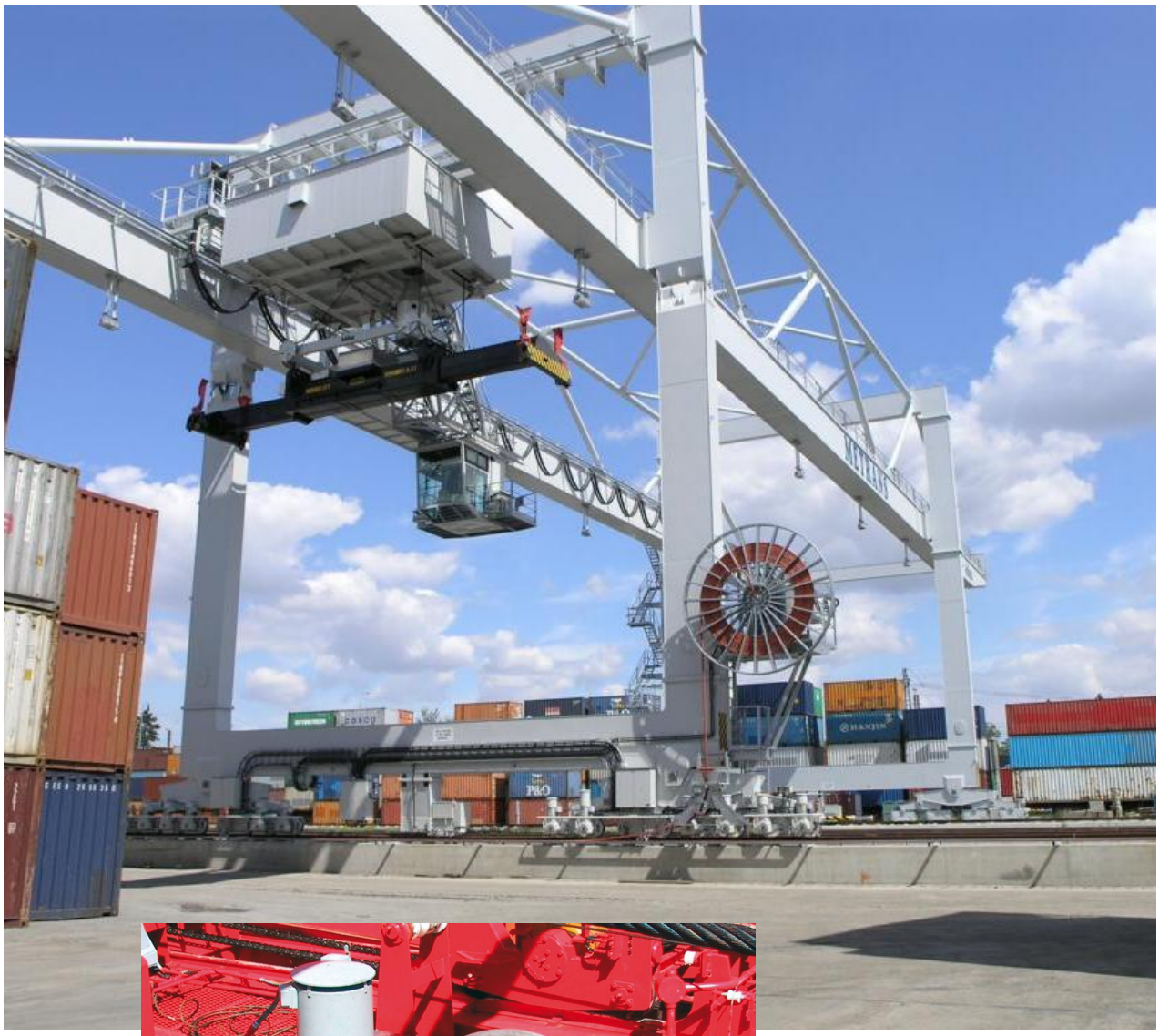
Assembly Instructions

Motor-driven reel

Frequency-controlled



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Contents

1 General notes

1.1 Information about these installation and operating instructions

This document facilitates safe and efficient handling and use of the equipment.

It is an integral part of the equipment and must be kept in its immediately vicinity to allow access by personnel at any time. Prior to commencing any work, personnel must have carefully read through and understood this document. It is a basic requirement for safe working that all safety and procedural instructions contained in this Installation and Operating Manual are complied with.

Local accident protection regulations and general safety guidelines for the area of use of the device also apply.

Illustrations are provided for basic understanding and may deviate from the actual implementation of the unit.

1.2 Limitation of liability

All information and instructions in this Installation and Operating Manual have been compiled with due regard to the standards and regulations in force, best engineering practice, and the findings and experience we have accumulated over many years.

The manufacturer is in no way liable for damages resulting from:

- Failure to comply with this document
- Improper use
- Use by untrained personnel
- Unauthorized modifications
- Technical changes
- Use of unauthorized replacement parts and accessories

The actual scope of delivery may differ from the explanations and illustrations described here for special variants, if additional order options are utilized, or due to the latest technical changes.

The obligations agreed upon in the delivery agreement and our General Terms of Business apply, as do the delivery conditions of the manufacturer and all regulations applicable at the time the contract was concluded.

All products are subject to technical modifications in the context of improvement of function and further development.

1.3 Copyright

1.4 Spare parts

WARNING!

Safety risk due to wrong spare parts!

Wrong or faulty spare parts can result in damage, malfunction or complete failure as well as impair safety.

Therefore:

→ Use only original spare parts of the manufacturer!

Purchase replacement parts from licensed dealers or directly from the manufacturer (the address can be found on the last page of these operating instructions).

1.5 Material defects

The regulations about material defects are listed in the general terms and conditions of business.

1.6 Technical support

For technical support please contact our staff from the Customer Support Department.
Our employees are also always interested in new information and experience from the field that can be valuable for the improvement of our products.

2 Safety advice

2.1 Explication of symbols

Safety and hazard information is identified in this document by symbols. Signal words are used to indicate the degree of hazard. Always observe safety and hazard information and work carefully to avoid accidents, bodily harm or property damage!

DANGER!

… indicates an immediately hazardous situation, which if not avoided, may result in death or serious injury.

DANGER!

… … indicates an immediately hazardous situation due to electricity, which if not avoided, may result in death or serious injury.

WARNING!

… indicates a possibly hazardous situation, which if not avoided, may result in death or serious injury.

WARNING!

… indicates a possibly hazardous situation due to electricity, which if not avoided, may result in death or serious injury.

CAUTION!

… indicates a possibly hazardous situation, which if not avoided, may result in moderate or minor injury and property damage.

NOTE!

Tips and recommendations
… refers to useful tips and recommendations as well as information for efficient and trouble-free operation.

2.2 Requirements on the personnel

2.2.1 Qualification

WARNING!

Injury due to insufficient qualification!

Improper use can result in serious injury to person and property.

Therefore:

→ All activities may only be performed by qualified personnel

The following qualifications have been mentioned in these operating instructions for different areas of operation:

- **Trained personnel/operators**
  have been instructed in an instruction session by the Operator with respect to the tasks assigned to them and the potential dangers arising from improper actions.
- **Qualified specialists**
  due to their specialized training, knowledge, and experience, as well as knowledge of applicable regulations, are capable of carrying out work assigned to them, while independently recognizing and avoiding possible risk.
  Personnel are considered qualified, e.g. for electrical commissioning, if they have successfully concluded training, for example, as electricians, master electricians, electrical engineers, or electrical technicians. Personnel are also considered qualified for electrical commissioning who have been employed correspondingly for several years, have been educated in theory and practice during that time, and whose electrical knowledge and skills have been tested.
  The operator of the electrical facility must document that the corresponding certification or other documentation of qualification are present or have been demonstrated.
- Only those persons are authorized as personnel who can be expected to perform their work reliably. People whose capacity for reaction is influenced e.g. by drugs, alcohol, or medications are not authorized.
- When selecting personnel, follow all age- and occupation-specific guidelines applicable at the location of use.

2.2.2 Unauthorized personnel

WARNING!

Danger due to unauthorized personnel!

Unauthorized personnel who do not meet the requirements described here do not understand the danger in the working area.

Therefore:

→ Keep unauthorized personnel away from the working area.

→ In case of doubt, address the person and direct them away from the working area.

→ Stop work as long as unauthorized personnel is in the working area.

2.2.3 Instruction prior to working on electrical equipment

Before working on and commissioning electrical equipment, personnel must be instructed by the operator. For better tracking, log the instruction as follows:

Date	Name	Type of instruction	Instruction given by	Signature:

2.3 Intended use

The equipment is exclusively designed and built for the intended use described here.

The motor-driven reel is used for the winding and unwinding of a mobile power supply line (cable suitable for reeling applications) for a mobile consumer.

WARNING!

Possible injury resulting from improper use!

Any application that deviates from or goes beyond the intended use of the machine can result in a hazardous situation.

Therefore:

Use the device only as intended.

→ Strictly comply with all specifications in these installation and operating instructions.

→ The following uses of the device are not appropriate. Non-intended use particularly includes the following:

- → Using the device with unapproved accessories not authorized by the manufacturer.
- → Operation of the device by untrained personnel.
- → Operation of the device when installed on an improper foundation / base.
- → Operation of the device when environmental conditions deviate from those which have been agreed upon.

Claims of any kind due to damage from improper use are excluded.

The operator bears sole liability for all damage resulting from unintended use.

2.4 Protective measures to be taken by the operator / user

The equipment is used in an industrial setting. The operator of the device is thus subject to legal obligations for workplace safety. In addition to the safety guidelines in these installation and operating instructions, the safety, accident protection, and environmental protection regulations applicable to the place of operation of the unit must be followed. This particularly includes:

- Work on electrical components of the motor-driven reel may **only be carried out when disconnected from power**.
- The operator must be informed of applicable workplace safety guidelines and identify any additional hazards that result from the special working conditions at the location of use of the device. These must be expressed in the form of operating instructions for operation of the device.
- The operator must verify during the entire time the device is in use that the operating instructions provided still correspond to the current state of regulations, and adapt the instructions as necessary.
- The operator must clearly regulate and determine responsibilities for installation, operation, troubleshooting, and maintenance.
- The operator must ensure that all employees involved with the unit have read and understood these installation and operating instructions. He must furthermore train personnel at regular intervals and inform them of hazards.
- The operator must provide personnel with all required safety gear.
- When working on electrical equipment outdoors, work must be limited or stopped when unfavorable weather conditions such as lightning, strong rainfall, fog, strong wind or the like prevents safe work.
- The operator must keep the key for switching cabinets in a safe place. "Safe" means that only explicitly authorized personnel may have access to the keys. The keys may only be issued to technical personnel as described in Section 2.2.1 "Qualification".

The operator is furthermore responsible for ensuring that the device is always in a technically trouble-free condition.

- The operator must ensure that the maintenance schedule described in this document is followed.
- The operator must regularly have all safety systems inspected for functionality and completeness (once yearly if possible, but at least as often as required by applicable national regulations).
- If the device or system has been modified, the safety systems must be inspected again and adapted to the changed conditions in such a way that the device or system is safe again.

2.5 Specific hazards

The following section lists residual risks determined based on a risk assessment.

- Follow the safety instructions listed here and the warnings in other sections of these installation and operating instructions in order to reduce health hazards and avoid dangerous situations.

Electrical hazards and sources of danger

DANGER!

Danger of death by electric shock!

These components of the motor-driven reel are under voltage: Cable, slip ring assembly, motor, electromagnetic brake. When working on these components, death or injury may result from electrical shock, burns, or electrical arc.

Therefore:

Before working on these components:

→ Disconnect device from power using the main switch,

→ secure device against reactivation,

→ confirm that power has been disconnected,

→ ground and short-circuit the device,

→ cover or block off neighboring parts still carrying electrical current.

→ If there is no main switch, disconnect the energy source from the device according to the instructions of the manufacturer.

→ Each time before the device or system is started, test the insulation resistance according to locally applicable technical standards, directives, and law.

Mechanical hazards and sources of danger

WARNING!

Danger of death due to suspended loads!

Loads falling or swinging sideways in an uncontrolled manner can lead to severe injuries or death.

Therefore:

→ Never step under suspended loads.

→ Only use the attachment points provided; do not fasten lifting accessories to projecting machine parts or eyes built onto components.

→ Be sure the separate lifting accessories are firmly seated.

→ Use only authorized lifting gear and separate lifting accessories with sufficient load capacity.

→ Do not use torn or worn ropes or straps.

→ Do not attach ropes or straps to sharp corners and edges, and do not knot or twist them.

→ Move loads only under supervision.

→ Set down loads before leaving the work area.

CAUTION!

Danger of crushing injuries!

Locations (see Figure 1.):

1. Between the rotating reel and stationary parts
2. Between cable and cable
3. Between spokes and cable
4. Under the falling cover of the slip ring assembly housing
5. Between the chain and rotating gear on the limit switch mechanism
6. Falling components due to wrong connection points.

Therefore:

→ For 1, 2, and 3: Do not reach into the reel. During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger. When disconnecting the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

→ For 4: To prevent the cover from falling shut unintentionally, use the attached locking device.

→ For 5: Reaching into the gear is prevented if the safety cover is in place. When removing the safety cover (e.g. when replacing the chain), the system must be shut down and secured against unauthorized, unintentional, and accidental reactivation.

→ For 6: Use the defined attachment points. If necessary, block off the area. Be sure to use suitable lifting gear.

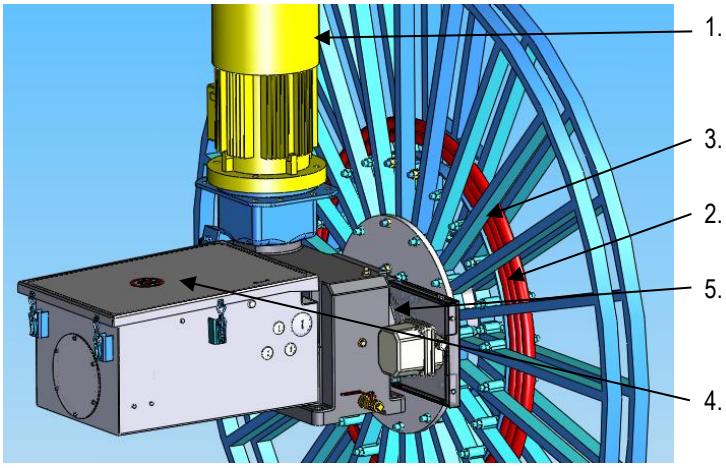


Figure 1.: Danger of crushing

CAUTION!

Danger of shearing injuries!

Locations (see Figure 2.):

1. Between the rotating reel and stationary parts
2. Between cable and cable
3. Between spokes and cable.

Therefore:

→ Do not reach into the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

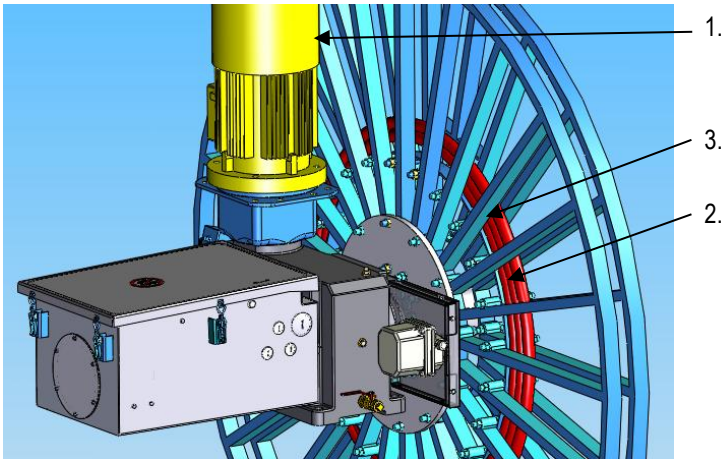


Figure 2.: Danger of shearing injuries

CAUTION!

Danger due to entanglement!

1. As the reel turns, its projecting threaded rods and other parts can entangle a person.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

2. The slip ring bodies and the coupling are parts that rotate during operation and can entangle personnel. They are equipped with safety mechanisms.

Therefore:

→ Do not reach in during operation after previously removing the safety mechanism.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

CAUTION!

Danger of being pulled in and caught!

During operation of the system, the rotation of the reel and the cable layers being wound on it can pull in and catch personnel between the layers.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

CAUTION!

Danger of friction and scrapes!

During operation of the system, the rotation of the reel and its projecting threaded rods and other parts may cause friction or scrapes.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

WARNING!

Danger of slipping on the slip ring assembly housings!

Slip ring assembly housing covers and other cover plates are generally made of thin sheet metal. They are not designed to support a person! Stepping on one of them can lead to slipping and falling, or you could break through into the slip ring assembly. At least permanent deformation of the metal can be expected.

Therefore:

→ Do not step on the slip ring assembly housing! See also Figure3.

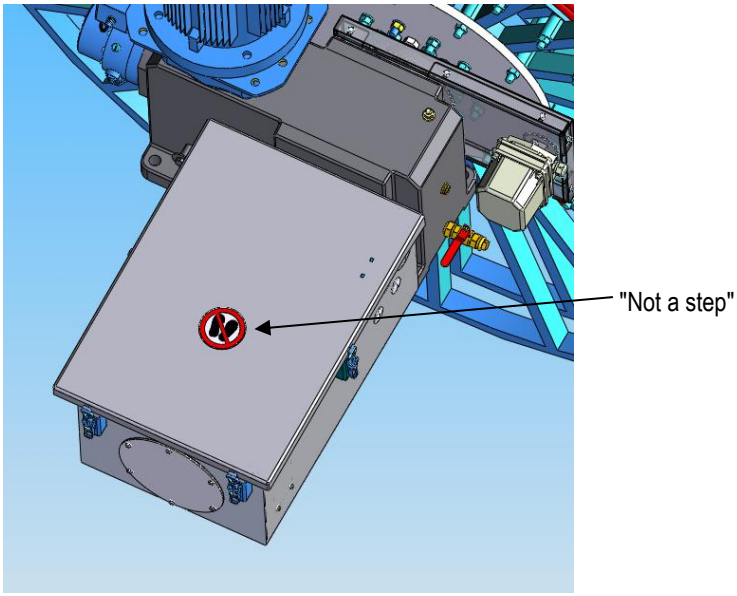


Figure 3.: Slip ring assembly housing - do not step here!

CAUTION!

Danger of burns!

The anti-condensation heater mounted on the slip ring assembly housing or rotating optical fiber transmitter housing can cause burns.

Therefore:

→ Do not touch the anti-condensation heater. Safety covers are installed to prevent this. During troubleshooting, maintenance or commissioning, protective gloves must be worn when the safety covers are removed.

CAUTION!

Danger of burns from hot surfaces!

In strong sunshine there is a danger of burns on thin cover walls.

Therefore:

→ Wear protective gloves.

2.6 Safety devices

WARNING!

Potentially fatal injury due to non-operation of safety devices!

Safety is only guaranteed provided safety devices are intact and complete.

Therefore:

→ Prior to commencing work, check that the safety systems are in working order and properly fitted.

→ Never disable safety systems.

There are several safety devices present on the motor-driven reel (see figures 4. to 6.).
These include:

- Safety cover on the mechanical coupling
- Safety cover on the slip ring assembly housing
- Locks on the slip ring assembly safety cover ≥ 10 kV
- Fall protection for motor
- Chain guard over chain at limit switch mechanism

Figure 4.: Safety systems on the motor-driven reel

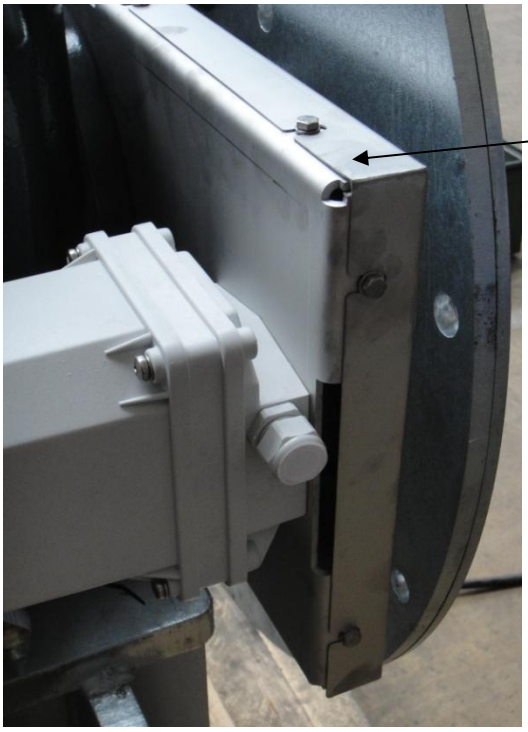


Figure 5.: Safety systems on the motor-driven reel

Figure 6.: Safety systems on the motor-driven reel

2.7 Actions in the event of accidents and faults

Measures in case of accident:

- Shut down the system and secure it against unauthorized, unintentional, and/or erroneous activation.
- Secure the danger zone.
- Rescue personnel out of the danger area.
- Take first aid measures.
- Alarm the rescue services.
- Inform responsible parties at the place of operation.
- Make access ready for rescue vehicles.

Measures to be taken in case of malfunction:

- Shut down the system and secure it against unauthorized, unintentional, and/or erroneous activation.
- Secure the work area against entry.
- Involve qualified personnel for fault analysis.
- Involve qualified personnel for maintenance and repair.

3 Specifications

3.1 General information

The motor-driven reel is used for the winding and unwinding of a mobile power supply line (reeling cable) for a mobile consumer. The exact specifications of the motor-driven reel can be found in the order confirmation. The dimensions of each motor-driven reel can be found in the dimension sheet.

3.2 Interfaces

3.2.1 Electrical interface

see BAL0500-0016-E --> Section 3.2 (or similar, project-specific documentation)
see BAL0500-0017-E --> Section 3.2 (or similar, project-specific documentation)

3.2.2 Mechanical interface

For a low-voltage motor-driven reel (<1 kV), the gearbox is to be mounted flat on the mounting structure, and attention must be paid to avoid any tension that might be introduced by unevenness. The unit must be mounted on a sufficiently rigid foundation with a smoothness of ≤ 0.1 mm. Screws and nuts in a strength class of at least 8.8 must be used; these are not included in the Conductix-Wampfler scope of delivery. They must be tightened evenly.

Tightening torque and prestressing forces for metric shaft screws of quality 8.8 (for 90% utilization of the 0.2% elongation / stretching limit)

Regular thread, friction coefficient μ total = 0.14

Dimension x P	Prestressing force Fv (N)	Tightening torque Ma (Nm)
M10x1.5	28800	**54**
M12x1.75	41900	**93**
M16x2	78800	**230**
M20x2.5	127000	**464**
M24x3	183000	**798**

For a medium-voltage motor-driven reel (> 1 kV), the gearbox is mounted on a steel bracket at the factory. The reel system is fastened using the bracket, and this bracket must also be mounted flat on the fastening substructure or foundation. Screws and nuts in a strength class of at least 8.8 must be used; these are not included in the Conductix-Wampfler scope of delivery. They must be tightened evenly.

3.3 Operating conditions

General environment:

Designation	Value	Unit
Ambient temperature	-20 to +50	°C
Maximum relative humidity	95	%
Maximum wind speed for operation	8	Beaufort
Maximum wind speed	12	Beaufort
Seawater climate, high UV radiation, environmental stress by dust and exhaust gases		
No radioactivity		
Gearbox mounted horizontally		

CAUTION!

For a reel size of D > 3.6 m and a wind speed > 12 Beaufort, the reel must be parked with the cable **unwound** to reduce the wind attack surface.

Customer-specific environment:
Custom conditions agreed upon specifically with the customer may apply instead of the general environmental conditions.

3.4 Type plate

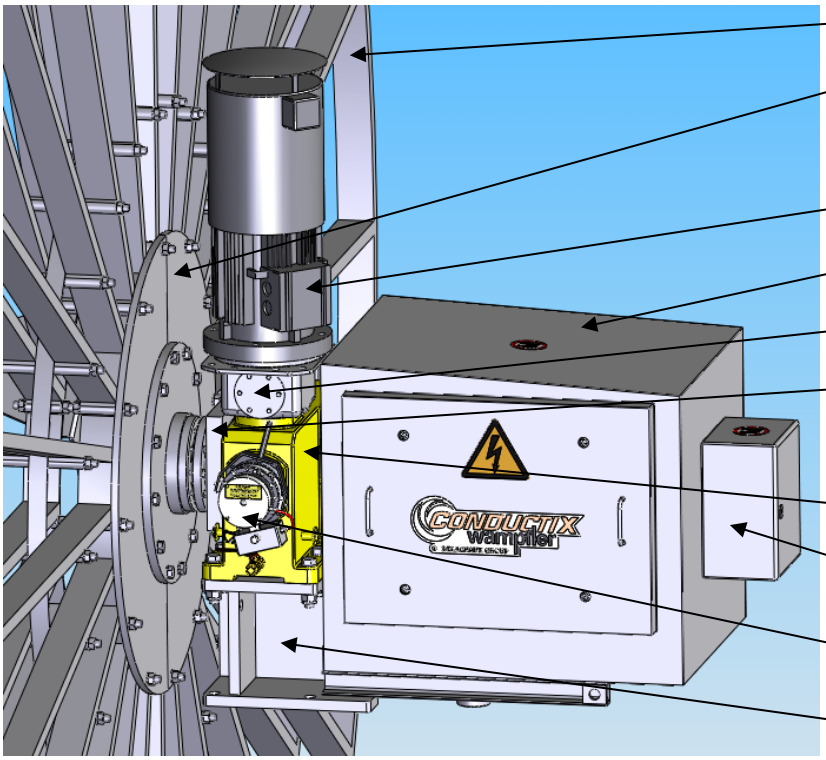
The type plate is attached to the slip ring assembly housing. It contains
- all technical data
- the reel designation
- the order number.

When communicating about the specific cable reel provided, e.g. for spare parts, modifications, etc., please state the type ("Typ") and order number ("Auftragsnummer").

4 Product description and mode of operation

4.1 Overview of components

The motor-driven reel is used for the winding and unwinding of a mobile power supply line (reeling cable) for a mobile consumer. The dimensions of each motor-driven reel can be found in the dimension sheet.



1) Reel body
2) Reel flange
3) Drive motor
4) Slip ring assembly housing
5) Coupling
6) Limit switch mechanism
7) Gearbox
8) Rotating optical fiber transmitter housing
9) Brake
10) Mounting bracket

4.2 Description of assemblies

4.2.1 Cable

4.2.1.1 General information

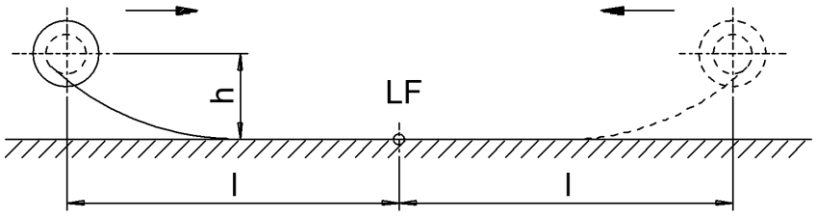
When specifying the cable, be sure that the cable to be used is a cable suitable for reeling applications.
Conductix-Wampfler only uses reeling cables as specified in DIN VDE 0250 for use on cable reels. If the reel cable is not included in the scope of delivery, you must be sure that the reel provided for installation and the reel cable to be used with it match the operating and/or order data. Only in this way can it be guaranteed that the reel (size, drive, number of poles in the slip ring assembly) and the cable applied (outer diameter, weight per meter, number and cross-section of wire strands, winding length) meet the operational requirements of the application.
According to DIN 57298 part 3 / VDE 0293 part 3, cables may only be used whose outer diameter at least fall into the categories below.

Cable diameter	Smallest permissible bending radius	Rated voltage
up to 20 mm	10 x cable diameter	up to 0.6/1 kV
above 20 mm	12 x cable diameter	up to 0.6/1 kV
above 20 mm	24 x cable diameter	above 0.6/1 kV

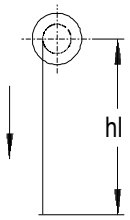
4.2.1.2 Cable fixed point

Unwinding the cable (horizontal or vertical)

Depending on the arrangement of the cable fixed point (LF in the figure below), the cable may be unwound in one or two directions of travel.



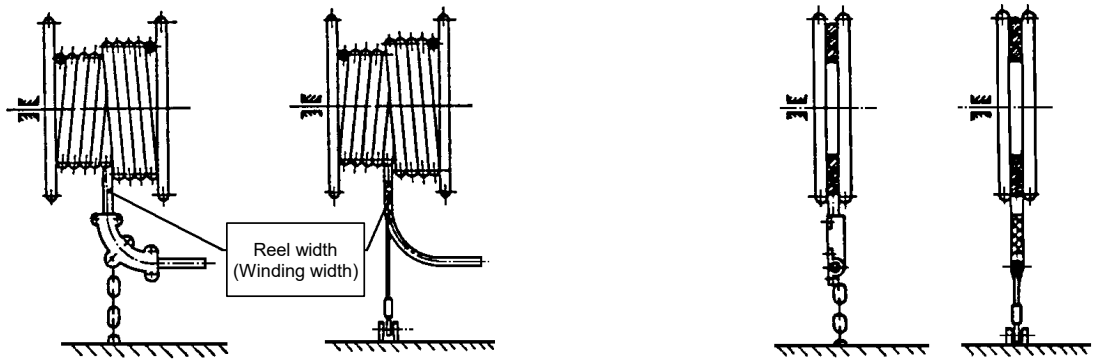
Arrangement in 2 directions of travel (horizontal)
Be sure that when attaching the cable fixed point (LF) outside the center, the winding lengths are oriented towards the longer travel distance.



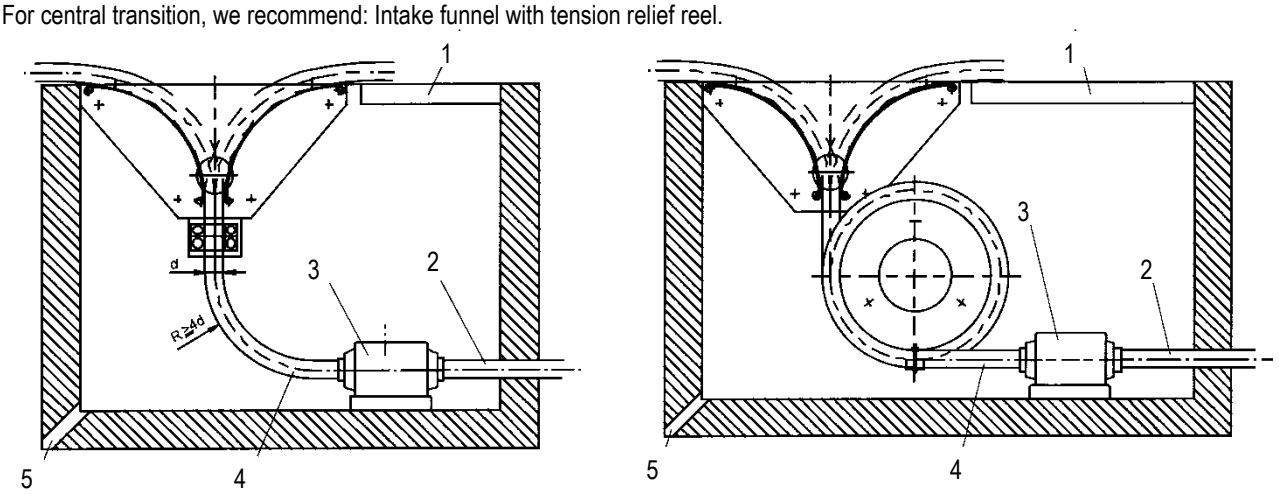
Vertical arrangement
(hl = length suspended)

Construction of the cable fixed point

There are different options for construction of the cable fixed point. Tension relief and redirection is handled either by a cable collar with a chain and shackle, or a cable pull hose (suitable for horizontal and vertical cable take-off).



For central transition, we recommend: Intake funnel with tension relief reel.



1	2	3	4	5
Corrugated or bulb plate	Underground cable	Transmission system	Tough rubber sheath cable	Drain

Please request our accessories catalog for more information.

4.2.2 Reel body

4.2.2.1 Random-winding variant - type EB

The random-winding reel body is used for the winding of a low-voltage cable or control cable that is suitable for reeling applications. The capacity of the reel body is specified such that the specified winding length plus 2 windings for tension relief can be supported.

EB reel body for defined cable winding

EB reel body for "wild winding"

4.2.2.2 Spiral winding variant - type ES

The spiral winding reel body is used for the winding of a medium-voltage cable, low-voltage or control cable that is suitable for reeling applications. The capacity of the reel body is specified such that the specified winding length plus 2 windings for tension relief can be supported.
Depending on the diameter of the reel body (D), the reel system is either delivered assembled (D < 2500 mm) or in parts (D ≥ 2500 mm). Reel bodies with multiple winding spaces are still possible.

4.2.3 Reel flange

4.2.3.1 General information

The reel flange is used to fasten the reel body onto the hollow shaft of the gearbox. The reel flange consists of clamping elements (outer and inner ring), the clamping or pressure flange, and one or two fastening flanges depending on the reel body and the associated clamping screws. The conical surfaces of the clamping elements are lubricated. The conical angle is specified such that no self-locking can occur.
The clamping element represents a force-fit and releasable connection between the drive shaft or flange for the clamping set and the fastening flange. The torque is transmitted from the clamping or pressure flange through the outer and inner ring of the clamping elements to the gear shaft. The clamping screws are used to generate the pressure required.
The fastening flange establishes a connection between the clamping element and the reel body (spiral or wide winding).

4.2.3.2 Installation

WARNING!

Significant risk of injury if reel wheel loosens!

Incorrect installation of the clamping elements can lead to the reel wheel coming off the shaft.

Therefore:

→ Ensure the correct installation orientation of the inner and outer rings of the clamping element!

CAUTION!

Corrosion of the gear shaft and flanges!

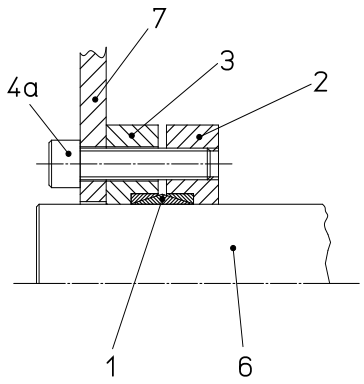
The gear shaft and flanges are only treated with a temporary corrosion protection agent.

Therefore:

→ After installation, the clamping or pressure flange and shaft must be preserved with a long-term corrosion protection.

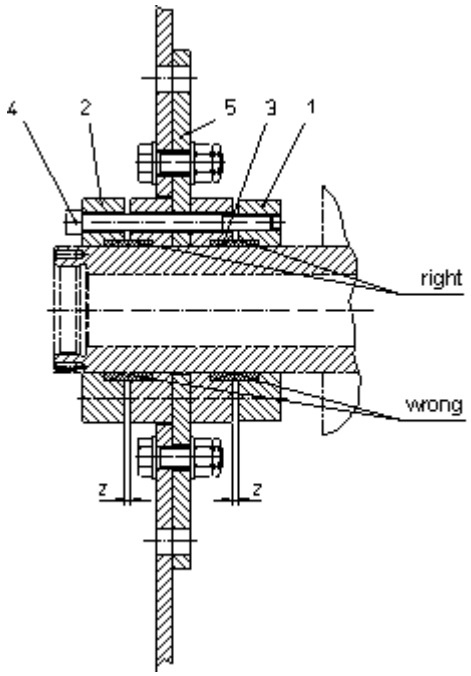
The reel flange is normally attached to the gear shaft on delivery. If this should not be the case for technical reasons (only in special cases), then proceed as follows

Example 1: Gearboxes W63 –W125



1. Clamping element (outer ring and inner ring)
2. Clamping flange
3. Pressure flange
4. (4a) clamping screws
5. Flange
6. Shaft
7. Fastening flange

Example 2: Gearboxes K12-K16

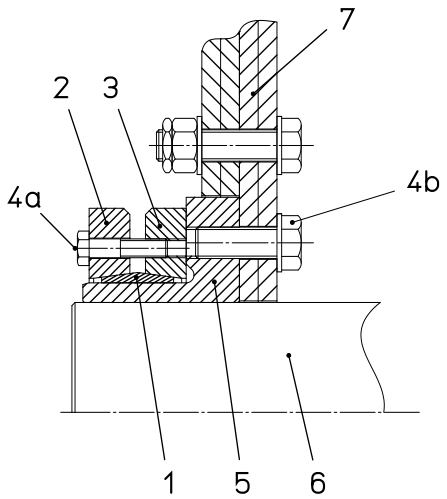


1. Clamping flange
2. Pressure flange
3. Clamping element (outer ring and inner ring)
4. Clamping screw
5. Fastening flange

Cleaning of the gear shaft, the clamping and pressure flanges (1, 2) and the pressure point on the fastening flange (5) (free of oil and grease)

1. Lightly oil clamping elements as needed and insert into the correct insertion position in the clamping and pressure flange (see examples 1 or 2).
2. Loosely screw the fastening flange (5) and clamping unit (1, 2, 3) together, push them onto the gear shaft, and bring them into the required position.
3. Tighten the clamping screws (4) by hand, then with a torque wrench one after the other (not in cross-wise fashion). Multiple rounds of tightening are required before all screws are tightened to the appropriate torque (see Table).
4. The gap distances "z" between the two pressure flanges and between the pressure and clamping flanges must be equal.

Example 3: Gearboxes K20-K25



1 Clamping element (inner ring)
2 Front clamping disk
3 Back clamping disk
4a Clamping screws
4b Clamping screws
5 Flange for clamping set
6 Shaft
7 Fastening flange

CAUTION!

Permanent deformation of the clamping elements!

Do not start tightening before the shaft (6) is seated in the flange hole (5); otherwise, a permanent deformation may occur.

Therefore:

→ Start tightening only if the gear shaft is seated in the flange hole (5)!

1. Cleaning of gear shaft (6), flange (5), clamping disks, and pressure points on the fastening flange (7) (free of oil and grease).
2. Clamping screws (4a) may not yet be tightened so that the inner ring (1) can be pushed into place.
3. Push the clamping set (1 to 4a) onto the flange (5).
4. Push flange (5) and clamping set onto the shaft and bring it into the required position.
5. Orient the clamping set, that is, establish flat parallelism between the two clamping disks by tightening the clamping screws. The gap between the clamping disks must be even.
6. Clamp down by smooth, even tightening of the screws in multiple stages one after the other (not cross-wise). Multiple rounds of tightening are required before all screws are tightened to the appropriate torque (see Table).

Gearbox type	Tightening torque Ma (item 4 or 4a) in Nm	Tightening torque Ma (4b) in Nm
W 63.x	40	
W 80.x	52	
W 100.x	85	
W 125.x	85	
K 12	85	
K 16	350	
K 20	100	425
K 25	190	425

4.2.3.3 Disassembly

Before dismantling the reel flange, always dismantle the reel wheel first!

1. Loosen the clamping screws evenly and one after the other in multiple rounds to avoid twisting the disks on the inner ring.
2. Under no circumstances, remove clamping screws entirely from their threaded holes to keep the disks from falling away.
3. Pull the flange from the shaft. First, remove any rust deposits on the shaft and the hub.
4. Pull the clamping set from the shaft.

NOTE!

Used clamping sets should be disassembled and cleaned. A grease lubricant is applied to the conical surfaces at the factory. Grease undamaged conical surfaces only with Molykote BR 2. Grease screw thread and connecting surface with Molykote BR 2 as well.

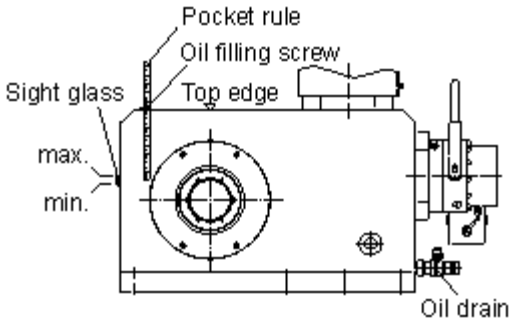
4.2.4 Gearbox

In frequency-controlled motor-driven reels, Conductix-Wampfler is currently using type "K" bevel gears that have been developed specifically for use in motor-driven reels. It is the bearing element for the following primary parts: reel body, reel flange, slip ring assembly with housing or rotary feedthrough, and a drive motor with coupling.
The reel system is mounted on the system with the gearbox. The gearbox housing is cast iron.
There are currently 4 sizes in use: K12x.3, K16x.3, K20x.3 and K25x.3. The variable "x" stands for different possible shaft arrangements. The gearbox is powered by a vertical or horizontal driveshaft. The hollow shaft supporting the reel body as well as the slip ring assembly and drive shaft are arranged at an angle of 90° from one another. The longer projecting part of the hollow shaft is used to support the reel body. There is a type plate affixed to each gearbox that shows the type, gear ratio, and year of construction with a serial number.

4.2.4.1 Lubrication and oil change

The gear bearing as well as toothed and bevel gears are permanently supplied with oil by means of submersion lubrication. The external bearings of the driveshafts (bevel gear shafts) are permanently lubricated. The gearboxes are delivered from the factory with the appropriate oil fill level.
The gearboxes of types K16x.3, K20x.3, and K25x.3 are equipped with an oil sight glass on the side for checking the oil level. Inspect the oil level after the gearboxes have been at standstill for at least ten minutes. If the oil filling level is correct, the surface of the oil is visible in the oil sight glass.

The exact filling level measurement (e.g. after oil change and in general for gearboxes of type K12x.3) is carried out with a meter stick through the filling bore, with the gearbox horizontally levelled. The distance from the top edge of the gearbox to the oil level is measured.



Model	K 12x.3	K 16x.3	K 20x.3	K 25x.3
Filling quantity in litres	**6**	**8**	**16**	**28.5**
Maximum oil level (mm) from the top edge	**100**	**140**	**150**	**260**
Minimum oil level (mm) from the top edge	**110**	**150**	**170**	**280**

For oil lubrication, high-alloy, age-resistant, non-foaming raffinates with the highest level of pressure capacity are used (FZG test DIN 51354 force level greater than 12). Oils may not be mixed during oil changes. If the oils listed below are not available, only equivalent ones may be used.

Recommended lubricants

Ambient temperature °C	DIN 51512 labeling	ARAL	BP	DEA	ESSO	FUCHS	MOBIL	SHELL
-20°C to 80°C (Standard)	CLP ISO VG 100	Degol BG 100	Energol GR-XP 100	Falcon CLP 100	Spartan EP 100	Rendin CLP 100	Mobil Gear 627	Omala oil 100
-30°C to 80°C (Special)			Enersyn HTX 220			Renolin Unksyn CLP 150	Mobil SHC 629	Omala HD 150

The standard gearboxes are filled at the factory with Mobilgear 627

The first oil change must be carried out after 50 to 100 operating hours; all later oil changes must be carried out after another 10,000 operating hours, but no later than once yearly for gearbox type K25x.3 and no later than after 3 years for types K12x.3, K16x.3, K20x.3.

Model	K 12x.3	K 16x.3	K 20x.3	K 25x.3
First oil change after operating hours	50-100 hrs	50-100 hrs	50-100 hrs	50-100 hrs
Regular oil change after operating hours	10,000 hrs	10,000 hrs	10,000 hrs	Once yearly
Latest oil change	Every 3 years	Every 3 years	Every 3 years	Once yearly

The oil must be drained at operating warmth. After draining the first oil filling (startup filling), the gearbox must be rinsed. The rinsing oil should be identical to the gear oil used. After removal of the oil sludge, wear debris, as well as the residue of the gear and rinse oil, fresh oil must be filled in the appropriate quantity (see table). The screw plug must be cleaned and provided with a new copper ring. The greatest possible cleanliness is essential during an oil change.

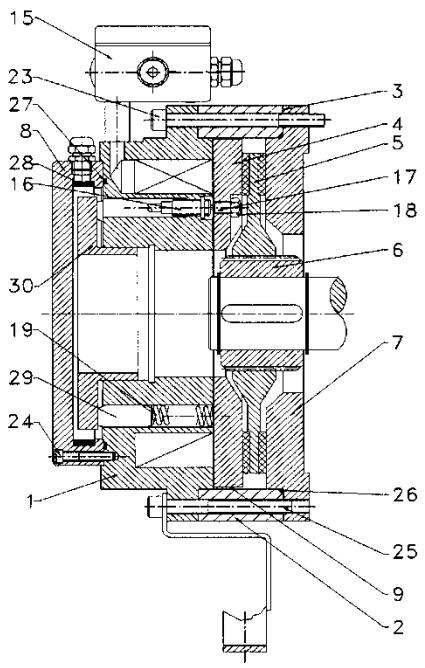
4.2.5 Electromagnetic spring pressure brake

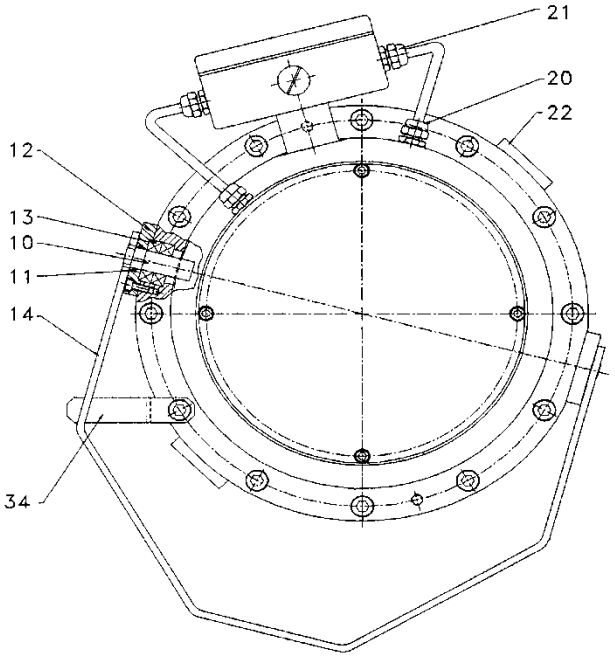
The brake is a spring-loaded two-surface brake that brakes in the de-energized state and is disengaged electromagnetically.

Pos.	Designation	Pos.	Designation
1	Coil body	17	Threaded pin
2	Socket	18	Safety nut
3	Shim	19	Screw pressure spring
4	Anchor plate	20	Pg screw connector
5	Friction pad carrier	21	Pg screw connector
6	Towing hub	22	Cover
7	Flange	23	Fastening screws
8	Cover	24	Cover screws
9	Parallel key	25	Coil body screws
10	Cylinder pin	26	Seal
11	Sealing ring	27	Seal
12	Cover	28	Anti-condensation heater
13	Ball bearing	29	Bolts
14	Hand lever	30	Adjusting nut
15	Terminal box	34	Support for vertical installation
16	Microswitch		

Motor-driven reel

Frequency-controlled





Size	M_{dyn} Nm	M_{stat} Nm	n_0 min^{-1}	n_{zn} min^{-1}	U_n * V-DC	P_k W	Air gap min./max.	W kJ	P_{VN} kW	J kgm^2	m kg
2	20	22	5300	3000	24	80	0.6/1.0	25	0.080	0.00040	5.5
4	40	44	4900	3000	24	67	0.6/1.0	30	0.067	0.00043	7.3
4/6	60	66	4900	3000	24	67	0.6/1.0	30	0.067	0.00043	7.3
6.3	63	70	4500	3000	24	103	0.6/1.2	65	0.103	0.00073	8.6
6.3/9.4	94	103.5	4500	3000	24	103	0.6/1.2	65	0.103	0.00073	8.6

M_{dyn}: Dynamic moment (friction moment, rated moment for working brake)
Applicable for dry running with oil- and grease-free friction pads after running-in
M_{stat}: Static moment (adhesion torque)
n_0: Maximum idle speed
n_{zn}: Rated switching speed
P_k: Exciter power at 20 °C
P_{vn}: Rated switching power
W: Switching work per circuit for z = 1 to 5 h^{-1}
J: Moment of mass inertia
m: Mass
Type of protection: IP66 according to DIN 40050
Mode: S1, S4-40% ED
ISO class: up to F according to DIN VDE 0580
AC controller: possible with rectifier component

4.2.5.1 Installation

The intermediate flange and round sealing ring must be screwed onto the type K gearbox in advance (see drawing in section 4.2.5). Mount the towing hub (6) onto the shaft, and secure it with a parallel key and fasten it axially. It is not necessary to open the brake. Push the brake over the already mounted towing hub (6). Be sure that the brake pad carrier (5) and the towing hub (6) are centered. The fastening screws must be tightened to the torque specified on the drawing (screw the cover (8) tight). Connect the brake according to the circuit diagram located in the terminal box.
The surface between the brake and the intermediate flange is sealed with a round sealing ring.

4.2.5.2 Manual emergency brake disengagement

CAUTION!

Unintentional unwinding of the cable!

Emergency disengagement of the brake can cause the cable to unwind!

Therefore:

→ Emergency brake disengagement may not be used to maintain provisional operation! It may only be used in an emergency or during maintenance and installation. The reel wheel must be blocked to prevent unwinding.

Without hand lever

Insert emergency brake disengagement screws through the holes in the coil body (1), screw them into the anchor plate (4) and tighten them. These will then be pulled axially against the reel body and the brake pad carrier (5) will be released.

With hand lever

Pulling the hand lever (14) against the back of the brake causes the anchor plate (4) to be pulled axially against the reel body and the brake pad carrier (5) will be released.

Depending on the application of the brake, wear of the brake pads can cause the air gap to widen between the coil body (1) and the anchor plate (4). The maximum permissible air gap is specified on the drawing. If this value is exceeded, there is a risk that the brake may no longer disengage. This air gap must therefore be inspected from time to time. To do this, disconnect the coil, remove the cover (22) and insert an antimagnetic feeler gauge into the exposed hole in the socket (2) to measure the air gap between the coil body (1) and the anchor plate (4). If necessary, the brake must be readjusted to the rated value in accordance with the instructions on the drawing.

4.2.5.3 Heat capacity

During dynamic braking (emergency stop switch), friction heat is produced in the brake pads. Depending on the load, an abrasion residue is produced in the brake pads which must be completely removed. The function of the microswitch can otherwise be hindered. That means:
The air gap must be checked for wear after commissioning. If the maximum air gap is measured or excessive dust is visible through the inspection window, disassemble the brakes, clean them, and remove the shim (if necessary).
We recommend carrying out this test every six months. Shorten this period if necessary.
If the heat capacity is exceeded, the friction pads (5), anchor plate (4), flange (7), and coil must be checked.

4.2.5.4 Readjusting the air gap

If the maximum permissible air gap is reached, the brake must be readjusted as follows:
Remove the screw fasteners (23) and coil body screws (25). Dismount the entire coil body group with the socket (2) from the flange (7). Be sure that the pressure springs (19) are not lost and the anchor plate (4) is not damaged.
Remove the shim (3) and remount the coil body assembly and socket again in the reverse order.
To simplify this maintenance task, the anchor plate can be fastened with the emergency brake disengagement screws. Before commissioning the brakes, remove these emergency brake disengagement screws first. If such a readjustment of the air gap has already been carried out, then a new brake pad carrier (5) must be installed. However, the shim (3) must be inserted again then.

CAUTION!

Slipping of the brake!

When assembling the brake and/or replacing the friction pad carrier, be careful that the brake pads do not come into contact with grease. If greasy materials are present, they can be removed with suitable degreasing agents.

However:

→ Never use gasoline or petroleum to degrease the friction pads.

NOTE!

Use only original spare parts (see last page for ordering address)!
These are asbestos-free!

4.2.5.5 Microswitch

Normally the microswitch (16) is connected into the control circuit of the motor in such a way that the motor can only start when the brake is disengaged.
When the coil is energized, the anchor plate (4) is pulled against the coil body (1). During this movement, the anchor plate actuates the microswitch by means of the threaded pin (17). Before delivery, the microswitch is adjusted in our factory. This adjustment should not be changed. The microswitch may only be replaced according to our guidelines.

CAUTION!

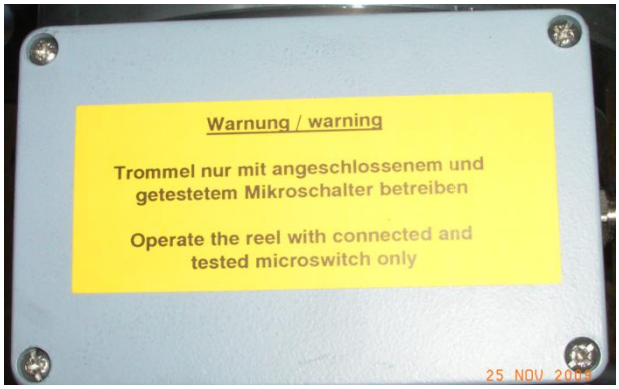
Damage to or destruction of the gearbox!

To prevent the motor from starting with the brake engaged, only the microswitch engages the motor.

Therefore:

→ The reel may only be operated with the microswitch connected and tested.

→ Microswitches are safety and monitoring mechanisms and may not be bridged.



Troubleshooting:

The cause of a non-functional switch display can be that either:

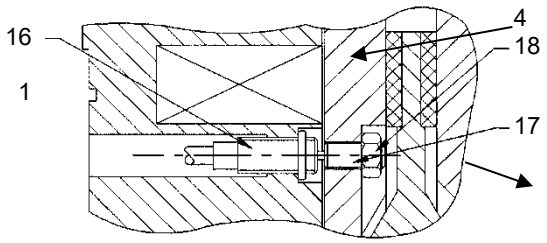
a) The anchor plate (4) is not pulled against the face of the coil body (1) because the maximum permissible air gap has been exceeded (set the air gap to the normal value - see maintenance), or

b) The anchor plate (4) was not pulled against the face of the coil body (1) because there are foreign objects between the two parts (dismount the brake and clean it - see maintenance).

Adjustment:

First, be sure that the microswitch (16) is positioned in the coil body (1) in such a way that the plunger is 0.2 mm to 0.5 mm under the face of the coil body. Without the screw pressure springs (19; see drawing in section 4.2.5), pull the anchor plate (4) against the coil body. Place two 0.2 mm feeler gauges offset by 180° onto the face of the coil body. Place the anchor plate (4) onto the feeler gauges.

Insert the feeler gauges from outside



Slowly adjust the threaded pin (17) until a signal appears on the brown or white connectors of the continuity tester. Secure lock nuts (18) and pin (17) with Loctite fluid. Check function with 0.2 mm feeler gauge.
Test: with a 0.3 mm feeler gauge, no signal may appear.

4.2.5.6 Adjusting the braking torque

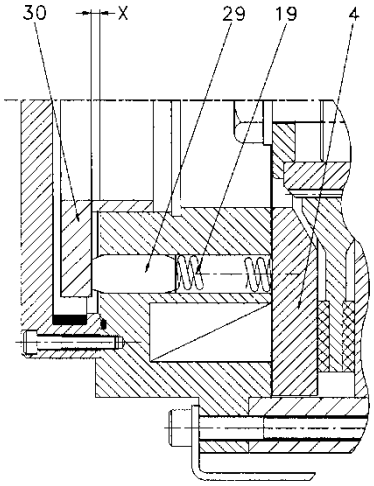
The brakes are delivered from the factory with a reduced braking torque and provided with a corresponding sticker.

Motor-driven reel

Frequency-controlled

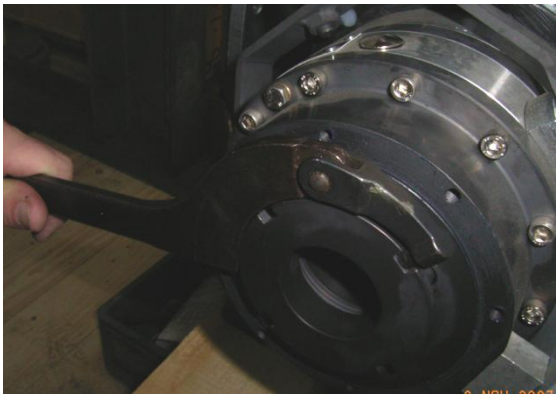
Brake	$M_{red.}$	$M_{max.}$
NFF 4	30 Nm	40 Nm
NFF 4/6	50 Nm	60 Nm
NFF 6.3	50 Nm	63 Nm
NFF 6.3/9.4	70 Nm	94 Nm

Turning the set screw (30) changes the prestress of the screw pressure springs (19) and thus the torque of the brake as well.



The table below shows the adjustment value "X" and the corresponding rated torque [%].
These are approximate values only.

left right

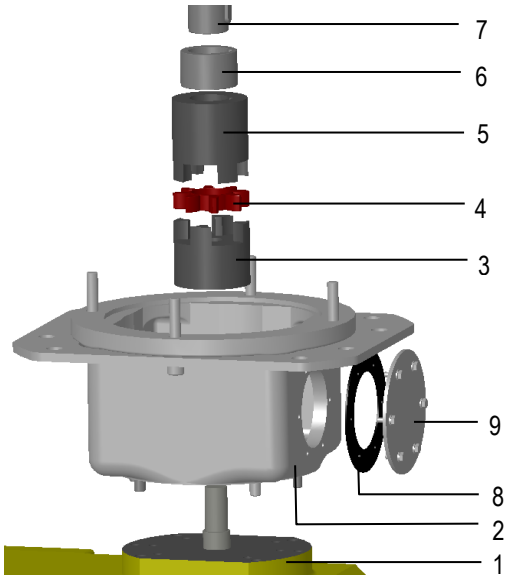


Place hook wrench
on adjustment ring
Turning to the left:
→ Gap X gets bigger
Torque gets
smaller
Turning to the right:
→ Gap X gets smaller
Torque gets
bigger

Brake size	Adjustment value "X" [mm]									
	100%	**90%**	**80%**	**70%**	**60%**	**50%**	**40%**	**30%**	**20%**	**10%**
2	0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3
4	0	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9
4/6	0	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.9
6.3	0	0.95	1.9	2.85	3.8	4.75	5.7	6.65	7.6	8.55
6.3/9.4	0	0.95	1.9	2.85	3.8	4.75	5.7	6.65	7.6	8.55

4.2.6 Mechanical coupling

Torque is transmitted from the motor to the gearbox by a mechanical coupling. It is rotationally elastic and transmits the torque in a form-fit manner. Vibrations and impacts that occur during operation are effectively damped and reduced. Between the coupling halves (3 and 5) there is a gear rim (4). The individual teeth of the gear rim have a convex profile in order to avoid edge pressure in case of alignment errors in the shafts. The gear rim has an application range from -30 °C to +100 °C, is outstandingly wear-resistant, as well as oil-, ozone-, and age-resistant.
For inspection of wear on the gear rim, there is a cover (9) cut into the clutch housing.



1) Gearbox
2) Clutch housing
3) Coupling half on gearbox side
4) Gear rim
5) Coupling half on motor side
6) Intermediate ring
7) Motor shaft
8) Seal
9 Cover

4.2.6.1 Service

Before work such as checking the play with a feeler gauge or replacing the gear rim is carried out, ensure that the drive assembly is turned off and secured against unintentional reactivation.

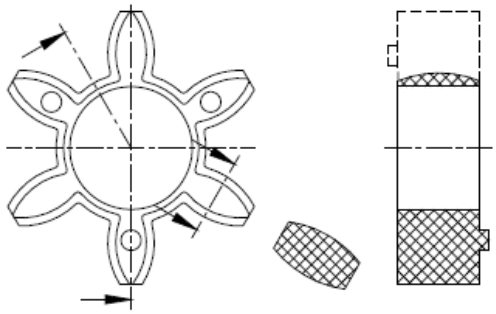
WARNING!

Danger due to rotating parts!
Rotating parts of the coupling can cause severe injury.
Therefore:
→ When working on the coupling, turn off the drive assembly and secure it against unintentional reactivation.

CAUTION!

Danger due to heated parts!
Contact with the heated hub can lead to burns.
Therefore:
→ Wear protective gloves.

Gear rim

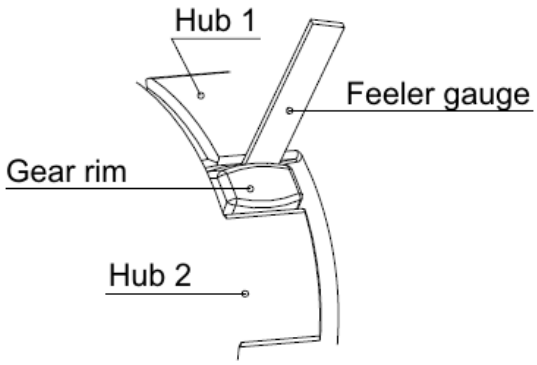


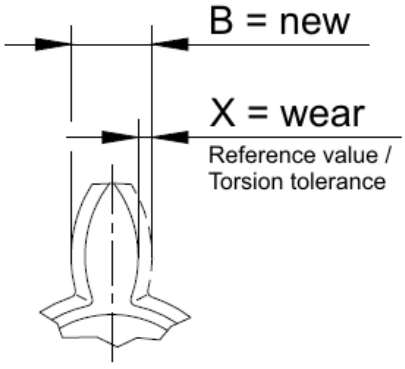
Size	Wear limits (abrasion) X_{max} [mm]
24	3
28	3
38	3
42	4

If the play is > X_{max} mm, the elastic gear rim must be replaced.
The coupling size is indicated on the gear rim.

NOTE!

Use only original gear rims as spare parts! Only in this manner is the torque to be transmitted ensured!





4.2.7 Low-voltage asynchronous motor

General information
Electric motors have dangerous current-bearing and rotating parts, as well as possibly hot surfaces. All work for transport, connection, commissioning, and regular maintenance must be carried out by qualified, responsible technical personnel (observe VDE 0105; IEC 364). Improper behavior can lead to severe personal injury and property damage. The applicable national, local, and system-specific conditions and requirements must be followed.

Intended use
These motors are intended for commercial systems. They satisfy the harmonized standards of the EN 60034 (VDE 0530) series. Their use in the Ex zone is forbidden unless explicitly provided for this purpose (note supplemental instructions).
In special cases - for use in non-commercial systems - if increased requirements are specified (e.g. contact protection against children's fingers), these conditions must be ensured after system installation.
The motors are dimensioned for ambient temperatures from -25 °C to +40 °C and installation heights < 1000 m above sea level. Always note any deviating specifications on the type plate. The conditions at the place of use must meet all requirements on the type plate.
Low-voltage motors are components for the installation into machines in the sense of the Machinery Directive 2006/42/EC. Commissioning is not permitted until the conformity of the end product with this Directive is determined (observe EN 60204-1 or EN 60204-32).

Electrical connection
All work may only be carried out by qualified technical personnel with the motor stopped and disconnected and secured against reactivation. This also applies to auxiliary circuit (e.g. anti-condensation heater).

Check for disconnection from power!

Exceeding the tolerances in EN 60034-1 / IEC34-1 – voltage ± 5 %, frequency ± 2 %, waveform, symmetry – increases heating and influences electromagnetic compatibility. See the specifications on the type plate and the circuit diagram located in the connection box.
The motor must be connected in such a way that a permanently reliable electrical connection is maintained (no protruding wire ends); use the assigned cable end equipment. Ensure a secure protective conductor connection.

Tightening torques for terminal plate connections	Diameter of thread	M4	M5	M6	M8	M10
	Torque (Nm)	0.8...1.2	1.8...2.5	2.7...4	5.5...8	9...13

Air gaps between exposed live parts and against ground ≥ 5.5 mm (UN ≤ 690 V).
No foreign objects, contaminants, or moisture may be found within the connection boxes. Unnecessary cable entry openings and the box itself must be sealed against dust and water.
For test operation without drive elements, secure the parallel key.
For motors with brakes, check the correct function of the brake before commissioning.

Installation

Ensure even footing, secure fastening of feet and flanges, and exact orientation for direct coupling. Avoid structural resonances with the three-phase frequency and twice the power supply frequency. Turn the rotor by hand, note any unusual grinding sounds. Check the direction of rotation when not coupled.

Use only suitable tools and methods (heat up) to pull off or install drive elements (drive belt, coupling, etc.) and cover them with a contact guard. The balance type is specified on the shaft end face or the type plate (H = half, F = full wedge balancing). When installing the drive element, the balance type is important! For half-wedge balancing, remove any visibly overlapping part of the parallel key.

For designs with the shaft end down a protective roof is recommended; with the shaft end upwards a cover must be provided by the customer that prevents foreign objects from falling into the fan. Do not hinder ventilation! Exhaust air - including that of neighboring assemblies - may not be directly sucked back in.

Operation

In case of changes from normal operation - e.g. elevated temperatures, noise, vibrations - turn the motor off if in doubt. Determine the cause and contact the manufacturer if necessary. Do not disable safety mechanisms, even in test operation. Clean the air passages regularly if there is a great deal of contamination. Open any plugged condensate holes from time to time!

For motors with external ventilation, the external fan must be turned on during operation.

4.2.8 Slip ring assembly

NOTE!

Performance data on type plates of slip ring assemblies pertain to rotating operation. In standstill, lower values apply. Call Conductix-Wampfler, if you are not convinced that your slip ring assembly is powerful enough for your application.

NOTE!

Slip ring assemblies may may be built different than standard types, if it is required to match the operating conditions. For example, connection plates may be built on, or strand connection be fitted, or the slip ring assembly may be delivered with or without terminal box.

Instructions for cleaning the slip ring assembly and slip ring assembly housing:

NOTE!

Do not clean the slip ring assembly or the interior of the slip ring assembly with compressed air or a vacuum cleaner!

→ When cleaning, wear a class FFP3 dust mask.

NOTE!

Conductix-Wampfler recommends the use of SAEKA cleaning paste 80.750 from Säkaphen for cleaning the insulators, the slip ring assembly and the interior of the slip ring assembly.
No skin-protection measures are required when using this product. It is especially suitable for surface cleaning of insulators, brass and stainless steel.
The manufacturer's instructions apply to the handling of the product used.

4.2.8.1 Intended use

The slip ring assembly is used to transmit power or data from the cable on the reel to the fixed cable.

- Slip ring assemblies may only be opened when disconnected from voltage.
- Slip ring assemblies may only be operated with the housing closed.
- Slip ring assemblies may only be operated under the conditions specified on the type plate.

4.2.8.2 Safety advice

Only qualified electricians are allowed to perform work on slip ring assemblies, because they are trained to assess the risks related to this work and take appropriate measures to avoid them.

Heed this information for all work on slip ring assemblies

DANGER!

Danger of death by electric shock!

→ Work on electrical systems only when they are disconnected from the power supply. Follow the 5 Safety Rules before starting work (see DIN VDE 0105-100/ EN 50110-1).

→ disconnect device from power (main switch),

→ secure device against reactivation,

→ confirm that power has been disconnected from all poles,

→ ground and short-circuit the device,

→ cover or block off neighboring parts still carrying electrical current.

→ If there is no main switch, disconnect the energy source from the device according to the instructions of the manufacturer.

→ Each time before the device or system is started, test the insulation resistance according to locally applicable technical standards, directives, and law.

Installation, commissioning and repair

WARNING!

Risk of fire and destruction of assemblies and installations

Electrical installations not protected according to regulations may catch fire. Assemblies may be overloaded and destroyed. Current collectors may burn onto slip rings and make them unusable.

Therefore:

→ Prior to installation and commissioning, check weather all assemblies match the performance requirements,

→ install overcurrent protection devices according to regulations,

→ follow national and international regulations regarding installation and operation of electrical installations.

NOTE!

Install overcurrent protection devices!

Overcurrent protection devices for motor-driven reels are not part of Conductix-Wampfler standard scope of supply. **Overcurrent protection devices must be installed by the operator of the installation**, where the motor-driven reel is built into!

WARNING!

Fires and demolition of machinery and installations may be caused by loose electrical connections.

Therefore:

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Check all screw connections for tightness after connecting, retighten if necessary!

Maintenance and operation

WARNING!

Danger of slipping on the slip ring assembly housings!

Slip ring assembly housing covers and other cover plates are generally made of thin sheet metal. They are not designed to support a person! Stepping on one of them can lead to slipping and falling, or you could break through into the slip ring assembly. At least permanent deformation of the metal can be expected.

Therefore:

→ Do not step on the slip ring assembly housing!

4.2.8.3 Connecting cables

Who is allowed to connect cables?

Only qualified electricians are allowed to perform work on slip ring assemblies, because they are trained to assess the risks related to this work and take appropriate measures to avoid them.

What do you need to pay attention to?

DANGER!

Danger of death by electric shock!

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).

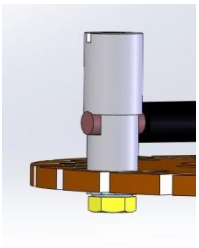
Connect all parts of the housing to the protective conductor (PE)!
Housing parts may be under voltage, if a cable inside the slip ring assembly has come loose and touches the housing. If the housing is connected to the protective conductor (PE), the current is directly lead away and a protective device interrupts the power supply. **Overcurrent protection devices must be installed by the operator of the installation**, where the motor-driven reel is built into!

Check all screw connections and retighten if necessary!
Screw connections must be tight. Contacts loosely screwed on lead to spark discharge, burned contact surfaces, high transitional resistances and unreliable function. Observe tightening torques.

Tightening torque on screw connections in copper / brass / bronze

Thread size	Screw made of brass (M10 and bigger: copper) [Nm]	Screw made of steel, 8.8 [Nm]
M5	2	2,5
M6	3	4,5
M8	6	10
M10	10	20
M12	14	35

Tightening torque on mantle clamping unit

Nominal thread diameter [mm]	Nuts on mantle clamping units, tightened by means of a screwdriver [Nm]	
Greater than 6,0 up to and inclusive 8,0	2,5	
Greater than 8,0 up to and inclusive 10,0	3,5	

Mount and align brushes (current collectors) with care!

For the electrical current, the surfaces of slip ring and brushes form the critical interface from the rotating to the stationary part of the slip ring assembly. If the brushes are not aligned properly, the current will not be optimally transmitted and the brushes wear down fast. Once the brushes are ground-in wrong, it is a lot of effort to correct them.

Different types

There are various designs, not all are being connected the same way.

- Before connecting, read the chapters where the slip ring type you need to connect is described.
- Pay attention to the figures.

Connecting the fixed cable

DANGER!

Danger of death by electric shock!

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

Connect the fixed cable to the current collectors (stationary part of the slip ring assembly).

Connecting the reeling cable

DANGER!

Danger of death by electric shock!

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

Connect the reeling cable, coming from the reel body, to the slip rings (rotating part of the slip ring assembly).

Connecting a medium-voltage cable

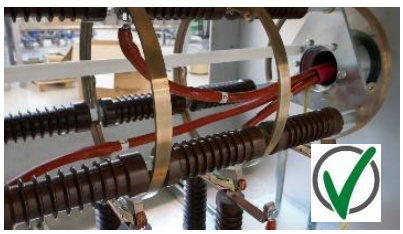
Please note the following points when connecting a medium-voltage cable:

- In medium-voltage applications, the cable for connection to the slip ring assembly must be designed with suitable cable terminations.
- The installation of the cable terminations depends on the used cable and slip ring assembly. An authorized specialized company must carry it out.
- After installation of the cables, the complete system within the slip ring assembly housing must be free of partially discharge.

Please mind the basic advices having no claim to completeness:

- Conductix-Wampfler recommends the installation of surge arresters on the supply side to compensate voltage peaks and to protect the system.
- In order to ensure that no partial discharges are present, Conductix-Wampfler recommends carrying out a partial discharge measuring before commissioning the system.
- The strand marking (L1, L2, L3) should be located behind the field controls and should be made of non-conductive materials.

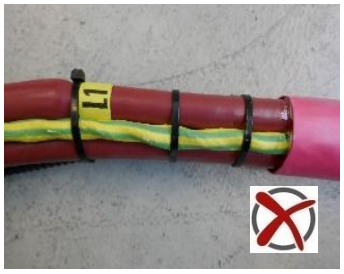
- The minimum bending radius of the cable used and the termination must be respected.

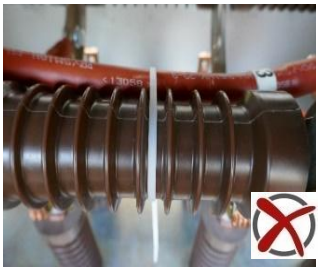


- The individual strands must be laid with the greatest possible distance between them. There are three 120° offset connection points on the slip rings. Conductix-Wampfler recommends connecting the individual connection strands offset by 120°.

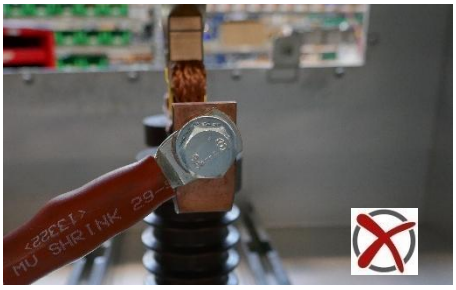
- After the field control elements the crossing of the strands with each other must be avoided.

- Lay the strands freely in the air and do not use cable ties or other aids to fasten them to each other, to the insulators or to the cable support. This support is intended exclusively for fixing optical fibres.

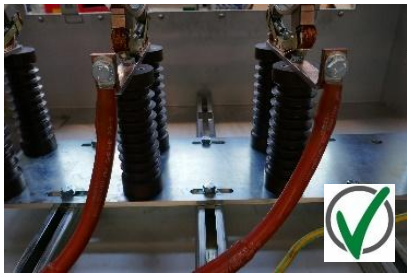




- When connecting strands to slip rings and current collectors, use the complete contact surface of the cable lugs. Use 45° angled cable lugs suitable for the voltage range, preferably with rounded edges.



- The conductors must not be connected under tension.



The following applies additionally when replacing an existing medium-voltage cable:

- The slip ring assembly and current collectors must be checked for damage and wear.
- The slip ring assembly housing must be cleaned. All graphite dust must be removed.
- The cable terminations at the cables must be replaced.

4.2.8.4 SRB types 13, 15

Electrical rating

Slip ring bodies of types 13 and 15 are designed for the following values:

Maximum operating voltage:		1000 VAC
Maximum current:	Type 13	50 A at 100% duty cycle, rotating operation, at 30 °C
	Type 15	90 A at 100% duty cycle, rotating operation, at 30 °C

DANGER!

Danger of death by electric shock!

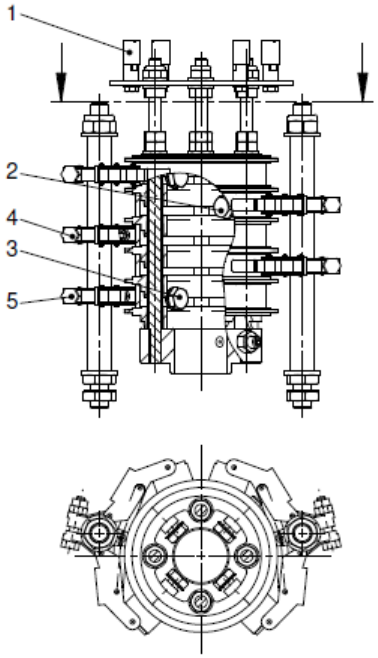
→ Only qualified electricians are allowed to perform work on slip ring assemblies.

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

→ **When connecting, strictly follow** advice given under 4.2.8.2 and 4.2.8.3 .

→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).



Connections:

1. Connection of the reel cable on the ring side to the mantle terminals, according to terminal drawing
2. Connection of the mantle terminal to the phase slip ring
3. Connection of the mantle terminal to the PE slip ring
4. Phase connection of the fixed cable on the brush side
5. PE connection of the fixed cable on the brush side

4.2.8.5 SRB type 18

Electrical rating

The slip ring assembly type 18 is designed for the following values:

Maximum operating voltage: 690 VAC

Maximum current: 25 A at 100% duty cycle, rotating operation, at 30 °C

DANGER!

Danger of death by electric shock!

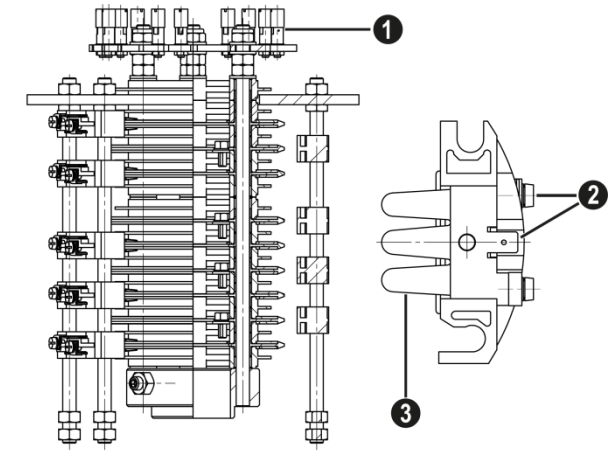
→ Only qualified electricians are allowed to perform work on slip ring assemblies.

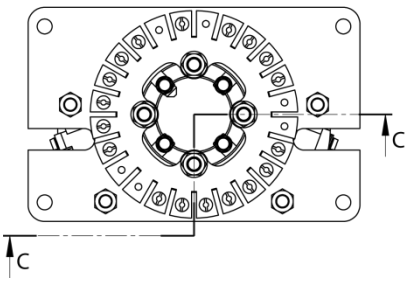
→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

→ **When connecting, strictly follow** advice given under 4.2.8.2 and 4.2.8.3 .

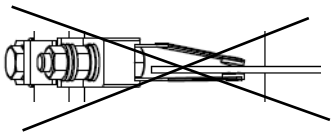
→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).



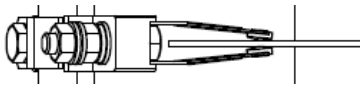


Connections:

1. Connection of the reel cable, on the ring side to the mantle terminals
2. Connection of the fixed cable, on brush side with insulated flat socket DIN 46245 or screw terminal with cable lug DIN 46237.



Wrong: Brush **not** centered on slip ring



Right: Brush centered on slip ring

Important mounting information

- Mount current collector absolutely symmetrical to the slip rings, see drawing above.
- Under no circumstances bend the collector fingers (3).
- The cables may not exert any mechanical force on the current collectors.

4.2.8.6 SRB types 70, 88, 110

Electrical rating

Slip ring assemblies types 70, 88, and 110 are designed for the following values:

Maximum operating voltage: 660 VAC

Maximum current: 25 A at 100% duty cycle, rotating operation, at 30 °C

DANGER!

Danger of death by electric shock!

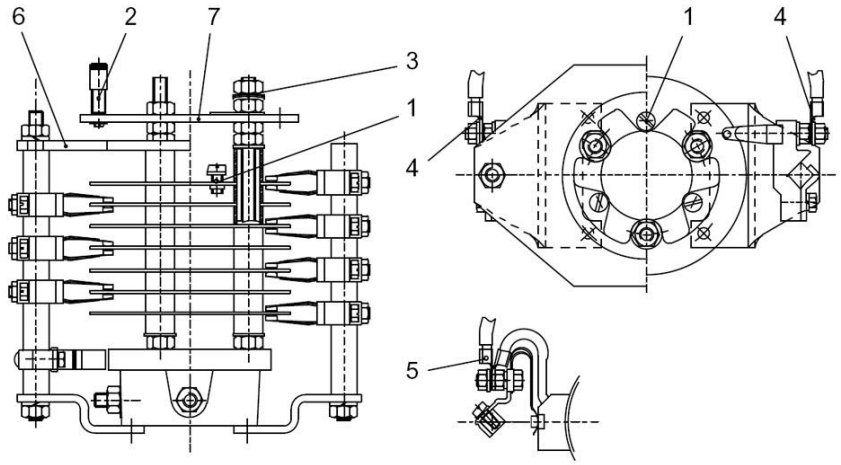
→ Only qualified electricians are allowed to perform work on slip ring assemblies.

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

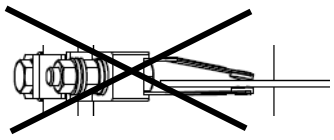
→ **When connecting, strictly follow** advice given under 4.2.8.2 and 4.2.8.3 .

→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).

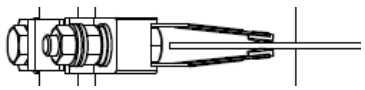


Connections

1. Phase connection of the reel cable on the ring side, only for strand count < 6 + PE
2. Phase connection of the reel cable on the ring side to the connection terminals ≥ 6 + PE
3. PE connection on ring side (reel cable)
4. Phase connection of the fixed cable on the brush side
5. PE connection of the fixed cable on the brush side
6. Support disk (for 7 or more poles)
7. Connection disk (standard for strand count of 6 + PE and upward)



Wrong: Brush **not** centered on slip ring



Right: Brush centered on slip ring

4.2.8.7 SRB types 50, 71, 90

Electrical rating

Slip ring assemblies types 50, 71 and 90 are designed for the following values:

Maximum operating voltage:		660 VAC
Maximum current:	Type 50	40 A at 100% duty cycle, rotating operation, at 30 °C
	Type 71	63 A at 100% duty cycle, rotating operation, at 30 °C
	Type 90	80 A at 100% duty cycle, rotating operation, at 30 °C

DANGER!

Danger of death by electric shock!

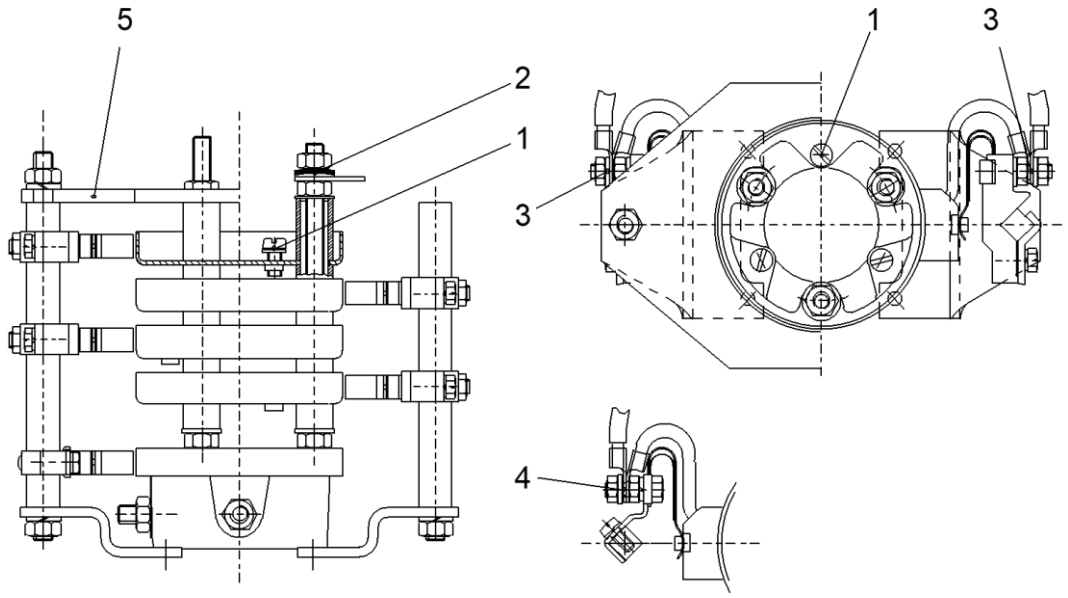
→ Only qualified electricians are allowed to perform work on slip ring assemblies.

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

→ **When connecting, strictly follow** advice given under 4.2.8.2 and 4.2.8.3 .

→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).



Connections:

1. Phase connection of the reel cable on the ring side
2. PE connection to the reel cable on the ring side
3. Phase connection of the fixed cable on the brush side
4. PE connection of the fixed cable on the brush side
5. Support disk (for 5 or more poles)

4.2.8.8 SRB types 130, 131

Electrical rating

Slip ring assemblies of types 130 and 131 are designed for the following values:

Maximum operating voltage:		660 VAC
Maximum current:	Type 130	125 A at 100% duty cycle, rotating operation, at 30 °C
	Type 131	200 A at 100% duty cycle, rotating operation, at 30 °C

DANGER!

Danger of death by electric shock!

→ Only qualified electricians are allowed to perform work on slip ring assemblies.

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

→ **When connecting, strictly follow** advice given under 4.2.8.2 and 4.2.8.3 .

→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).

Connections:

1. Phase connection of the reel cable on the ring side
2. PE connection of the reel cable on the ring side
3. Phase connection of the fixed cable on the brush side
4. PE connection of the fixed cable on the brush side

4.2.8.9 SRB types 210-212, 270-272, 320-323

Electrical rating

Slip ring assemblies are designed for the following values:

Maximum operating voltage:		660 VAC
Maximum current:	Type 210, 270 and 320	125 A at 60% duty cycle, rotating operation, at 30 °C
	Type 211, 271 and 321	200 A at 60% duty cycle, rotating operation, at 30 °C
	Type 212, 272 and 322	315 A at 60% duty cycle, rotating operation, at 30 °C
	323	400 A at 60% duty cycle, rotating operation, at 30 °C

DANGER!

Danger of death by electric shock!

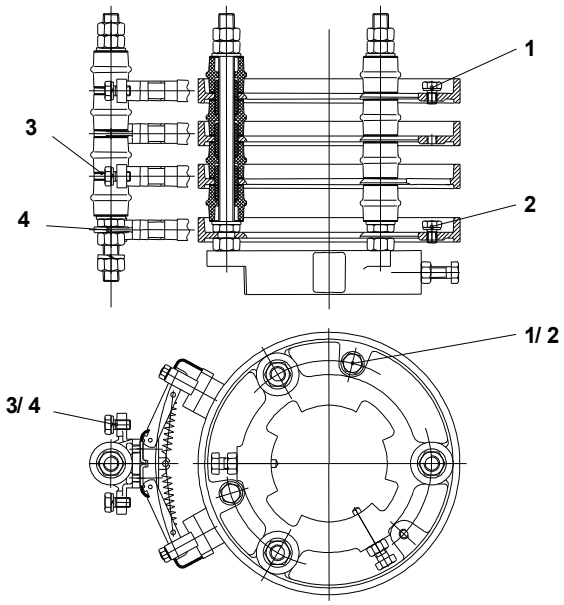
→ Only qualified electricians are allowed to perform work on slip ring assemblies.

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

→ **When connecting, strictly follow** advice given under 4.2.8.2 and 4.2.8.3 .

→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).



Connections:

1. Phase connection of the reel cable on the ring side
2. PE connection, on the ring side
3. Phase connection of the fixed cable, brush side
4. PE connection of the fixed cable, brush side

4.2.8.10 SRB types 321-323 10 kV

DANGER!

Danger of death by electric shock!

- The slip ring assembly may only be operated with the housing closed.
- There may be no voltage present, if the cover is opened!

Access to the high-voltage slip ring assembly is on the top side of the protective housing. A transparent safety shield of acrylic glass is also installed between the access and all live parts. 2 locks protect the complete protective housing against being opened unauthorized.
The insulation consists of cast resin rib supports. By default, 3+PE are provided. Deviations are possible at the customer's request. Special designs (combinations with low-voltage SRB) are possible.

Electrical rating

The slip ring assembly is designed for a nominal voltage (operating voltage, repectively) of 10 kV, its creeping distance and clearance values as well as the insulation are designed accordingly (electric equipment according to VDE 0101/11.80).

Maximum current:	Type 321	200 A / 10 kV at 100% duty cycle, rotating operation, at 30 °C
	Type 322	315 A / 10 kV at 100% duty cycle, rotating operation, at 30 °C
	Type 323	400 A / 10 kV at 100% duty cycle, rotating operation, at 30 °C

DANGER!

Danger of death by electric shock!

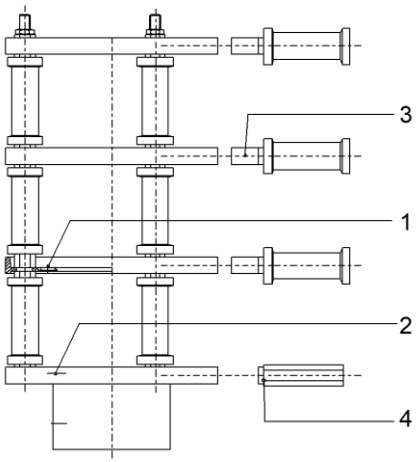
→ Only qualified electricians are allowed to perform work on slip ring assemblies.

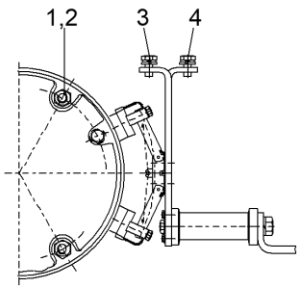
→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

→ **When connecting, strictly follow** advice given under 4.2.8.2 and 4.2.8.3 .

→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).





Connections:

1. Phase connection, on the ring side (cable on the reel)
2. PE connection, on the ring side
3. Phase connection, on the brush side (fixed cable)
4. PE connection, on the brush side (fixed cable)

4.2.8.11 SRB type 402 / 20 kV

DANGER!

Danger of death by electric shock!

- The slip ring assembly may only be operated with the housing closed.
- There may be no voltage present, if the cover is opened!

Access to the high-voltage slip ring assembly is on the 2 long sides of the protective housing. A transparent safety shield of acrylic glass is also installed between the access and all live parts. 4 locks protect the complete protective housing against being opened unauthorized. The insulation consists of cast resin rib supports. By default, 3+PE are provided. Deviations are possible at the customer's request. Special designs (combinations with low-voltage SRB) are possible.

Electrical rating

The slip ring assembly is designed for a nominal voltage (operating voltage, repectively) of 20 kV, its creeping distance and clearance values as well as the insulation are designed accordingly (electric equipment according to VDE 0101/11.80).

Maximum current: Type 402 315 A / 20 kV at 100% duty cycle, rotating operation, at 30 °C

DANGER!

Danger of death by electric shock!

→ Only qualified electricians are allowed to perform work on slip ring assemblies.

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

→ **When connecting, strictly follow** advice given under 4.2.8.2 and 4.2.8.3 .

→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).

Figure see next page.

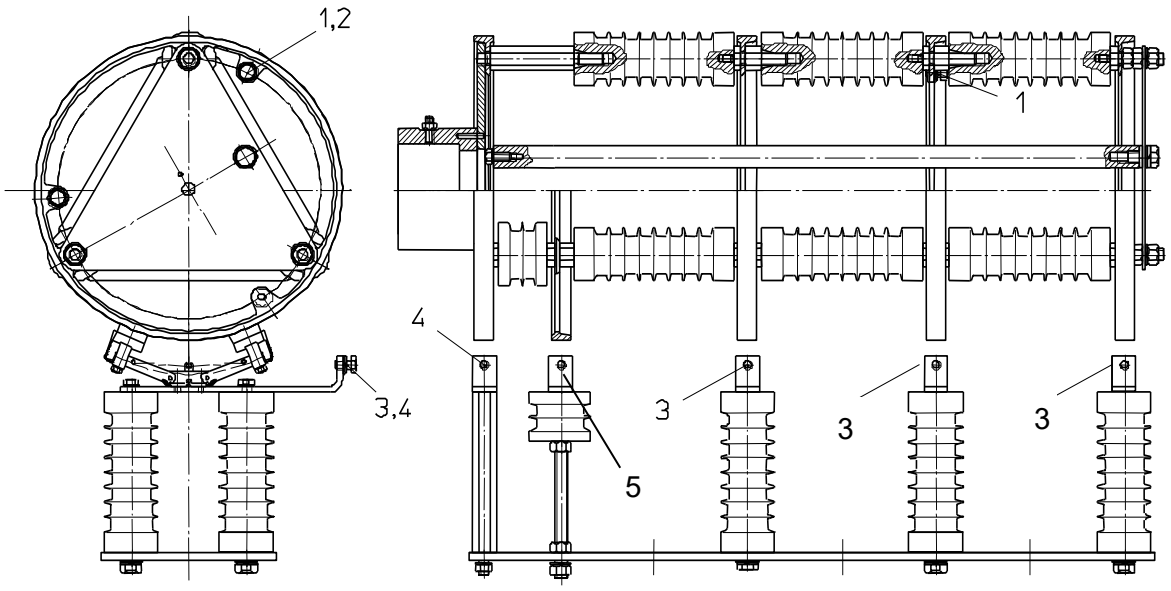


Figure: SRB type 402 / 20 kV

Connections:
1. Phase connection on ring side (cable on the reel)
2. PE connection on ring side
3. Phase connection on brush side (fixed cable)
4. PE connection on brush side
5. Optional for ground check

4.2.9 Cam switch with gears (limit switch)

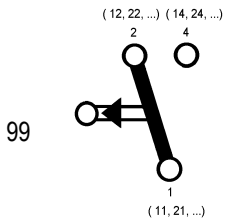
According to the specific requirements for the operating conditions and the resulting circuit diagram, a cam switch with gears (limit switch) is required. This switch generally has between one and twelve cam rings. Depending on the layout of the cable or hose reel, these cam rings are used for end position limiting, bridging when crossing a central feed to prevent a low-tension signal, and/or for the regulation of cable tension depending on the wound diameter. The cam switch is driven by a coupling inside the slip ring assembly housing or a chain.
Work on the cam switch may only be carried out by an electrician in accordance with applicable guidelines!

Connection data

Contact type	Switching system	Forced disconnection of the opener[1)]	Electrical data [1)]				Mechanical lifetime in millions of switch cycles	Contact opening width (VDE 0660 Part 206)
			AC - 15		DC - 13			
			I A	U V	I A	U V		
Switcher 99	Snap switch	yes	1.5	230	0.5	60	10	1.2 mm

1) EN60947T5-1, IEC947-5-1

Switcher

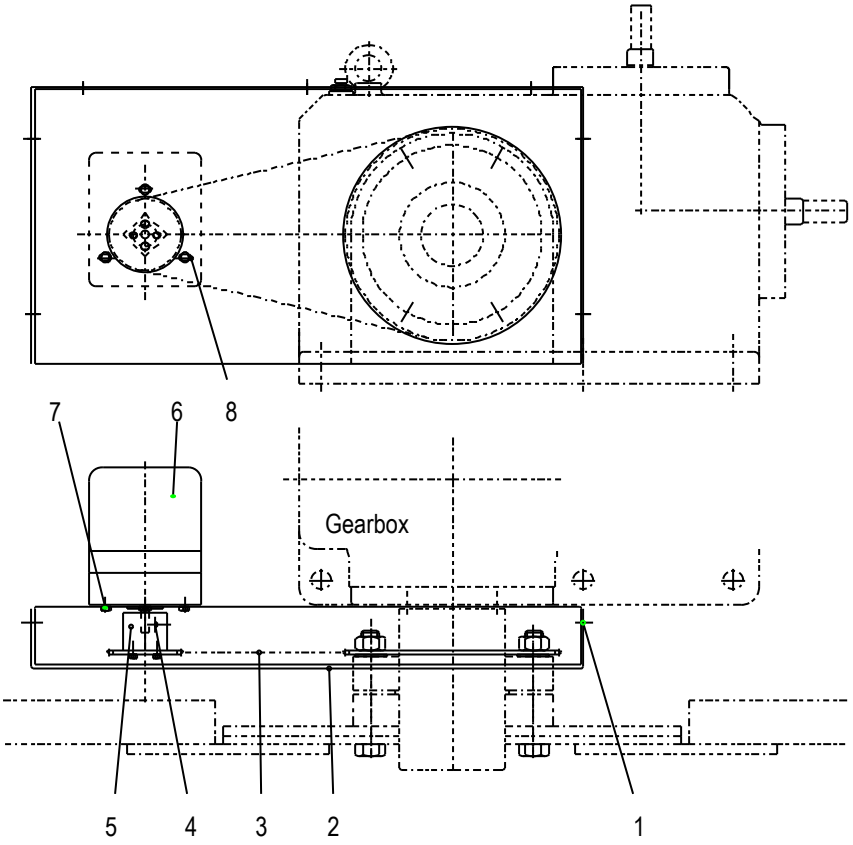


Circuit:
1 - 2: Opener (Normal Closed, NC)
1 - 4: Closer (Normal Open, NO)

Contacts with screw connection

→see also BAL0500-0016 and …-0017 (Chapter 7.2.3) or similar, project-specific documentation

4.2.9.1 Installation and dismantling for chain drive



1) Hex screw and washer
2) Chain cover on reel
3) Chain with chain lock
4) Threaded pin
5) Carrier with sprocket
6) Cam switch with gears (limit switch)
7) Hex screw with spring washer
8) Slot in gearbox chain cover

The cam switch may only be replaced by an equivalent switch. The use of other gear ratios must be discussed with Conductix-Wampfler!
If a cam switch is dismounted and reinstalled, the system must be turned off and secured against unintentional reactivation.

CAUTION!

Danger of crushing injuries!

There is a risk of crushing injuries between the chain and the sprocket, if the safety cover is removed.

Therefore:

→ Reaching into the gear is prevented if the safety cover is in place.

→ When removing the safety cover (e.g. when replacing the chain or the cam switch), the system must be shut down and secured against unauthorized, unintentional, and accidental reactivation.

When dismounting the cam switch with gears (limit switch), proceed as follows:

1. Remove the hex screws and washers (1) from the chain guard and remove the chain guard on the reel side (2).
2. Open the chain lock (3) and remove the chain.
3. Remove the threaded pin (4) and pull off the carrier (5). The sprocket can remain on the carrier.
4. To remove the cam switch (6), loosen the hex screws (7).

Caution: Hold or support the cam switch so it cannot fall.

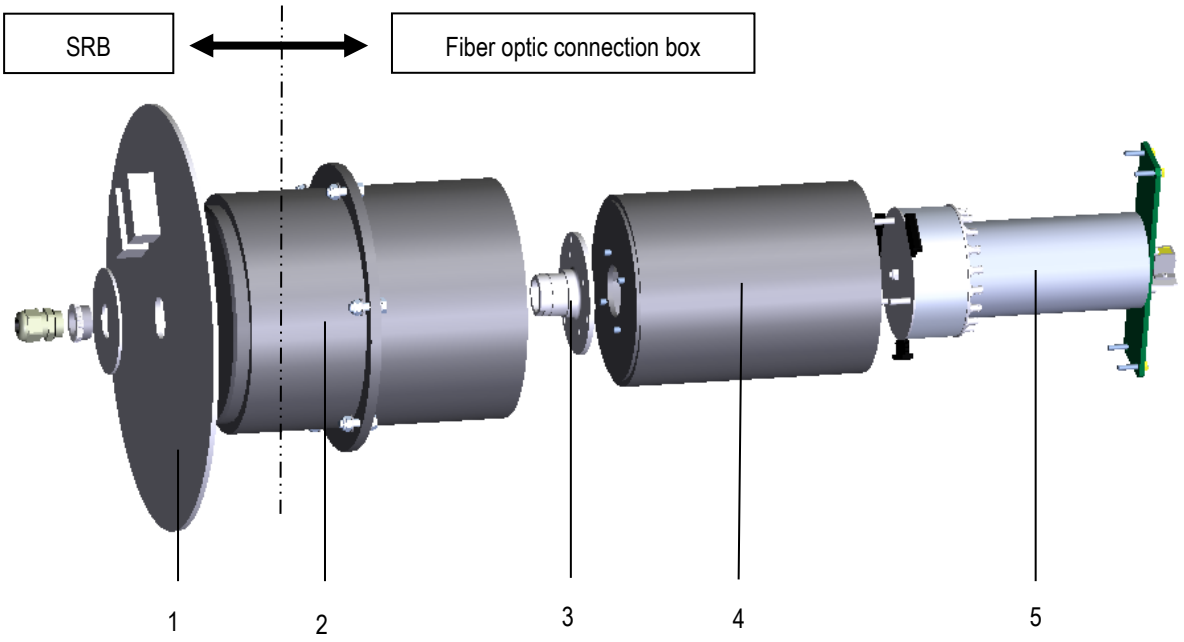
To mount the old cam switch or a new one, proceed in the reverse order as for dismounting. Also observe the following:

1. During installation of the carrier (5) and the threaded pin (4), the end of the threaded pin may not press into the parallel key groove of the cam switch gear shaft, since this can deform the edges and prevent the carrier from moving on them.
2. The hex screws (7) that hold the cam switch by three slots (8) are also used to regulate the chain tension. Thus the cam switch should first be pushed entirely in the direction of the gearbox. Then put the chain (3) into place and lock it with the chain lock. The chain tension will then be established by moving the cam switch away from the gearbox.

Caution: The chain tension may not be too high, so that the shaft and the bearings of the cam switch are not destroyed prematurely. However, the chain should not sag.

4.2.10 Rotating optical fiber transmitter

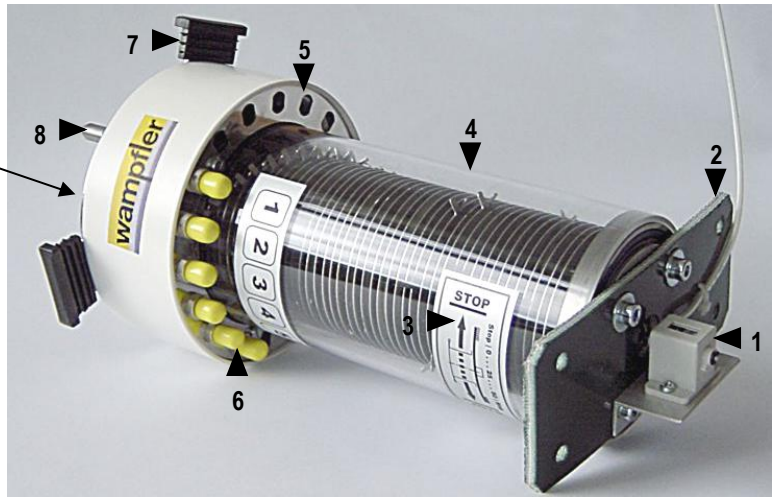
Application and use:
The rotating optical fiber transmitter is used for the uninterrupted transmission of optical signals. The rotating optical fiber transmitter is designed for a fixed maximum number of possible rotations.
The rotating optical fiber transmitter is located in the center of the medium-voltage slip ring assembly in a separate plastic box. Access is achieved through a connection box on the front of the slip ring assembly housing.



1) Towing plate
2) Outer can
3) Towing flange
4) Inner can
5) Rotating optical fiber transmitter

All technical data, such as the type designation, number of windings, fiber type, connector type, and weight, are shown on the type plate. The type plate is located on the back of the rotating optical fiber transmitter and on the inside of the housing doors.
Protection class: IP65 (installed)
Temperature: -20°C to +40°C

1) Counter
2) Torque bracket
3) Rotational direction indicator
4) Polycarbonate pipe
5) Connection ring
6) ST connection sockets
7) Insertion guide
8) Drive pin
9) Type plate



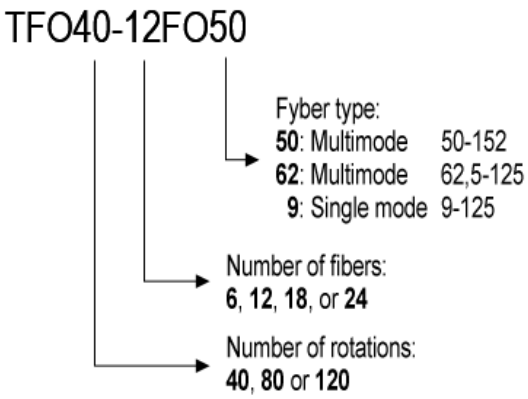
4.2.11 TFO rotary fiber-optic transmitter

Application and use:
The TFO is used for the uninterrupted transmission of optical signals. It is designed for a fixed maximum number of possible rotations.

The TFO is housed in a separate terminal box on the back of the slip-ring-assembly housing in a separate terminal box and can be swung out of the housing on a hinge for connection.

The TFO model is indicated on the type plates.

Type designations:



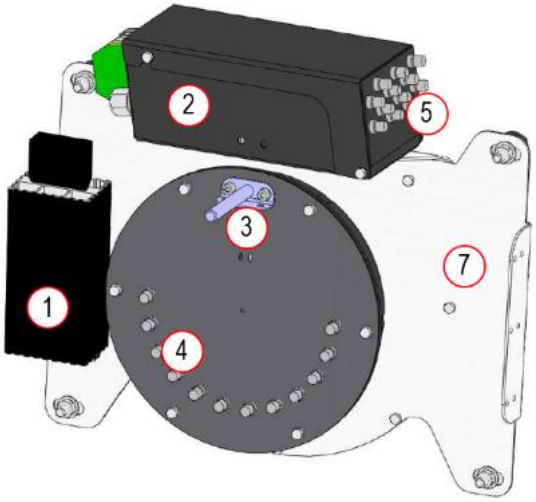
Motor-driven reel

Frequency-controlled

Technical data:

Permissible rotations:	TFO 40	90 rpm
	TFO 80	90 rpm
	TFO 120	30 rpm
Temperature range:	–15°C to +60°C	
Attenuation:	<1.5 dB	
Service life:	>70,000 cycles	

Description:



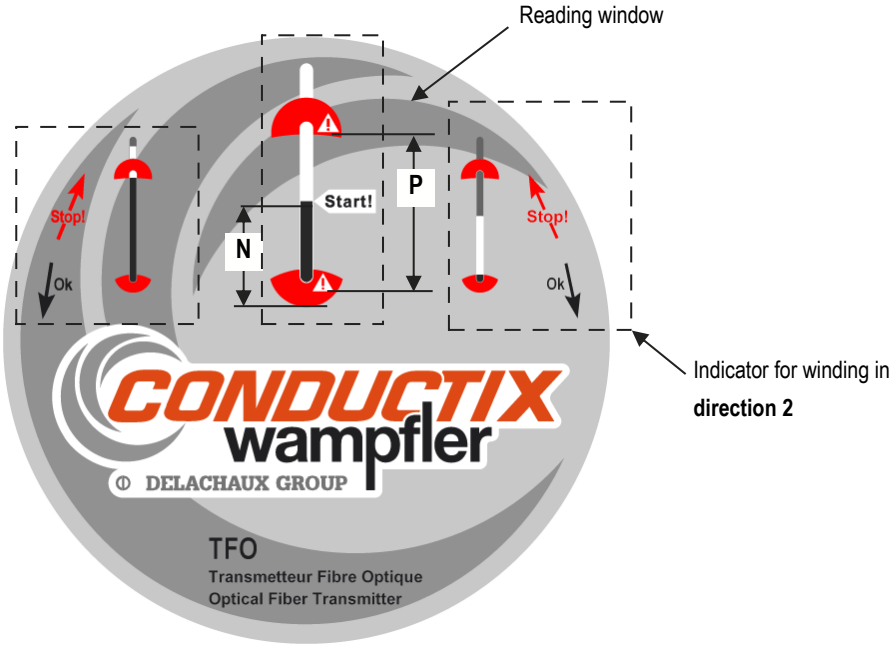
Item	Name
1	Heating unit
2	Thermostat
3	Follower
4	Couplings for connecting reel cable
5	Couplings for connecting customer's cable
6	Position indicator
7	Swivel mounting plate

Read position display and winding direction

N Winding level

P Total usage range

The “Start” label indicates the winding level of the tape when the reel is full.



DANGER! **Never exceed the scope of use!**

4.3 Modes of Operation

Motor-driven reels can be operated either in automatic mode or under manual control.

4.3.1 Automatic operation

During automatic operation, it is not permitted for people to stay in the work zone and danger zone.

4.3.2 Manual mode

During manual operation, only trained personnel are permitted to remain in the work zone and danger zone.

4.4 Accessories

The following accessory parts are not part of the scope of delivery and can be ordered from the manufacturer (see manufacturer catalog):

- Redirection mechanisms
- Roller arcs
- Cable funnels
- Roller mouthpiece
- Damping assembly
- Cable grip

5 Transport, packaging and storage

5.1 Shipment

5.1.1 Safety instructions for transport

WARNING!

Danger of death due to suspended loads!

When lifting loads, there is a danger of death from falling parts or those swinging out of control.

Therefore:

→ Never step under suspended loads.

→ Follow the specifications for the attachment points provided, for example base bracket/gear take-off shaft.

→ Do not attach to projecting machine parts or to eyes on installed components, such as the motor. Be sure the separate lifting accessories are firmly seated.

→ Use only authorized lifting gear and separate lifting accessories with sufficient load capacity.

→ Do not use torn or worn ropes or straps.

→ Do not attach ropes or straps to sharp corners and edges, and do not knot or twist them.

CAUTION!

Damage from improper transport!

Improper transport can result in substantial property damage.

Therefore:

→ Act with care when unloading the packaged unit as well as during internal transport, and observe the symbols and the hazard information on the packaging.

→ Use only the attachment points provided.

→ Remove packaging only shortly before installation.

CAUTION!

Danger of burns from hot surfaces!

In strong sunshine there is a danger of burns on thin cover walls.

Therefore:

→ Wear protective gloves.

5.1.2 Transport inspection

Check the delivery for completeness and transport damage immediately upon receipt.
If transport damage is externally visible, proceed as follows:

- Do not accept delivery, or accept it only with reservations.
- Note the scope of damage on the transport documents or on the transporter's delivery note.
- File a complaint.

NOTE!

Claim every defect as soon as it is detected. Damage compensation claims may only be made within the applicable claim periods.

5.2 Packing

The individual packaged parts must be packed according to the transport conditions to be expected. Only environmentally friendly materials have been used for packaging.
The packaging must protect the individual components from transport damages, corrosion, and other damage until installation. Thus do not destroy the packaging and remove it only just before installation.

Handling packaging materials:

Dispose of packaging material according to valid legal regulations and local guidelines.

CAUTION!

Environmental damage due to improper disposal!
Packaging material is a valuable resource and can be reused, processed or recycled in many cases.
Therefore:
→ Dispose of packaging materials in an environmentally appropriate manner.
→ Comply with locally applicable disposal guidelines; if necessary, engage a specialist with disposal.

5.3 Storage of packed parts

Store packed parts under the following conditions:

- Do not store outdoors.
- Store in a dry, dust-free place.
- Do not expose to aggressive media.
- Protect from direct sunlight.
- Avoid mechanical vibrations.
- Storage temperature: 15 to 35°C.
- Relative humidity: max. 60 %.
- For elastomer materials (e.g. seals, coupling gear rims), no ozone-generating equipment such as fluorescent light fixtures, mercury arc vapor lamps, or high-voltage electrical equipment may be located in the storerooms.
- When storing for more than 3 months, check the general condition of all parts and the packaging at regular intervals. If necessary, add or replace the preservative.

NOTE!

Under some circumstances, there may be instructions for storage on the packed parts which go beyond the requirements listed here. Follow them appropriately.

5.3.1 Storage of the gearbox

Short-term storage and disuse for up to 6 months
The gearbox must be stored under a roof and placed on a support (wooden pallet or the like). During storage, it is important that no moisture (condensate) or foreign objects can collect in the shaft sealing ring space. The running surfaces of the shaft sealing rings must be kept functional by greasing them. Exposed parts must be preserved.
No guarantee claims can be accepted for damages due to improper storage.

Long-term storage or retention of over 6 months before installation
For long-term storage of over 6 months, the gearbox must be completely filled with oil. It is important to use the same oil as that used for any oil filling already carried out at the factory. The entire oil must be drained before subsequent commissioning. Commissioning as described under 6.3.1. During storage, it is important that no moisture (condensate) or foreign objects can collect in the shaft sealing ring space. The running surfaces of the shaft sealing rings must be kept functional by greasing them. Exposed parts must be preserved.
No guarantee claims can be accepted for damages due to improper storage.

5.3.2 Low voltage asynchronous motor storage

When storing motors, ensure a dry, dust-free, low-vibration ($v_{eff} \leq 0.2$ mm/sec) environment (bearing damage due to standstill). During longer periods of storage, the bearings must be greased more often. Before commissioning, measure the insulation resistance. For values $\leq 1\ k\Omega$ per volt of measurement voltage, dry the windings.

6 Installation and commissioning

6.1 Safety

Personnel:

- Installation and initial commissioning may only be carried out by specially trained technicians.

Wear the following protective gear during all work of installation and initial commissioning:

- Work safety clothing
- Protective headgear
- Protective footwear
- Protective gloves

WARNING!

Danger of death due to suspended loads!

Falling loads can lead to severe injuries or death.

Therefore:

→ Never step under suspended loads.

→ Use only the attachment points provided, e.g. base bracket / gearbox take-off shaft.

→ Use only authorized lifting gear and separate lifting accessories with sufficient load capacity.

→ Do not use torn or worn ropes or straps.

→ Move loads only under supervision.

→ Set down loads before leaving the work area.

WARNING!

Injury due to improper installation and commissioning!

Improper installation and initial commissioning can result in serious injury to person and property.

Therefore:

→ Before starting work, ensure sufficient space for assembly.

→ Handle open, sharp-edges components carefully.

→ Maintain order and cleanliness in the assembly area! Loosely stacked or scattered components and tools are a source of accidents.

→ Mount components properly. Comply with specified screw tightening torques.

→ Secure components so that they cannot fall or tip over.

CAUTION!

Danger of crushing injuries!

Locations (see Figure 7):

1. Between the rotating reel and stationary parts.
2. Between cable and cable
3. Between spokes and cable
4. Under the falling cover of the slip ring assembly housing
5. Between the chain and the rotating sprocket
6. Falling components due to wrong attachment points

Therefore:

→ For 1,2,3: Do not reach into the reel. During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger. When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

→ For 4: To prevent the cover from falling shut unintentionally, use the locking device. Follow the installation order when assembling the slip ring assembly housing.

→ For 5: Reaching into the gear is prevented if the safety cover is in place. When removing the safety cover (e.g. when replacing the chain), the system must be shut down and secured against unauthorized, unintentional, and accidental reactivation.

→ For 6: Use the defined attachment points. If necessary, block off the area. Be sure to use suitable lifting gear.

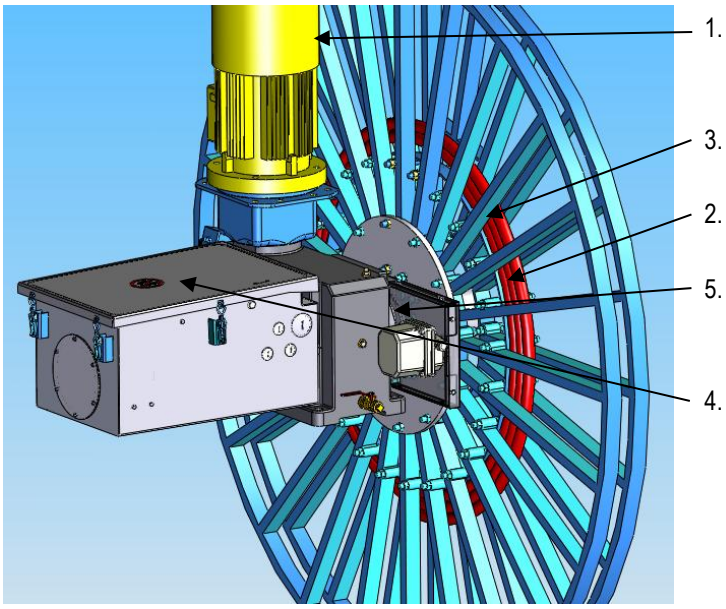


Figure 7.: Danger of crushing

CAUTION!

Danger of shearing injuries!

Locations (see Figure 8):

1. Between the rotating reel and stationary parts.
2. Between cable and cable
3. Between spokes and cable

Therefore:

→ Do not reach into the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

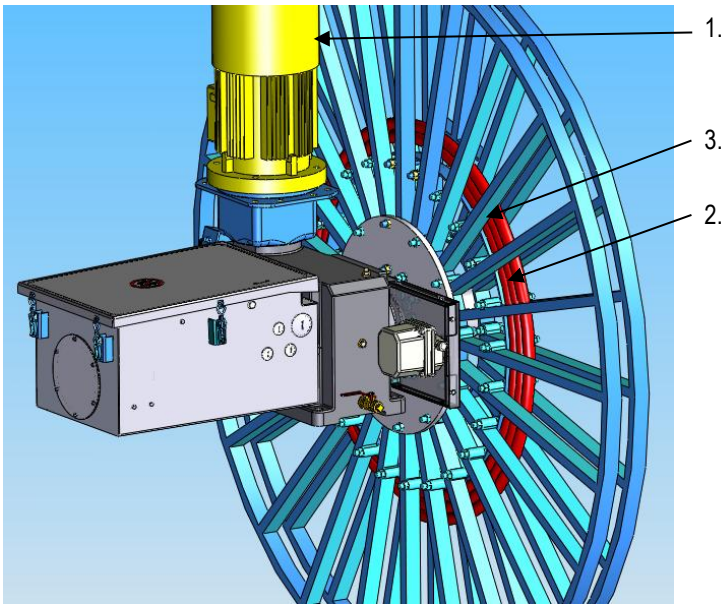


Figure 8.: Danger of shearing injuries

CAUTION!

Danger due to entanglement!

1. As the reel turns, its projecting threaded rods and other parts can entangle a person.

Therefore:

→ Do not remain near the reel. During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger. When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

2. The slip ring bodies and the coupling are parts that rotate during operation and can entangle personnel. They are equipped with safety mechanisms.

Therefore:

→ Do not reach in during operation after previously removing the safety mechanism. When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

CAUTION!

Danger of being pulled in and caught!

During operation of the system, the rotation of the reel and the cable layers being wound on it can pull in and catch personnel between the layers.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

CAUTION!

Danger of friction and scrapes!

During operation of the system, the rotation of the reel and its projecting threaded rods and other parts may cause friction or scrapes.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

CAUTION!

Danger of burns!

The anti-condensation heater mounted on the slip ring assembly housing or rotating optical fiber transmitter housing can cause burns.

Therefore:

→ Do not touch the anti-condensation heater. Safety covers are installed to prevent this. During troubleshooting, maintenance or commissioning, protective gloves must be worn when the safety covers are removed.

CAUTION!

Danger of burns from hot surfaces!

In strong sunshine there is a danger of burns on thin cover walls.

→ Therefore: Wear protective gloves.

6.2 Preparations

6.2.1 General delivery condition

6.2.1.1 Gear unit

- The gear unit contains all components. Depending on the reel size, the reel wheel may be delivered separately.
- The gearbox and slip ring assembly housing are mounted on a bracket. The bracket connects the unit to the crane structure. For motor-driven reels <1 kV, the bracket is not included.
- Small parts required are generally packaged with the gear unit.
- The fasteners to connect the bracket to the steel crane frame are not part of the scope of delivery of Conductix-Wampfler.
- Correct connection to the crane structure is the responsibility of the customer.

6.2.1.2 Reel wheel

- The reel wheel is delivered in two preadjusted reel halves if the wheel ≥ 2.5 m. Above D=5.6 m, nine-part wheels are sometimes used.
- The ramp for the cable entry is mounted on the left or the right for cable take-off, depending on the order.
- The angle bracket for the cable entry is mounted on the gear unit and must be removed before installing the reel wheel.
- Fasteners for fastening of the reel wheel to the gear unit are provided and placed inside the slip ring assembly housing.

6.2.1.3 Cable

- If it is not already mounted on the reel body, the cable is normally delivered on a wooden reel.
- For medium-voltage cables, an appropriate cable end seal must be attached at the factory. When cutting the cable to size on-site, the end seal must be attached by authorized technical personnel.

6.3 Installation

NOTE!

Before starting installation, the delivery must be checked for completeness and defect-free condition.

Damage to components must be reported immediately!

6.3.1 Gear unit

For a low-voltage motor-driven reel (<1 kV), the gearbox is to be mounted flat on the mounting structure, and attention must be paid to avoid any tension that might be introduced by unevenness. The unit must be mounted on a foundation with a smoothness of ≤ 0.1 mm, which is able to support the reel without getting distorted. Weight of the reel: see accompanying technical data sheets. For mounting, screws in a strength class of at least 8.8 must be used. They must be tightened evenly. The screw fasteners are not included in the scope of delivery of Conductix-Wampfler.
For a medium-voltage motor-driven reel (> 1 kV), the gearbox is mounted on a bracket at the factory. The reel system is fastened using the bracket, and this bracket must also be mounted flat on the fastening substructure.

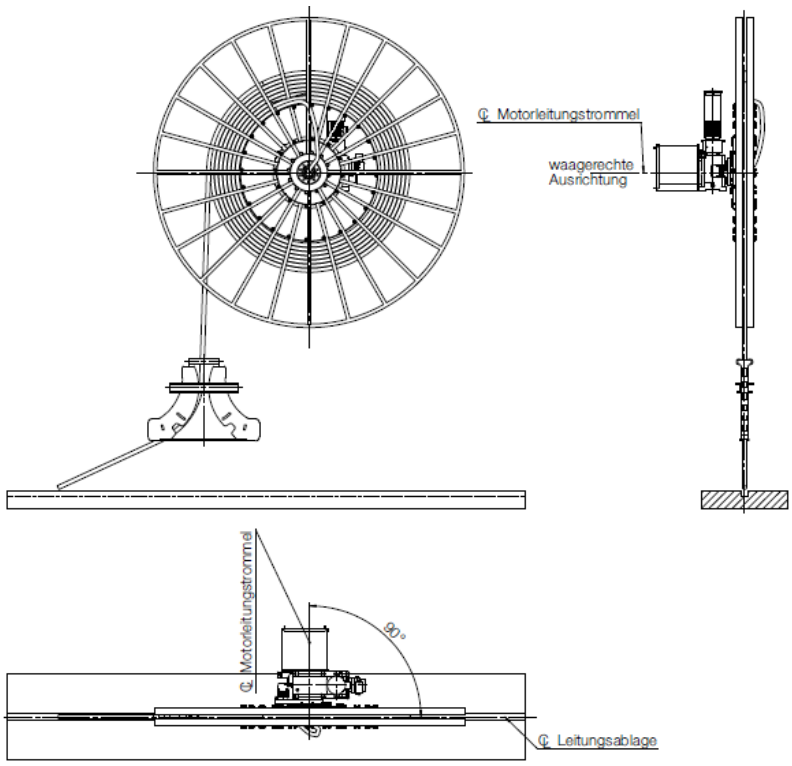
CAUTION!

Damage to the cable!

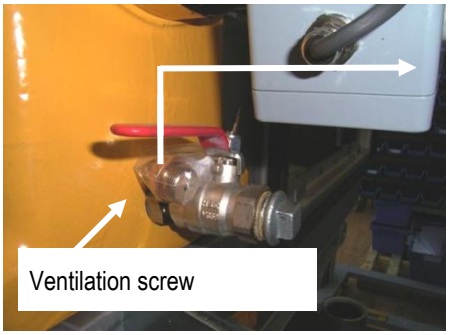
Improper setup can lead to damage to the cable.

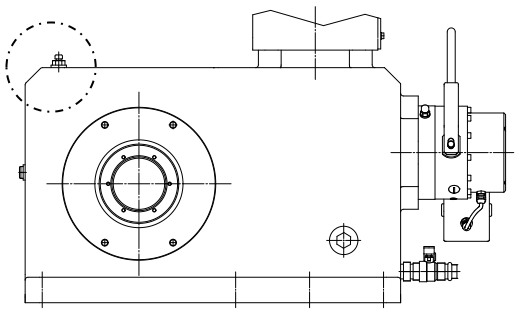
Therefore:

→ Orient the gearbox or motor-driven reel horizontally and at a right angle to the take-off direction!



The gearbox is delivered complete with oil filling. Before commissioning, the ventilation screw included must be mounted in the location provided.





CAUTION!

Leaks due to excess pressure!

If no ventilation screw is installed, operation and increased temperature can lead to excess pressure and cause a leak in the shaft sealing rings.

Therefore:

→ always install the ventilation screw (as a replacement for the existing screw)!

6.3.2 Reel flange

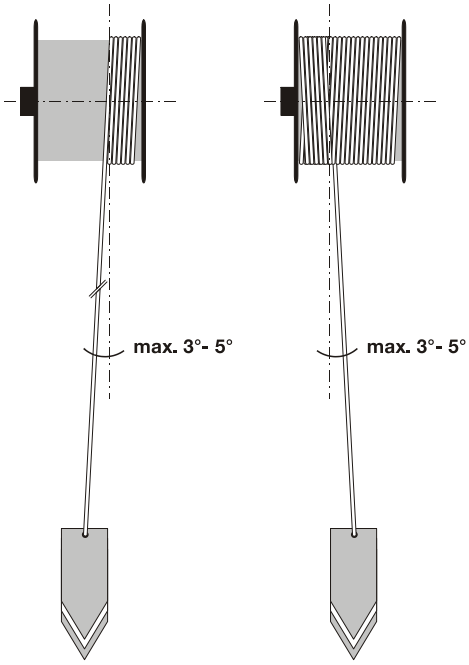
With only a very few exceptions, the reel flange is already installed on the gearboxshaft. However, if this is not the case (e.g. spare part) then its installation and dismounting are described in section 4.2.3.

6.3.3 Reel wheel

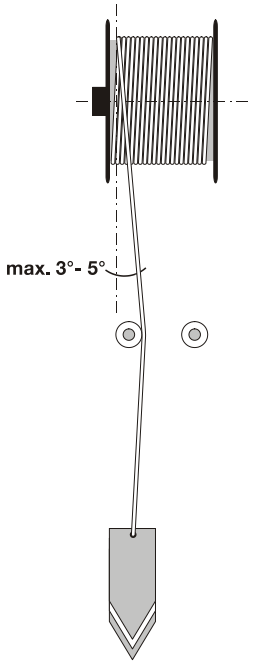
6.3.3.1 Installing the wide winding reel body - type EB

The reel body is fastened onto the fastening flange of the reel flange using hex screws.

When installing wide-winding motor-driven reels (EB), the relative position of the reel to the cable fixed point must be observed. The deflection angle of the cable may not be greater than 3 to 5° at any point (see the figure below).
Only if this maximum permissible angle is observed can proper winding be expected.



Correct arrangement of the wide-winding cable reel to the cable fixed point.



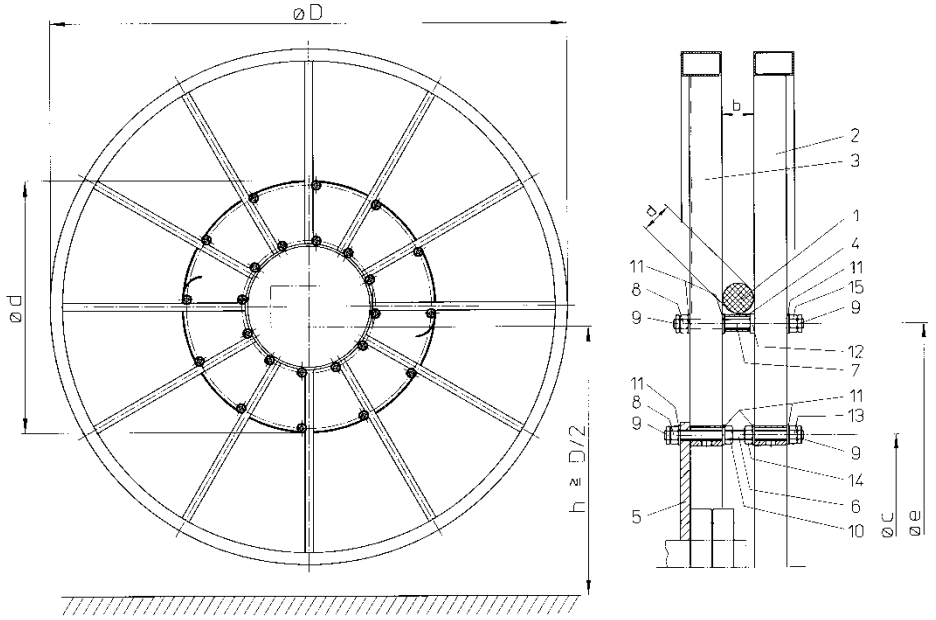
The maximum permissible angle must also be obeyed when using guide rollers. If necessary, the distance of the guide rollers to the cable reel must be increased.

6.3.3.2 Installing the spiral winding reel body - type ES

6.3.3.2.1 Reel body D < 2.5 m non-divided, with one winding space

The reel body is delivered already assembled and consists of:

- 2 reel shields (2/3)
- 1 reel mantle (4)
- 1 fastening flange (5)
- 12 threaded bolts (6) with hex nut (8/10),
  washer (11) and lock nut (9).
- 12 threaded bolts (7) with hex nut (8), washer (11), and lock nut (9).
- Spacer and/or bushing (12). The number may differ depending on the reel type and cable diameter.

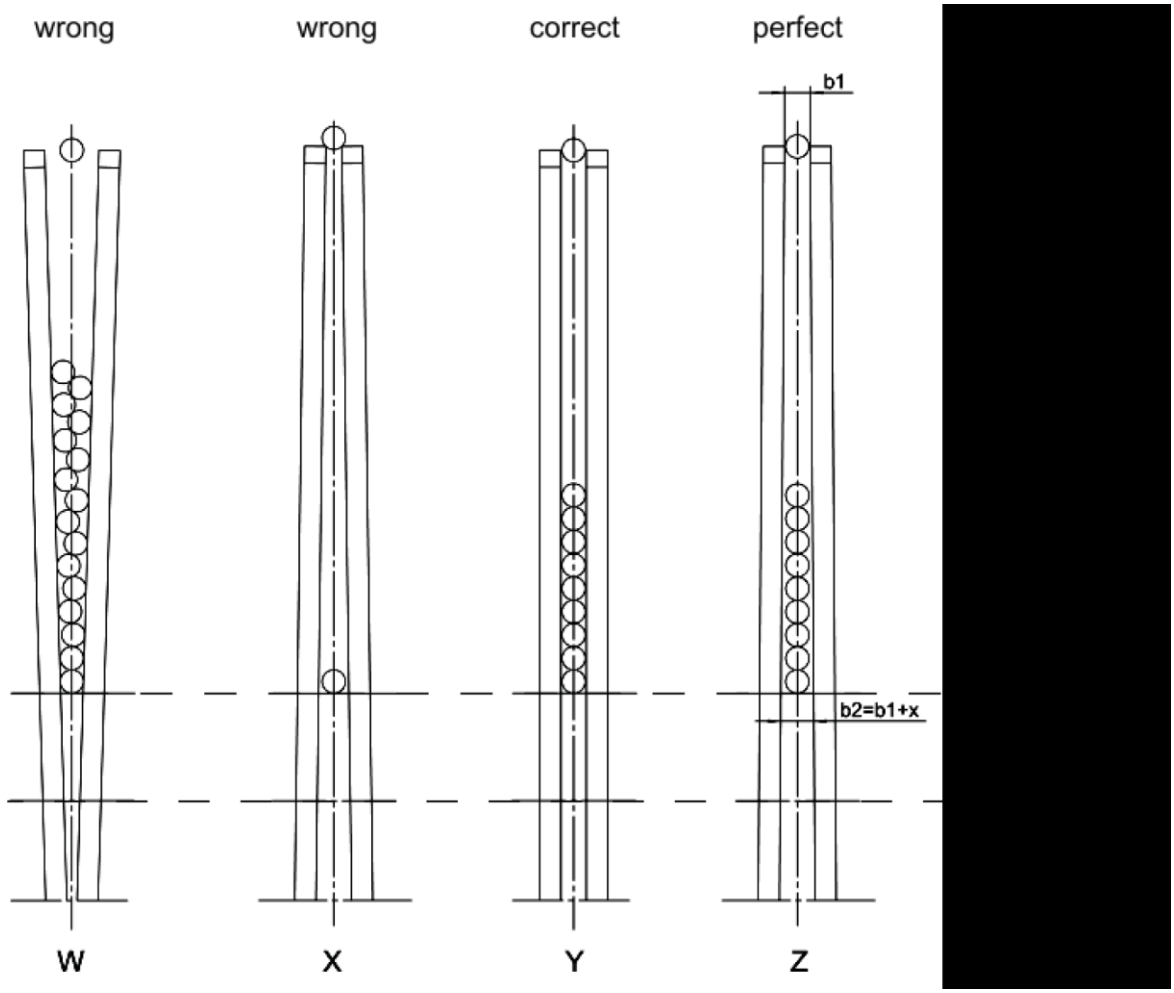


1. Cable
2. Reel shield
3. Reel shield
4. Reel mantle
5. Fastening flange
6. Threaded (adjustment) bolts
7. Threaded bolts
8. Hex nut
9. DIN 7967 lock nut
10. (Adjustment) hex nut
11. Washer
12. Spacers or bushing
13. Hex nut
14. Hex nut
15. Hex nut

If the cable is already wound at the factory, the following step should be omitted.

The reels are preconfigured and delivery according to the application data known from the purchase order. For delivery without wound cable, the actual cable diameter of the cable to be wound must be compared to the reel width delivered. See table page 79. If the reel is too wide or too narrow, the reel width (dimension b) must be adjusted. When setting up the reel, proceed as follows:

1. Reel width b must be adjusted at inner diameter Ød by removing or adding appropriate washers to adapt to the actual cable diameter, so that a slight air gap always remains between the outer mantle of the cable and the reel shields. See table 1 page 79.
2. The two reel shields (2/3) are oriented in parallel or narrowing outwards by adjusting the hex nuts (13/14).
3. Dimension "b" on the outer diameter should be adjusted with the reel empty until it is only just greater than the measured cable diameter.
4. If the minimum adjustable dimension "b" on the reel mantle (Ød) is greater than the cable diameter, then a smaller value must be used for the reel outer diameter D.
5. The alignment must be carried out on each pair of spokes in turn, over multiple rounds. Be sure that all spoke pairs are adjusted to the same value.
6. Measurement is carried out on the reel mantle Ød (inner diameter of the reel/hole ring diameter Øe) and on the outer diameter ØD of the reel.
7. **The tightening of the outer hex nuts (13) on hole ring diameter Øc increases "b"**
8. **The tightening of the inner hex nuts (14) on hole ring diameter Øc reduces "b"**
9. After alignment has been completed, tighten the hex nut (15) on the hole ring diameter Øe to **85 Nm (M12)** and counter with the lock nut (9).
10. On hole ring diameter Øc, tighten the hex nuts (13/14) to **85 Nm (M12)**. Then check the alignment of the reel body for parallelism or narrowing once more.
11. If the result is positive, attach and counter the lock nuts (9).
12. If the parallelism or narrowing towards the outer perimeter has accidentally been changed by tightening the hex nuts (13/14) then repeat the process starting with step 3.



Example: Measured cable diameter: 43.4 mm
Configured reel width at reel mantle: 47.5 mm
Reel width to adjust at the outer diameter: 44.0 mm
(Adjustment according to Figure "Z" above and table 1, page 79.)

Table 1: Reel types ES 6...

Level	Cable diameter (mm)	b (mm) Tolerance ± 2.5	Number of spacers / bushings 2.5 mm / 7.5 mm
1	15 - 16	17	1 / 0
	> 16 - 18.5	19.5	2 / 0
	> 18.5 - 21	22	3 / 0
	> 21 - 22	24.5	1 / 1
2	> 22 - 25.5	27	1 / 0
	> 22.5 - 28	29.5	2 / 0
	> 28 - 30.5	32	3 / 0
	> 30.5 - 32.5	34.5	1 / 1
3	> 32.5 - 34.5	37	1 / 0
	> 34.5 - 37.5	39.5	2 / 0
	> 37.5 - 39	42	3 / 0
	> 39 - 40.5	44.5	1 / 1
4	> 40.5 - 42.5	47.5	2 / 0
	> 44 - 47.5	50	3 / 0
	> 47.5 - 49	52.5	1 / 1
	> 49 - 52	55	2 / 1
	> 52 - 53	57.5	3 / 1

6.3.3.2.2 Reel body D < 2.5 m, non-divided, with 2 or more winding spaces

The reel body is used for the winding of 2 or more identical cables that are suitable for reeling applications.

The reel body is delivered already assembled and consists of:

- 3 reel shields (1/2/3)
- 2 reel mantles (4)
- 1 reel plate (5)
- 12 threaded (adjustment) bolts (7) with hex nut (6/8), washer (9) and lock nut (10).
- 12 threaded bolts (11) with hex nut (8), washer (9) and lock nut (10).
- Spacers and/or bushings (12). The number may differ depending on the reel type and cable diameter. See Tables 1 and 2.

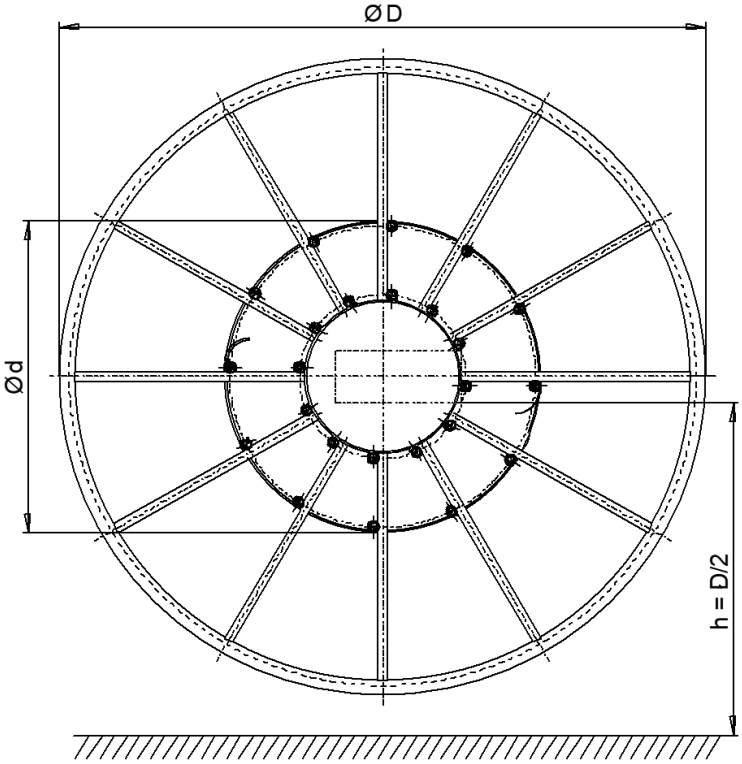


Figure 9.

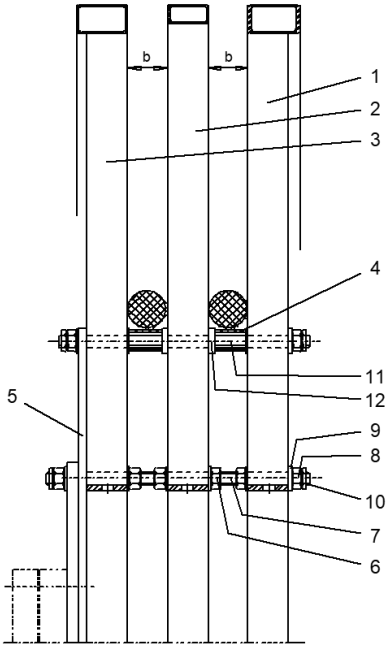


Figure 10.

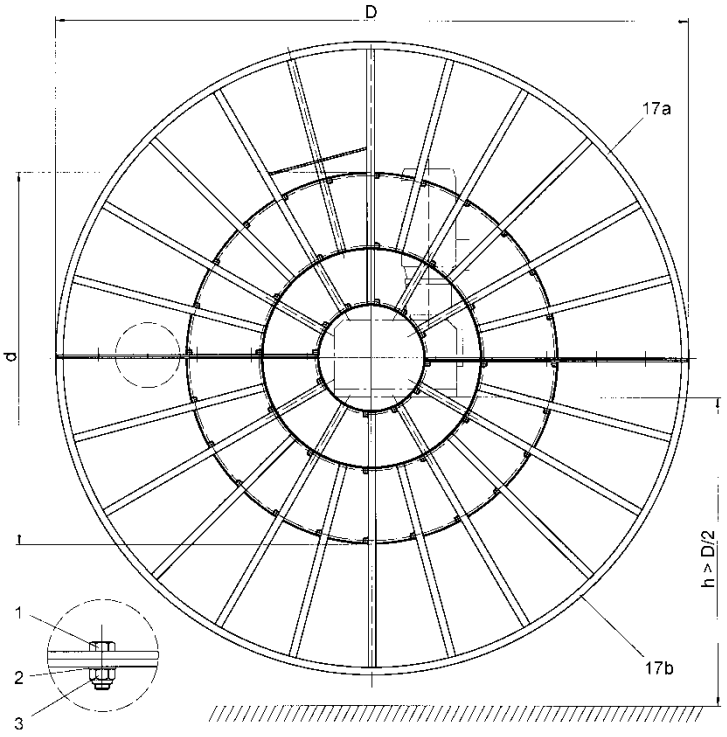
to figure 10.

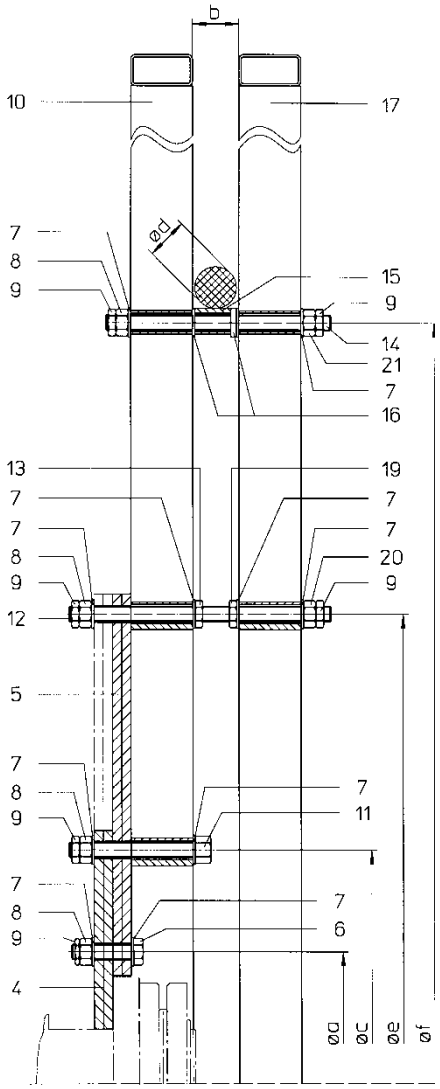
See Table 1 for dimension "b"

1. Reel shield
2. Reel shield
3. Reel shield
4. Reel mantle
5. Reel plate
6. (Adjustment) hex nut
7. Threaded (adjustment) bolts
8. Hex nut
9. Washer
10. DIN 7967 lock nut
11. Spacers or bushing

6.3.3.2.3 Reel body D ≥ 2.5 m, 2-part, with one winding space

The reel body is delivered in 2 preassembled and pre adjusted halves. These are adjusted at the factory to the average value of the cable known from the calculation.





1 / 6 / 11 / 14a / 22	DIN 933 hex bolt	13	DIN 934 or 439 hex nut
2 / 7 / 24	DIN 125 washer	14	Threaded bolts
3 / 8 / 20 / 21 / 23	DIN 985 hex nut	15	Reel mantle
4	Fastening flange	16	DIN 125 spacer or bushing
5	Reel plate	17	2. Reel shield
9	DIN 7967 lock nut	18	Ramp
10	1. Reel shield	19 / 20 / 21	(Adjustment) hex nuts
12	Threaded (adjustment) bolts	25	Cable entry (Shortened spoke in 2nd reel shield)

The following components are included in the scope of delivery:

- 1 reel shield (10) - this has 4 hole ring diameters - Øa, Øc, Øe, and Øf.
- 2 reel shield (17) - this has 2 hole ring diameters - Øe, and Øf.
- Reel mantle (15) with reel inner diameter Ød and for greater cable diameters a ramp (18) with a hex bolt (22), 2 or more washers (24), and a hex nut (23).
- One or 2 reel plates (5).
- 8 or more screw fasteners (1) with spring washer (2) and hex nut (3). (the exact number depends on the outer diameter D of the reel).
- 24 screw fasteners (6/11) with hex nut (8), washer (7) and lock nut (9).
- 12 threaded (adjustment) bolts (12) with hex nuts (8/13/19/20), washer (7) and lock nut (9).
- 23 threaded bolts (14) and one hex bolt (14a), with hex nut (8/21), washer (7) and lock nut (9).
- Spacer and/or bushing (16). The number may differ depending on the reel type and cable diameter.

Prerequisites

The gearbox must be installed at a height such that a minimum distance from the floor of half the reel body outer diameter (D/2) is ensured.

Assembling the reel wheel halves

- Place the preassembled wheel halves on a flat surface.
- Orient the reel wheel halves in accordance with any numbering and screw together with bolts (1), nuts (2), and washers (3).
- The transition of the assembly surfaces on the inner side of the reel shields (6/7) must be **even and smooth**.

Installing the reel plates (5)

- Push reel plates (5) over the hollow shaft towards the fastening flange (4).
- Screw the reel plate (5) and fastening flange (4) onto hole ring diameter Øa using 12 hex bolts (6), the associated washers (7), and the hex nuts (8).
- Secure the connections with the lock nuts (9).

Installing the reel wheel

- Connect the reel wheel to the reel plate (5) using the hex bolts (11) at hole ring Øc and the projecting threaded bolts (12) at hole ring Øe.
- Tighten the hex nuts (8) on the gear side on hole ring diameter Øc and Øe to **300 Nm** (M20) and **200 Nm** (M16) respectively, and counter with lock nuts (9).

Reel width

The factory adjustment of the reel width according to table 2, page 85, takes the average cable diameter into consideration. The reel width "b" to be adjusted, however, is based on the actual cable diameter "d" (to be measured by the customer). Between the reel mantle (15) and the reel shields (10, 17), spacers (16) or bushings must be inserted during the factory adjustment. The placement of the spacers (16) and bushings can be seen in the figure on page 82. By removing/adding washers of 3 mm thickness each around the entire hole ring, or after replacing a bushing h = 4.5 mm with a washer, the reel width can be selected to be as small as possible. The reel width “b” must be slightly wider than the measured cable diameter.

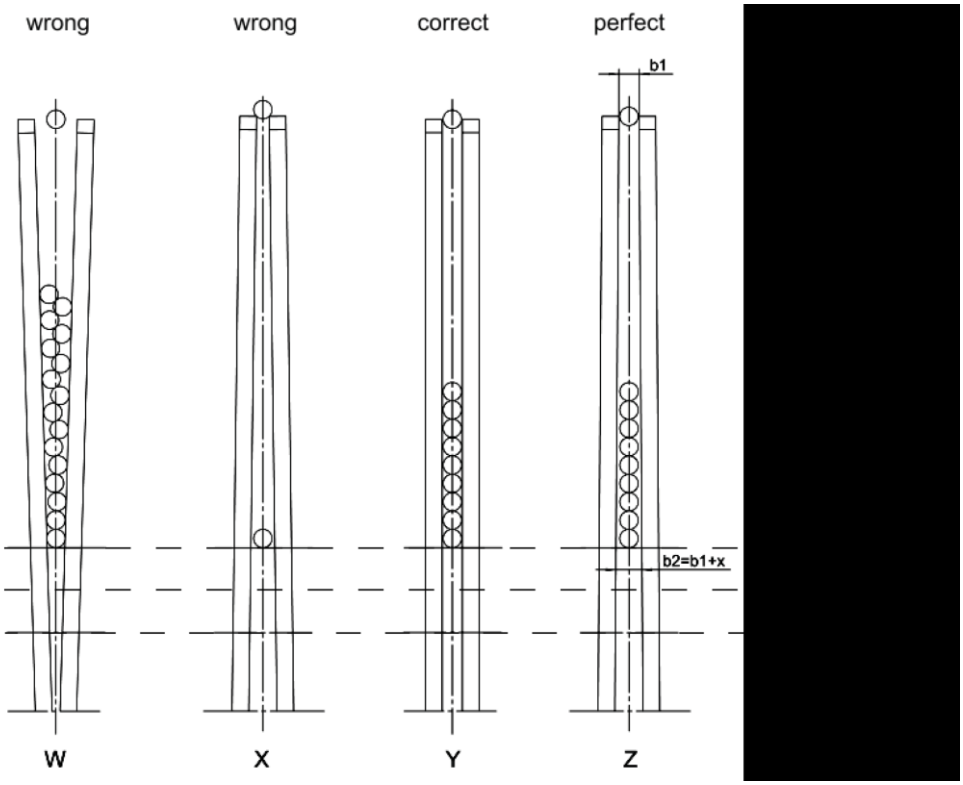
Example:	Rated cable diameter:	47.0 mm
	Reel width delivered:	50.5 mm
	Measured cable diameter:	46.1 mm
	Reel width to be adjusted:	47.5 mm (alternatively: 49 mm)
	(remove or omit one washer on each bolt connection around the entire hole ring)	

Table 2: Reel types ES10.., ES 12.., ES 16.., and ES 20..

Mantle width [mm]	Cable diameter ∅ [mm]	**b** [mm]	Quantity spacers 3 / bushings 4,5 / bushings 9	Mantle width [mm]	Cable diameter ∅ [mm]	**b** [mm]	Quantity spacers 3 / bushings 4,5 / bushings 9
	19.0 – 21.2	23	1 / 0 / 0		55.2 – 56.1	59	3 / 0 / 0
	21.3 – 23.0	24.5	0 / 1 / 0		56.2 – 57.9	60.5	2 / 1 / 0
	23.1 – 23.9	26	2 / 0 / 0		58.0 – 58.8	62	4 / 0 / 0
	24.0 – 25.7	27.5	1 / 1 / 0		58.9 – 60.6	63.5	3 / 1 / 0
20	25.8 – 26.6	29	3 / 0 / 0	50	60.7 – 62.4	65	2 / 0 / 1
	26.7 – 28.4	30.5	2 / 1 / 0		62.5 – 64.0	66.5	1 / 1 / 1
	28.5 – 29.3	32	4 / 0 / 0		64.1 – 65.0	68	3 / 0 / 1
	29.4 – 31.1	33.5	3 / 1 / 0		65.1 – 66.7	69.5	2 / 1 / 1
	31.2 – 32.0	35	5 / 0 / 0		66.8 – 67.7	71	4 / 0 / 1
	32.1 – 33.9	36	2 / 0 / 0		67.9 – 68.8	72	4 / 0 / 0
	34.0 – 35.7	37.5	1 / 1 / 0		68.9 – 70.6	73.5	3 / 1 / 0
	35.8 – 36.6	39	3 / 0 / 0		70.7 – 72.4	75	2 / 0 / 1
30	36.7 – 38.4	40.5	2 / 1 / 0	60	72.5 – 74.0	76.5	1 / 1 / 1
	38.5 – 40.3	42	4 / 0 / 0		74.1 – 75.0	78	3 / 0 / 1
	40.4 – 41.1	43.5	3 / 1 / 0		75.1 – 76.7	79.5	2 / 1 / 1
	41.2 – 42.7	45	2 / 0 / 1		76.8 – 77.7	81	4 / 0 / 1
	42.8 – 43.9	46	2 / 0 / 0		77.9 – 81.1	84	3 / 0 / 0
	44.0 – 45.7	47.5	1 / 1 / 0		81.2 – 82.9	85.5	2 / 1 / 0
	45.8 – 46.6	49	3 / 0 / 0		83.0 – 83.8	87	4 / 0 / 0
	46.7 – 48.4	50.5	2 / 1 / 0		83.9 – 85.6	88.5	3 / 1 / 0
40	48.5 – 48.8	52	4 / 0 / 0	75	85.7 – 87.4	90	2 / 0 / 1
	48.9 – 50.6	53.5	3 / 1 / 0		87.5 – 89.0	91.5	1 / 1 / 1
	50.7 – 52.4	55	2 / 0 / 1		89.1 – 90.0	93	3 / 0 / 1
	52.5 – 54.2	56.5	1 / 1 / 1		90.1 – 91.7	94.5	2 / 1 / 1
	54.3 – 55.1	58	3 / 0 / 1		91.8 – 92.7	96	4 / 0 / 1

Initial alignment of the reel

1. See figure page 82. Tighten the hex nuts (8 and 21) on the gear side on hole ring diameter Øf (reel mantle d, inner diameter of the reel) to **300 Nm** (M20) and **200 Nm** (M16) respectively, and counter with lock nuts (9).
2. Orient the reel shields (10/17) in parallel or narrowing outwards by adjusting the hex nuts (19/20).
3. Adjust dimension b on the reel mantle d (inner diameter of the reel / hole ring diameter Øf) using the spacers/bushings to as small a value as possible relative to the actual cable diameter.
4. If the minimum adjustable dimension "b" on the reel mantle is greater than the measured cable diameter, then a smaller value must be used for the reel outer diameter.
5. The alignment must be carried out on each pair of spokes in turn, multiple times. Be sure that all spoke pairs are adjusted to the same value.
6. Measurement is carried out on the reel mantle d (inner diameter of the reel- / hole ring diameter Øf) and on the outer diameter D of the reel.
7. **The tightening of the hex nuts (20) on hole ring diameter Øe increases "b".**
8. **The tightening of the hex nuts (19) on hole ring diameter Øe reduces "b".**
9. Tighten the hex nuts (8 and 21) on hole ring diameter Øf to **300 Nm** (M20) and **200 Nm** (M16) respectively, and counter with lock nuts (9).
10. Tighten the hex nuts (8/19/20) on hole ring diameter Øe to **300 Nm** (M20) and **200 Nm** (M16) respectively.
11. Be sure that the aligned position is not offset.
12. If the result is positive, attach and counter the lock nuts (9) on hole ring diameter Øe.
13. If the parallelism or narrowing towards the outer perimeter has accidentally been changed by tightening the hex nuts (19/20) then repeat the process starting with step 3.



Example:	Measured cable diameter:	56.1 mm
	Configured reel width at reel mantle:	59.0 mm
	Reel width to adjust at the outer diameter:	57.0 mm
	(Adjustment according to Figure "Z" above)	

6.3.3.2.4 Mounting the ramp

Depending on the reel width, there may be a ramp provided for the cable entry (see Figures 12 and 13).

The ramp (18) is attached to the reel mantle (4) in such a way that the first winding layer transitions to the second winding layer without kinking. winding layer transitions to the second winding layer without kinking. winding layer without kinking. This also avoids crushing the cable in the area of the cable entry. Kinking and crushing must absolutely be avoided in cables with fiber optics.
To this end, a hole Ø8 or Ø9 must be drilled at a distance "g" from the U profile of the reel mantle (Figures 12 and 13). The orientation of the drill hole is based on the diameter of the cable.

Note: Crushing of the cable at the cable entry (25) should be avoided. Observe the cable's minimum bending radius. Make sure the points in 4.2.1.2 have been taken care of by a trained electrician beforehand.

Washers (24) can be placed under the ramp (18) to adjust the height so that it corresponds roughly to the cable diameter. Afterwards, bolt the ramp (18) firmly to the reel mantle using the hex bolts (22) and hex nuts (23).

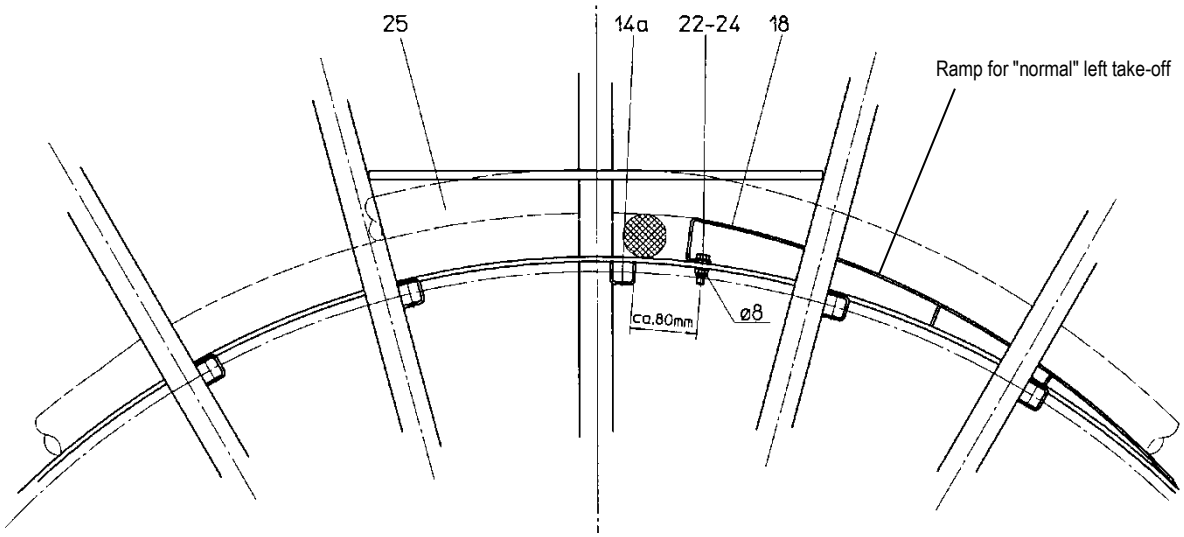


Figure 11. Cable take-off normal / left (looking onto the reel wheel from outside, gearbox and drive hidden from view).

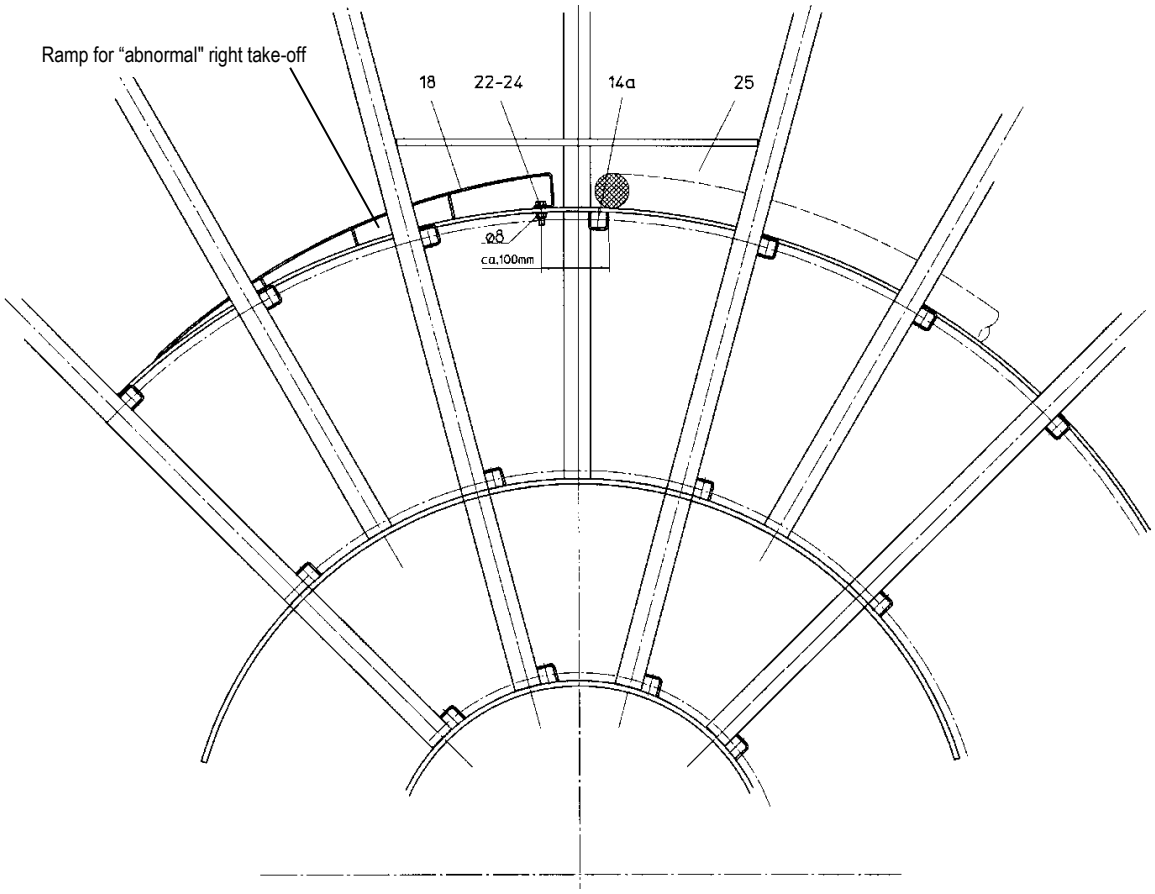


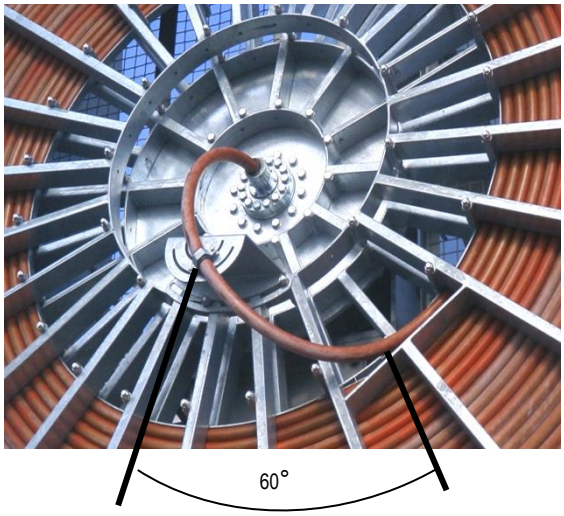
Figure 12. Cable take-off uncommon / right (looking onto the reel wheel from outside, gearbox and drive hidden from view).

6.3.3.2.5 Angle for cable guide (reel size D > 3.6 m)

Starting at a reel width Ø 3.6 m, to stabilize the cable between the cable entry on the reel wheel and the cable screw connector, there is an angle bracket included in the scope of delivery for fastening. For better transport, the angle bracket is mounted on the reel flange of the gear unit. Remove the angle bracket for the cable entry before commissioning and fasten it to the place provided on the reel.

The angle bracket for fastening the cable should be mounted at about 60° to the cable entry, as shown.

1. See figure page 82. Remove the corresponding nuts (14) on hole ring diameter Øc
2. Screw the hex bolts onto the screws
3. Orient the angle bracket to the cable collar and secure it with the nuts removed in step 1.
4. Fasten the cable with a cable collar



6.3.4 Installing the cable

6.3.4.1 Preparing the cable

Mount shipping reel or ring with its axis at a distance of a few meters from the reel axis (see Figure 13).
This will ensure a twist-free recoiling while retaining the slight intrinsic bend found especially in heavier cables.

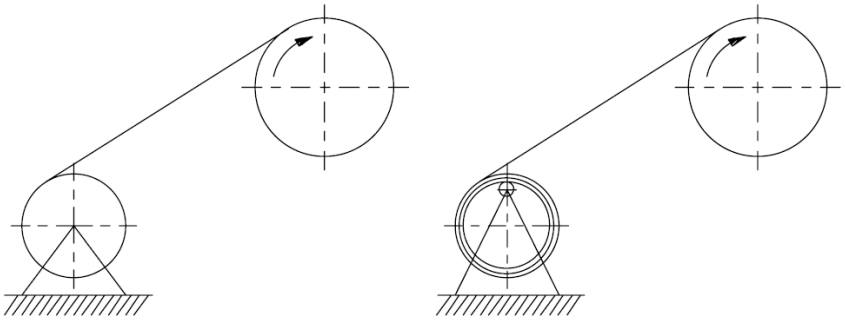


Figure 13.: Preparation of reel cable

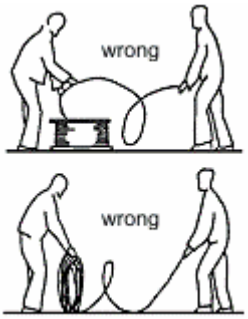


Figure 14.

Note: S-shaped cable guidance to the motor reel must be avoided during initial coiling!

CAUTION!

Danger of reel opening!

Mold release agent and lubricants on the cable reduce friction. The cable windings can thus wedge and press the reel shields apart. In particular ES reel wheels are prone to this.

Therefore:

→ Clean cable before winding!

CAUTION!

Danger of reel opening!

If the cable has a twist, it can no longer be placed properly in the wheel. The cable windings can thus wedge and press the reel shields apart.

Therefore:

→ The cable must be installed on the reel free of twists!

6.3.4.2 Installing the cable on reel body type EB

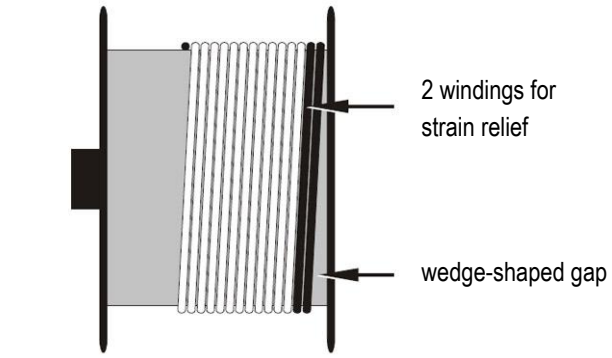
Preparation

To connect to the slip ring assembly, the cable must be stripped to a certain length. To calculate this length, proceed as follows:

1. Open the cover of the SRB housing.
2. Measure length between the flange fastening and the top point of the slip ring assembly.
3. Strip cable on this measured length.
4. Trim strands, taking individual ring distances into consideration.
5. Provide the ends of the individual strands with appropriate cable shoes.

Winding

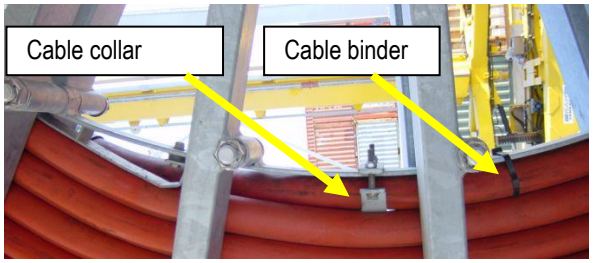
Guide the cable through the cable entry on the reel body, the cable collar in the interior of the reel, and the hollow shaft of the gearbox to the most remote connection point of the slip ring assembly. Then tighten the cable screw connection on the hollow shaft. After observing the minimum bending radius (6 x the cable diameter) between the cable collar and the screw connector, the cable collar must be firmly tightened. By turning the reel body by hand or provisionally connecting the drive motor (see "Drive motor" in the operating instructions), the cable can slowly be wound onto the reel body. By guiding the cable by hand, it is ensured that it is wound without twisting (see any labeling on the cable to help this effort) and in even coils.



6.3.4.3 Installing the cable on reel body type EB

The cable end coming from the shipping reel is pushed between the reel shields onto the reel mantle. At the cable entry, the end of the cable projects out from the reel wheel. Now guide the cable end through the stuffing box (there is a break-out rubber ring) and the hollow shaft of the gearbox to the further connection point of the slip ring assembly. If there is a ramp, the cable must be guided out of the winding area before the ramp. Before tightening the stuffing box with a face wrench, it must be adjusted to the actual outer diameter of the cable. Be sure that the part of the cable that is not stripped is within the rubber ring. If the rubber ring leaks after the stuffing box is tightened, it must be caulked with additional caulking (for example SSW E 105).

The cable must be fastened to the reel mantle with a cable collar as shown. It will also make winding easier if the first winding layer is fastened with cable clips all the way around the reel.



CAUTION!

Damage to the cable!

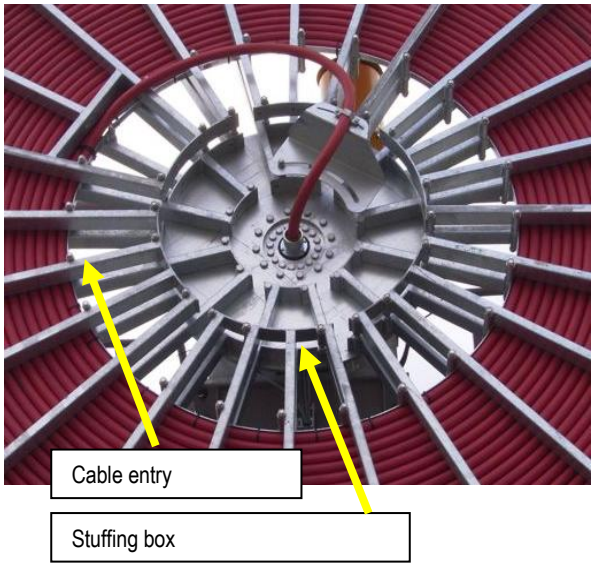
If the bending radius is below the minimum, the cable – especially optical fiber cables – can be damaged.

Therefore:

→ Observe the cable's minimum bending radius.

Winding up the cable by hand

The cable is wound up by slowly turning the reel shields by hand (after first disengaging the brake in the drive motor).



Winding up the cable by reel drive via frequency converter

WARNING!

Danger due to entanglement!

As the reel turns, its projecting threaded rods and other parts can entangle a person. Severe injury is likely to occur as a consequence.

Therefore:

→ Dismiss all persons from the danger area who do not participate in putting up the cable.

→ Shut down the system and secure it against unauthorized, unintentional, and/or erroneous activation.

→ Do not wear jewelry. Wear tight-fitting work clothes and head protection.

→ During commissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

Motor-driven reel

Frequency-controlled

WARNING!

Danger of being pulled in and caught!

Between the layers of the winding-up cable and between reel and cable, hands and pieces of clothing may pulled in and get caught. Severe injury is likely to occur as a consequence.

Therefore:

→ Let go of the cable and keep a distance when approaching the reel.

→ Generally, keep a distance from the location where the cable is pulled into the reel.

→ Do not put your hands into the turning reel.

→ Dismiss all persons from the danger area who do not participate in putting up the cable.

→ Do not wear jewelry. Wear tight-fitting work clothes and head protection.

CAUTION!

Risk of injury! Situation complex!

Persons may be harmed, if in threatening situations (person jammed) machine shut-down is not possible immediately.

Therefore:

→ The reel and the persons working on it must be visible from the position where the reel drive is switched on and off.

→ Under no circumstances connect the motor directly to the grid. The motor is only allowed to run at low speed via the frequency converter in speed control mode.

The cable can also be wound on the reel by using the drive motor. To keep the risk as low as possible, the motor is only allowed to run at low speed via the frequency converter in speed control mode. Working is safe and the cable tension is evenly.

→ A sudden winding by motor in jog mode must absolutely be avoided!

On the first commissioning of the reel it is important that the cable is reeled up tight.
The cables are wound up constantly in layers without any spaces in between.
At a new cable, which is still very soft and smooth, it might slip out laterally within the reel wheel.
If the cable is only reeled up in a certain section, it must be reeled on and off from time to time.
This must be done every week in the beginning, and later after inspection or once a month.
Otherwise the lateral escape might cause damage to the insulation of the cable or the reel itself.

6.3.5 Connecting cables

See operating instructions for slip ring assemblies and Chapter 4.2.8.

DANGER!

Danger of death by electric shock!

→ Only qualified electricians are allowed to perform work on slip ring assemblies.

→ Disconnect device from power. Follow the 5 rules for safety (see 4.2.8.2).

→ Connect cables only when de-energized.

→ **When connecting, strictly follow** advice given under 4.2.8.2 and 4.2.8.3 .

→ Prior to switching power on, check whether the housing is safely grounded (connected to protective conductor (PE)).

6.3.6 Slip ring assembly

The slip ring assembly is already assembled for delivery. The customer must generally connect the fixed cable on the brush side. See Chapter 4.2.8.3.

WARNING!

Injury due to insufficient qualification!

Improper connection of cables to the slip ring assembly can lead to significant personal injury and property damage.

Therefore:

→ Placement and connection of the cable must be carried out by an electrician.

WARNING!

Danger of slipping on the slip ring assembly housings!

Slip ring assembly housing covers and other cover plates are generally made of thin sheet metal. They are not designed to support a person! Stepping on one of them can lead to slipping and falling, or you could break through into the slip ring assembly. At least permanent deformation of the metal can be expected.

Therefore:

→ Stepping on the slip ring assembly housing is forbidden!

6.3.7 Rotating optical fiber transmitter

6.3.7.1 Commissioning

6.3.7.1.1 General information

Commissioning may only be carried out by an electrician. Before commissioning, the technical data on the type plate must be checked and compared with the application specified.

CAUTION!

Cable may break!

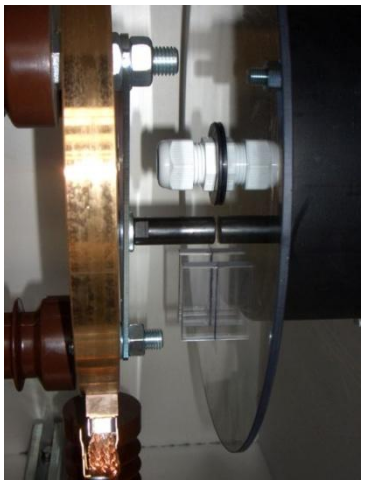
If the rotating optical fiber transmitter is "overtwisted", there is a risk of breaking the optical fibers.

Therefore:

→ The connection of the rotating optical fiber transmitter must be at the feed point, since the reel cable is fully wound there.

→ The adjustment of the rotating optical fiber transmitter must be carried out depending on the direction of winding - normal (left) or abnormal (right) (see 6.3.7.1.3).

6.3.7.1.2 Delivery condition



Upon delivery, the towing bolt is not engaged with the towing plate. The rotating optical fiber transmitter is adjusted to the middle setting of the maximum possible usable rotations and secured with a transportation lock against turning.

CAUTION!

Protection of the rotating transmitter!

If the system is operated without connecting the rotating optical fiber transmitter, protect the rotating transmitter against damage.

Therefore:

→ Disengage towing plate and towing bolt.

→ The mounted cable screw connector must be replaced with a plastic screw plug.

6.3.7.1.3 Preparation

1. Transportation lock mounted

2. Storage of transportation lock

- Remove the connection length of the cable from the reel, configure it and number it
- Remove the transportation lock (this can be reinstalled for storage - see figure)
- Remove the premounted rotating optical fiber transmitter and plug strip by loosening the screw fasteners

NOTE!

If the installed cable screw connection is not used, a non-metallic cable screw connection must be used instead.

Balance and calibrate the rotating optical fiber transmitter now to the current number of layers on the reel wheel as follows by turning it manually:

Z	=	counter setting to set on the rotating optical fiber transmitter
NW	=	rated number of windings of the rotating optical fiber transmitter (e.g. 40)
AL	=	number of layers on the full reel (including 2 reserve windings). Count at the feed point.

Normal take-off (left):	Z = NW-(NW-AL)/2	For example: Z = 40-(40-30)/2 = 35
Abnormal take-off (right):	Z = (NW-AL)/2	For example: Z = (40-30)/2 = 05

Example:
If 30 windings are on the reel (including 2 reserve windings) (for a rotating optical fiber transmitter with a maximum of 40 turns) and the take-off direction is normal (left), the counter must be at 35 at the feed point. If the take-off direction is abnormal (right), the counter at the feed point must show 05.

CAUTION!

Cable may break!

When the usable position is exceeded, there is a danger that the cable may break.

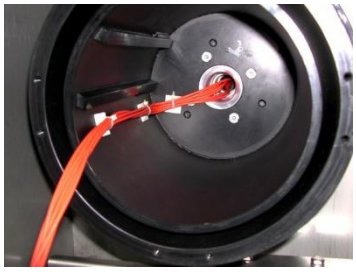
Therefore:

→ During setup and operation, the rotating optical fiber transmitter may not be turned below 00 or above the permitted number of windings, since this could lead to damage.

6.3.7.1.4 Connecting the cable

NOTE!

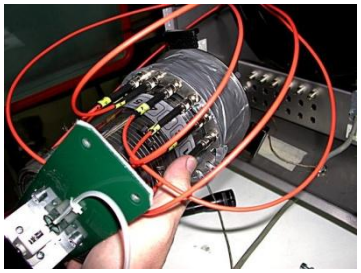
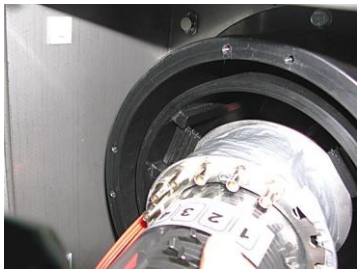
Be sure that cables are not kinked and that the minimum bending radius of 10 mm is respected.


Insert the rotating optical fiber transmitter into the inner socket through the cable screw connection and fasten it to the inner socket using the attached cable straps and supports.
For rotating optical fiber transmitter cables with more than 6 strands, the fastening of the individual strands should take place as shown below:

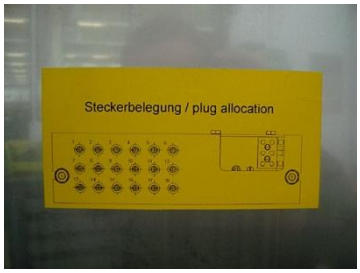
6 strands: 1 line / 12 strands: 2 lines / 18 strands: 3 lines

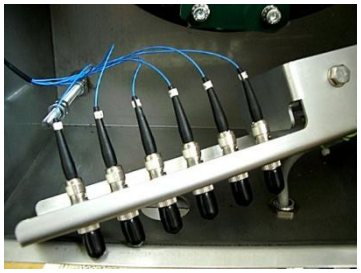

Connect the ST connectors by number to the coupling sockets on the connector ring.

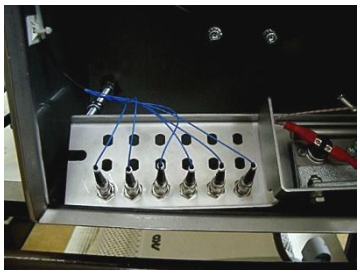
Insert the rotating optical fiber transmitter into the inner socket using the positioning aid.

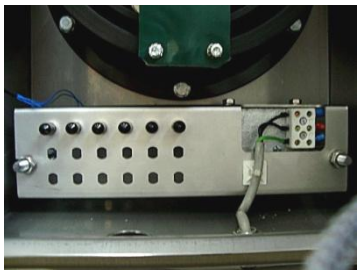
The three drive pins on the underside of the rotating optical fiber transmitter must engage the drill holes on the floor of the inner socket.



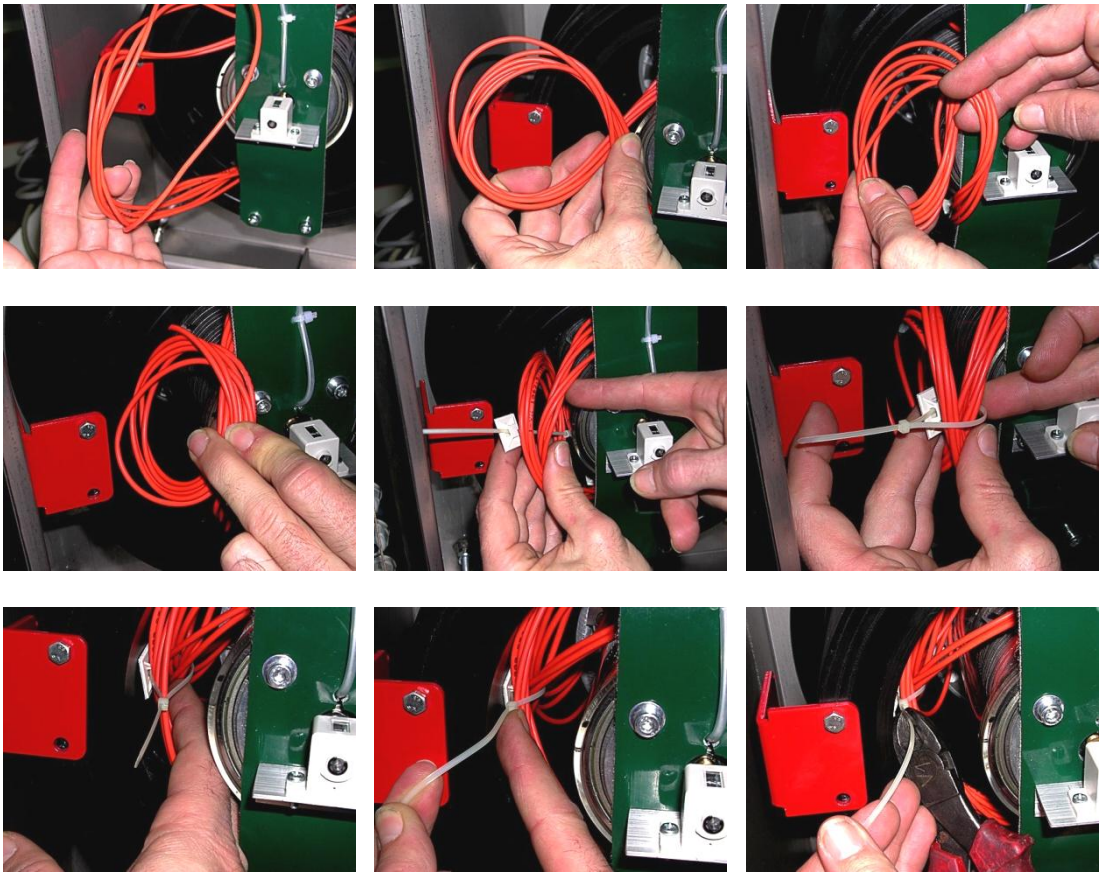


Fasten the torque bracket to the outer socket.
Connect the plugs according to the plug allocation sticker.





Mount the plug strip.



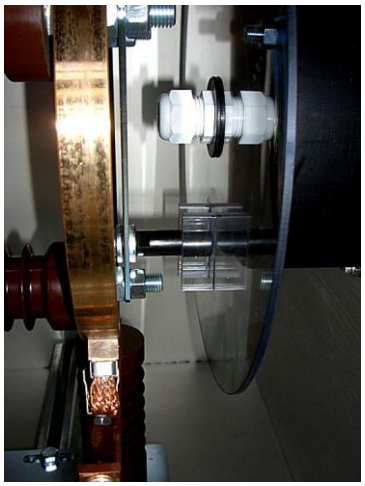
Overly long strands of the reel cable must be stowed and fastened between the rotating optical fiber transmitter and the wall of the inner socket as shown in the figures.

Fasten the strands of the rotating optical fiber transmitter with cable binders **(do not pull binders tight!)** to the inner wall of the connection box.

NOTE!

The optical fiber cables must be fastened in such a way that they do not rub against the fixed torque bracket as the rotating optical fiber transmitter turns.

6.3.7.1.5 Mechanical connection

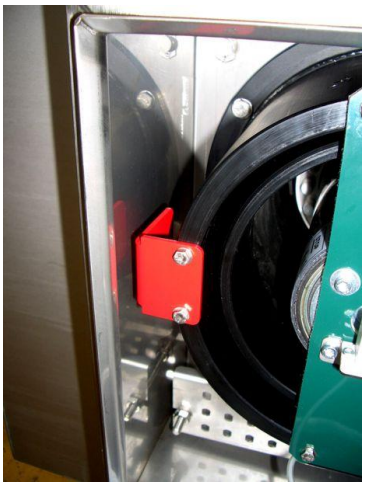


The mechanical connection is carried out by pushing the towing bolt into the guide of the towing plate.

NOTE!

The transportation lock may no longer be engaged.

Placing the transportation lock into the storage position.



6.3.8 TFO rotary fiber-optic transmitter
6.3.8.1 Commissioning

The TFO can be commissioned at any point along the path of the device. The cable of the cable reel must be connected to a fixed point and fastened with stress relief.

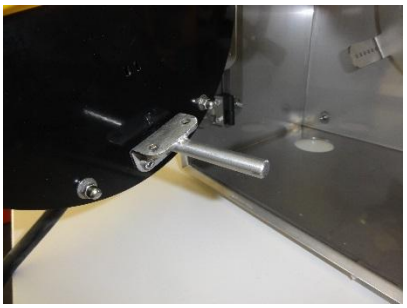
6.3.8.2 Preparation of the cable reel

Before commissioning, make sure that the following precautions have been taken for the cable reel:

- The system is not live (power supply is off)
- The cable is placed on the drum and the electrical wires of the cable are connected to the slip-ring assembly of the cable reel
- The other end of the cable is secured and connected with stress relief

6.3.8.3 Mechanical connection of the TFO

Delivery condition:
Follower in the parked position. TFO secured against twisting.

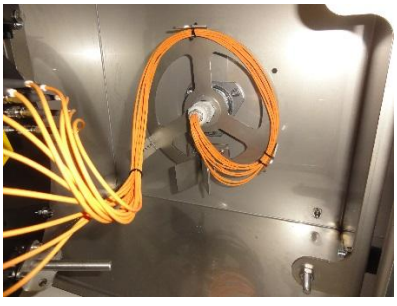


Preparation:
Remove the cable ties and install the follower as shown.

Operation:
The follower must be engaged.

6.3.8.4 Optical connection of the TFO

Insert the fiber-optic cable. Fix the splitter with the cable gland.



Secure the fiber-optic cables to the follower disk with cable ties.

Connect plugs and couplings according to the writing on the yellow label.

DANGER!

Make sure that the optical fibers do not break!
→ The device must be handled with care.

6.3.8.5 Electrical connection of the TFO

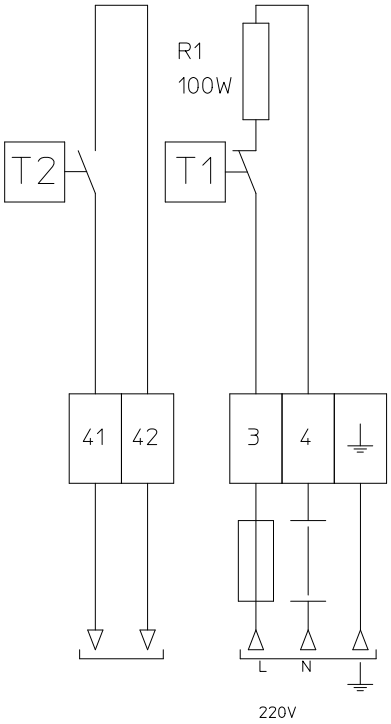
- The TFO must not be operated without temperature monitoring.
- Before commissioning, the heating unit must be wired up strictly in accordance with circuit diagram 440N111.
- The heating unit must always be connected to a power supply, even during shutdown phases of the equipment.

TFO heating unit

T1:
Thermostat for
isolating the heating unit

T2:
Thermostat for information
TFO temperature OK

Circuit breakers installed by
the customer



Info: “TFO heating unit ready”

The TFO heating unit must be ready (T2 closed) for the TFO to operate.

6.3.9 Cam switch with gears (limit switch)

The cam switch with gears (limit switch) is already assembled for delivery.
There are no maintenance or inspection tasks required for the cam switch with gears (limit switch).
Collected dust may under no circumstances be removed with compressed air, since this can force the dust into the contacts and hinder proper switching behavior. The cover seals of the protective housing must be replaced after opening the cover after a longer period of operation. Under no circumstances should gasoline or other solvents be used to clean the cam switch with gears (limit switch)!
If replacing the cam switch with gears (limit switch), follow the instructions in section 4.2.9.

Adjusting contacts

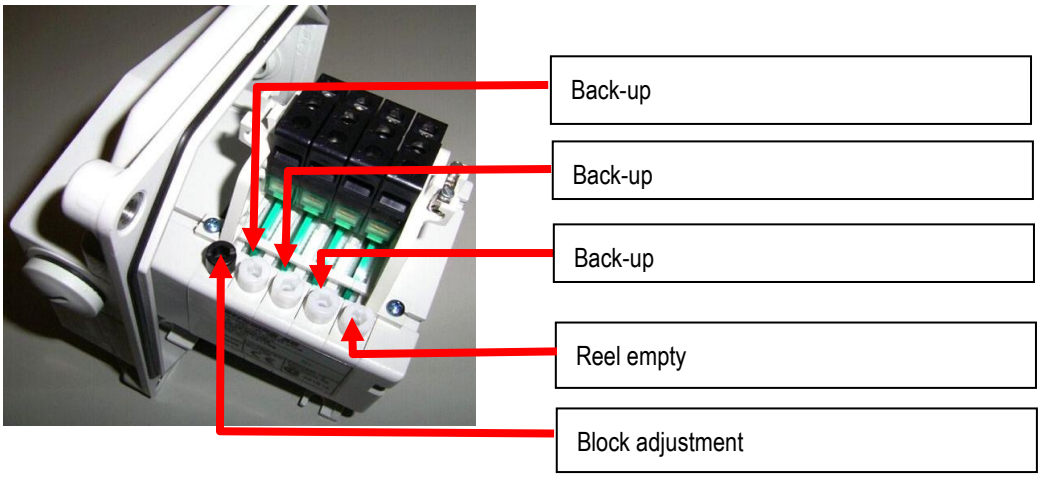
WARNING!

Danger of injury from live contacts!

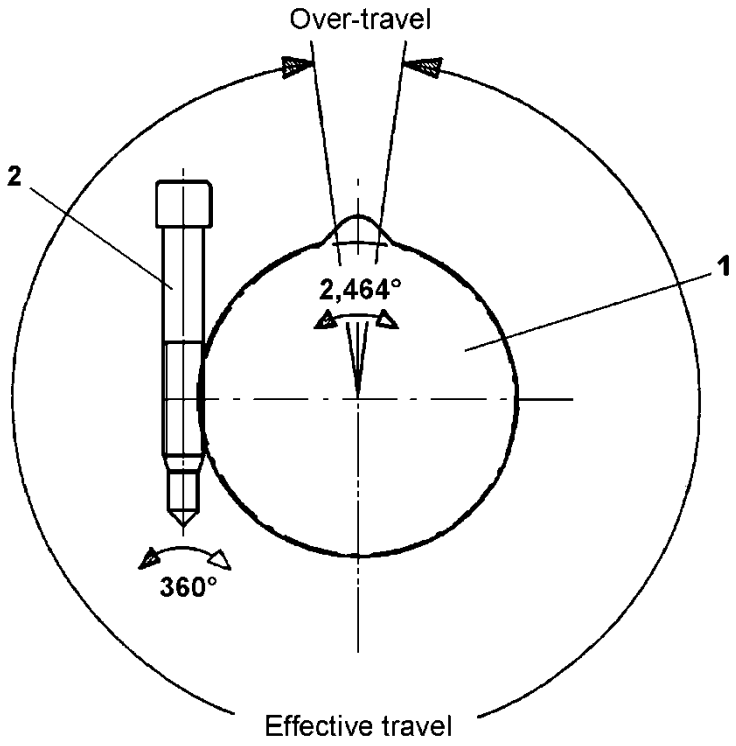
To adjust the contacts, remove the cover of the cam switch with gears (limit switch). This will expose live contacts.

Therefore:

→ Before opening the cover, the system must be disconnected from power and secured against accidental powering up.



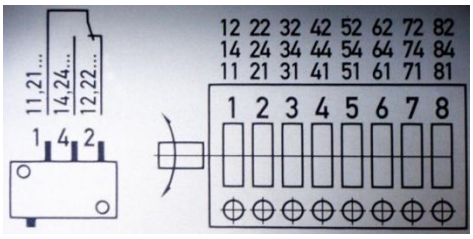
To adjust the cam switch with gears (limit switch), remove the cover. The green switching cam is adjusted by turning the white adjustment screw.
Each contact is assigned to a cam disk that is capable of continuous adjustment. The cam disks (1) can be adjusted independently using the adjustment screws (2). The adjustment can be carried out without loosening any parts. The adjustment screw is self-locking. The preadjustment of the adjustment screw can be carried out with 10 mm or 4 mm screwdrivers or with a 4 mm Allen wrench.
Turning the adjustment screw by one turn (360°) to the right turns the cam, also in the rightwards direction, by 2.464° (rear view, the B side of the switch).
The standard cam disks are designed to provide a maximum effective travel and an over-travel. Cam disks with other effective travels can be installed as special disks.
If the over-travel is exceeded, no damage to the switch will result. However, the contact will open or close again.



After adjusting the contacts, the cam switch should be covered again immediately, so that no penetrating dust or water can hinder the switch reliability.
Accidents due to contact with the live parts will also be prevented.
When putting the cover into place, be sure the screws are fully and evenly tightened to avoid twisting the cover and putting incorrect pressure on the seal.
During installation of the cable, be particularly sure that the clamping nuts are carefully tightened after introduction of the cable (2 to 3 Nm depending on the type of cable). Since the plastic mantle on some cables can be permanently deformed by the pressure at the clamping point of the Pg screw connector, it is a good idea to tighten the clamping nut by half a turn after 3 or 4 days.
The cable guide to the cam switch should be designed in such a way that the cable cannot direct water into the screw connector.

Adjusting the "Reel empty" end position

The switch cam must be adjusted in the unwinding direction in such a way that when the end position is reached (reel empty, including the reserve windings) the switch is actuated. This function must be tested several times by manually winding and unwinding the cable in speed control mode; if necessary due to the switching hysteresis of the limit switch contact to readjust the shutoff point in the unwinding direction again.

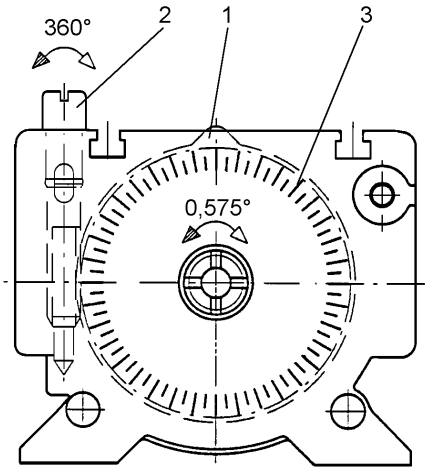


Block adjustment

The design of the reduction gear with planet steps makes it possible to install a block adjustment starting at the useful rotation number 17.5 in addition to the single contact adjustment. This provides the last gear step with an adjustment screw as well, but in black.

This adjustment screw (2) can be used to adjust all the cam disks (1) together. The relative adjustment of the single contacts to one another remains unaffected.

Turning the black screw by one turn (360°) to the right turns the cam, also in the rightwards direction, by 0.575° (rear view, the B side of the switch).

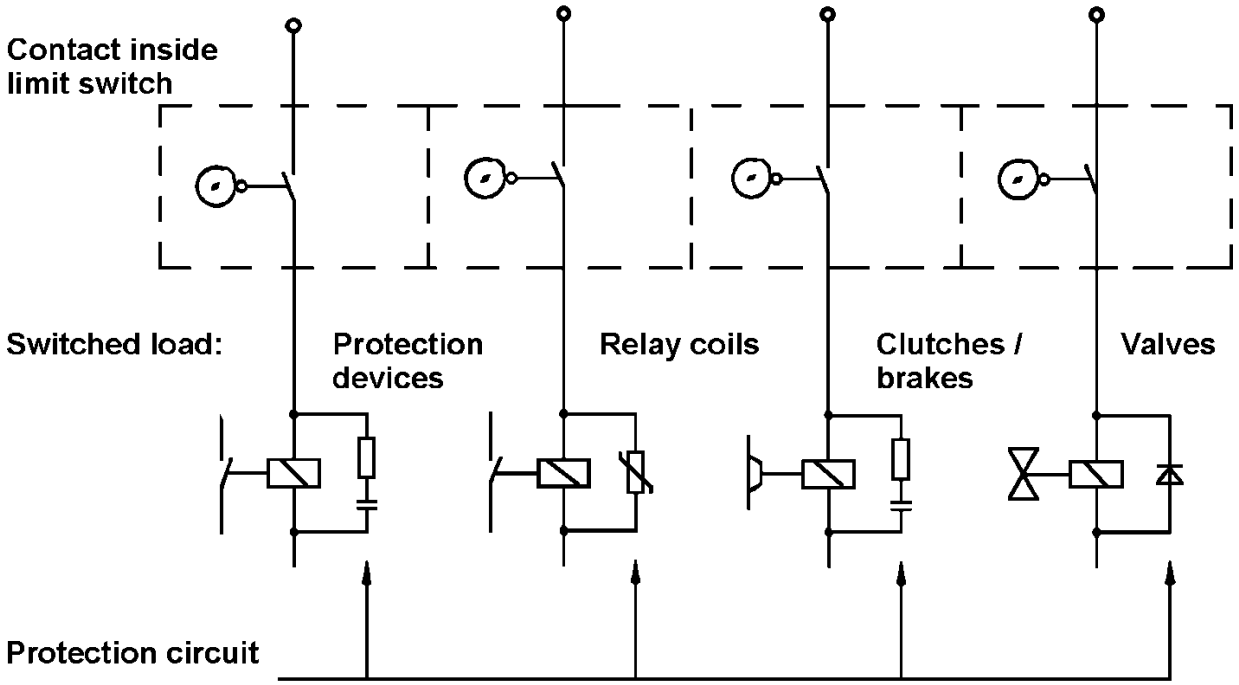


1) Cam disk
2) Adjustment screw (black)
3) Rough scale with 5° divisions

Electromagnetic compatibility

Compliance with the Directive on Electromagnetic Compatibility 89/336/EWG must be ensured by the user (system or machine manufacturer) as described in publication "EMC instructions for the operation and installation of electromagnetic couplinges, brakes, and limit switches", no. 170 00 0000 956.

Interference transmissions must be corrected at the interference source if possible. Below are some diagrams of protective circuits depending on the type of load switched by the contact.

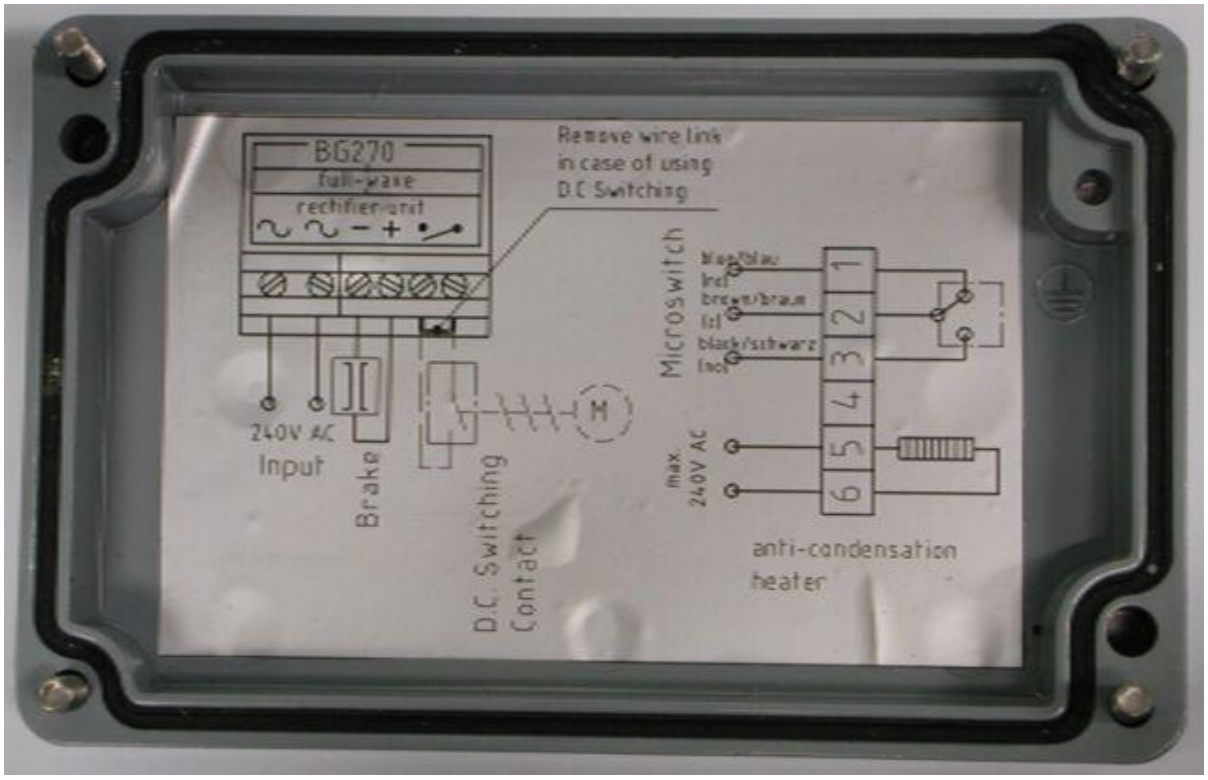


6.3.10 Electromagnetic spring pressure brake

Since the brake is already mounted on the gear unit with the torque adjusted upon delivery, it simply must be connected according to the circuit diagram and power schematic provided in the terminal box.

The following must be connected:

- Brake
- Microswitch
- Anti-condensation heater (optional)



CAUTION!

Damage to or destruction of the gearbox!

To prevent the motor from starting with the brake engaged, only the microswitch engages the motor.

Therefore:

→ The reel may only be operated with the microswitch connected and tested.

→ Microswitches are safety and monitoring mechanisms and may not be bridged.

In Chapter 4.2.5, brake installation is described.

6.3.11 Mechanical coupling

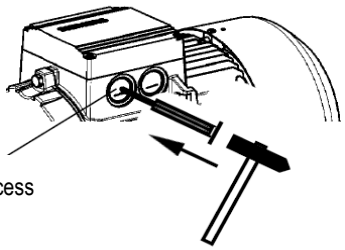
In general, the mechanical coupling is already completely installed between the drive motor and gearbox.

6.3.12 Low-voltage asynchronous motor

The drive motor is mounted on the gear unit before delivery. See the specifications on the type plate and the circuit diagram located in the connection box. This applies for the anti-condensation heater and PTC-resistor to be connected as well. The motor must be connected in such a way that a permanently safe electrical connection is maintained (no protruding wire ends). A reliable protective conductor connection must be made.

Tightening torques for terminal plate connections	**Diameter of thread**	M4	M5	M6	M8	M10
	Torque (Nm)	0.8...1.2	1.8...2.5	2.7...4	5.5...8	9...13

Air gaps between exposed live parts and against ground ≥ 5.5 mm (U_N ≤ 690 V).
No foreign objects, contaminants, or moisture may be found within the connection boxes. Unnecessary cable entry openings and the box itself must be sealed against dust and water.



Break out optional access

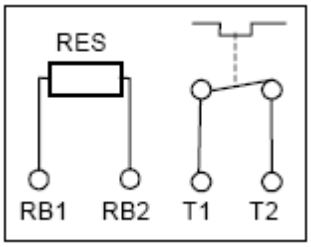
6.3.13 Brake resistance

When braking a motor, electrical energy is applied to the brake unit. This increases the voltage in the intermediate circuit. The brake unit is connected in parallel to the intermediate circuit and prevents the intermediate circuit voltage from rising to impermissibly high levels. The brake unit converts the resulting braking energy into heat in the externally connected brake resistance. The assigned resistance must always be connected to the brake unit. Without a brake resistance, no braking energy can be converted. The brake unit is connected through the intermediate circuit terminals to the converter or inverter. It turns on automatically when a certain voltage is reached in the intermediate circuit and prevents the voltage from rising further. The brake unit works independently of the converter or inverter. The electronics of the brake unit are supplied with power from the intermediate circuit voltage. To increase braking power, brake units can be connected in parallel. To protect from overheating, it is equipped with a temperature switch.

The electrical connection of the brake resistance is carried out in accordance with the connection schematic shown and the power schematic. The maximum connection cross-section in the following table must be followed.

Rated current and connection cross-section of terminals:

Type	Designation	Rated current (A) at 100% duty cycle	Rated current (A) up to 40% duty cycle	Maximum connection cross-section
Porcelain terminal	PK	16		up to 2.5 mm²
Strip terminal, ceramic	FK	35	44	2.5 – 10 mm²
Equipment terminal Polyamide (PA)	G5	30	38	0.5 – 2.5 (4) mm² AWG 24 – 12
	G10	60	75	0.5 – 10 (16) mm² AWG 20 – 6
Stud terminal, ceramic	BK M6	60	75	Connection diameter depends on terminal lug size at corresponding bore diameter
	BK M8	115	143	
	BK M10	220	287	
	BK M12	400	536	
Bushing terminal (PA)	HDFK4	30	38	up to 4.0 mm²; AWG 24 - 12
	HDFK10-HV	65	82	up to 10 mm²; AWG 20 - 6
Spring clamp terminal (PA)	ST 2,5	20	25	up to 2.5 mm²; AWG 26 - 12
	ST 4	30	38	up to 4.0 mm²; AWG 20 - 10



6.4 Testing and commissioning

WARNING!

Danger of injury due to improper commissioning!

Improperly performed commissioning can lead to dangerous situations for personnel.

Therefore:

→ Before commissioning, carry out the tests in the test list of the manufacturer.

A frequency-controlled motor-driven reel is commissioned together with the system operator and is documented. All necessary personnel for commissioning including operators, electricians and installation technicians are to be provided by the system operator for the course of commissioning. Free access to the system must be provided. After commissioning is complete, Conductix-Wampfler will receive an authorized final acceptance protocol from the operator, in which it is logged that the system corresponds to the requirements.

6.5 Commissioning checklist

The commissioning checklist BAL0500-0016-E / ...-0017-E (or similar, project-specific documentation) also applies.

Activity	Value	Checked
Mechanical inspection		
Gearbox		
Gear unit aligned and fastened		
Oil level checked in gearbox		
Ventilation screw inserted		
Reel wheel		
Reel wheel width adjusted correctly, checked on each spoke	B= mm	
All lock nuts present and tight		
All screws tightened to the required torque		
Cable		
Cable completely clean of mold release agent and lubricants		
Determination of mean cable diameter	D = …….. mm	
Number of windings at "reel empty"	X = ……..	
Cable entry into gearbox cleanly sealed and tightened		
Cable secured to the ramp with cable collar		
Cable angle mounted on reel wheel		
Cable secured to cable angle with cable collar		
Cable complete reeled on and off		
Slip ring assembly housing		
Reel cable connected on ring side and checked for firm seating		
Fixed cable connected on brush side and checked for firm seating		
Position of current collector in middle of slip rings checked		
Cable entry into slip ring assembly housing cleanly sealed and tightened		
Anti-condensation heater connected and checked for function	Adjustment: ……°C	
Door seal checked for damage		
Towing part for rotating optical fiber transmitter connected and checked for function		
Contact guard checked for damage and installed		
Rotating optical fiber transmitter		
Transportation lock removed		
Rotating optical fiber transmitter connected and counter adjusted	Counter: ……	
Optical fiber cables fastened to the inner side of the inner socket		
Anti-condensation heater connected and checked for function		
Cable screw connections on optical fiber boxes tightened		

Drive motor		
Motor connected and checked for function		
External fan connected and direction of rotation checked		
Rotary pulse encoder connected and checked for function		
Anti-condensation heater connected and checked for function		
PTC-resistor connected and checked for function		
All cable screw connections to the motor tightened		
Brake		
Brake connected and checked for function		
Microswitch connected and checked for function		
Anti-condensation heater connected and checked for function		
All cable screw connections on the brake tightened		
Limit switch mechanism		
Cam switch with gears (limit switch) connected, adjusted and checked for function		
Cable screw connections on cam switch with gears (limit switch) tightened.		

…….……. …….…….

Date Signature

7 Operation

7.1 Safety

WARNING!

Danger of injury due to improper operation!

Improper operation can result in serious injury to person and property.

Therefore:

→ Carry out all operating steps according to the specifications of these operating instructions.

→ Before starting work, be sure that all covers and safety systems are installed and working properly.

→ Never disable the safety systems during operation.

→ Maintain order and cleanliness in the working area! Loosely stacked or scattered components and tools are a source of accidents.

WARNING!

Danger for unauthorized personnel!

Unauthorized personnel who do not meet the requirements described here do not understand the danger in the working area.

Therefore:

→ Keep unauthorized personnel away from the working area.

→ In case of doubt, address the person and direct them away from the working area.

→ Stop work as long as unauthorized personnel is in the working area.

Personnel:

- The system may only be operated by trained personnel!

Personal protective equipment (this must be worn for all work):

- Work safety clothing
- Protective footwear

CAUTION!

Danger of crushing injuries!

Locations (see Figure 15):

1. Between the rotating reel and stationary parts.
2. Between cable and cable
3. Between spokes and cable
4. Under the falling cover of the slip ring assembly housing
5. Between the chain and the rotating sprocket
6. Falling components due to wrong attachment points

Therefore:

→ For 1, 2, and 3: Do not reach into the reel. During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger. When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

→ For 4: To prevent the cover from falling shut unintentionally, use the locking device. Follow the installation order when assembling the slip ring assembly housing.

→ For 5: Reaching into the gear is prevented if the safety cover is in place. When removing the safety cover (e.g. when replacing the chain), the system must be shut down and secured against unauthorized, unintentional, and accidental reactivation.

→ For 6: Use the defined attachment points. If necessary, block off the area. Be sure to use suitable lifting gear.

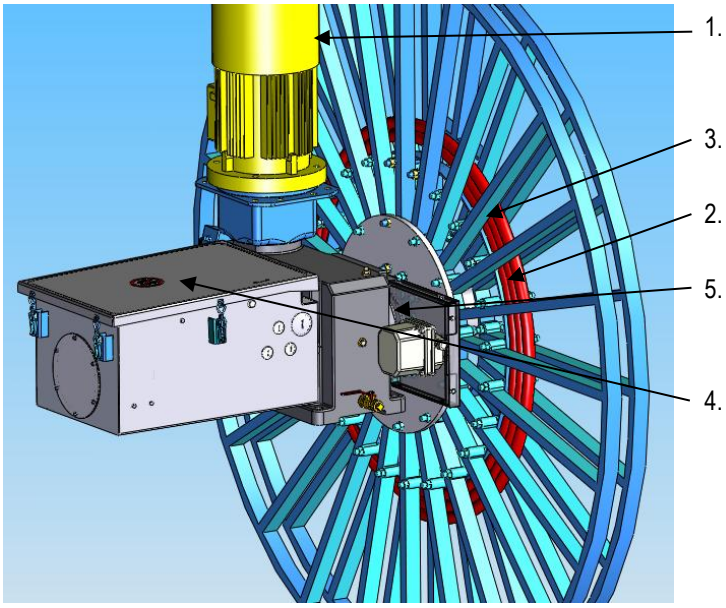


Figure 15.: Danger of crushing

CAUTION!

Danger of shearing injuries!

Locations (see Figure 16):

1. Between the rotating reel and stationary parts.
2. Between cable and cable
3. Between spokes and cable

Therefore:

→ Do not reach into the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

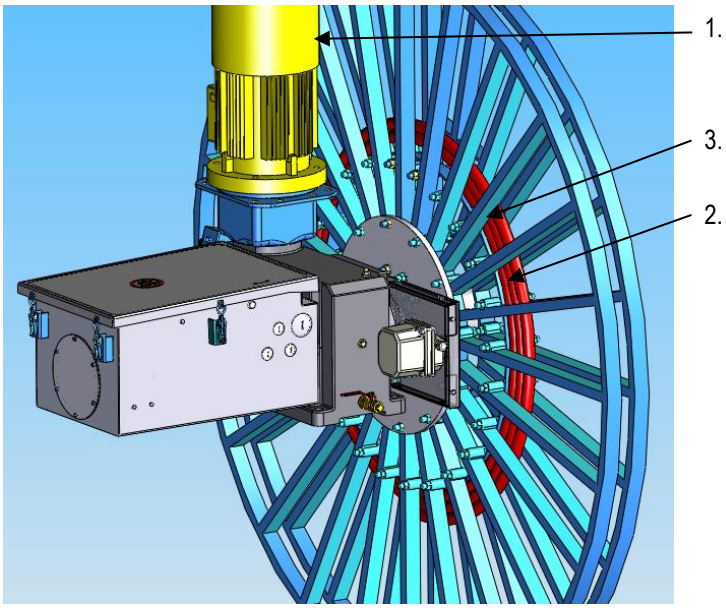


Figure 16.: Danger of shearing injuries

CAUTION!

Danger due to entanglement!

1. As the reel turns, its projecting threaded rods and other parts can entangle a person.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

2. The slip ring bodies and the coupling are parts that rotate during operation and can entangle personnel. They are equipped with safety mechanisms.

Therefore:

→ Do not reach in during operation after previously removing the safety mechanism.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

CAUTION!

Danger of being pulled in and caught!

During operation of the system, the rotation of the reel and the cable layers being wound on it can pull in and catch personnel between the layers.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

CAUTION!

Danger of friction and scrapes!

During operation of the system, the rotation of the reel and its projecting threaded rods and other parts may cause friction or scrapes.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

WARNING!

Danger of slipping on the slip ring assembly housings!

Slip ring assembly housing covers and other cover plates are generally made of thin sheet metal. They are not designed to support a person! Stepping on one of them can lead to slipping and falling, or you could break through into the slip ring assembly. At least permanent deformation of the metal can be expected.

Therefore:

→ Do not step on the slip ring assembly housing! See also Figure 17.

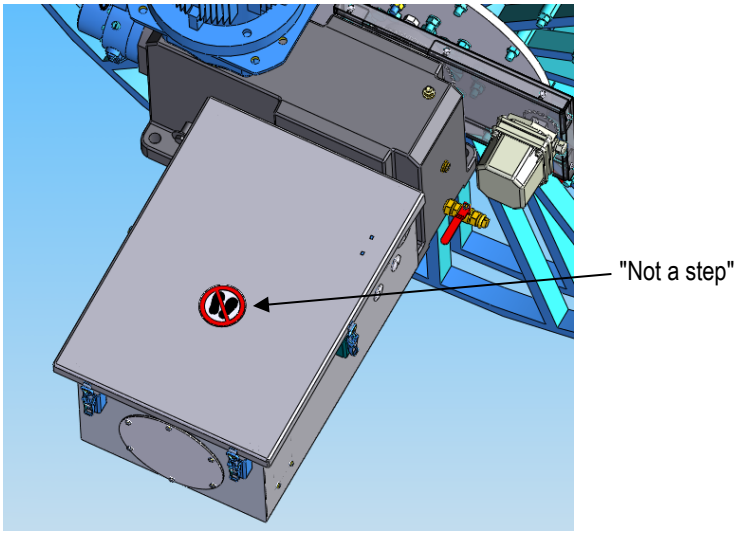


Figure 17.: Slip ring assembly housing - do not step here!

CAUTION!

Danger of burns from hot surfaces!

In strong sunshine there is a danger of burns on thin cover walls.

→ Therefore: Wear protective gloves.

CAUTION!

Damage to the cable

→ Before the system is started, be sure that the cable is not frozen to the ground or floor, greatly contaminated, or stuck, in order to prevent damage or even cable breaks.

7.2 Function

The motor-driven reel is used for the torque-controlled, automatic winding and unwinding of a mobile power supply line (reeling cable) for a mobile consumer.

Its detailed function is described in BAL0500-0016-E and ...-0017-E (or similar, project-specific documentation).

8 Maintenance and Servicing

8.1 Safety

WARNING!

Danger of injury due to improperly executed maintenance tasks!

Improper maintenance can result in serious injury and property damage.

Therefore:

→ Before starting work, ensure sufficient space for assembly.

→ Maintain order and cleanliness in the assembly area! Loosely stacked or scattered components and tools are a source of accidents.

→ If components have been removed, be careful to reinstall them properly, replace all fastening elements, and comply with screw tightening torques.

→ After maintenance, reinstall all safety covers and any locks.

WARNING!

Danger of death due to suspended loads!

Falling loads can lead to severe injuries or death.

Therefore:

→ Never step under suspended loads.

→ Use only the attachment points provided, e.g. base bracket / gearbox take-off shaft.

→ Use only authorized lifting gear and separate lifting accessories with sufficient load capacity.

→ Do not use torn or worn ropes or straps.

→ Move loads only under supervision.

→ Set down loads before leaving the work area.

CAUTION!

Danger of crushing injuries!

Locations (see Figure 18):

1. Between the rotating reel and stationary parts.
2. Between cable and cable
3. Between spokes and cable
4. Under the falling cover of the slip ring assembly housing
5. Between the chain and the rotating sprocket
6. Falling components due to wrong attachment points

Therefore:

→ For 1, 2, and 3: Do not reach into the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

→ For 4: To prevent the cover from falling shut unintentionally, use the locking device. Follow the installation order when assembling the slip ring assembly housing.

→ For 5: Reaching into the gear is prevented if the safety cover is in place. When removing the safety cover (e.g. when replacing the chain), the system must be shut down and secured against unauthorized, unintentional, and accidental reactivation.

→ For 6: Use the defined attachment points. If necessary, block off the area. Be sure to use suitable lifting gear.

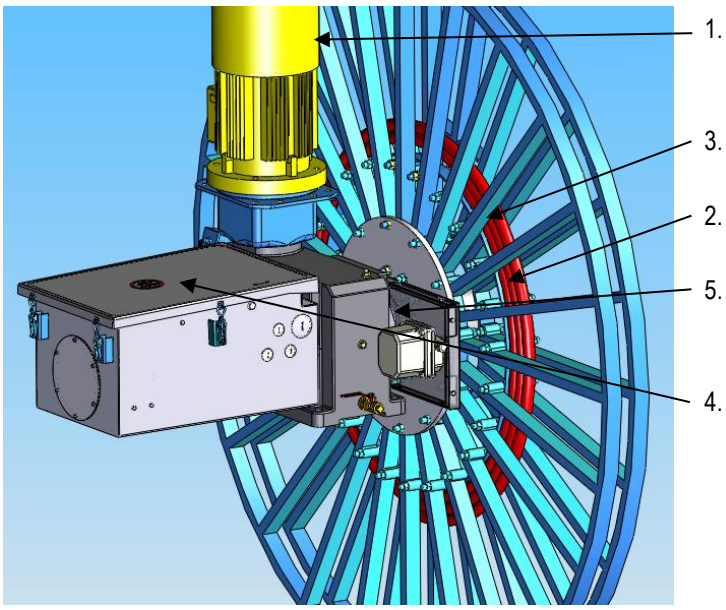


Figure 18.: Danger of crushing

CAUTION!

Danger of shearing injuries!

Locations (see Figure 19):

1. Between the rotating reel and stationary parts.
2. Between cable and cable
3. Between spokes and cable

Therefore:

→ Do not reach into the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

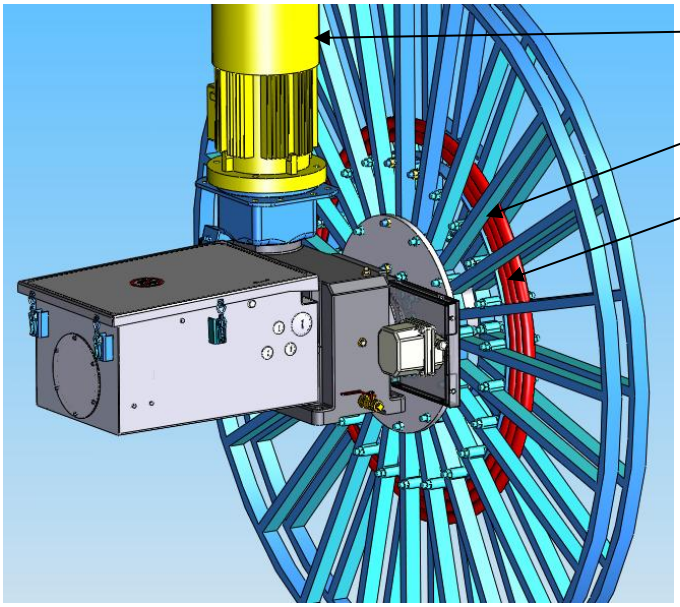


Figure 19.: Danger of shearing injuries

CAUTION!

Danger due to entanglement!

1. As the reel turns, its projecting threaded rods and other parts can entangle a person.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

2. The slip ring bodies and the coupling are parts that rotate during operation and can entangle personnel. They are equipped with safety mechanisms.

Therefore:

→ Do not reach in during operation after previously removing the safety mechanism.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

CAUTION!

Danger of being pulled in and caught!

During operation of the system, the rotation of the reel and the cable layers being wound on it can pull in and catch personnel between the layers.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

CAUTION!

Danger of friction and scrapes!

During operation of the system, the rotation of the reel and its projecting threaded rods and other parts may cause friction or scrapes.

Therefore:

→ Do not remain near the reel.

→ During commissioning, operation, troubleshooting, maintenance and decommissioning, take protective measures, such as a customer-supplied safety fence, or keep a minimum space between rotating parts and stationary parts to rule out danger.

→ When dismantling the safety measures, e.g. during commissioning, troubleshooting, and maintenance, shut the system down and secure it against unauthorized, unintentional, or accidental activation.

WARNING!

Danger of slipping on the slip ring assembly housings!

Slip ring assembly housing covers and other cover plates are generally made of thin sheet metal. They are not designed to support a person! Stepping on one of them can lead to slipping and falling, or you could break through into the slip ring assembly. At least permanent deformation of the metal can be expected.

Therefore:

→ Do not step on the slip ring assembly housing! See also Figure 20.

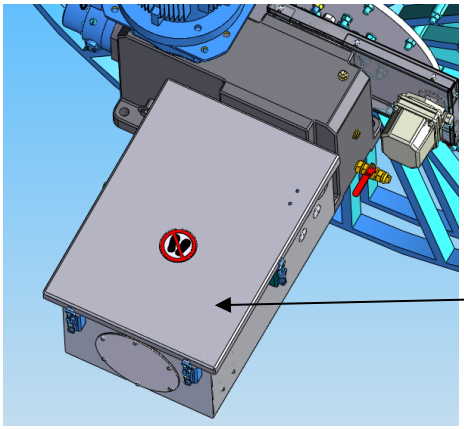


Figure 20.: Slip ring assembly housing - do not step here!

CAUTION!

Danger of burns!

The anti-condensation heater mounted on the slip ring assembly housing or rotating optical fiber transmitter housing can cause burns.

Therefore:

→ Do not touch the anti-condensation heater. Safety covers are installed to prevent this. During troubleshooting, maintenance or commissioning, protective gloves must be worn when the safety covers are removed.

CAUTION!

Danger of burns from hot surfaces!

In strong sunshine there is a danger of burns on thin cover walls.

→ Therefore: Wear protective gloves.

8.2 Maintenance plan

In order to retain the warranty rights and to avoid damage, the system operator is responsible for performing the following maintenance tasks. Maintenance tasks must be carried out by trained, qualified technicians.
The next sections describe the maintenance tasks required for optimum, trouble-free operation.
If regular inspections reveal increased wear, the corresponding maintenance intervals should be shortened in accordance with the actual signs of wear.
In case of any questions regarding maintenance tasks and intervals, contact the manufacturer; see the service address on the last page.

Motor-driven reel

Frequency-controlled

Responsible	Commissioning personnel	Operator	Maintenance personnel	Maintenance personnel	Maintenance personnel	Maintenance personnel	Maintenance personnel
Interval	**during commissioning**	**daily**	**3 months after first use**	**every 3 months**	**every 6 months**	**yearly**	**(Special)**
Items							
Protection devices	-	1a	-	-	-	-	-
Reel wheel	2a	-	-	-	-	2a	-
Reel flange	3a	-	3a	-	-	3a	-
Gearbox	4a	-	4a	-	-	4a	-
	4b	-	4b	-	-	4b	-
	4c	-	4c	-	-	4c	-
	4d	-	-	-	-	-	see 4.2.4.1
SRB	5a	-	5a	-	-	5a	-
	-	-	5b	-	-	5b	-
	-	-	5c	-	-	5c	-
	-	-	5d	5d	-	-	-
	5e	-	5e	-	-	5e	-
	5f	-	5f	-	-	5f	-
	5g	-	5g	-	-	5g	-
	5h	-	5h	-	-	5h	-
Brake	-	-	6a	-	6a	-	-
	6b	-	6b	-	6b	-	-
	6c	-	6c	-	-	6c	-
Limit switch mechanism	-	-	7a	-	-	7a	-
	-	-	7b	-	-	7b	-
	-	-	7c	-	-	7c	-
	-	-	-	-	-	7d	-
Rotating optical fiber transmitter	8a	-	8a	-	-	8a	-
	8b	-	8b	-	-	8b	-
	8c	-	8c	-	-	8c	-
Drive motor	9a	-	9a	-	-	9a	-
	9b	-	9b	-	-	9b	-
	-	-	9c	-	-	9c	-
	9d	-	9d	-	-	9d	-
	-	-	9e	-	-	9e	-
	-	-	9f	-	-	9f	-
Brake resistance	10a	-	10a	-	-	10a	-
	-	-	10b	-	-	10b	-
Coupling	-	-	11a	-	-	11a	-
Cable	12a	-	-	12a	-	-	-

Assembly	Item	Test	Symptoms / defects	Remedy
Safety cover	**1a**	Completeness Function	• Parts missing • Parts are defective	➢ Replace missing parts ➢ Repair defective parts
Reel wheel	**2a**	The adjusted width at reel "empty" must be checked at multiple points around the circumference.	• Reel width varies	➢ Adjust reel width! See Chapter 6.3.3.2.
Reel flange	**3a**	Check the torque of the clamping screws.	• Screws are loose. • Clamping flange slipping on the shaft.	➢ Tighten screws with a torque wrench! See Chapter 4.2.3.
Gearbox	**4a**	The shaft sealing rings on the hollow shaft and the housing must be checked for oil leaks.	• Oil leaking from the shaft sealing rings. • Oil leaking from the halves of the housing.	➢ Replace unit
	4b	Inspect gearbox for unusual noises.	• Noises in bearing.	➢ Replace unit
	4c	Check the oil level in the gearbox. Test after minimum 10 minutes standstill.	• Oil level too low • Oil level too high	➢ Refill oil ➢ Drain oil See Chapter 4.2.4.
	4d	Oil change	• Oil has aged	➢ See lubrication recommendations See Chapter 4.2.4.
		During maintenance work on the slip ring assembly, be sure that the system is disconnected from power and secured against unauthorized reactivation.		

Assembly	Item	Test	Symptoms / defects	Remedy
Slip ring assembly housing	**5a**	The rib supports must be checked for damage and contamination.	• Damaged rib supports • Contaminated rib supports	➢ Replace rib supports ➢ Clean rib supports
	5b	Check the surface of the slip rings	• Severe scoring • Burn marks • Oxidation layer (after longer standstill)	➢ Smooth with fine sandpaper (400 grain).
	5c	Check the position of the current collector on the slip rings.	• Current collector not in the middle of the slip ring.	➢ Correct the position of the current collector.
	5d	Check the wear of the slip brushes.  Wear mark	• The abrasion has reached the wear mark.	➢ Replace slip brush or current collector. ➢ Remove abrasion residue.
	5e	Check the connection cable for damage to the insulation near the slip ring housing and that it is correctly fastened to the slip rings or current collectors.	• Damaged insulation • Cable is loose	➢ Repair insulation ➢ Tighten cable fastening. Observe tightening torques. See Chapter 4.2.8.3
	5f	Check anti-condensation heater for function.	• Anti-condensation heater not heating	➢ Replace anti-condensation heater

Assembly	Item	Test	Symptoms / defects	Remedy
	5g	Check the seals on the housing door for damage.	• Sealing profile damaged / water and/or dust can penetrate. • Impact point (bottom) of sealing profile damaged.	➢ Repair or replace sealing profile ➢ Repair impact point with silicone
	5h	Check the cable entry for leaks	• Water entering the housing	➢ Tighten screw connector ➢ Replace sealing tape in the screw connections
Brake	**6a**	Check air gap between coil body and anchor plate with a feeler gauge.	• Air gap too big • Air gap too small	➢ Adjust air gap See Chapter 4.2.5
	6b	Check function of the microswitch.	Microswitch emits no "brake disengaged" signal although the brake is open. • Brake pad worn / air gap too large • Error in line or controller • Microswitch defective	➢ Adjust air gap Disengage brake by hand and check microswitch for continuity at the terminal box: ➢ Circuit continuity at microswitch check and repair wiring, controller ➢ Microswitch circuit faulty: Replace brake and send to Conductix-Wampfler for repair
	6c	Check anti-condensation heater for function.	• Anti-condensation heater not heating	➢ Replace anti-condensation heater
Limit switch mechanism	**7a**	Check the chain for sufficient tension.	• Chain too loose	➢ Retension chain ➢ Eventually remove a chain link

Assembly	Item	Test	Symptoms / defects	Remedy
	7b	Check the sprockets for tooth wear.	• Chain teeth severely rounded	➢ Replace sprockets
	7c	Check the chain for sufficient lubrication.	• Chain is dry • Chain grease has hardened	➢ Lubricate chain ➢ Replace grease
	7d	Check the housing of the cam switch with gears (limit switch) for leaks	• Water entering	➢ Repair seal
Rotating optical fiber transmitter	**8a**	Check the secure fastening of the cable within the plastic socket.	• Cable not fastened • Cable chafing	➢ Fasten cable ➢ Repair chafing spots
	8b	Check the insulation of the cable for wear.	• Cable insulation defective	➢ Cover damaged point with insulating tape
	8c	Check anti-condensation heater for function.	• Anti-condensation heater not heating	➢ Replace anti-condensation heater
Motor	**9a**	Inspect motor for unusual noises.	• Noises in bearing. • External fan	Replace ➢ Drive motor ➢ Fan rotor
	9b	Check motor connection for correct fastening.	• Cable is loose	➢ Tighten cable fastening
	9c	Check terminal board for corrosion.	• Corrosion on terminal board	➢ Clean or replace terminal board

Assembly	Item	Test	Symptoms / defects	Remedy
	9d	Check external fan for function.	• External fan not working	➢ Replace drive motor
	9e	Check air pathways.	• Air pathways are dirty	➢ Clean air pathways
	9f	Check condensate holes for blockage.	• Holes blocked	➢ Open blocked holes
Brake resistance	**10a**	Check cable connection for correct fastening.	• Cable is loose	➢ Tighten cable fastening
	10b	Check terminals for corrosion.	• Corrosion on terminals	➢ Clean or replace terminals
Coupling	**11a**	Check gear-rim of the coupling for wear (sight glass on coupling). see Chapter 4.2.6	• Wear on gear-rim	➢ Replace gear-rim
Cable	**12a**	Check winding of the cable	• Lateral escape of the cable • Gap between the layers	➢ Reeled on and off the cable

9 Fault diagnostic

WARNING!

Danger of injury due to improper troubleshooting!

Improper troubleshooting can result in serious injury and property damage.

Therefore:

→ Contact the manufacturer in case of malfunction.

→ Allow troubleshooting to be carried out only by personnel from or authorized by the manufacturer.

Detailed troubleshooting is described in BAL0500-0016-E and ...-0017-E (or similar, project-specific documentation).

10 Dismantling and disposal

10.1 Safety

WARNING!

Danger of injury due to improper disassembly!

Stored energy, sharp components, points, and edges on and in the device or the tools needed can cause injury.

Therefore:

→ Before starting work, ensure sufficient space.

→ Handle open, sharp-edges components carefully.

→ Maintain order and cleanliness in the work area! Loosely stacked or scattered components and tools are a source of accidents.

→ Dismount components properly. Note the high weight of some components. If necessary, use lifting gear.

→ Secure components so that they cannot fall or tip over.

→ Involve the manufacturer in case of any unclear points.

WARNING!

Danger of death due to suspended loads!

Falling loads can lead to severe injuries or death.

Therefore:

→ Never step under suspended loads.

→ Use only the attachment points provided, e.g. base bracket / gearbox take-off shaft.

→ Use only authorized lifting gear and separate lifting accessories with sufficient load capacity.

→ Do not use torn or worn ropes or straps.

→ Move loads only under supervision.

→ Set down loads before leaving the work area.

CAUTION!

Danger of burns from hot surfaces!

In strong sunshine there is a danger of burns on thin cover walls.

Therefore:

→ Wear protective gloves.

10.2 Disassembly

After the system is no longer in use, the device must be disassembled and environmentally friendly disposal carried out.

Before starting disassembly:

- Remove operating and auxiliary materials as well as residual processing material, and dispose of them in an environmentally appropriate manner.

Then clean the assemblies and components properly and disassemble them as required by applicable local workplace safety and environmental protection regulations.

10.3 Disposal

Properly disassembled components are to be recycled if no return or disposal agreement has been made.

- Scrap metals.
- Take plastic elements for recycling.
- The other components are to be disposed of according to their material composition.

CAUTION!

Environmental damage due to improper disposal!

Electrical waste, electronic components, lubricants, and other auxiliary materials are subject to hazardous waste disposal regulations and may only be disposed of by authorized specialists.

Local community officials or special disposal companies can provide information about environmentally appropriate disposal.

11 Additional Documents

11.1 Conformity declaration

11.2 Spare parts list

A spare parts list will be provided upon request for the specific project.

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