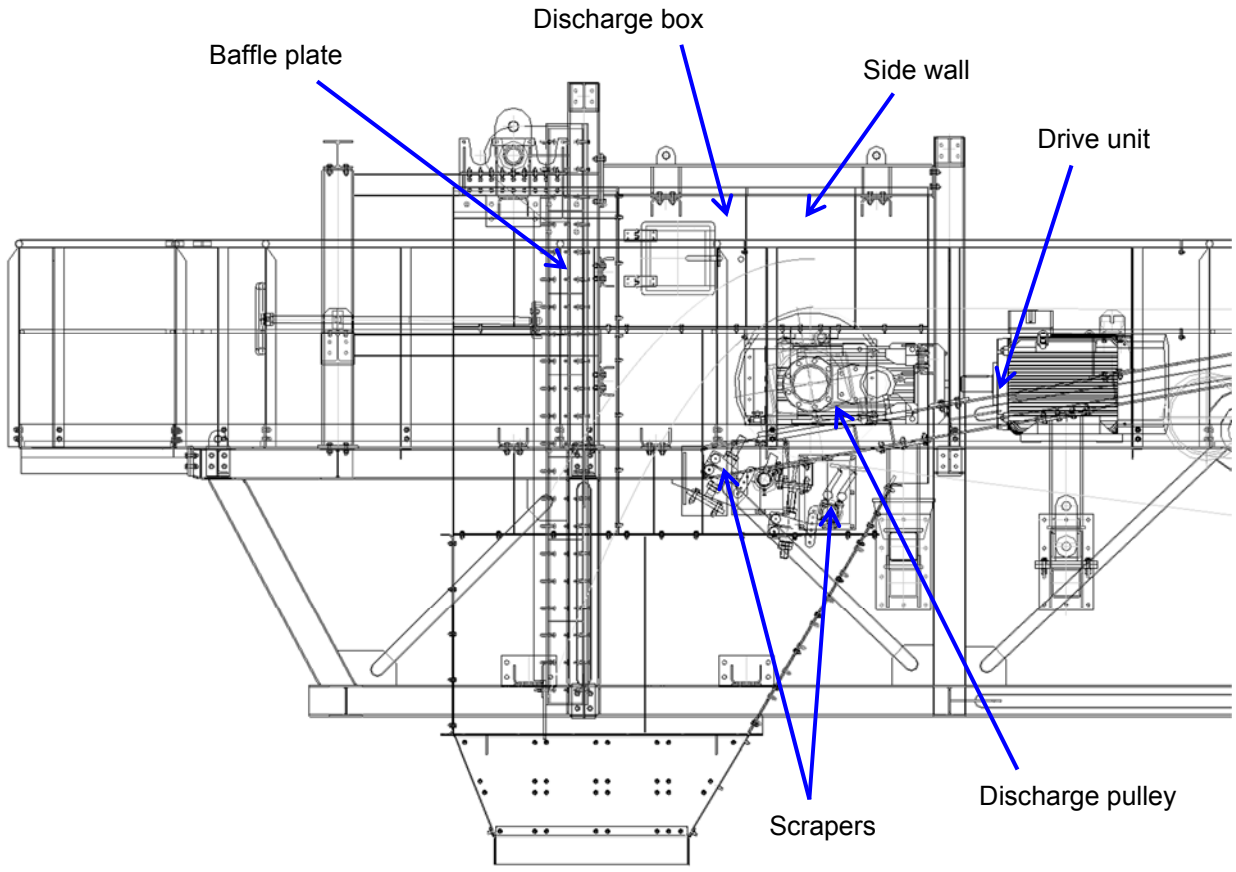



Figure 8: Example – Discharge station U2

### 1.5.4.3 Disassembly of drive pulley U2-U4

- Run the conveyor belt empty
- Relieve the conveyor belt completely from tension (see section 1.5.2.2)
- Secure the belt in the vicinity of the drive pulley against slipping (clamps or lifting)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Sling the drive unit to a suitable hoisting device, separate the flange coupling, dismount the drive unit (as per instructions in section 1.5.3.1) and lower it onto a suitable base.

**DANGER**

**In case of necessity, the drive unit may only be placed at locations where the load capacity for the acceptance of the drive unit weight is provided. There, the drive unit must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

- If necessary, remove auxiliary constructions which obstruct disassembly of the pulley.
- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the drive pulley is free
- Attach a suitable load suspension device to the hoisting gear and position it above the drive pulley (see its weight in Table 4)
- Put webbing slings around the drive pulley, attach to the load suspension device and secure the drive pulley against moving.
- Loosen pedestal bearing screws of the drive pulley
- Pull the drive pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

**In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the drive pulley.

**IMPORTANT**

**Before tightening the bearing base screws, the drive pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!**

- Re-installation of the drive unit following the manufacturers´ instructions (see Manual 7, Register 1).
- Tension the belt (see section 1.5.2.2)

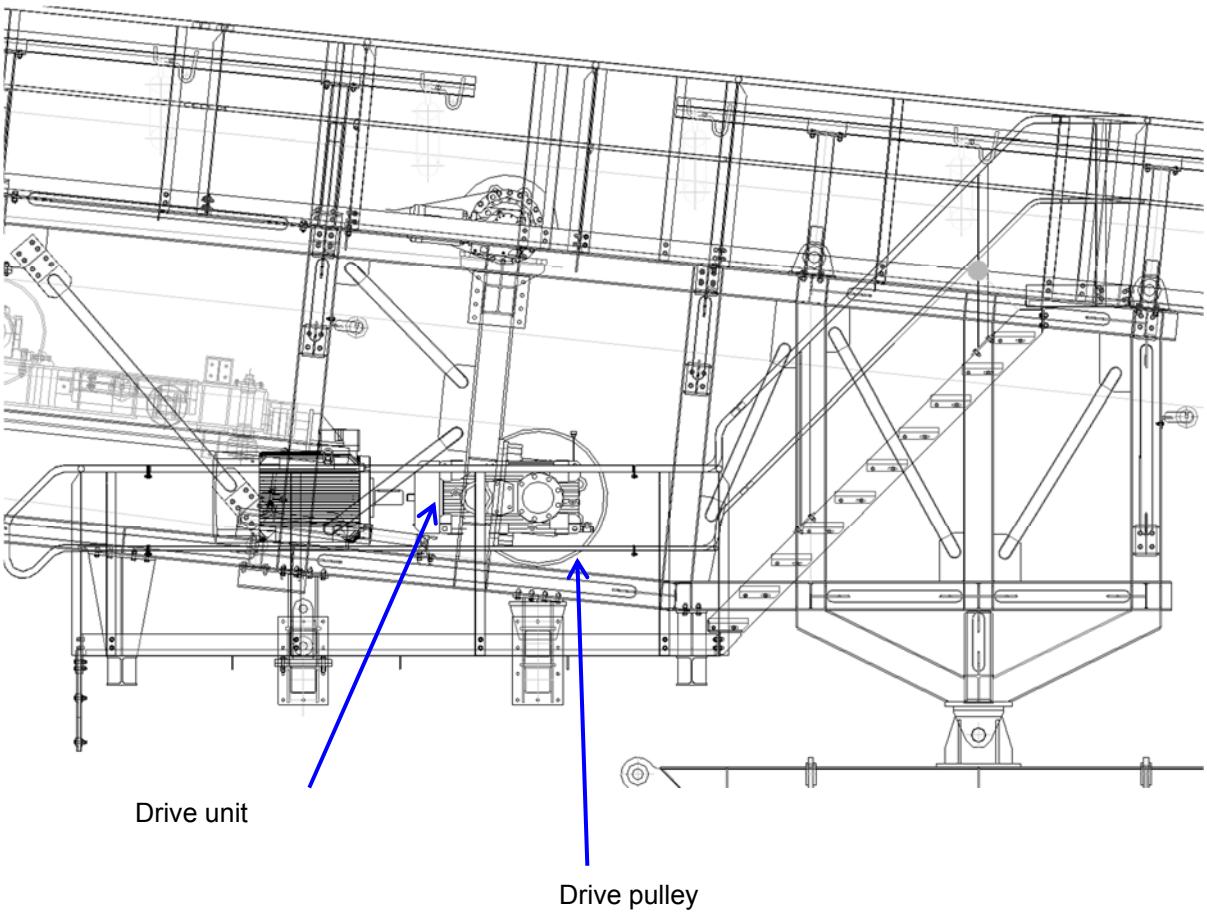



Figure 9: Example – Drive station U3

#### 1.5.4.4 Disassembly of take-up pulley U1

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Sling the protective hood of the take-up station (weight 220 kg) to a suitable hoisting gear and dismount it
- If necessary, remove the inner belt cleaner from the work space

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.**

- If necessary, remove obstructing parts of the feeding box
- Relieve the belt from tension (see section 1.5.2.1) and shift the take-up frame as far as possible in the direction of drive pulley
- Remove the upper profile of the take-up frame
- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the take-up pulley is free
- Attach a suitable load suspension device to the hoisting gear and position it above the take-up pulley (see its weight in Table 4)
- Sling the take-up pulley to the load suspension device and secure it against moving
- If necessary, draw the belt sideways using assembly hoists
- Loosen pedestal bearing screws of the take-up pulley
- Pull the take-up pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

**In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the take-up pulley.

**IMPORTANT**

**Before tightening the bearing base screws, the take-up pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!**

- Tension the belt (see section 1.5.2.1)
- If necessary, adjust the scrapers of the inner belt cleaner
- If necessary, adjust sealing plates and rubber seals of the feeding box

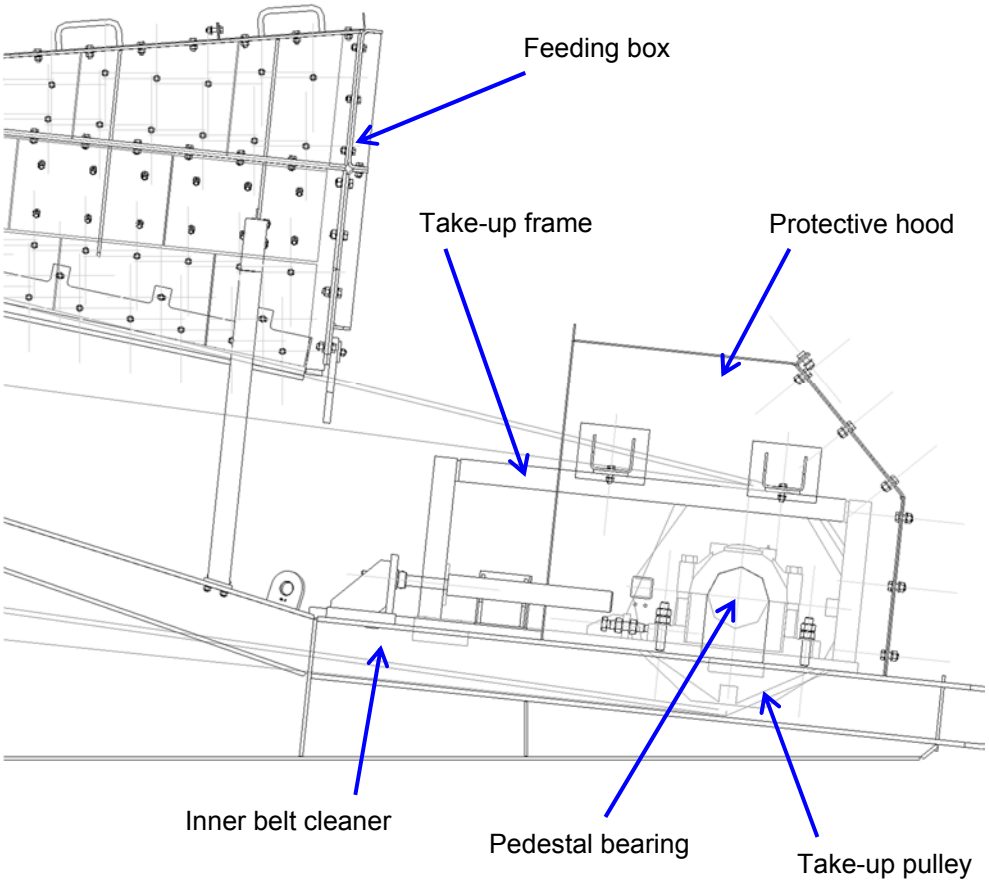



Figure 10: Take-up station U1

### 1.5.4.5 Disassembly of take-up pulley U2-U4, take-up station with tensioning carriage

- Run the conveyor belt empty
- Lift the inner belt cleaner from the belt and fix it
- Relieve the belt from tension (see section 1.5.2.2) and position therewith the tensioning carriage in a way providing access to the take-up pulley for its disassembly.

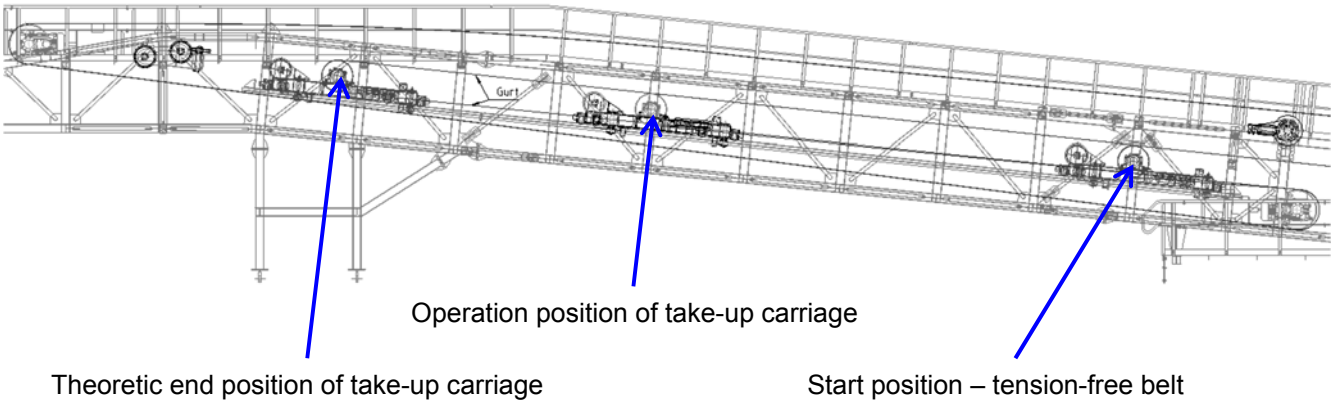



Figure 11: Example – Take-up station with tensioning carriage U2

- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove the obstructing lateral diagonals.
- If necessary, dismantle railings and walkways above the take-up pulley to an extent required for the disaasmebly.
- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the take-up pulley is free
- Secure the belt against slipping (clamps or lifting).
- Attach a suitable load suspension device (e.g. C-type crossbeam) to the hoisting gear and position it between the lifted belt and the take-up pulley (see its weight in Table 4)

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.**

- Attach the take-up pulley to the load suspension device using slings and secure it against moving.
- Loosen pedestal bearing screws of the take-up pulley

- Pull the take-up pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

**In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the take-up pulley.

**IMPORTANT**

**Before tightening the bearing base screws, the take-up pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!**

- Tension the belt (see section 1.5.2.2)
- Remove the inner belt cleaner fixation and, if necessary, adjust the scrapers of the inner belt cleaner at the tensioning carriage

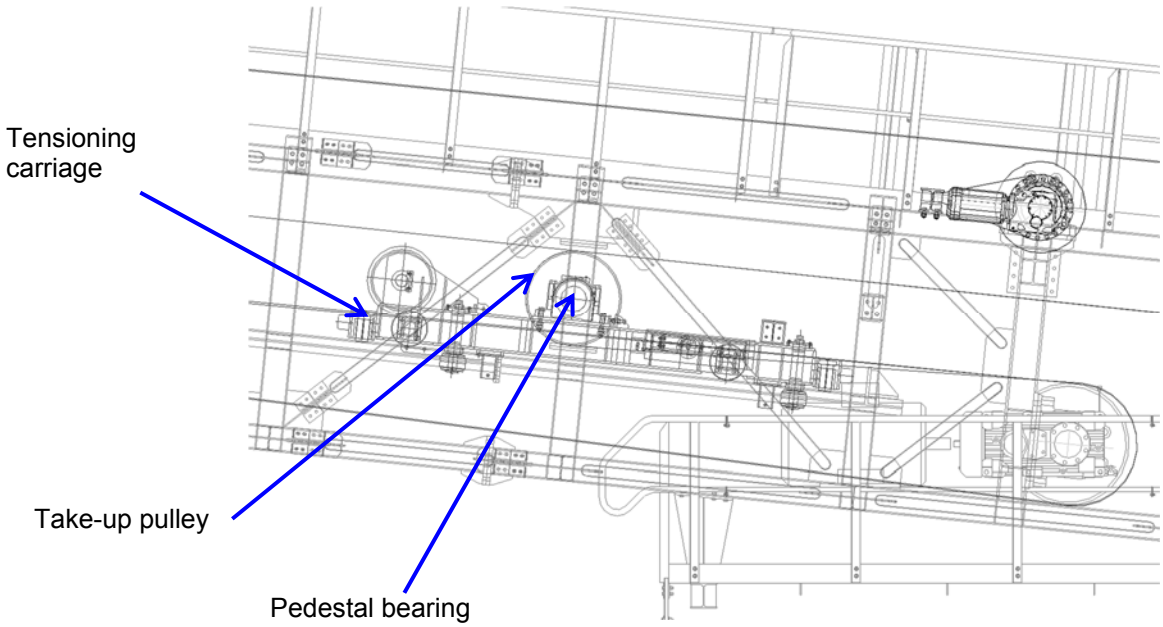



Figure 12 Tensioning carriage with take-up pulley

### 1.5.4.6 Disassembly of weight-tensioned take-up pulley U5

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Disassembly of take-up pulley protection and other obstructing parts such as scraper of the take-up sledge.
- Lift carefully the take-up sledge with the dead weight box using a suitable hoisting device (e.g. forklift or chain hoist). This operation results in slow and careful relieving of the belt from tension.
- Set up a trestle on the ground and lower safely the dead weight box onto the trestle.
- Undo the connection between the take-up pulley frame and dead weight box.

**DANGER**

**CAUTION, SUSPENDED LOADS!**

**Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.**

- Using a suitable hoisting device, lift the take-up sledge onto the service platform and let it down on a suitable base (secure the take-up sledge in this position against movement).
- Sling the take-up pulley (see its weight in Table 4) to a suitable hoisting device and secure against movement.
- Draw the belt sideways from the work area.

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.**

- Loosen pedestal bearing screws of the take-up pulley
- Pull carefully the take-up pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

**In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

- Further transport to the repair site, depositing on the pulley body

- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the take-up pulley.

**IMPORTANT**

**Before tightening the bearing base screws, the take-up pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!**

- Tension the belt (see section 1.5.2.3)
- If necessary, adjust the scrapers of the inner belt cleaner at the tensioning sledge

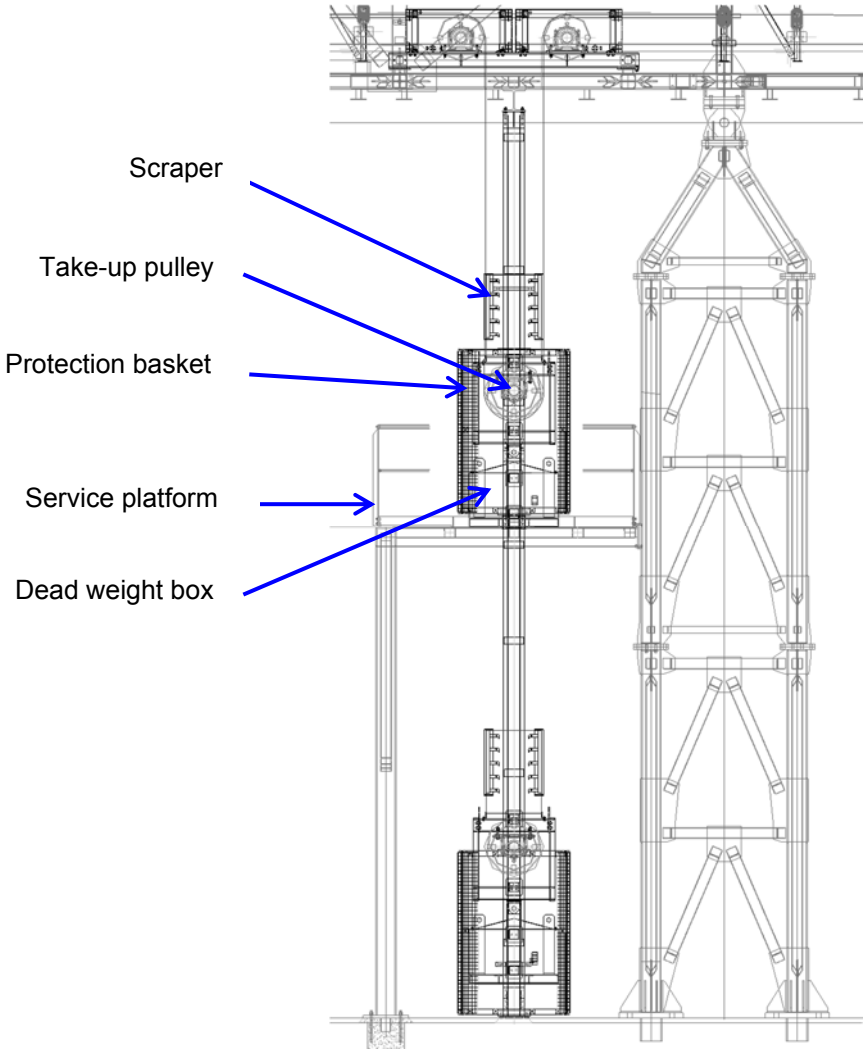



Figure 13: Take-up station U5

### 1.5.4.7 Disassembly of return pulley U2-U5

- Run the conveyor belt empty
- Relieve the conveyor belt completely from tension (U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Sling the protection basket (max. weight 285 kg) to a suitable hoisting gear and dismount it.

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.**

- Pull the relieved conveyor belt by means of a suitable device (crossbar or beam) until the return pulley is free
- Secure the belt against slipping (clamps or lifting).
- Attach a suitable load suspension device to the hoisting gear and position it above the return pulley (see its weight in Table 4).
- If necessary, draw the belt sideways using assembly hoists
- Put webbing slings around the return pulley, attach to the load suspension device and secure the return pulley against moving.
- Loosen pedestal bearing screws of the return pulley
- Pull the return pulley out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

**In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the return pulley.

**IMPORTANT**

**Before tightening the bearing base screws, the return pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!**

➢ Tension the belt (U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)

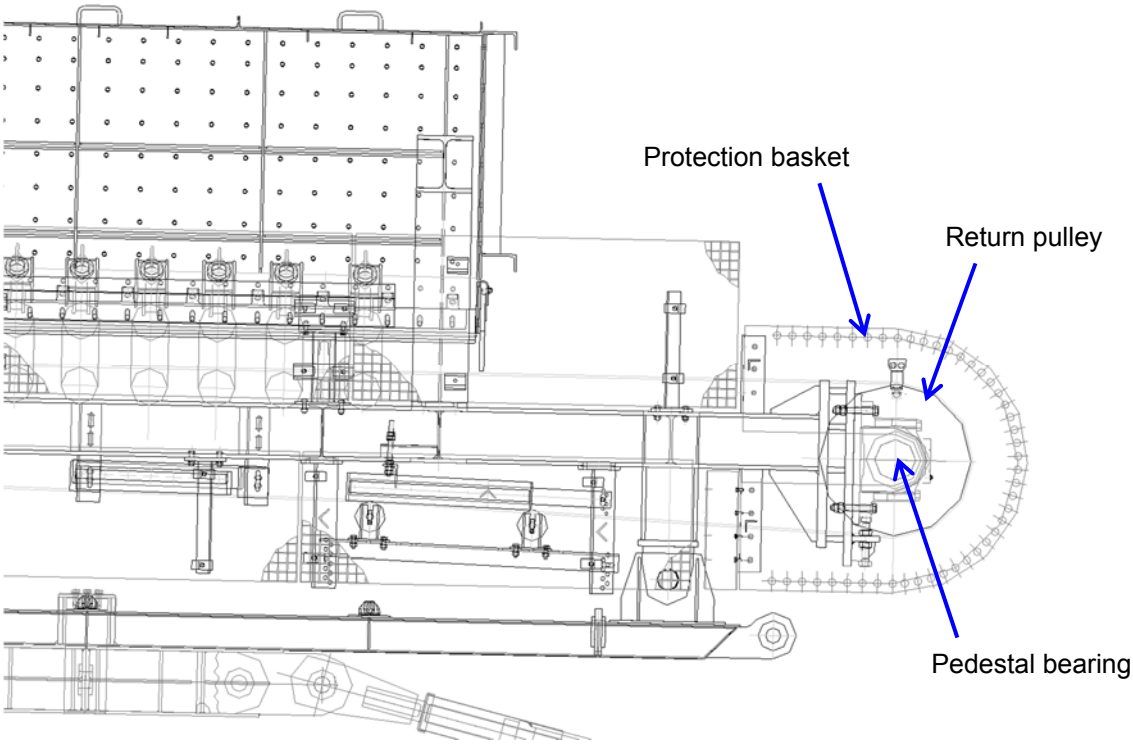



Figure 14: Example – Return station U2-U4

### 1.5.4.8 Disassembly of deflection pulley U5

- Run the conveyor belt empty
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove protective devices to the extent required
- Relieve the conveyor belt completely from tension by careful lifting the take-up frame with the dead weight box (see section 1.5.2.3)
- Pull the freely hanging belt loop upwards and sideways into the carrying structure until the deflection pulley is free, then fix the belt.
- Attach a suitable load suspension device to the hoisting gear (use a mounting support) and position it above the deflection pulley designated for disassembly (see its weight in Table 4).
- Put webbing slings around the deflection pulley, attach to the load suspension device and secure the deflection pulley against moving.
- Loosen pedestal bearing screws of the deflection pulley
- Pull the deflection pulley laterally out of the conveyor belt, swing it out and lower it onto a suitable base.

**DANGER**

**In case of necessity, the pulley may only be placed at locations where the load capacity for acceptance of the pulley weight is provided. There, the pulley must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

- Further transport to the repair site, depositing on the pulley body
- Re-assembly of the dismounted parts and/or components in reversed order ensuring exact alignment and adjustment of the deflection pulley.

**IMPORTANT**

**Before tightening the bearing base screws, the deflection pulley must be correctly aligned. The adjusting screws seated in the opposite direction to the conveying direction of the belt must be in contact with the bearing base and locked!**

- Tension the belt (see section 1.5.2.3)

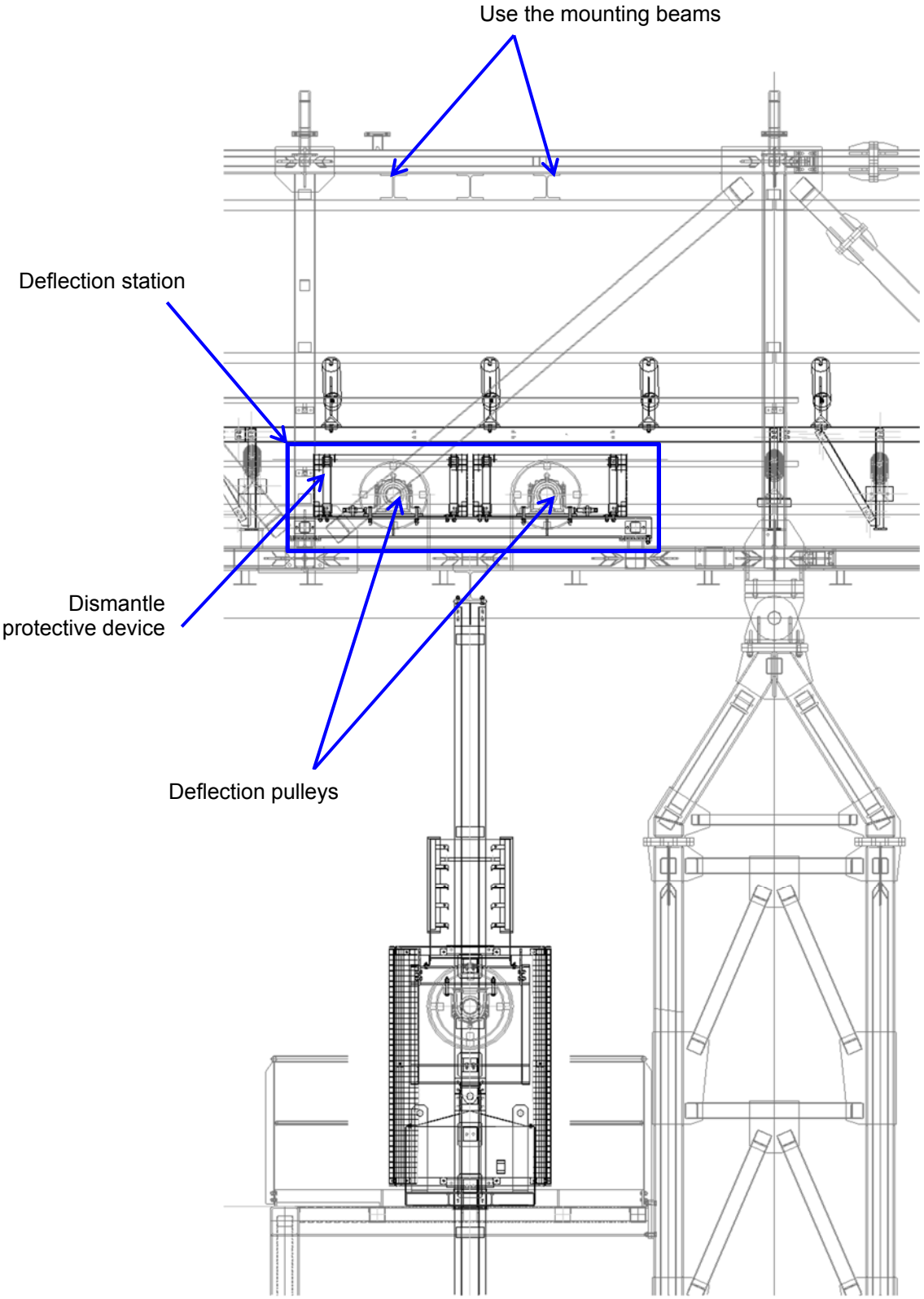



Figure 15: Deflection station U5

### 1.5.5 Elimination of Belt Misalignment

**IMPORTANT**

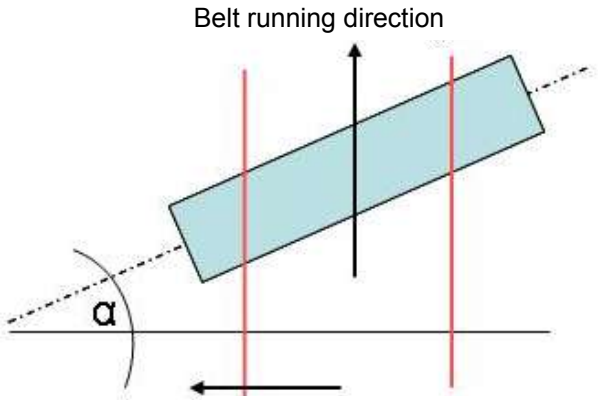
**The requirement for a proper straight running is the exact alignment of all components.**

**Belt misalignment can be caused by material accumulations on idlers or pulleys. Before carrying out further works, this must be checked. Material accumulations must be removed.**

The straight running of the belt is influenced by the corresponding setting of the carrying idlers and pulleys.

**The following applies to carrying idlers:**

- The belt always runs to the side it meets first.




Lateral force and misalignment resulting from it

**The following applies in general:**

- Even small adjustment angles (α) cause lateral movements.
- The shifting (influencing) is effected slowly. The conveyor belt must be monitored for a longer period of time to ensure that it does not move to the opposite side.
- Slanted pulleys achieve significantly stronger effects and are therefore often the cause for misalignment. Therefore, only the correct alignment and straight position should be checked. Adjustment for the steering of the belt should be avoided.
- Multi-part carrying idler stations are often equipped with a so-called camber of the two outer side rollers. In normal position, these rollers are aligned symmetrically askew to the running direction of the belt. If such stations are installed in the wrong direction, they cause misalignment. The direction of installation must be checked.
- Measures taken to eliminate misalignment must be recorded in order to have hints on possible causes for future problems so the initial condition can be restored.

## 1.5.6 Repair Work at the Tensioning Device U2-U4

### 1.5.6.1 Basic principles

DANGER

**Prior to repair and maintenance work, the respective conveying line and the upstream conveying line must be made empty.**

**Isolate conveyor from power supply and secure it against unauthorized, erroneous and unintended start-up.**

DANGER

**RISK OF SQUEEZING-OFF LIMBS**

**The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.**

- If components of the tensioning device which affect the holding force, such as geared motor, cable drum etc., are scheduled for disassembly, the conveyor belt must be relieved from tension before start of the repair work, and the take-up carriage must be moved to the end position and secured against moving. The individual components can then be disassembled after they have been attached to a suitable hoist and the appropriate fastening screws have been loosened.
- Installation of the components is realised in the reversed order. In this connection, particular attention must be paid to the firm seating of the fastening elements. The pre-tension of the belt must be subsequently set by the equipment user!
- Re-install all protective devices.

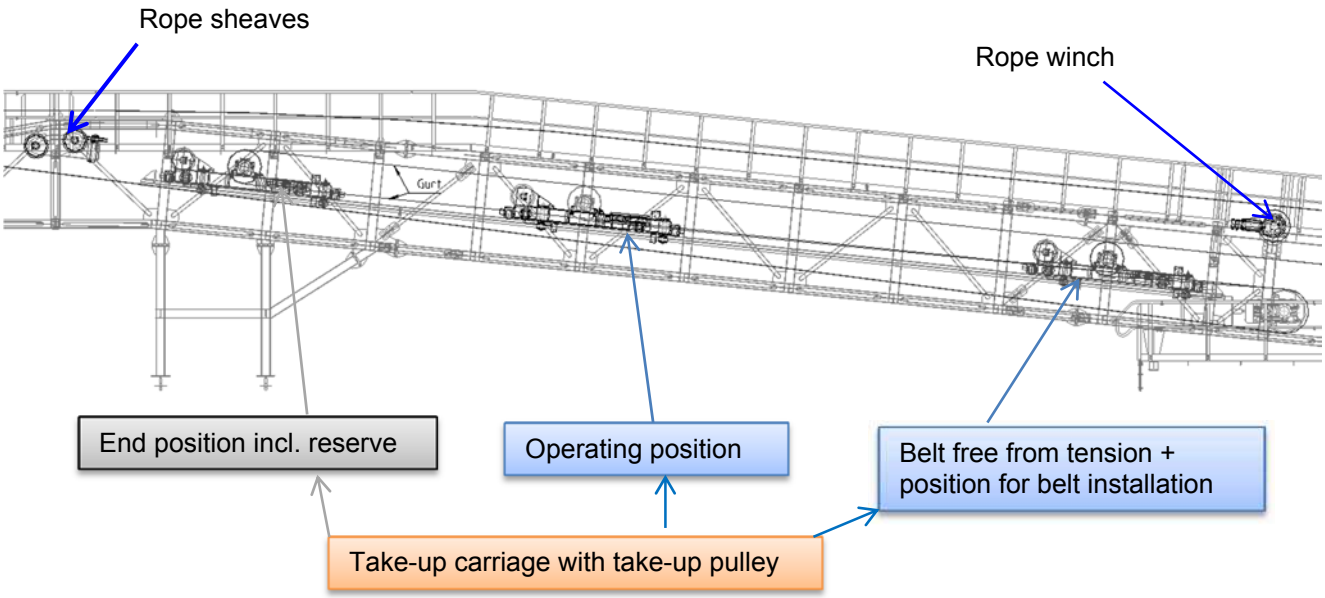



Figure 16: Take-up station U2-U4

### 1.5.6.2 Disassembly of geared motor

NOTE

**For documentation of the geared motor refer to Manual 7, Register 2.**

DANGER

DANGER

**POTENTIAL HAZARDS CAUSED BY ELECTRIC POWER**

**POTENTIAL RISK OF AUTOMATIC OR UNINTENDED START OF MACHINE**

**Only qualified electricians should carry out work on the power supply system.**

**Make sure that machine and plant equipment subject to compulsory inspections, repair and maintenance work are isolated from power before such work is carried out. To be sure, check the isolated equipment items if they are still under voltage. Earth and short-circuit them and isolate other equipment in the vicinity from power supply.**

**Prior to all repair and erection work, the equipment and its components should be isolated from power supply so that drives cannot be started by mistake while repair work is carried out.**

**All cable connections of components to be replaced must be disconnected. After reassembly, cable connections must be made again!**

- Run the conveyor belt empty
- Relieve the conveyor belt completely from tension (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section 1.5.2.2, U5 see section 1.5.2.3)
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Disconnect the supply cables of the geared motor
- Undo the connecting elements of the torque support
- Sling the geared motor (weight approx. 420 kg) to a suitable lifting device (see operating manual) and secure it against movement
- Pull off the shrink disc (see operating manual)
- Pull off the geared motor from the shaft, swing it out and lower it onto a suitable base.

DANGER

**In case of necessity, the geared motor may only be placed at locations where the load capacity for acceptance of its weight is provided. There, the geared motor must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

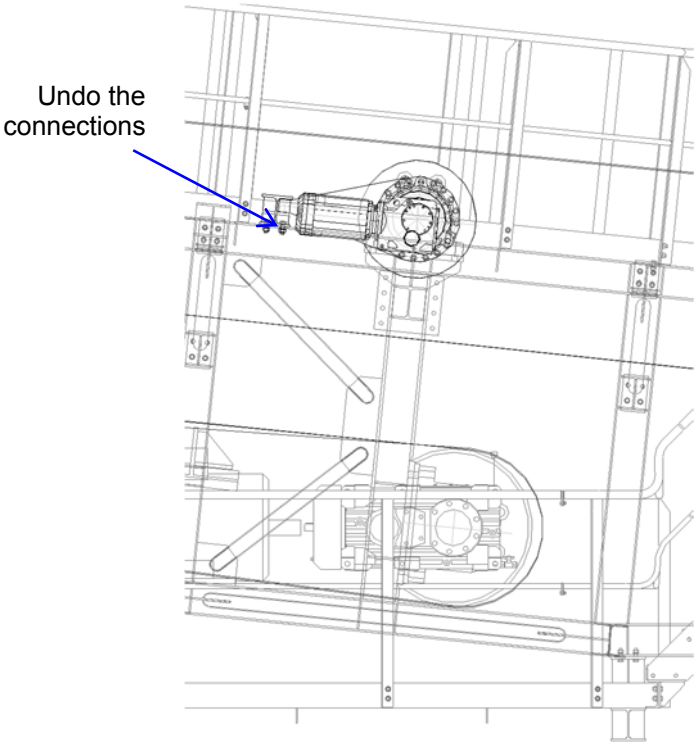
- Further transport to the service station and there possibly disassembly of the components
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
  - Note the tightening torques for the shrink disc.
  - Reconnect the supply cables of the geared motor
  - Tension the belt (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).

**IMPORTANT**

**For information regarding assembly/disassembly of the geared motor please refer to the manufacturers operating instructions in Manual 7, Register 2.**

**IMPORTANT**

**After reassembly inspect the gear unit oil level in accordance with the lubrication schedule. Add oil if needed.**



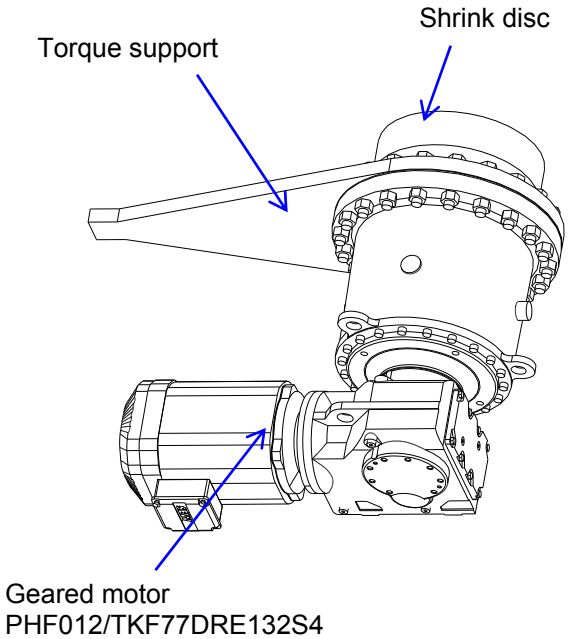



Figure 17: Example – take-up winch and geared motor U2

### 1.5.6.3 Replacement of take-up rope

NOTE

**For documentation of the take-up rope refer to Manual 7, Register 6.**

- Relieve the belt from tension using the rope winch (slack rope).
- Move the take-up carriage into the end position “Belt free from tension (see Figure 16), secure the take-up carriage against shifting and take the winch out of operation.
- Loosen the take-up rope fixtures at the rope fixed points (see Figure 18).

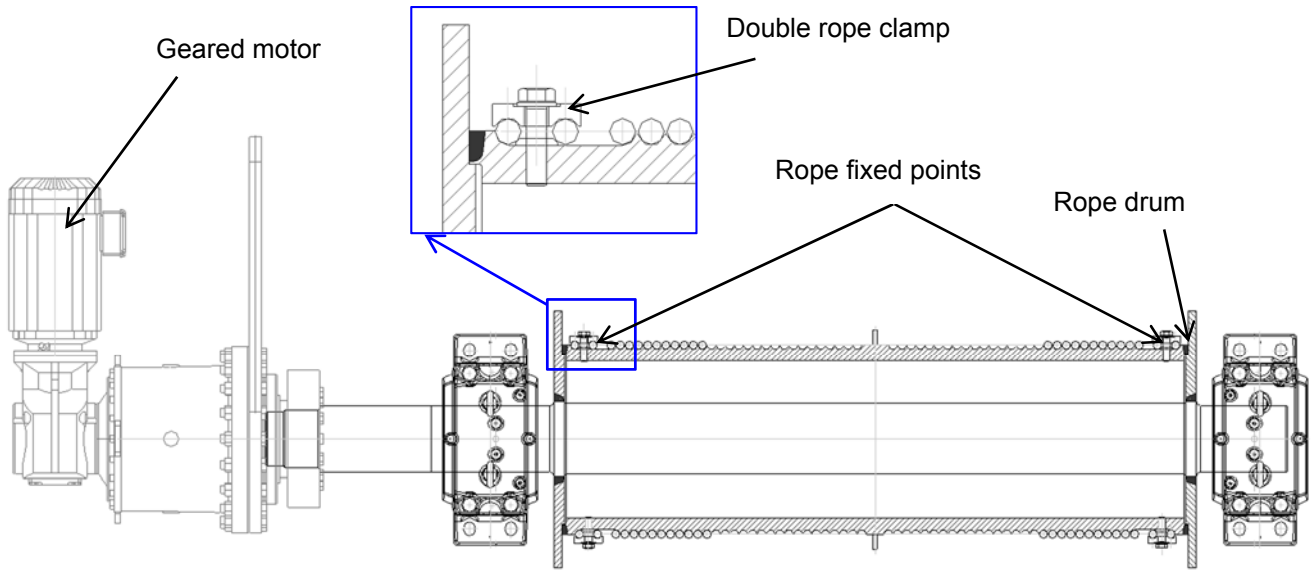



Figure 18: Rope winch

- Dismount the rope force measuring device between the horizontal rope sheaves.
- Unwind and remove the old rope from the rope drum.
- Reave a new rope according to the following scheme and Figure 19:
  1. Rope end descending underneath from the rope drum →
  2. towards both vertical rope sheaves in the front part: first up, then down →
  3. from bottom towards the rope sheave in the take-up carriage, turn upwards and →
  4. towards the horizontal rope sheaves →
  5. on the other side – backwards; the second rope end must be secured on the other rope drum side coming underneath

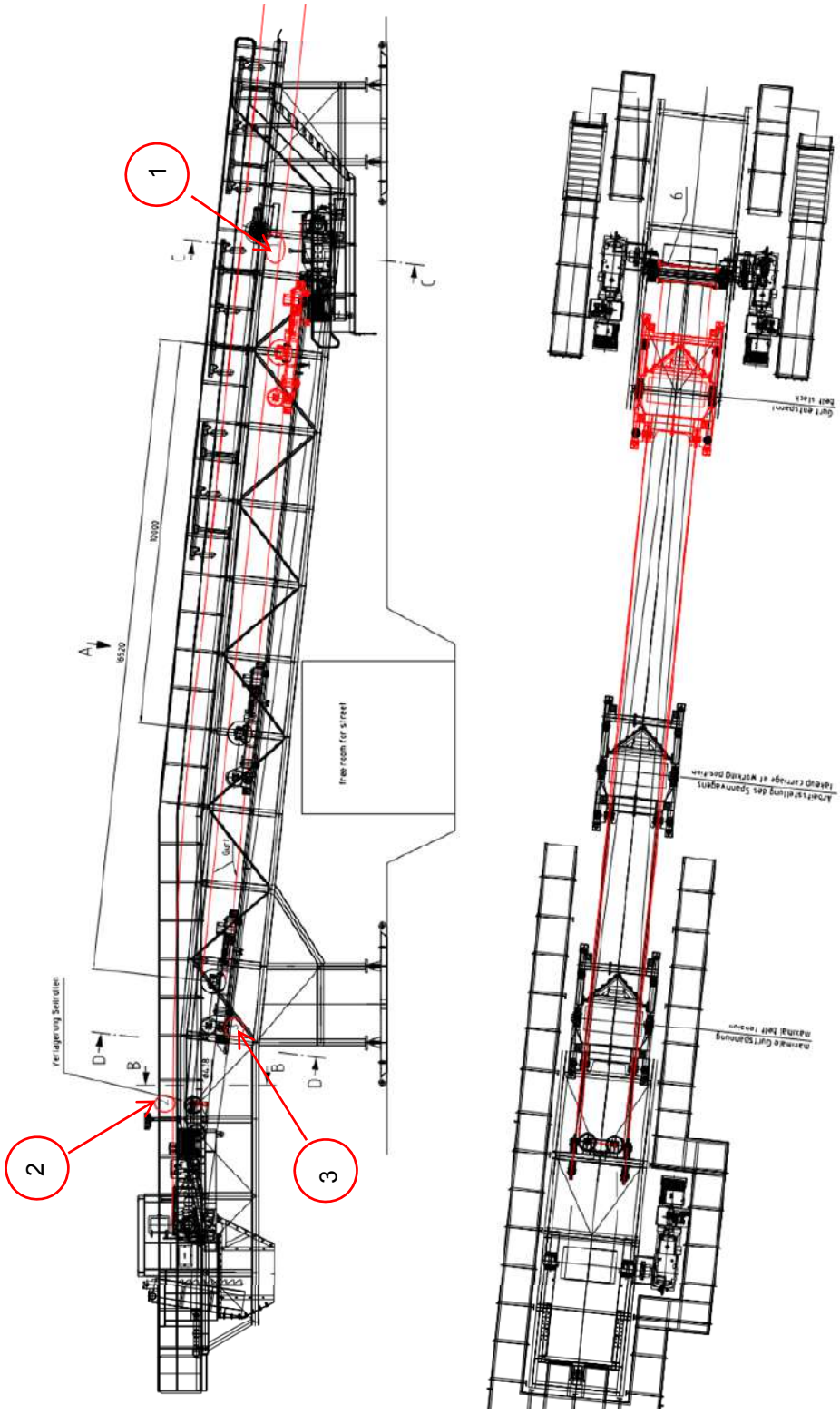



Figure 19: Rope scheme

**IMPORTANT**

**When securing the new rope on the rope drum, note 3 safety windings!**

- Re-install the rope force measuring device.
- Restore the pre-tension of the belt (see section 1.5.2.2)

### 1.5.6.4 Disassembly of rope sheaves

NOTE

**Applicable to all rope sheaves.**

DANGER

**ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!**

**Maintenance personnel realizing work on the rope sheaves must use a catching safety belt and/or personal safety equipment for protection against falling!**

**Failure to observe this precaution could result in severe bodily injury or loss of life.**

- Using the winch, relieve the rope from tension according to section **Fehler! Verweisquelle konnte nicht gefunden werden.** (slack rope) and take the winch out of operation.
- Lift the rope from rope sheave using a suitable hoisting device.
- Undo the rope sheave fastenings and take out the rope sheave (weight 48,5 kg).
- After re-installation of the rope sheaves, tension the belt using the winch.

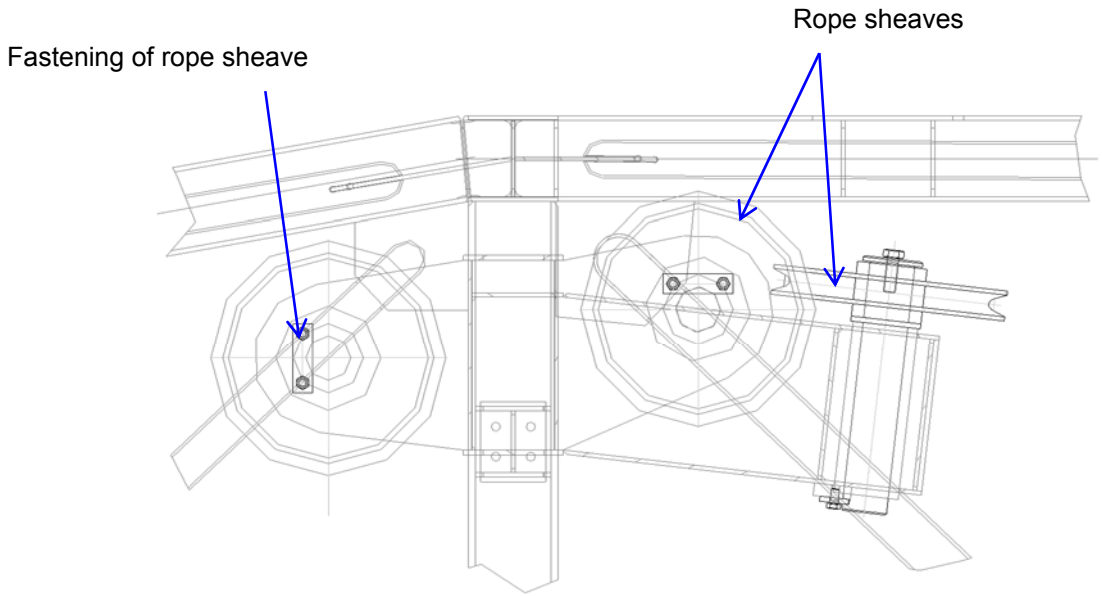



Figure 20: Rope sheaves Take-up station U2-U4

### 1.5.7 Replacement of Carrying Idler Garlands in Upper and Lower Run

**DANGER**

**RISK OF SQUEEZING-OFF LIMBS**

**The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.**

- Run the conveyor belt empty.
- If necessary, relieve the belt from tension (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove obstructing parts (such as covers, safety guards, steel construction components etc.) to the extent required.
- Lift the conveyor belt with a suitable hoisting device.

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.**

- Sling the carrying idler garland to a suitable lifting device or hoist, relieve the suspension and unhook it from the eyelets.
- Draw the carrying idler garland sideways out of the frame.
- Replace the defect carrying idlers by new ones.
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
  - Precise alignment of the idler stations is required so that a fault-free straight running of the conveyor belt is achieved.
  - If applicable, tension the belt (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).

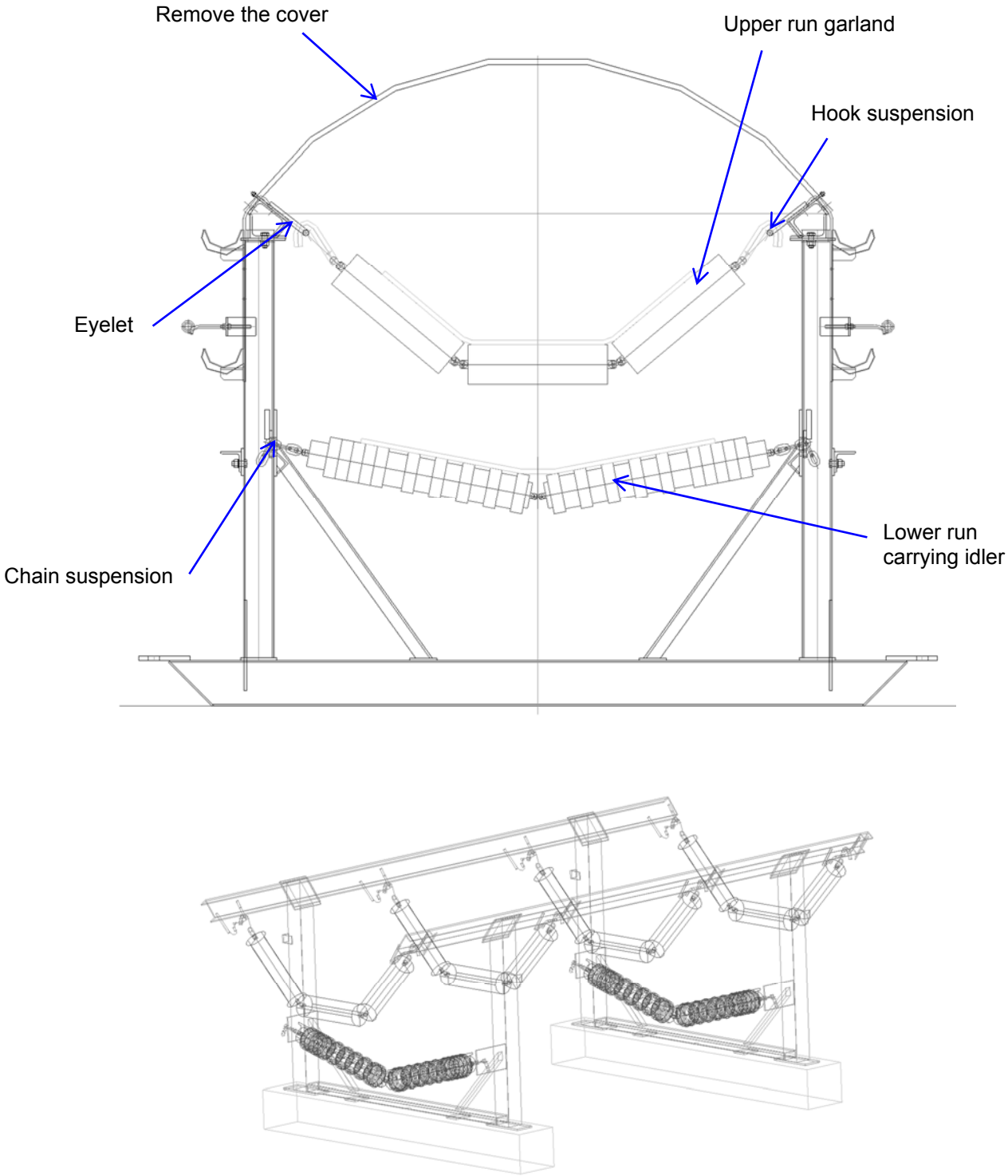



Figure 21: Example of carrying idler station

### 1.5.8 Replacement of Rigid Carrying Idlers in Upper and Lower Run

**DANGER**

**RISK OF SQUEEZING-OFF LIMBS**

**The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.**

- Run the conveyor belt empty.
- If necessary, relieve the belt from tension (see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart
- Remove obstructing parts (such as covers, safety guards, steel construction components etc.) to the extent required.
- Lift the conveyor belt with a suitable hoisting device.

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.**

**Replacement of a carrying idler**

- For replacement of a single carrying idler the idler support need not to be dismantled.
  - When replacing only one idler in upper or lower run, the conveyor belt is locally raised so that the idler to be replaced could be removed from the conveyor laterally. For this, apply the lifting devices previously described. The belt in upper run must be locally free from material load.
  - Remove the carrying idlers (for weight refer to spare part catalogue) from the carrying idler support and deposit them safely.

**Replacement of a carrying idler station**

- Secure the carrying idler station with a suitable hoisting device. Ensure the following:
  - Protect the carrying idlers against falling, remove them from the idler support and deposit safely.
- Undo the bolted or clamped connection of the carrying idler station.
- Secure the carrying idler support against falling considering its own weight (max. weight 40 kg), swing it sideways out of the belt and remove. The support can be put down flatly.
- Further transport to the service station and there possibly disassembly of the components

- Re-assembly of the dismounted carrying idler station in reversed order under observance of following instructions:
  - Precise alignment of the idler stations is required so that a fault-free straight running of the conveyor belt is achieved.
  - Note the tightening torques for bolted connections.
  - If applicable, tension the belt (see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).

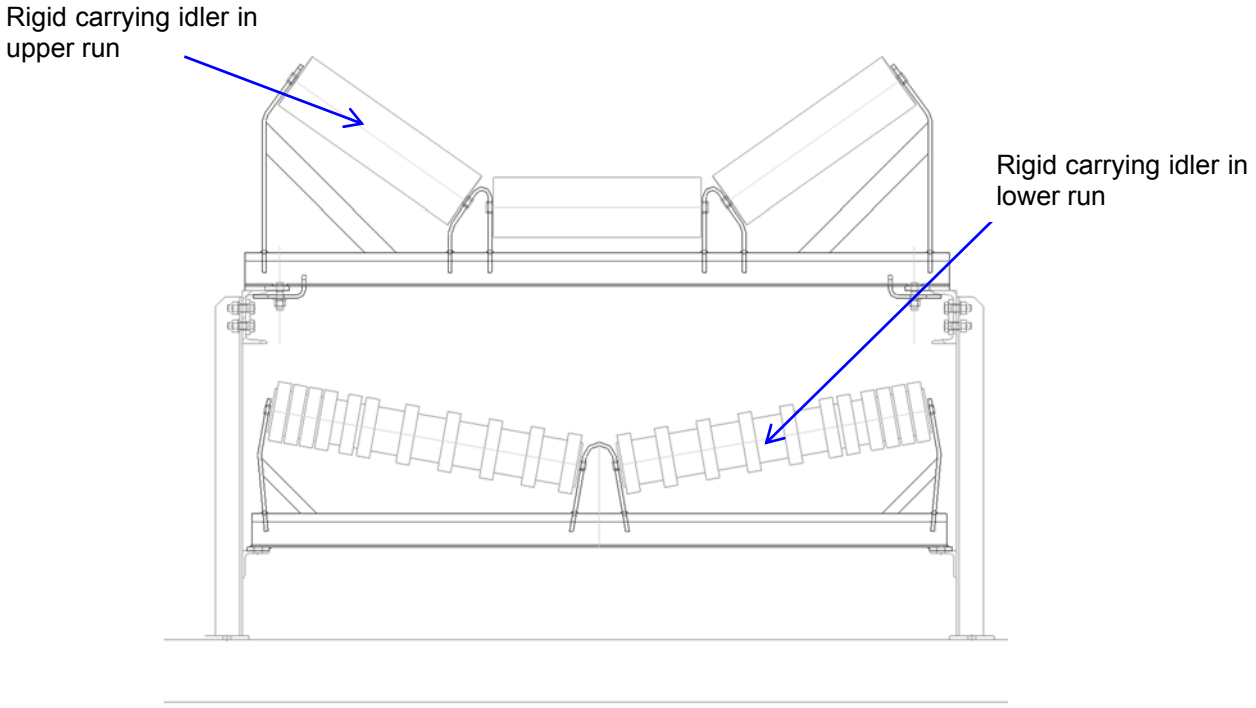



Figure 22: Example – Carrying idler station U5

### 1.5.9 Replacement of Carrying Idlers in Feeding Zone

**DANGER**

**RISK OF SQUEEZING-OFF LIMBS**

**The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.**

- Run the conveyor belt empty.
- If necessary, relieve the belt from tension (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart

**Replacement of carrying idlers in upper run**

- Remove safety guards
- Open the lateral covers of the feeding hopper and, if required, dismantle the lateral sealings in order to provide free space between conveyor belt and feeding hopper.
- Using a suitable hoisting device, lift the belt from the carrying idler garland until the connection with supporting structure can be undone.

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**Utmost care is required when suspending or threading-in auxiliary tools for lifting of loads (chains, lifting belts, ropes). Note the risk of squeezing-off limbs.**

- Undo the connection pin – wedge
- Remove the washer.
- Let the carrying idler garland from both sides down onto the lower run of conveyor belt and pull it sideways out of the feeding frame.

**DANGER**

**CAUTION, SUSPENDED LOADS!**

**Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.**

- Replace the defect carrying idlers by new ones.

### Replacement of carrying idlers in lower run

- Remove safety guards
- Loosen the bolted connections of the lateral holders and remove the holders.
- Pull out the carrying idler sideways
- Replace the defect carrying idler by a new one.

- Re-assembly of the dismounted carrying idlers in reversed order under observance of following instructions:
  - Precise alignment of the idler stations is required so that a fault-free straight running of the conveyor belt is achieved.
  - If applicable, tension the belt (U1 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U2-U4 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**, U5 see section **Fehler! Verweisquelle konnte nicht gefunden werden.**).

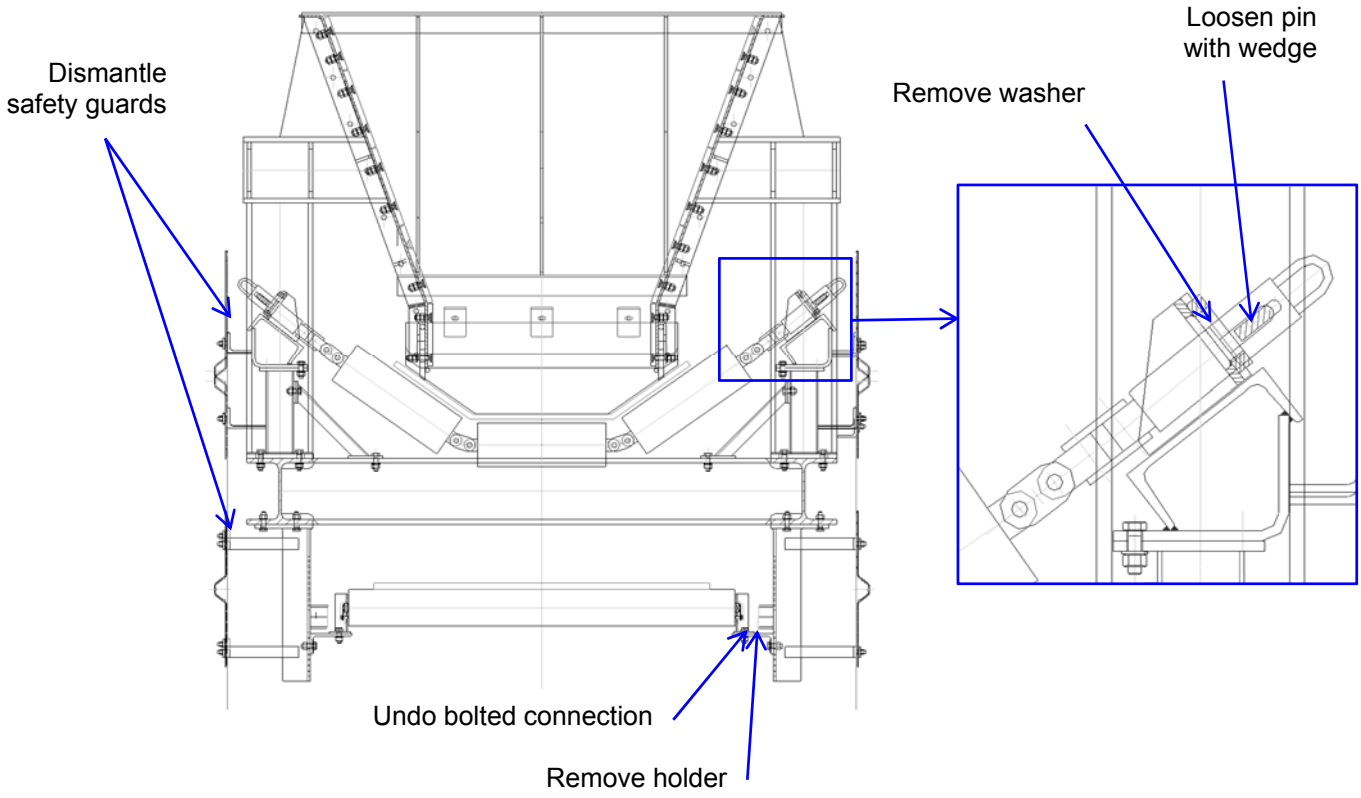



Figure 23: Example of carrying idler station in feeding zone

## 1.5.10 Replacement of Scraper Elements (External Belt Scrapers)

NOTE

**For documentation of the scrapers refer to Manual 7, Register 6.**

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart

NOTE

**The external belt scrapers are accessible from the side walls of the discharge chute.**

- Relieve the scrapers from tension and fold them back.
- Remove rubber plates from both sides in order to get access to the belt scraper.
- Replace worn-out scraper elements according to the operating manual.
- Re-installation of the scraper is performed in reversed order.
- Adjust the scraper according to the operating manual.

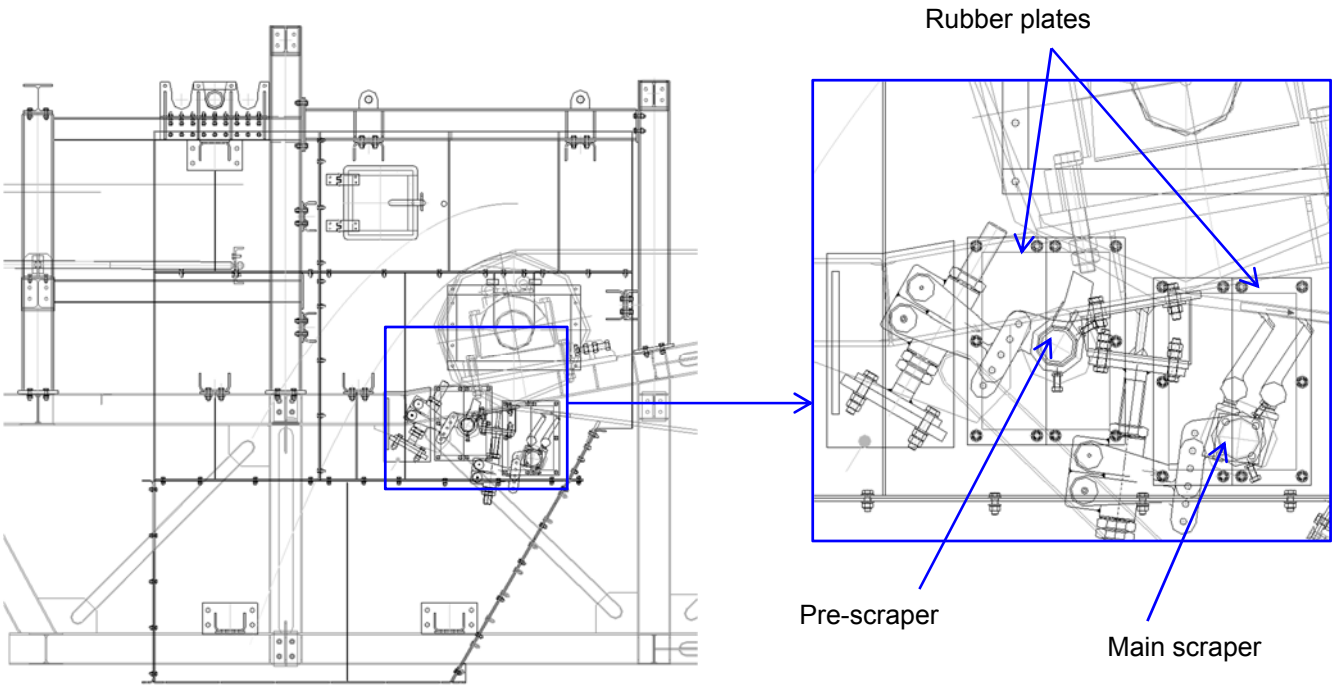



Figure 24: Example – Discharge station U2

## 1.5.11 Adjustment or Replacement of Feeding Chute Seals

DANGER

**RISK OF SQUEEZING-OFF LIMBS**

**The conveying belt remains under stress even when the belt conveyor is switched off. In case of work when the conveyor belt exerts a direct or indirect effect, pretension must be neutralized by relieving the conveyor belt before starting the work. This might result in a short movement of the conveyor belt and the take-up device.**

### 1.5.11.1 Lateral and rear seals

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart

IMPORTANT

**For seal replacement it might be necessary to relieve the conveying belt from tension. For re-adjustment the conveying belt must be under tension.**

- Open the lateral coverings.
- Undo the fastening nuts, followed by replacement or re-adjustment of sealing strips so that the strips rest on the conveyor belt. Make sure that the rubber strips do not press down on the conveyor belt!
- When mounting a new rear seal, adapt its profile to the one of conveying belt as precisely as possible in order to ensure a good sealing effect.

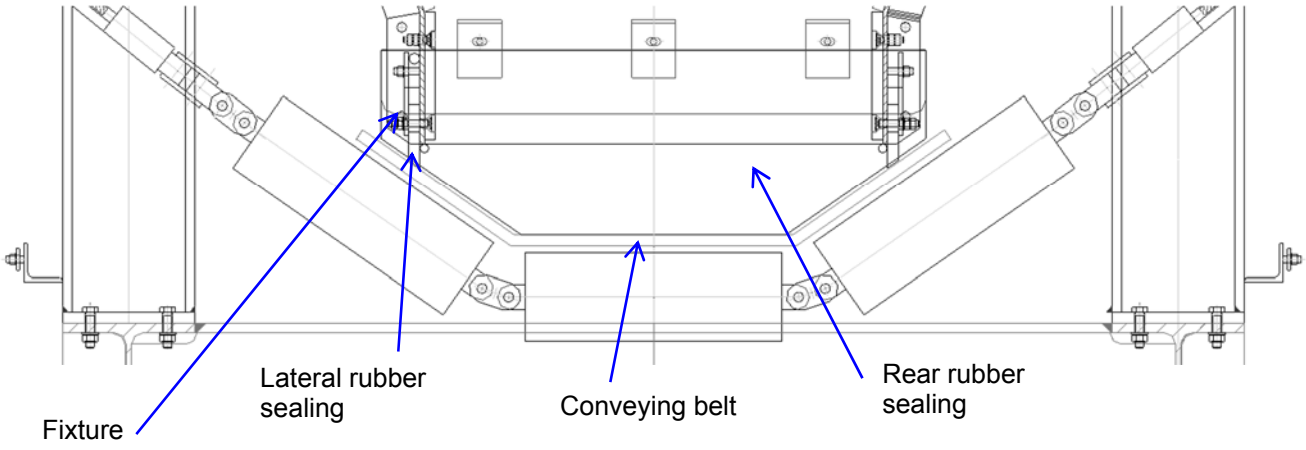



Figure 25: Example – Feeding station U2-U4

### 1.5.11.2 Replacement of rubber curtain

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart.
- If necessary, remove the covering of conveying belt provided in this area.
- For replacement of rubber curtain it is required to remove the fastening nuts of clamping plates. After that, the rubber curtain can be pulled off outwards.
- When mounting a new rubber curtain, adapt its profile to the one of conveying belt as precisely as possible in order to ensure a good sealing effect.
- Re-assembly of the dismounted components in reversed order under observance of following instructions:
  - Exact alignment of seals is necessary in order to ensure a proper sealing effect.

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**When installing the components, note that distances are changing. The risk of squeezing the limbs is present.**

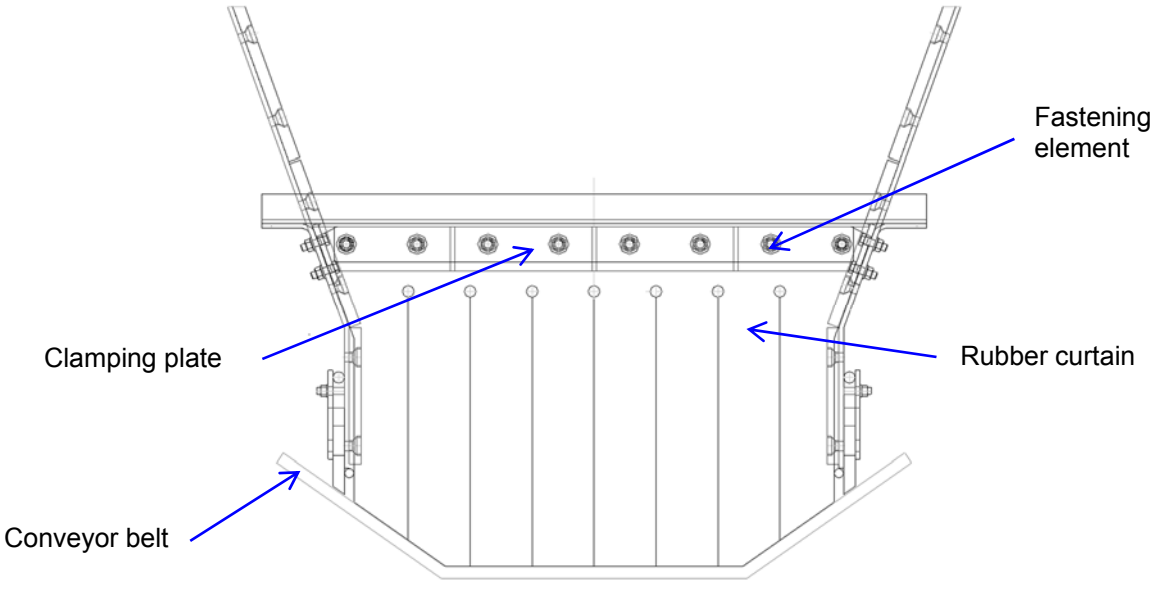



Figure 26: Example – Rubber curtain of feeding station U2-U4

## 1.5.12 Replacement of Wear Plates of Baffle Plate

DANGER

**ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!**

**Maintenance personnel realizing work in the chutes and discharge boxes must use a catching safety belt and/or personal safety equipment for protection against falling!**

**Failure to observe this precaution could result in severe bodily injury or loss of life.**

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart.
- If applicable (U5), dismount the roof of the discharge box
- Bring the baffle plate in the vertical position
- If necessary, remove material accumulations from the baffle plate.
- Use a suitable hoisting gear to secure the baffle plate (weight U1: 1010 kg, U2-U4: 1125 kg, U5: 360 kg) in its position on the shaft.
- Undo the connection baffle plate – adjusting spindle

WARNING

**WARNING, DANGER OF SQUEEZING INJURIES**

**Be careful when undoing the connection of the baffle plate and the adjusting spindle! Due to the great weight of the baffle plate, it can be briefly set in motion. There is a danger of squeezing limbs in the connection angle between the baffle plate and the adjusting spindle.**

- Undo the shaft fixture.
- Lift the baffle plate out of the discharge box and lower it safely on suitable trestles.

DANGER

**The trestles with necessary load capacity must be secured against tilting.**

**Non-compliance with this instruction can cause severe injuries or lethal outcome of personnel.**

- Remove the wear plates and replace them by new ones.

- Re-assembly of the dismounted parts and/or components is performed in reversed order.

**IMPORTANT**

**New fasteners of the same quality must be used during the installation of the new wear plates!**

- Bring the baffle plate back in the initial position

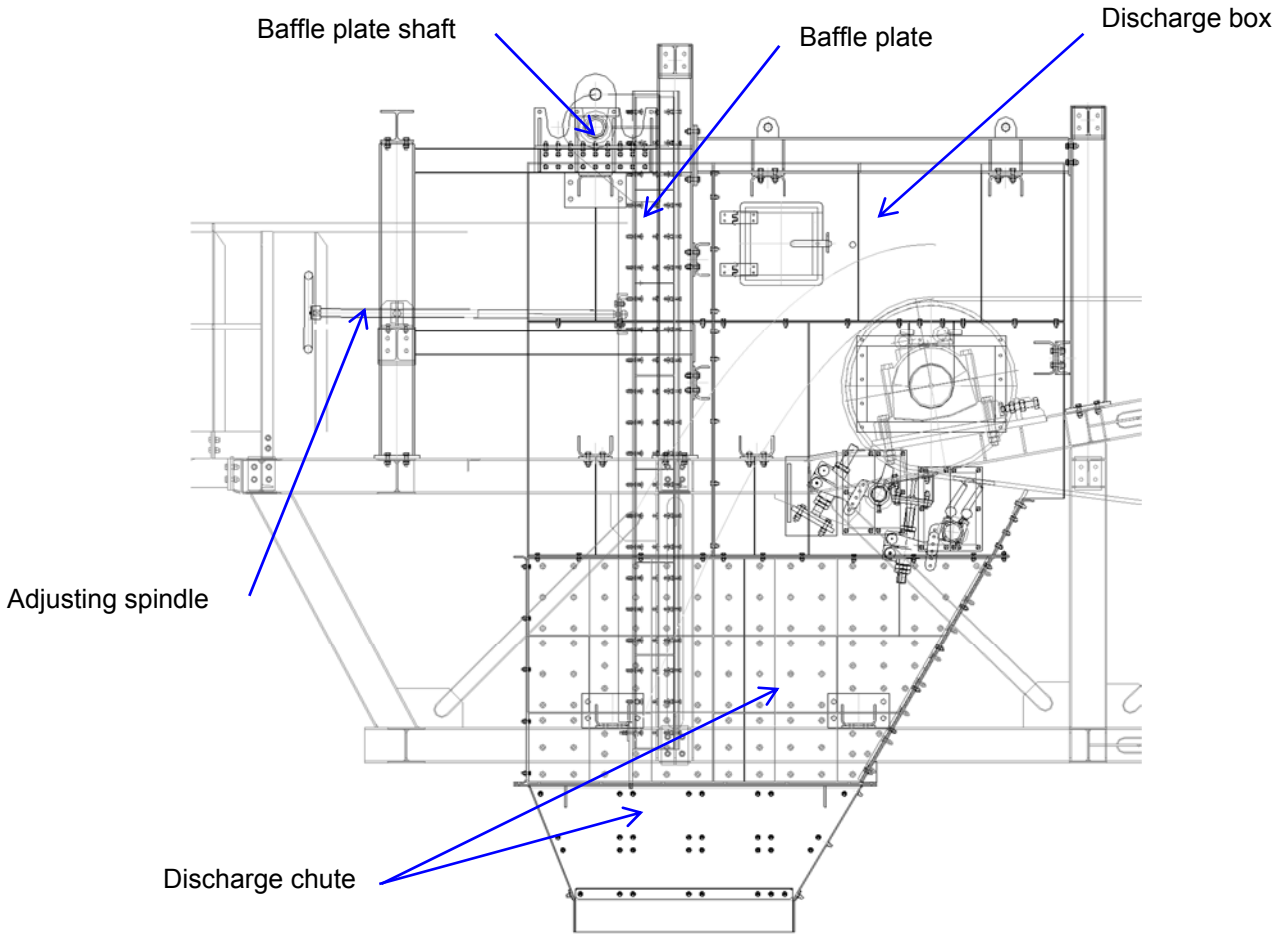



Figure 27: Example – Discharge station with baffle plate U2

## 1.5.13 Replacement of Wear Plates in Discharge Chute

**DANGER**

**ATTENTION IN CASE OF WORK IN ELEVATED POSITIONS!**

**Maintenance personnel realizing work in the chutes and discharge boxes must use a catching safety belt and/or personal safety equipment for protection against falling!**

**Failure to observe this precaution could result in severe bodily injury or loss of life.**

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart.
- If necessary, remove material accumulations from the baffle plate and discharge box.
- Position the baffle plate with the adjusting spindle as far away from the drive pulley as possible or, if required, dismantle it (see section 1.5.12).

**WARNING**

**WARNING, DANGER OF SQUEEZING INJURIES**

**Be careful when undoing the connection of the baffle plate and the adjusting spindle! Due to the great weight of the baffle plate, it can be briefly set in motion. There is a danger of squeezing limbs in the connection angle between the baffle plate and the adjusting spindle.**

**IMPORTANT**

**Wear plates in the lower part of the discharge chute U1-U4 can be reached from the next belt conveyor. For this purpose, it might be necessary to partially disassemble the feeding box.**

**Wear plates in the upper part of the discharge chute U1-U4 are also accessible from above.**

**Wear plates of the discharge chute U5 can only be replaced from above after removal of discharge hood and installation of a maintenance platform.**

**If necessary and possible, a part of the chute should be dismantled in order to facilitate the replacement work.**

- Protect the belt against damage under the chute exit (planking)

**DANGER**

**Planking with sufficient load capacity must be secured against slipping.**

- Put a ladder from above through the discharge box onto the planking, align it and secure against movement.

**DANGER**

**During replacement of wear plates only one person carrying required number of new screws is allowed to work inside the chute.**

**If inside the chute the visibility is not sufficient, an additional lighting source must be provided.**

- If necessary, scaffold the chute from outside.
- Secure the defective wear plates against falling, undo the screw connections outside and remove subsequently the wear plate (weight approx. 11,8 kg) by means of a suitable hoisting device.
- Deliver the new wear plates by means of the hoisting device and mount them in the discharge chute.

**IMPORTANT**

**New fasteners of the same quality must be used during the installation of the new wear plates!**

- Re-assembly of the dismounted parts and/or components is performed in reversed order.
- Remove the planking and, if available, the scaffolding.
- Bring the baffle plate in its original position.

## 1.5.14 Disassembly of Magnetic Separator

NOTE

**Applicable to the electro-magnetic separator 452-130 installed at the belt conveyor U5**

NOTE

**For documentation of the magnetic separator refer to Manual 7, Register 8.**

DANGER

**Prior to repair and maintenance work, the respective conveying line and the upstream conveying line must be made empty.**

**Isolate conveyor from power supply and secure it against unauthorized, erroneous and unintended start-up.**

- Run the conveyor belt empty.
- Disconnect the belt conveyor from the power supply (enable) and protect it against unauthorised, erroneous and unintentional restart.
- Switch off the drive unit of the magnetic separator and ensure that it cannot be switched on.
- Disconnect the power cables of the magnetic separator.
- Sling the roof (weight approx. 680 kg) to a suitable hoisting gear, dismount it and lower safely on the ground.

DANGER

**CAUTION, SUSPENDED LOADS!**

**Persons are not permitted to stay or work under suspended loads. Every movement must be continuously monitored by several persons. The operator and monitoring personnel must always remain in contact.**

- Sling the magnetic separator (weight approx. 5050 kg) including the frame (weight approx. 1000 kg) through the lifting eyes to a suitable hoisting gear and secure against movement.
- Disconnect the plate flanges between the frame and supports.
- Lift the magnetic separator together with the frame from the supports and lower the unit onto a suitable transportation vehicle.

DANGER

**In case of necessity, the magnetic separator may only be placed at locations where the load capacity for acceptance of its weight is provided. There, the magnetic separator must be secured against movement.**

**Non-compliance with this instruction can cause damage to the components as well as severe injuries or lethal outcome of personnel.**

- Dismantle the suspension of the magnetic separator, place the frame on the supports and screw them together.
- Further transport of the magnetic separator to the service station and there possibly disassembly of the components (for further information refer to the Operating Instructions).
- Re-assembly of the dismounted parts and/or components in reversed order under observance of following instructions:
  - Note the tightening torques for bolted connections.
  - Check and, if necessary, adjust the height of the magnetic separator.

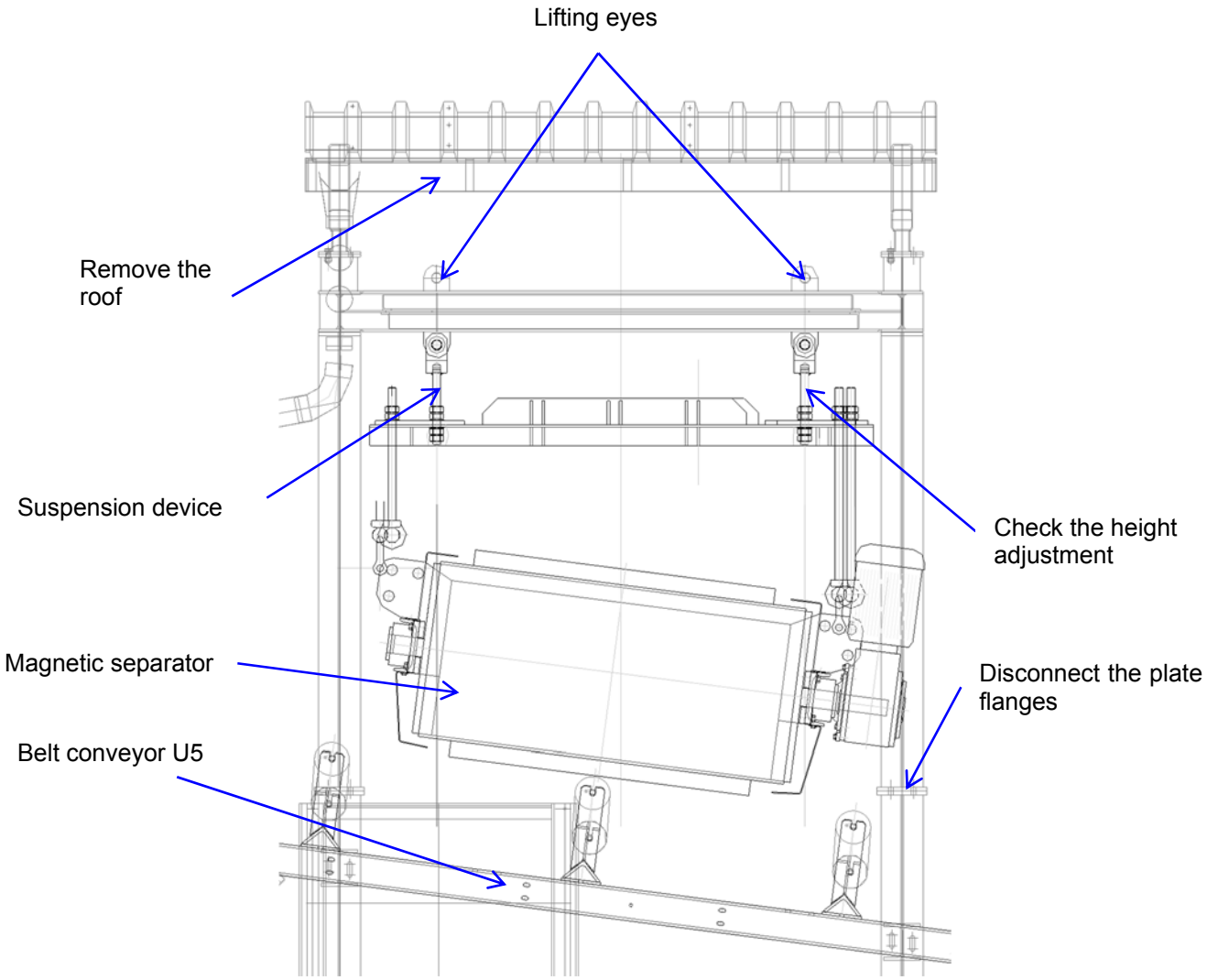



Figure 28: Magnetic discharge unit U5