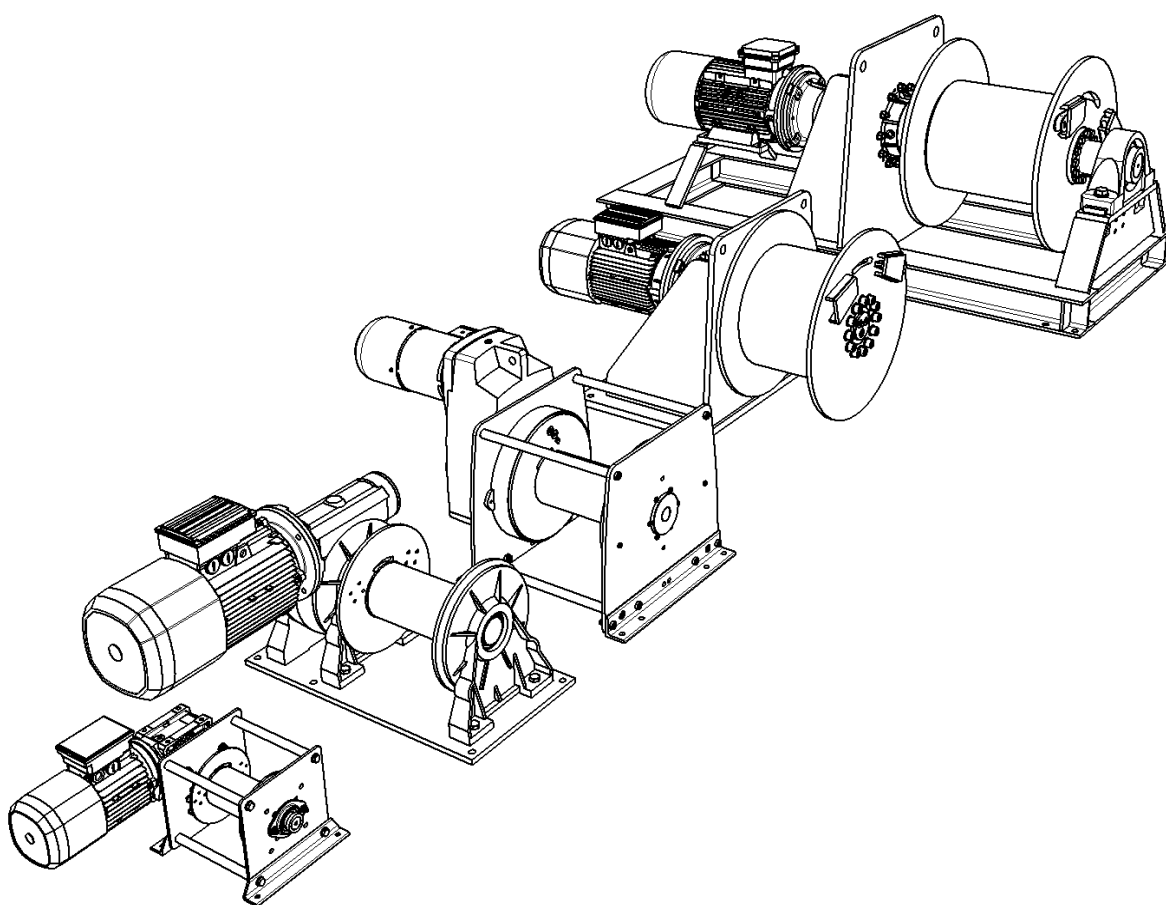




TRANSLATED VERSION OF

ORIGINAL INSTRUCTIONS

WINCHES



ALWAYS KEEP THIS MANUAL HANDY FOR QUICK REFERENCE.

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ENCLOSED WINCH CERTIFICATE

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INFORMATION TO THE USER MANUAL

PURPOSE OF THE MANUAL

This manual has been compiled by the Manufacturer to provide information on the safe transport, handling, installation, maintenance and repair of winches. Failure to adhere to the information provided herein may result in risk to personal health and safety, and may incur economic damages. The documentation must be stored by a person with the correct authority and must always be made available for consultation. A copy of the user manual can best be kept close the working area of the winch.

The manual reflects the state of the art at the time of commercialization of the winch. The manufacturer reserves the right to modify, supplement and improve the manual, without the present publication being for that reason considered inadequate. Particularly significant sections of the manual and important specifications are highlighted by symbols whose meanings are given below.



DANGER - WARNING

This symbol indicates situations of serious danger which, if ignored, may result in serious risks to the health and safety of personnel.



CAUTION - ATTENTION

This symbol indicates the need to adopt specific precautions to avoid risks to the health and safety of personnel and possible economic damages.



IMPORTANT

This symbol indicates important and technical information.



ATEX -WINCH

In case that the winch is built according to the "ATEX"-directive 2014/34/EU, you also have to consider the information given in the appendix "EX-PROOF-APPENDIX -ROPE-WINCHES" beside the information given to you by this manual. Whether your winch is built according to this directive you can see on the EX-symbol printed on the type plate of the winch. Please refer to the type plate or the ATEX Declaration of Conformity enclosed with the winch certificate for the EX classification.

WINCH CERTIFICATE

Specific information about the winch

In addition to this manual, each winch is supplied with a specific document, the winch certificate. It is enclosed with the winch and must remain with the winch along with this manual.

In addition to the exact technical data of the installed components and options, the winch certificate contains the specifications on the model and design of the winch in the form of drawings, plans and spare parts lists. If the winch was delivered with a control unit, the circuit diagram of the control unit is also in this winch certificate.

The winch certificate also includes the manufacturer's factory test certificate and declarations of conformity and also simultaneously serves as the inspection log book for the periodic inspections to be carried out.

There is only one winch certificate for each winch. The serial number of the rope winch, which is located on the type plate of the winch as well as the cover sheet of the winch certificate, specifies which certificate belongs to which winch. In case of loss, a new copy - however, without the original certificates - can be ordered as a duplicate from the manufacturer.

Intellectual property

Winch models, drawings and technology are the sole property of the manufacturer. It is expressly forbidden to copy, use or hand over to third parties such information without a specific written permission.

Warranty

The manufacturer warrants to the original user its winches to be free of defects in material and workmanship for a period of one year from the date of purchase. The manufacturer will repair, without cost, any product found to be defective, including parts and labor charges, or at its option, will replace such products or refund the purchase price less a reasonable allowance for depreciation, in exchange for the product.

If any product proves defective within its original one year warranty period, it must be returned to an authorised dealer, including a proof of purchase or including winch datasheet/test certificate. The winch must be carriage paid to.

This warranty does not apply to products which the manufacturer has determined to have been misused or abused, improperly maintained by the purchaser; or where the malfunction or defect can be attributed to the use of no genuine manufacturer parts.

The manufacturer makes no other warranty, and all implied warranties including any warranty of merchantability or fitness for a particular purpose are limited to the duration of the expressed warranty period as set forth above. The manufacturers maximum liability is limited to the purchase price of the product and in no event shall the manufacturer be liable for any consequential, indirect, incidental, or special damages of any nature arising from the sale or use of the product, whether based on contract, tort, or otherwise.



With a missing TAG plate the product is not conform to the current CE machine construction standards and warranty will expire.

The following information is required to ensure reliable delivery of spare parts:

Fabrication number (Fabr. No.).....(on factory TAG plate)

Product type.....(on factory TAG plate)

Spare part number.....(from the winch certificate)

Additional information such as type and/or description of the parts.....(from the winch certificate)



The manufacturer cannot guarantee a smooth delivery of spare parts unless the above information is not fully submitted. If the TAG plate is removed or damaged, contact your dealer or supplier.

The manufacturer does reserve the right to modify and upgrade the winches its fabricated at any moment and without advance notice and will not be liable for any difference between winch features and the specifications of present use and maintenance manual.

Contact the manufacturer technical department in case extra information is required about for example maintenance and repair. This user manual is made with great care. The manufacturer cannot be put responsible for errors in this publication or for the impact of this.

1. SAFETY INSTRUCTIONS FOR WINCHES

In its basic version, the cable winch is designed for transporting material within a closed, dry and clean building without large temperature fluctuations in a range between -10°C and +40°C up to max. 1,000m above sea level, without contact with corrosive or aggressive media.

The winch can be built for other conditions by a variety of additional equipment. These include, for example, special paints, anti-condensation heaters, stainless steel screws, higher protection class and weather protection covers against wind, rain, snow and solar radiation.



THE WINCH MAY NOT BE USED FOR LIFTING OR MOVING PERSONS UNLESS IT IS CLASSIFIED AS A MAN RIDING WINCH.



Read the manual carefully before start, use or carry out any maintenance operation on the winch.



Transport of molten material only with special equipment.



Operation in corrosive or hazardous environment only with special equipment.



This manual is issued with the scope to be a guide for the correct and safe use of the winch and for its rational maintenance. After careful reading keep present manual in unabridged condition and near the winch in order to be always available. In case of non understanding of the manual or parts of such, we recommend to contact the manufacturer.

This also applies to and in particular, to the supplied to specific winch certificate.



For any kind of technical assistance please contact the manufacturer or an official dealer of it.



The manufacturer cannot know of, or provide all the procedures by which product operations or repairs may be conducted and the hazards and/or results of each method. If operation or maintenance procedures not specifically recommended by the manufacturer are conducted, it must be ensured that product safety is not endangered by the actions taken. If unsure of an operation or maintenance procedure step, personnel should place the product in a safe condition and contact supervisors and/or the factory for technical assistance.



On various parts of the winch warning labels are used. Observe the warnings on these labels, if you have a question concerning the meaning of a label, then go to your supervisor.



Winches, which are purchased directly from the manufacturer must be considered as "partial machines", since they are designed for installation in an assembly, for example, consisting of a platform, a suspension system, etc. They are therefore not only delivered without a CE mark, however, also with an installation declaration according to the current machinery directive. Since they are equipped with selected safety options, the "parts" match the winch meet the EC requirements if the operator complies with the EC requirements of the entire system.




The usage category has to be considered. The winches are differentiated by their design as lifting winch or pulling winch. Please pay regard to the label on the winch.



PULLING WINCH


ONLY TO BE USED TO PULL HORIZONTAL





LIFTING WINCH

TO LIFT AND LOWER LOAD
AND TO PULL HORIZONTALLY



1.1 Regulations

The assembly, start of operation, testing and maintenance of rope winches are based on the following regulations in Germany and all EC countries. (German titles)

European Regulations	
EC machinery directive	2006/42/EC
EC directive for electromagnetic compatibility	2004/108/EC
EC low voltage directive	2006/95/EC
BetrSichV	German Industrial Safety Regulation
GPSG	German Equipment and Product Safety Act
German Regulations Berufsgenossenschaftliche Vorschriften (UW)	
BVG A1	Grundsätze der Prävention
BGV A3	Elektrische Anlagen und Betriebsmittel
DGUV V. 54 (BGV D8)	Winden, Hub- und Zuggeräte
BGR 500	Betreiben von Arbeitsmitteln
BGV B3	Lärm
BGG 956-1	Hinweise für die Prüfung von Winden- Hub und Zuggeräten

1.2 Measures to achieve safer operating periods

The Safety and Health Requirements of the EC Directives stipulate by law that the special risks, e.g. that may occur due to fatigue and ageing must be eliminated.

According to this, the operator of standard hoisting gear is obligated to define the actual use.

The actual useful life is determined and documented during the annual audit.

The unit must undergo a general overhaul after reaching the theoretical useful life or at the latest, after 10 years. All inspections and the general overhaul must be arranged by the operator of the lifting gear.

The following theoretical useful life applies for electrical rope winches, which are classified according to FEM 9.511.

(Converted into full load hours):

M3 (1Bm)	M4 (1Am)	M5 (2m)	M6 (3m)	M7 (4m)
400 h	800 h	1600 h	3200 h	6300 h

1.2.1 Determining the actual useful life S

The actual useful life depends on the daily operating time and the load duty cycle. The running time is determined according to the specifications of the operator or is recorded by an operating hours counter. The load duty cycle is determined according to table 1.2.1-1.

The annual useful life from table 1.2.1-2 is determined using the two specifications.



The periodic calculated or read out values must be documented in the winch certificate.

Table 1.2.1-1: Load duty cycle

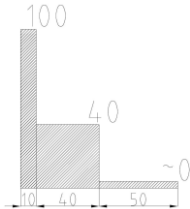
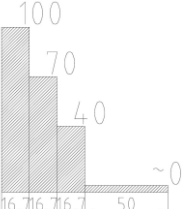
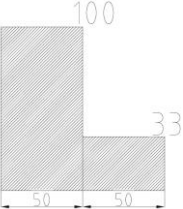
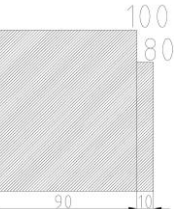
Load type 1 light $k < 0.5$ $k = 0.5$		Load type 2 medium $0.5 < k < 0.5$ $k = 0.63$		Load type 3 heavy $0.63 < k < 0.8$ $k = 0.8$		Load type 4 very heavy $0.8 < k < 1.00$ $k = 1.0$	
% of the load							
	% of the runtime - k = Load duty cycle (load type)						
	Only partial full load, however, primarily low load	Frequently full load, usually, however, low load	Frequently full load, usually medium load	Regular full load			

Table 1.2.1-2: Annual useful life

Use per day (h)	≤ 0.25 (0.16)	≤ 0.50 (0.32)	≤ 1.0 (0.64)	≤ 2.0 (1.28)	≤ 4.0 (2.56)	≤ 8.0 (5.12)	≤ 16.0 (10.24)	> 16.0 (20.48)
Load duty cycle	Annual useful life (h)							
k = 0.50	6	12	24	48	96	192	384	768
k = 0.63	12	24	48	96	192	384	768	1536
k = 0.80	24	48	96	192	384	768	1536	3072
k = 1.00	48	96	192	384	768	1536	3072	6144

1.2.2 General overhaul

A general overhaul must be performed once the theoretical useful life is reached (at least, after 10 years, if not otherwise specified, if recording without operating data entry system). The device is set to a state that enables safe operation for another use period.



The inspection and approval for further use must be performed by a specialised company authorised by the manufacturer or by the manufacturer himself.

The inspector defines:

- which new theoretical use is possible
- the max. time period until the next general overview

This data must be documented in the enclosed winch certificate.

1.3. Personal protective equipment

When operating the winch, the operating instructions regarding personal protective equipment to be arranged by the operator must be observed.



When operating the winches over a long time periods, metal chips, for example, from the drum or rope may come loose and result in injuries. The manufacturer therefore always strongly suggests wearing gloves when handling the rope wire.

In individual cases, winches equipped with compressed air motors can exceed the limit values for working without hearing protection. Depending on the winch equipment, suitable hearing protection must therefore be worn.

Additional instructions regarding personal protective equipment are provided in chapter 3.4.3 "Handling and installing the rope wire".

1.4 Important winch protective equipment

Depending on the winch equipment ordered, it is delivered with protective equipment ex works, which is required by Machinery Directive to prevent personal injuries or damage to objects while the winch is operating. The operator's task is to ensure that this protective equipment functions at all times.

The basic protective equipment of a winch includes:

1.4.1 Emergency switch

The control unit of a winch must be equipped with an emergency switch, which allows the winch to be switched off in an emergency. The winch operator must be informed about the emergency switch and its location.



Emergency switches may only be operated in emergencies.
The function of the emergency switch(es) must be regularly checked.



After the emergency switch is actuated, the reasons for the emergency shutdown must be examined and eliminated if necessary.

After the emergency shutdown of the winch, it can only be restarted after the emergency switch has been unscrewed.

1.4.2 Protective covers

When operating the winch, it must be ensured that no one can reach into or no cloths, personnel or objects can be drawn into the unit.



The winch can be delivered with a protective drum cover ex works for this purpose.
Despite the installed cover, the operator must ensure that no one can grab the moving rope or an object cannot be drawn into the rope drive, for example, in the open rope guide opening or rope outlet on the drum.

Fans for cooling the motor are also equipped with a cover and may only be removed for maintenance and repair purposes.

1.4.3 Overload protection

To comply with the machinery directive, winches with a load-bearing capacity from 1000 kg, require overload protection. This is generally implemented by current monitors and monitor relays as part of the winch control. The relay is available as an option for every contactor control.



If the winches, however, are ordered with or without a control, however, without overload protection, the operator is responsible for retrofitting the units with an overload cut-off device.

1.4.4 Limit stop

The operator must ensure that overrunning structural or required limits whose movement is generated by the rope winch is prevented by a limit switch.



The winch is optionally equipped with a spindle limit switch for this purpose.
Only a spindle limit switch with 4 contacts and the corresponding wiring may be used regularly.
Other versions as well as spindle limit switches with only 2 contacts are only used as emergency limit switches and may not be used regularly.

2. INTRODUCTION

2.1 General

Any other use than mentioned on the type plate, winch certificate or winch datasheet excludes the manufacturer of every responsibility.

2.2 Specification

Identification data and specifications are mentioned on the identification plate attached to the winch and described in detail in the winch certificate.

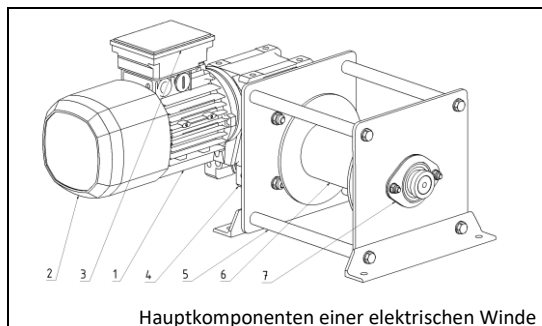
Standard winches are designed for an ambient temperature of -10° to $+40^{\circ}$ C.

Standard electric winches have motors with protection class IP 54. These winches are suitable for indoor use also for outdoor use depending on the application. For offshore applications motors with protection class IP 56 TENV can be supplied.

Hydraulic and pneumatic winches are suitable for indoors and outdoors use.

The exact technical data, protection classes, voltages and design of the supplied winch are located in the specific winch certificate which that is enclosed with the winch..

2.3 Main components of winches



1) Motor:

The part delivering the torque for driving the load.

2) Brake:

The safety device delivering the torque opposite to the load when the motor is not fed. The brake acts on the input torque and normally features 1.5 times the driving torque. A further safety brake, directly acting on the drum, can be delivered on request.

3) Connection data

For the electrical connection of the motor and the brake or the connection of the electric control unit.

4) Gearbox

The part which multiplies the torque, delivered by the motor, to obtain the necessary torque to drive the load. This is designed as a planetary, worm, shaft or spur gear depending on the winch type.

5) Frame:

The structure which supports drum and other winch parts. It is used for fastening the rope winch on a suitable surface.

6) Drum:

The part which winds the rope. Use of a grooved drum smoothens spooling of the rope. Drum boundaries are the flanges. For safety reasons the diameter of the flanges is equal to the outer diameter of the upper allowed rope layer increased by three rope diameters.

7) Drum bearing

Mounts the rope drum and dissipates the lateral and bending forces in the frame.

2.4 Description of the electric circuit

Winches are delivered without controls as standard. The required voltage is specified in the chapter "Technical data" of the enclosed winch certificate and on the type plate on which the winch is fastened.

The correction connection of the control to the motor and brake is displayed in the following chapter 3.1 "Installation of the winch".

Technical information about the optionally installed electrical components is provided in chapter 7 "Options".

If the winch was delivered with a control unit, the wiring diagram is provided in the supplied winch certificate as well as a copy in the electrical control box.

2.5 Characteristics with 1-phase 230 V alternating current motors



If your winch is equipped with a 1-phase 230 V AC motor, it contains capacitors to start and run. Because these capacitors have to charge and discharge during lifting and lowering of the load, inching operation is forbidden.

Between the single drive commands have to be at least 3 seconds before a new drive command is engaged.

If a buzzing noise occurs from the motor, the capacitors did not have enough time to discharge. To avoid overheating and damage of the motor you have to electrically isolate the control of the winch by pulling the plug for at least 30 seconds. After that you can go on working with the winch normally.

2.6 Storage prior to initial commissioning and re-storage

Winches that are put into storage for a long time prior to initial commissioning are subject to special storage conditions.

Generally, the winch, together with the controller and accessories, must be protected against extreme temperatures and moisture when they are put into storage.

Bare components such as the drum must be treated with a standard commercial anti-corrosion agent (e.g. Tectyl 846 K-19) before they are put into storage in order to prevent corrosion. Bearing points and ropes that are already wound or also put into storage must be lubricated. Before it is put into storage, the winch must be inspected to establish whether any painted areas are damaged. Any damage must be repaired.

If the winch is in storage for longer than 6 months, the gear unit of the winch must be filled completely with the oil that is intended for this purpose in order to prevent corrosion in the gear unit housing. Ensure that the oil fill level is correct prior to commissioning.

In the event of fluctuating temperatures that deviate from +20°C and the possibility of air humidity >50% at the storage location, the winch must be packaged in an air-tight manner and can only be stored for a maximum period of 6 months subject to the addition of drying agent.

In this case, seaworthy packaging in accordance with ISPM15 would prove useful in ensuring additional mechanical protection throughout the storage period.

To prevent deterioration in storage, the winch must be operated without a load for at least 15 minutes at least once every 6 months while it is in storage. Ensure, in particular, that the brake opens and closes correctly. Approx. 30 start and stop procedures should be carried out during the 15 minute period. Once the test run has been completed successfully, the winch must be treated again as described above and can then be packed away in the appropriate manner for another 6 months. Documented proof of this inspection process must be provided to the manufacturer.

3. INSTALLATION

Every winch is delivered completely assembled, tested and packed on a pallet, unless specified otherwise. Check product integrity on delivery and immediately notify found damages to the transport company.

3.1 Installation of the winch

3.1.1 Lifting and transporting the winch



Only approved and tested lifting gear must be used for lifting and transporting the winch. Make sure to observe the approved load-bearing capacity of the lifting gear and compare it with the weight of the rope winch. Information about the weight of the rope winch is provided in the technical data in the enclosed winch certificate.



Winches with larger designs, in particular, types PHW and PCW are securely fastened to the supplied pallet ex works. When transporting the winch, for example, using a forklift or industrial truck, make sure the winch is correctly fastened to the pallet and if necessary, secure it with lashing straps.

During transport, pay attention to protruding parts, such as the spindle limit switch to avoid accidentally damaging it when moving the winch.



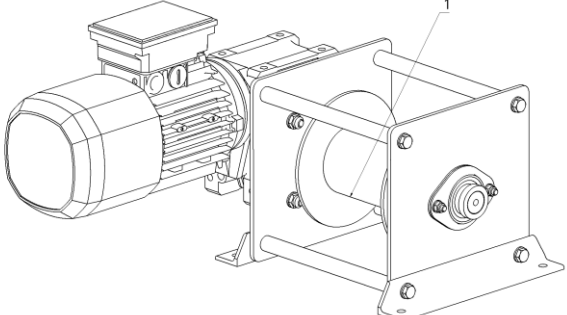
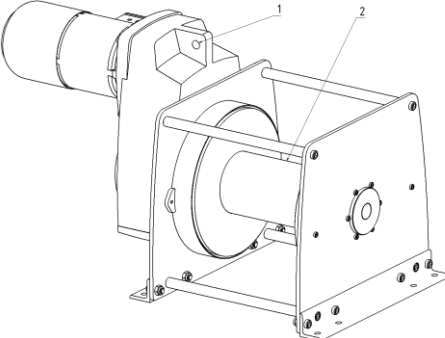
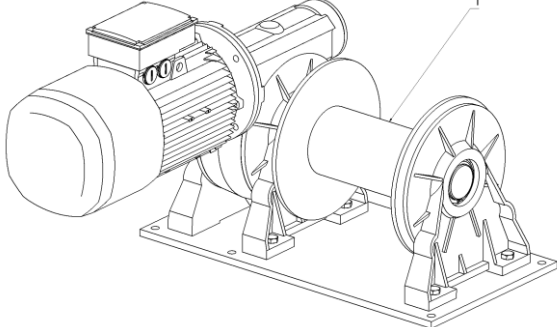
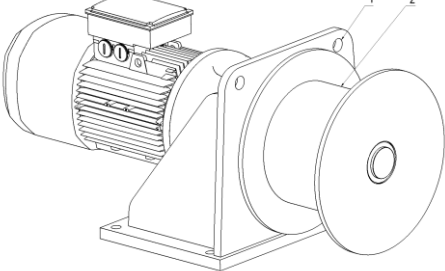
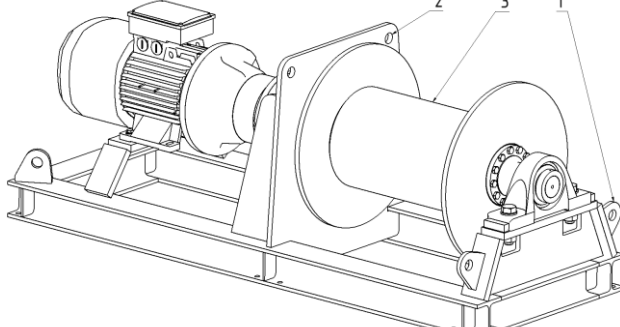
Never lift or transport the winch over people.

The following options should be used for lifting the respective winch types to connect the winches to suitable lifting gear. If attachments, for example, the protective drum cover prevent these options or make them more difficult, disassembly it for the time required for installing the winch. Covers are connected to the winch using a plug connector or screw connection for this purpose.

Always observe the operating instructions and special instructions for the used lifting equipment.

Only slightly lift the winch type at first to check whether the winches are at their centre of gravity and to ensure that they cannot slip during lifting. Only then can you lift or transport the winch to the designated installation site.

3.1.2 Lifting points of standard winch types

	<p>PORTY TYPE</p> <ol style="list-style-type: none"> 1. Use the lifting straps around the drum and the gearbox. Wrap the lifting straps around the drum several times to prevent the winch from slipping. Make sure that the straps and the winch's centre of gravity are in the correct position when lifting.
	<p>PFW TYPE</p> <ol style="list-style-type: none"> 1. Use the lifting point on the gearbox to attach a suitable shackle. 2. Use the lifting straps around the drum. Wrap the lifting straps around the drum several times to prevent the winch from slipping. Make sure that the straps and the winch's centre of gravity are in the correct position when lifting.
	<p>MC TYPE</p> <ol style="list-style-type: none"> 1. Use the lifting straps around the drum and the gearbox. Wrap the lifting straps around the drum several times to prevent the winch from slipping. Make sure that the straps and the winch's centre of gravity are in the correct position when lifting.
	<p>PCW TYPE</p> <ol style="list-style-type: none"> 1. Use the stop holes in the gearbox wall to attach a suitable shackle. 2. Use the lifting slings around the drum and the gearbox. Observe the winch's centre of gravity when lifting.
	<p>PHW TYPE</p> <ol style="list-style-type: none"> 1. Use the optional lever brackets or lifting points on the frame (if available) with a lifting chain harness or shackle and lifting sling. 3. Use the stop holes in the gearbox wall to attach a suitable shackle. 4. Use the lifting slings around the drum and the gearbox. Observe the winch's centre of gravity when lifting.

3.1.3 Positioning and fastening the winch

To prevent damage to the winch during installation, observe the following points and in case of questions, contact the manufacturer.



BEWARE!

FLATNESS OF CONTACT SURFACE ± 1 mm

If the winch is mounted on an uneven surface, it will warp the frame and damage the winch and voids the warranty.

Standard winches can be installed in any position. During the installation, however, you must ensure that the position of the ventilation plug in the gearbox is at the highest possible level. It can otherwise result in leaks and an oil leak must be expected.

If you have any doubts about the installation situation, please contact the manufacturer.

The winch foundation must be flat and solid to prevent abnormal tension, which may cause the inner parts to wear quickly.

Mount the suitable washers before tightening the foundation bolts, if there is a gap between the foundation and winch base and to compensate for unevenness in the foundation.

Using the high-strength foundation bolts through all the existing foundation holes and tighten all screws with the necessary torque.



When installing a rope pulley for deflecting the cable, it must be exactly vertical to the rope drum axis and aligned in the centre to the used drum length. Small deviations may result in poor winding and increase wear to the wire drive. Further information about positioning the rope deflections is provided in chapter 3.4.1 "Angle of deflection of rope".

3.2 Gearbox Lubrication



In principle, all winches are delivered with lubricated gears. The chapter "Technical data" in the enclosed winch pass tells you which oil your winch is equipped with and in what quantity.

Nevertheless, check whether there is actually oil in the gearbox. To do this, loosen the breather screw and carry out a visual check and, if necessary, an additional measuring check with a suitable dipstick. Top up with oil if necessary.

The position of the bleed screw is explained below.

Additional details can also be found in chapter 6.2 "Changing and checking the gearbox oil".



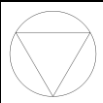


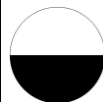
Observe the duty cycle of the winch, which is located on the type plate and in the technical data of the enclosed winch certificate. Failure to comply with this can result in overheating and damage to the winch and burns to personnel who come into contact with the components.

The temperature of the lubricating oil may never exceed a temperature of 100 °C.

Make sure that the gearbox vent screw supplied separately is in the right correction. The primarily depends on the selected installation position.

Depending on the installation position, make sure that the vent is installed at the highest possible point of the gearbox to prevent leaks in case of increasing internal pressure due to the ambient and operating temperature.

To do this, unscrew the top gearbox plug out of the gearbox and replace it with the enclosed ventilation plug.

	Position of the filler plug. Attach the vent screw here.
	Inspection glass to determine the oil level (if available).
	Position of drain screw for draining the gearbox oil (it may be equipped with magnet).
	Note about the installation position selected ex works (black for the ground).

In addition to the vent, the gearbox is equipped with at least one drain screw and if necessary, an inspection glass for checking whether the oil level is correct.

The position of the inspection glass, oil inlet and drain screw can be identifies on the winch using the adjacent symbols. Unless otherwise agreed, this symbol indicates a horizontal installation position with the base frame on the ground. The pre-selected installation position can be identified on the adjacent symbol.



The gearboxes of the winch types PFW and P 125 to 750 are supplied with lifetime lubrication. Check the gearboxes for leaks. When used correctly, no gearbox vent is necessary.

If no spirit level can be identified in the inspection glass when the P winch type is delivered for the first time, it is generally due to the slight and harmless overfilling of the gearbox and the transparent oil. In this case, check the oil level.

Make sure to take special care when handling lubricants, protect your skin using gloves and dispose of the remainder and oily cloths at an approved specialist waste management company.

3.3 Electrical connection of the motor and brake

Two different alternative plans are displayed for the electrical connection. The connection types displayed here represent the manufacturer standard and should be used. Each system, however, has characteristics that must be clarified with the manufacturer. Additional information on connecting the motor or brake is provided on the type plate of the motor. If the winch was delivered with a completed control unit, the motor and brake are already correctly wired ex works.

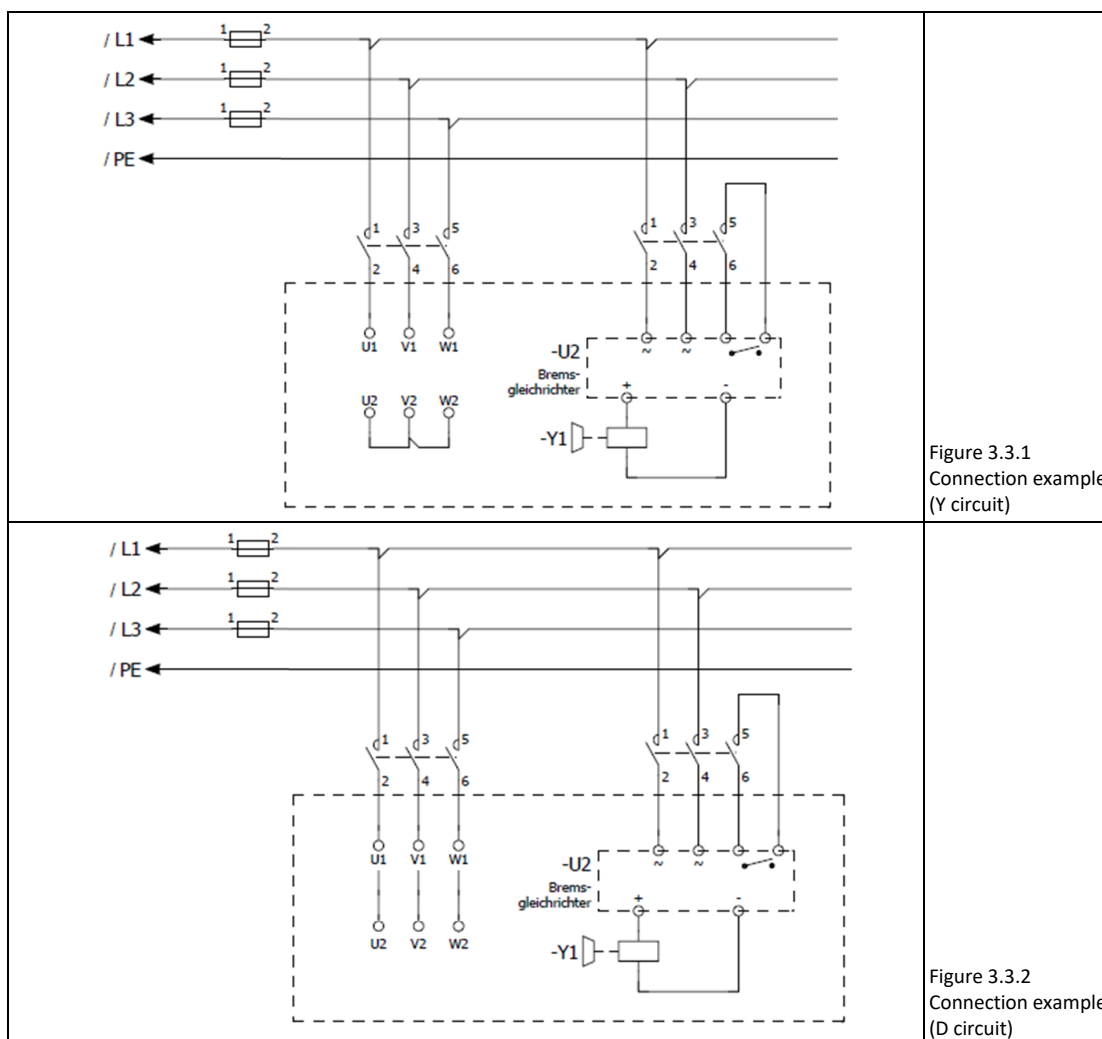


Make sure, however, to check that the motors runs correctly without a load after connecting the optionally supplied control unit and before installing the rope wire. The direction of rotation as well as the opening of the brake, which is identified by a clear switching noise when opening and closing the brake, must be checked.

Unless otherwise agreed, optionally supplied control units are designed and built for clockwise rotating field. Check to determine that connection's direction of rotation is correct, since the optionally installed overload protection and limit switch may otherwise have a malfunction. If the direction of rotation of your network does not have a clockwise rotating field, please contact the manufacturer.



The right direction of rotation with a supplied control unit and the smooth drum is identified on the direction arrow glued on the rope outlet. With a scored drum, the direction of rotation is specified by the scoring. When pressing the "AB" button, turn the smooth drum in the arrow direction.



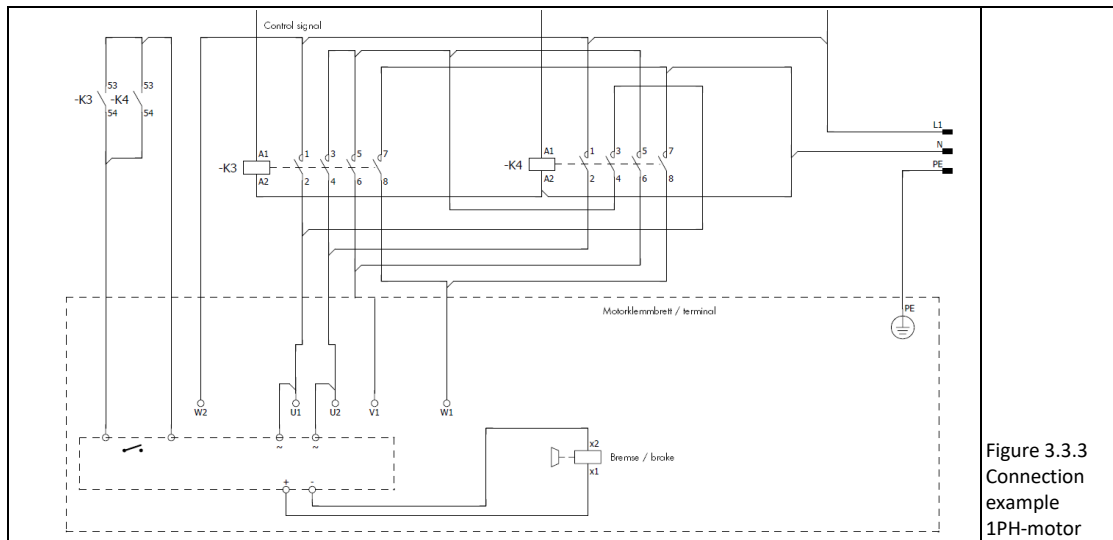


Figure 3.3.3
 Connection
 example
 1PH-motor

3.4 Rope

3.4.1 Angle of deflection of rope

To spool the rope correctly it is important that the rope comes off the drum in a sufficient low fleet angle.

The following table specifies the minimum and maximum angle of deflection that must be observed depending on the selected drum and rope model.

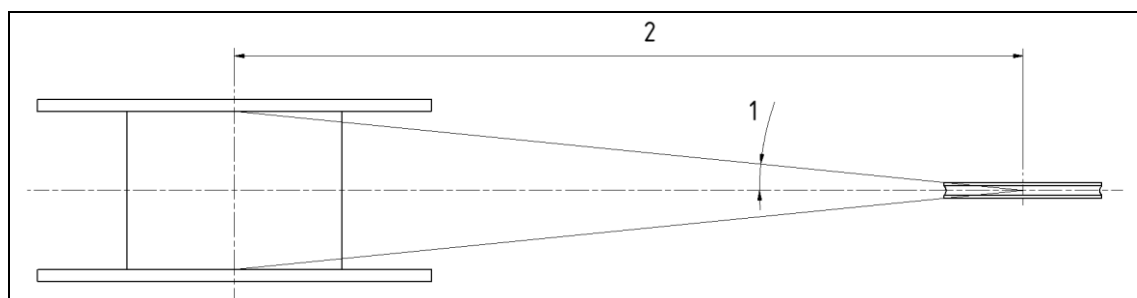
Higher fleet angles will result in excessive wear, grinding noise and bad spooling. To obtain a correct fleet angle, line out the products drum at a right angle to the rope, and centralize to the first sheave. A piece of rope can be useful in determining the correct angle.

	Smooth drum			Scored drum single layer			Scored drum multiple layers		
	Min.	Max. recommended	Max.	Min.	Max. recommended	Max.	Min.	Max. recommended	Max.
Non-rotation resistant rope (e.g. 6x19 or 6x36)	0,5°	1,5°	2,0°	0°	2,5°	4,0°	0,5°	1,5°	2,5°
Rotation resistant rope (e.g. 17x7)	0,5°	1,2°	1,5°	0°	1,5°	2,0°	0,5°	1,5°	2,5°

* The angle specified for the smooth drums should be used for scored drums with more than 3 rope layers.

Determining the angle on the drum and reflection:

- 1) Angle to be observed
- 2) Minimum distance to first deflection



3.4.2 Fitting the wire rope to the winch drum

Direction of the rope outlet

You can select the rope's direction of rotation on the drum for rope drums with a smooth drum surface and fastening elements for the rope in two directions. With scored drums, the rope's direction of rotation is specified on the drum.

To attach the rope on the drum, observe the following points step by step.



When handling the rope, make sure to sufficiently protect your hands, e.g. using gloves.

1) Extending the rope outward

Move the rope end from the winding area of the drum through the opening into the drum flange. (See figure 3.4.2.1)

The rope fastening options vary depending on the winch type:

2a) Fastening the rope with rope wedge

Guide the rope through the rope case, place a loop around the rope wedge and then guide the rope wedge with the rope loop in the rope case. (See figure 3.4.2.2)

Make sure that the free protruding end of the rope corresponds to at least five times the rope diameter. Pull the rope wedge on the rope into a secure position. (See figure 3.4.2.3)

2b) Fastening the rope with rope clip

Fasten the rope on the drum flange as displayed in figure 3.4.2.4. Place the rope in the ridge on the clamping piece and clamp it by tightening the screw. Make sure that the free protruding end of the rope corresponds to at least five times the rope diameter.

Please refer to the "Technical data" chapter of the enclosed winch certificate for the screw torque.

With the PFW DT2 please loop the rope a second time around the drum before clamping it twice with the clamp piece. The DT2 drum has 3 clamp pieces and a 4th tapped hole as spare (See figure 3.4.2.5)

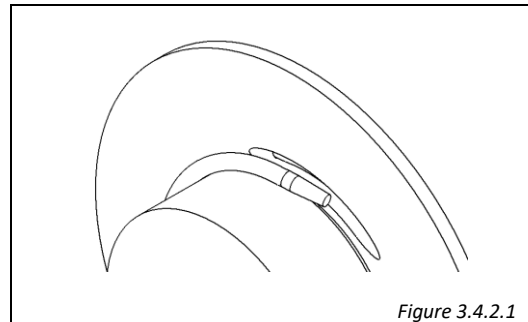


Figure 3.4.2.1

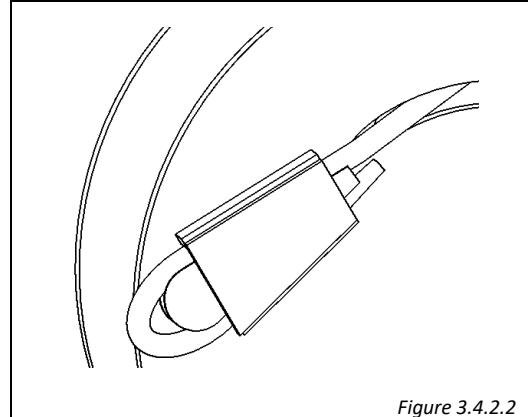


Figure 3.4.2.2

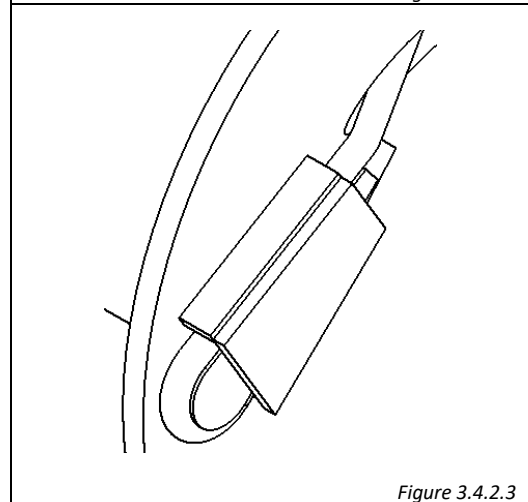


Figure 3.4.2.3

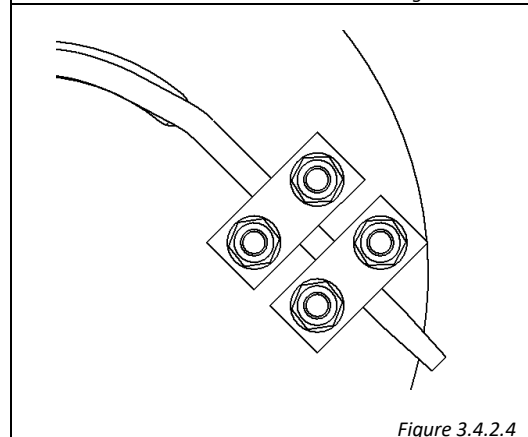
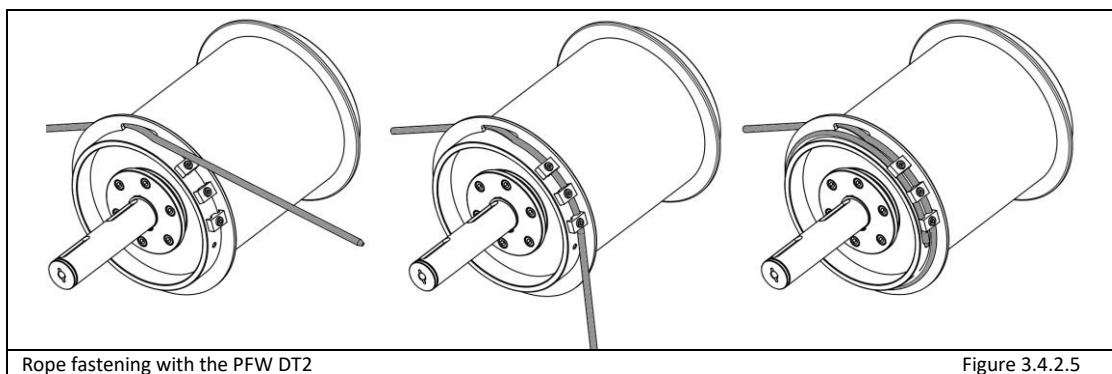


Figure 3.4.2.4



Rope fastening with the PFW DT2

Figure 3.4.2.5

2c) Fastening the rope with double round clamp

Loosen the two countersunk head screws of the rope clamping piece on the inside of the flanged pulley. Move the rope end from the winding area of the drum through the opening into the drum flange. (See figure 3.4.2.6)

Loop the rope one 3/4 rotation around the hub and route it through the inner ridge of the rope clamping piece. (See figure 3.4.2.7)

Loop the rope around the curve of the rope clamping piece and route it through the outer ridge of the rope clamping piece. (See figure 3.4.2.8)

Now tighten the screws of the rope clamping piece in intervals and alternately with uniform torque.

Please refer to the "Technical data" chapter of the enclosed winch certificate for the torque.

3) Safety windings



Always keep a minimum of 3 rope coils winded around the drum to warrant a safe winch load holding. The rope dead end fastening alone is not sufficient to hold the winch load



Never fit a rope longer than the maximum allowed to avoid excess rope layers not conforming to safety rules.

Please refer to the type plate or the "Technical data" chapter of the enclosed winch certificate for the maximum rope lengths.



The first winding of the rope to the drum shall be such to obtain a perfect compactness of the rope coils and leave no space between the coils. Keep the rope under tension during the first winding operation. The rope can be easily damaged should it be wedged under load between non compacted under laying coils.

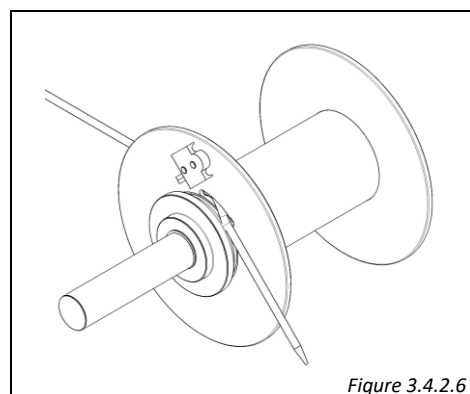


Figure 3.4.2.6

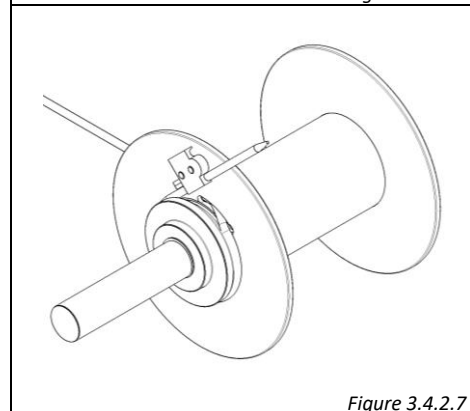


Figure 3.4.2.7

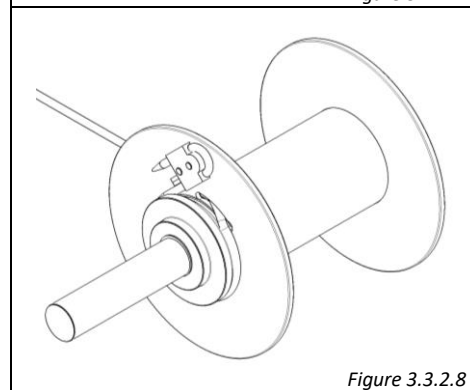


Figure 3.3.2.8

3.4.3 Handling and installation of the wire rope

Handling and installation of the rope should be carried out accordingly and should be supervised or monitored by a competent person.



Incorrectly supervised handling and installation procedures may result in serious injury to persons in the vicinity of the operation as well as those persons directly involved in the handling and installation.

Wear suitable protective clothing such as overalls, industrial gloves, helmet, eye protectors and safety footwear.



Failure to wear suitable protective clothing and equipment may result in skin problems from over exposure to certain types of rope lubricants and dressing.

Before installing the rope wire, check whether the supplied rope wire match with the ordered rope wire. To do this, compare the suspension type of the rope with the description on the type plate of the winch and the data from the enclosed winch certificate.

Measure the nominal diameter of the rope wire and check whether it matches the nominal size specified in the winch certificate and the type plate.

Examine the rope visually to ensure that no damage or obvious signs of deterioration have taken place during storage or transportation to the installation site.

Check the working area around the equipment for any potential hazards which may affect the safe installation of the rope.

Check the status of the components that make contact with the rope wire during the operation. Also check the following:

Drum

Check the general condition of the drum.

If the drum is grooved, check the radius and pitch and ensure that the grooves will satisfactorily accommodate the size of the rope.

Deflection pulley

Ensure that the grooving is of the correct shape and size for the rope.

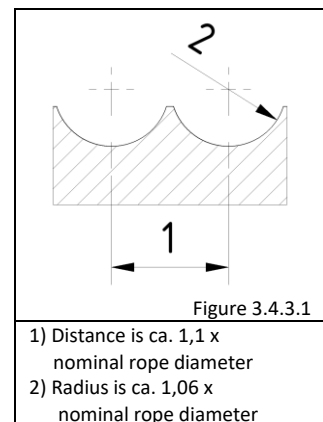
Check that all deflection pulleys are free to rotate and in good condition.

Protective drum cover

Check whether any covers, for example, the protective drum covers, are properly attached and in perfect working order. After the protective drum cover is installed, check and make sure that the rope does not rub the cover when the winch is running and that the guide opening is large enough and positioned correctly.



Failure to carry out any of the above could result in unsatisfactory and unsafe rope performance.



Loose wire ropes delivered in the bundle

Set the wire rope coil on the ground and roll the wire rope straight down. Make sure that the wire rope does not come into contact with dust, sand, moisture or any other harmful materials.

If the coil is too large to physically handle it may be placed on a 'swift' turntable and the outside end of the rope pulled out allowing the coil to rotate. (See figure 3.4.3.2)



Never pull a rope away from a stationary coil as this will induce turn into the rope and kinks will form. They will adversely affect rope performance and damage it (see figure 3.4.3.3).

Rope wire delivered on reel

Pass a shaft through the reel and place the reel in a suitably anchored stand which allows it to rotate and be braked to avoid overrun during installation. Where multi-layer coiling is involved it may be necessary for the reel to be placed in equipment which has the capability of providing a back tension in the rope as it is being transferred from reel to drum. This is to ensure that the underlying and subsequent laps are wound tightly on the drum.

Position the reel and stand such that the fleet angle during installation is limited to 1.5 degrees. If a loop forms in the rope, make sure that it does not tighten to form a kink that damages the wire rope



A kink can severely affect the strength of a six strand rope and can result in distortion of a rotation-resistant or low rotation rope leading to its immediate discard.

When unwinding rope wire, make sure that the reel as well as the deflection pulleys are mounted so that the rope does not bend in the opposite direction (see figure 3.3.3.5).

Ensure that any equipment or machinery to be roped is correctly and safely positioned and isolated from normal usage before installation commences.

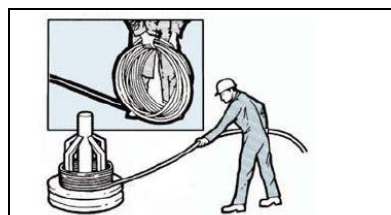


Figure 3.4.3.2

Right uncoiling with hand or rope coil

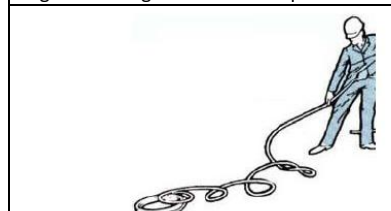


Figure 3.4.3.3

Wrong uncoiling with loops and bends

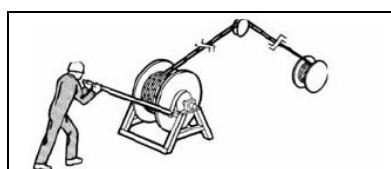


Figure 3.4.3.4

Right: Winding up the rope with pre tensioning

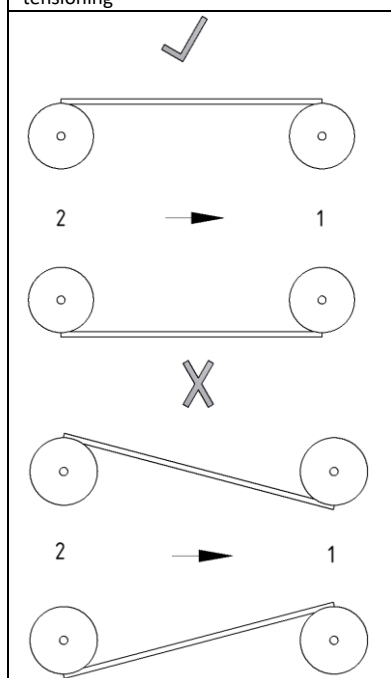


Figure 3.4.3.5

Spooling of rope from coil (2) to rope drum (1):

Top - Right: Rope exit from top to top or from bottom to bottom

Down - Wrong: Rope exit from top to bottom or from bottom to top

When releasing the outboard end of the rope from a reel or coil, ensure that this is done in a controlled manner. On release of the bindings and servings used for packaging, the rope will want to straighten itself from its previously bent position. Unless controlled, this could be a violent action. Stand clear.



Failure to control could result in injury.

Ensure that the as-manufactured condition of the rope is maintained during installation.

If installing the new rope with the aid of an old one, one method is to fit a wire rope sock (or stocking) to each of the rope ends. Always ensure that the open end of the sock (or stocking) is securely attached to the rope by a serving or alternatively by a clip (See Fig. 9). Connect the two ends via a length of fibre rope of adequate strength in order to avoid turn being transmitted from the old rope into the new rope. Alternatively a length of fibre or steel rope of adequate strength may be reeved into the system for use as a pilot/messenger line. Do not use a swivel during the installation of the rope.

Monitor the rope carefully as it is being pulled into the system and make sure that it is not obstructed by any part of the structure or mechanism which may cause the rope to come free.



Failure to monitor during this operation could result in injury.

This entire operation should be carried out carefully and slowly under the supervision of a competent person.

When coiling a rope on a plain or smooth barrel drum ensure that each lap lies tightly against the preceding lap. Pre-loading the wire rope for winding up a rope wire is very helpful.



Any looseness or uneven winding will result in excessive wear, crushing and distortion of the rope.

Slowly wind up the new wire rope several revolutions, preferably with a lighter load. Pre-loading to the amount of 2% to 5% of the wire rope strength helps achieve a tight and even coil - particularly, the first layer.

Check whether the new wire rope was properly wound up on the drum and there are no loose or crossed windings. The following layers must be uniform and even on the previous wire rope layers wherever windings with several layers cannot be avoided.



Irregular coiling usually results in severe surface wear and rope malformation, which in turn is likely to cause premature rope failure



Unless otherwise expressly stated by a certified body, the wire rope must be wound up before any acceptance tests can be performed on the winch.

Ensure that the as-manufactured condition of the rope is maintained throughout the whole of the handling and installation operation

Limit switches, if available, must be checked and if necessary, readjusted after the wire rope was mounted.

Note the following information in the winch certificate after the installation is complete:
Type of equipment, location, serial number, operating hours and date of the installation as well as any assessments and the signature of qualified personnel.

3.4.4 Rope types

Basically, the design of the winches is based on the use of metallic ropes / wire ropes.

However, the use of non-metallic textile ropes made of natural or synthetic fibres is also possible. If non-metallic ropes are to be used, the winches are usually already prepared in accordance with the enquiry. In the case of a winch for non-metallic ropes, the measures listed below have already been implemented:

- Preferred use of smooth rope drums with a fine-finished surface and appropriate surface coating.
- Alternative use of grooved rope drums, if supportive arranged winding of the rope is desired. Grooved rope drums then only with increased groove pitch, in order to be able to round groove ridges more generously and thus avoid sharp edges. Grooved profile with fine-finished surface and chemical treatment for corrosion protection.
- Suitable rope anchorage point depending on the tailoring of the rope.
- Increase of safety windings to 5 rope windings.
- For hoisting winches: Minimum breaking force of the used textile rope must be 7 times greater than the rated load to be lifted.
- Avoid any sharp edges that come into contact with the rope in the rope winding area and anchorage point area (e.g. by mechanical processing such as radii and smoothings and/or by using protective plastic parts).

If you wish to retrofit your winch with a non-metallic rope, the measures listed above must always be implemented in order to ensure a sufficient level of safety. In case of doubt, please contact the manufacturer.

3.5 Initial commissioning of the winch

Prior to the initial commissioning of the winch, carefully and thoroughly perform the following points to prevent damage to the winch, personnel or objects:

3.5.1 Checking the installation

Check whether all points of the installation were carefully and thoroughly performed.

This includes the chapter:

- Installing and fastening the winch (chapter 3.1)
- Check and if necessary, replenish the gearbox oil and check the position of the vent screw (chapter 3.2)
- Electrical connection of the motor and gearbox or cabling and the connection of the optionally supplied control unit (chapter 3.3) with the subsequent connection test and the first run without a load and rope
- Installing the rope (chapter 3.4)

3.5.2 Commissioning

3.5.2.1 Statics and records

Before using the unit with a load for the first time, it must be ensured that building's statics of the suspension are available.



It must also be checked that the anchoring is properly installed. Depending on the installation location, this includes a record about the installation of the properly selected dynamic anchors in the concrete ceiling, walls or foundations or a record indicating the correct tightening of the connecting screws with torque required for steel constructions.

Otherwise, the winch may not be commissioned.

3.5.2.2 Reduced load test

Now perform a few tests with a reduced load (e.g. 25% of the nominal load). Check that the brakes functions properly and check for excessive or inexplicable noise.

3.5.2.3 Setting the limit switch



Now set the optionally supplied gearbox limit switch. To also observe the rope expansion, perform this procedure with a reduced load and allow suitable play within design limits. The setting of the optionally supplied gearbox limit switch is explained in greater detail in chapter 7 under "Options".

3.5.2.4 Final load test and overload protection

Now operate the winch a little bit until the nominal load hangs in the system and check whether irregularities can be identified in the rope drive or suspension after 10 minutes.

Only then can the lifted nominal load be moved to the outermost positions to check the correct setting of the limit switches.



Check the function if each available EMERGENCY STOP unit by actuating the EMERGENCY STOP button or the corresponding safety switch while operating the winch with a nominal load.

Afterwards, check that the overload protection functions properly with the corresponding test load.

If the winch is delivered with an overload protection as part of the control unit ex works, it is set during the load test ex works with a value between 1.1 to 1.25 times the specified nominal load in the first rope layer. The test record about the load test is in the enclosed winch certificate.

3.5.3 Records and CE mark

After successfully completing the installation and commissioning, the winch must be tested by a qualified person or an expert. The responsible person must document and take responsibility of this inspection on the EC installation declaration and in the "Inspections" chapter of the enclosed winch certificate.

Each record concerning the work performed as well as the available statics must be kept in the winch certificate for the periodic inspections to be performed later (in Germany).

With the commissioning, the conformity of the entire system must be determined according to the respective applicable regulations and a CE mark must be attached by the responsible installation company or personnel. The conformity declaration for the entire system to be created by the responsible installation company or personnel must be in the winch certificate.

The operator is responsible for maintaining the conformity according to the respective applicable guidelines.

For important safety criteria regarding the machinery directive conformity of a rope winch, see also chapter 1.4 "Important winch protective equipment".

4. NOTES FOR A SECURE OPERATION

4.1 Important notes for operation



THE WINCH MAY NOT BE USED FOR LIFTING OR MOVING PERSONS UNLESS IT IS CLASSIFIED AS A MAN RIDING WINCH.



Personnel may not remain under suspended loads or near the deflected ropes!



Read the manual carefully before start, use or carry out any maintenance operation on the winch.



Molten materials are only allowed with additional equipment.
Use in aggressive environments is only allowed with additional equipment.

4.2 Important regulations and bans



When the operator and user are operating the winch, the following points must be observed:

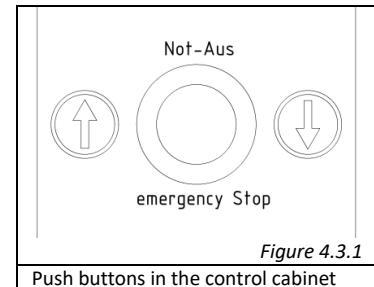
- Only qualified personnel may operate the winch.
 - The winch operator must read the instructions and familiarize with the product before operation.
 - Only authorized dealers and qualified mechanics may adjust or repair the winch.
 - Before performing any maintenance or close inspection to the winch, ensure that the product is not under load and that the power supply is switched off and disconnected.
 - Check controls of the product and its operation before operating the winch.
 - Please make sure that the winch fastening system is safe and secure.
 - Periodically check the tightness of all fasteners and tighten if necessary. Replace any damaged fasteners found.
 - Place the winch in a proper position and secure all fixing points with right size bolts correctly tightened.
 - Check oil level and fill up if necessary.
 - Ensure that all personnel and spectators are clear of the load and winch.
 - Should the winch be easily accessible by third parties, realize the protections stated by machine guideline (2006/42/EG).
 - Do not lift loads over people.
 - Use proper crane signals while operating the winch.
 - Ensure safe lifting practices are employed while rigging the cargo for lifting. Do not use untested or uncertified lifting appendages.
 - Avoid shock loads on the winch, inch the load into engagement before applying full power.
 - Emergency limit switches are installed as a safety device. They are not suited to be used as positioning devices.
 - Swinging loads will significantly increase the products load and must be avoided.
 - Do not handle wires without accident prevention gloves and never try to move wires under tension.
 - Make sure that wire size and features are compatible with winch ones and check the correct fastening of the wire to the drum.
 - Check the wire winding sense on winch drum for correctness and conformity to the one stated on winch data sheet. The correct winding contributes to extend wire's operational life.
 - Check wire integrity and absence of broken strands or kinks which may cause wire breaking.
 - Check safety device operation and efficacy.
 - Make sure that working conditions conform to winch features.
 - Make sure that working conditions conform to winch features (W.L.L.).
 - Avoid inch mode.
 - Never lift loads fastened or stuck on the ground.
 - Do not route the rope over edges.
 - Before lifting the load, the load supporting device must first be tensioned. Loads may not be slightly torn.
 - The load may not be towed or pulled at angles.
 - After reaching the theoretical useful life, the rope winch may no longer be used, but it can be generally overhauled by the manufacturer.
 - The optional delivered control box may only be opened by qualified personnel. The control box has to be closed during operation to protect the operator against applied voltage and to protect the control parts against environmental influences.
- The five safety regulations for the work with electrical equipment have to be observed.

4.3 Possibilities of Control

Depending on whether your new winch is supplied by an eclectic control you have various possibilities to control it. Listed subsequent are some of these possibilities how you can work with your winch. If you have ordered your winch as a lifting device winding or unwinding the rope is called lifting or lowering.

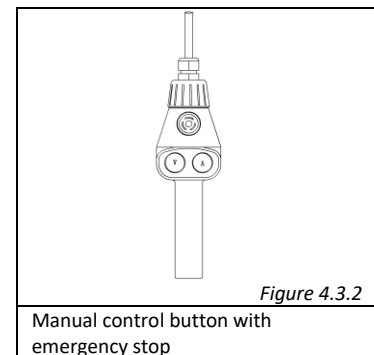
Contactor control with control box

One possible configuration is to control your winch from a control box. Depending on your order the control box has different buttons to wind or unwind you winch in different speeds. If your winch has a frequency inverter there may be a rotary control on your control box to adjust the speed of the winch. The emergency stop button stops your winch immediately. It can be turned to start your winch again.



Pendant Control for direct / contractor control

Depending on your configuration you may have a pending control connected directly to your winch or to your control box. It has different buttons to lower or lift the load with your winch. The emergency stop button stops your winch immediately. It can be turned to start your winch again.

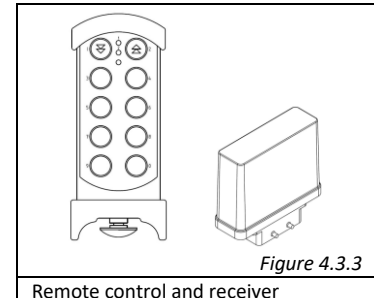


Radio remote control

If your winch is equipped with a radio remote control, you can wind the rope on and off by pushing the arrow buttons. Depending on your configuration you may have different speed levels which are also controllable with the remote control. At the bottom of the remote control you can find the emergency stop button. By pushing this button, it will snap in and can only be unlocked by turning.

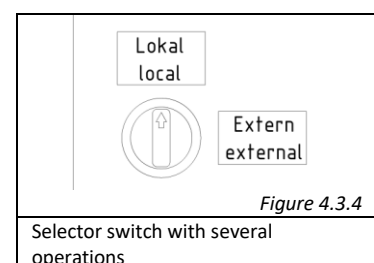


To activate the remote control, please make sure that the emergency stop button is unlocked and simultaneously press the two buttons marked with "Start". To switch off the remote control, please actuate the emergency stop button.



Several operating modes

Depending on the selected option, (with several operating modes) the control cabinet is designed with a selector switch. In addition to the "Radio" and "Manual" positions for the respective operating mode, there is frequently a third switch position, which allows you to switch off the control unit.



5. CIRCULAR TESTING

5.1 Safety measures during maintenance and repair work



- The winch and the rope drive must be free of all loads during maintenance and repair work.
- Electric winches must be isolated from the supply voltage and secured against reactivation with a main switch on the controls, for example.
- Pneumatic and hydraulic winches must have an isolation ball valve before the motor inlet. Before starting with the maintenance and repair on the winch the users must make sure that there is no pressure left on the components by shortly operating the winch up till the winch does not respond anymore on the controls
- The motor and gearbox can become hot during operation. Before starting any maintenance or repair on these components they first must cool down.

5.2 Inspections



- Each new, changed or modified device must be checked and tested by qualified personnel who have been trained in the safety, operation and maintenance of the winch to ensure safety operation prior to the (initial) commissioning of the device.
- Never use a winch when inspection indicates is damaged. Frequent and periodic inspections should be performed on equipment in regular service.

Frequent inspections are visual examinations performed by operators or service personnel during routine winch operation. Periodic inspections are thorough inspections performed by personnel trained in inspection of the winch.

Inspection intervals depend upon the equipment and the severity of usage. Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages. This allows remedial measures to be performed at an early stage to prevent a dangerous state. Defects detected through an inspection or during operation must be communicated to the personnel commissioned by the operator.

The operator must make a decision whether the detected defects represent a safety risk before the winch may be operating further.

Records and Reports

Some form of inspection record must be maintained for each winch, listing all points requiring periodic inspection. A written report should be made monthly on the condition of the critical parts of each winch. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available for review. We recommend keeping records in the enclosed winch certificate.

Wire Rope Reports

Records should be maintained as part of a long-range wire rope inspection program. Records should include the condition of wire rope removed from service. Accurate records will establish a relationship between visual observations noted during frequent inspections and the actual condition of wire rope as determined by periodic inspections.

5.2.1 Frequent Inspection

On equipment in continuous service, frequent inspection should be made by operators at the beginning of each shift. In addition, visual inspections should be conducted during regular operation for indication of damage or evidence of malfunction (such as abnormal noises).

Frequent inspections must be performed on the following components:

1. WINCH. Prior to operation, visually inspect winch housings, controls, brakes and drum for indications of damage. Do not operate the winch if the wire rope is not evenly unwound from the drum. Any discrepancies noted must be reviewed and inspected further by authorized personnel instructed in the operation, safety and maintenance of this winch.
2. WIRE ROPE. Visually inspect all wire rope which can be expected to be in use during the day's operations. Inspect for wear and damage indicated by distortion of wire rope such as kicking, "birdcaging", core protrusion, main strand displacement, corrosion, broken or cut strands. If damage is evident, do not operate winch until the discrepancies have been reviewed and inspected further by personnel instructed in the operation, safety and maintenance of this winch.



The full extent of wire rope wear cannot be determined by visual inspection. At any indication of wear inspect the wire rope in accordance with instructions in "Periodic Inspection."

3. AIR SYSTEM. Visually inspect all connections, fittings, hoses and components for indication of air leaks. Repair any leaks or damage. Check and clean filters if equipped. Check lubricator operation.
4. CONTROLS. During operation of winch, verify response to control is quick and smooth. If winch responds slowly or movement is unsatisfactory, do not operate winch until all problems have been corrected.
5. BRAKES. Test brakes during winch operation. Brakes must hold load without slipping. Automatic brakes must release when winch motor throttle is operated. If brakes do not hold load, or do not release properly, the brakes must be adjusted or repaired
6. REEVING THE ROPE. Check the reeving and make sure that the rope is properly secured on the drum.
7. LUBRICATION. For the recommended procedures and lubrication, see chapter 6.1 "Lubrication".
8. LIMIT SWITCH. Check that the limit stop deactivation functions correctly.

5.2.3 Periodic Inspection

The frequency of periodic inspections primarily depends on the severity of use and must be defined the operator through a risk assessment.

Keep accumulative written records of periodic inspections to provide a basis for continuing evaluation. Inspect all items listed in "Frequent Inspection". Also inspect the following:

Also check:

1. **FRAME and UPRIGHT.** Check for deformed, or cracked or corroded main components. If external evidence indicates the need for additional inspection, return the winch to the service repair center of the manufacturer.
2. **FASTENERS.** Check retainer rings, split pins, cap screws, nuts, and other fasteners on winch, including mounting bolts. Replace if missing or damaged and tighten if loose.
3. **DRUM AND SHEAVES.** Check for cracks, wear or damage. Replace if necessary.
4. **WIRE ROPE.** In addition to Frequent Inspection requirements, also inspect for the following:
 - a. Build-up of dirt and corrosion. Clean with steam or a stiff wire brush to remove dirt and corrosion if necessary.
 - b. Loose or damaged end connection. Replace if lost or damaged.
 - c. Check wire rope anchor is secure in drum.
 - d. Verify wire rope diameter. Measure the outer diameter of the wire rope during its service life. The current diameter for wire ropes must be recorded under the same load conditions as with the previous checks. If the actual diameter of the wire rope has decreased more than 0.4 mm (1/64inch) a thorough examination of the wire rope should be conducted by an experienced inspector to determine the suitability of the wire rope to remain in service.
5. **ALL COMPONENTS.** Externally inspect for wear, damage, distortion, deformation and cleanliness. Clean, replace or lubricate as required.
6. **BRAKE.** Test brake to ensure proper operation. The brake must withstand 1.25 times of the nominal load for the respective rope layer without slipping. If poor operation or visual damage, return winch to the manufacturer for repair. Check all brake surfaces for wear, deformation or foreign deposits. If brake lining thickness appears to be worn, contaminated or damaged brake band should be replaced. Clean and replace components as necessary.
7. **FOUNDATION OR SUPPORTING STRUCTURE.** Check for distortion, wear and continued ability to support winch and rated load. Ensure winch is firmly mounted and that fasteners are in good condition and tight.
8. **LABELS AND TAGS.** Check for presence and legibility of labels. Replace if damaged or missing.

5.2.4 Winches used irregularly

1. Equipment which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming to the requirements of "Frequent Inspection" before being placed into service.
In particular, make sure the brake functions, since it can result in the brake lining becoming "stuck" during longer downtimes.
2. Equipment which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection" before being placed into service.
3. Standby equipment shall be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". In abnormal operating conditions equipment should be inspected at shorter intervals.



Please observe the national applicable operational safety ordinances as well as the national applicable regulations for occupational health and safety.

5.3 Trouble Shooting

Problem	Possible Reason	Possible Solution
- Winch will not operate.	- No motor power. - Product is overloaded. - Brake is not released.	- Check connections, circuits, supply lines. - Check the load. - Release or clean the brake. - Check brake circuit for leakage's.
- Load doesn't stop.	- Brake is slipping. - Product is overloaded. - Spindle limit switch wrong adjusted.	- Check air gap of brake or replace brake. - Reduce the load within the rated capacity. - Check adjustment of limit switch.
- Winch is too slow.	- Product is overloaded. - Insufficient oil flow. - Brake is not released completely - Gearbox damaged.	- Reduce the load within the rated capacity. - Check flow in pressure line. - Release or clean the brake. - Check for back pressure in return line - Check gearbox. (Pay attention for strange sounds)
- Oil leakage.	- Improper oil plug. - Gasket leakage. - Oil ventilation plug at wrong place. - Oil leakage at places other than plug.	- Install right oil plug with gasket. - Fit new gasket. - Put plug at highest place of gearbox. - Check for loose bolts in gearing and tighten. - Check other seals or gaskets of gearbox and replace them if needed.
- Rope doesn't wind correctly on the drum.	- Excess fleet angle. - Winding of slack wire.	- Set fleet angle within acceptable limits (2 to 4°). - Keep rope under tension during winding.
- Winch vibrates.	- Loose foundation bolts.	- Tighten foundation bolts with due torque.

6. MAINTENANCE

The presented winch is engineered to a bare minimum of maintenance operations. The following points must still be observed:

6.1 Lubrication

Lubrication intervals are based on intermittent operation of the winch eight hours each day, five days per week.

At more intensive use lubrication intervals increase. Also, the lubrication types are based on operation in an environment relatively free of dust, moisture, and corrosive fumes.

Pinions and Screw Threads

Thread lubricant or an antiseize compound use is recommended for threaded shafts, cap screws and nuts. Remove old lubricant, clean the part with an acid free solvent and apply a new coating of lubricant to the part before assembly

Bearings and Pivot Points

Lubricate all grease fittings monthly with a grease gun, or more frequently, depending on severity of service. For temperatures -29° to 10°C use multipurpose lithium-based EP 1 grease. For temperatures 0° to 49°C use multipurpose lithium-based EP 2 grease.

Motor

Bearings of all electrical motors are lifetime grease packed.

Brake

The motor brake must not be lubricated. To protect the brake against corrosion in case the winch is rarely used and to prevent the brake lining from seizing, the winch should at least be used once a month to vent the brake.

Wire rope

Follow the wire rope manufacturer's instructions. At a minimum, observe the following guidelines.

1. Clean with a brush or steam to remove dirt, rock dust or other foreign material on the surface of the wire rope.
2. Lubricate the wire rope by means of heavy viscosity oils or light greases containing adhesive additives together with graphite, molybdenum bisulphide or sodium triphosphate.
3. Brush, dip or spray lubricant weekly, or more frequently, depending on severity of service.



Always check wire rope integrity before winch operation. Fitting a suitable new wire rope is necessary if the existing one has been squeezed or has broken strands.

6.2 Gearbox oil checks and changes

First check whether your winch has a lifetime lubricated gearbox or not. Gearboxes lubricated for life do not require an oil change and/or further checks.



Gearboxes of winch types PFW and P 125 to P 750 are lifetime lubricated. When used correctly, no gearbox vent is necessary.

For all other gearboxes, check the oil level monthly and top up if necessary. To do this, loosen the vent screw and check visually plus, if necessary, do an additional measuring check with a suitable dipstick.

You can determine the almost exact oil level by draining the oil into a clean collecting vessel as for the oil change (steps 1-4), weighing it and comparing it with the required oil fill quantity. Then refill the oil and top up with any required oil. Optionally, you can also order an oil sight glass from which the oil level can be read directly.

Information on the oil type and filling quantity can be found in the chapter "Technical data" of the enclosed winch pass.

Oil change

- 1.) Use a sufficiently large container to collect the oil and place it under the oil drain screw. The positioning of the oil drain screw is explained in more detail in chapter 3.2 "Lubricating the gearbox". Pay attention to the symbols attached to the winch.
- 2.) Remove the oil drain screw. If there are several oil drain outlets, remove all plugs to drain the oil from all gearbox stages.
- 3.) Remove the oil filler plug or vent screw. The positioning is explained in more detail in chapter 3.2 "Lubricating the gearbox". Pay attention to the symbols attached to the winch.
- 4.) Drain the oil completely.
- 5.) Refit the oil drain plug(s).
- 6.) Fill with new oil of the same type through the filler hole. Use a filter when filling. Information on the oil type and filling quantity can be found in the chapter "Technical data" of the enclosed winch pass. Remove any oil that may flow past immediately with suitable oil binders.
- 7.) Refit the oil filler plug or vent screw.

After an oil change, operate the winch briefly without load to allow the oil to distribute completely in the gearbox.



Old lubricating oil must be disposed in accordance with the applicable rules.

Worm gearboxes

Worm gearbox in which liquid lubricating must be refilled, are filled with E.P. (extreme pressure) rated mineral gear oil with ISO viscosity grade: ISO VG 320. Change the oil after the first 300 running hours. Subsequent oil changes are to follow at 4000 running hour intervals, or at least once a year.



Oil temperatures up to 70°C are normal.

Helical-bevel gearboxes

Helical-bevel gearboxes in which liquid lubricating must be refilled, are filled with E.P. (extreme pressure) rated mineral gear oil with ISO viscosity grade: ISO VG 220. Change the oil after the first 300 running hours. Subsequent oil changes are to follow at 4000 running hour intervals, or at least once a year.

Planetary gearboxes

All planetary gearboxes require E.P. classed mineral gear oil with ISO VG 150-220. Change the oil after the first 150 running hours. Subsequent oil changes are to follow at 2000 running hour intervals, or at least once a year.

Gearboxes may in some cases be filled with synthetic oil (eq. for extreme duty or temperature range) in this case the oil will normally last 8000 hours before requiring a change.

6.3 Bolt tightening check

Check periodically the tightening of winch foundation bolts and all bolts on the winch. PLANETA screw connections are secured ex works with low-strength threadlocker (e.g. Loctite 222 or similar) and tightened to tightening torques in accordance with the applicable DIN/ISO series of standards. If screw connections have to be loosened, make sure when retightening them to use low-strength threadlocker and tighten them to tightening torques in accordance with the applicable DIN/ISO series of standards.

6.4 Setting the brake play

If a brake motor was installed on the winch, the brake play must be checked and if necessary, readjusted during the maintenance.



If the maximum air gap value is exceeded, it negatively affects the brake function and it can result in the load slipping or falling.

The brake may only be adjusted by qualified personnel. In case of doubt, contact the manufacturer or send in the winch for maintenance.



If a break release lever is available, for example, as part of the free-wheeling coupling option, it may open the air gap wide enough so that the brake torque is almost zero due to the load of the break release lever connecting rods.

In this case, set the brake gap so that it is narrower.

To check the brake gap, the motor fan cover must be removed depending on the design and winch type. This generally takes place using screws that are concentrically attached on the fan cover and fasten them on the motor.

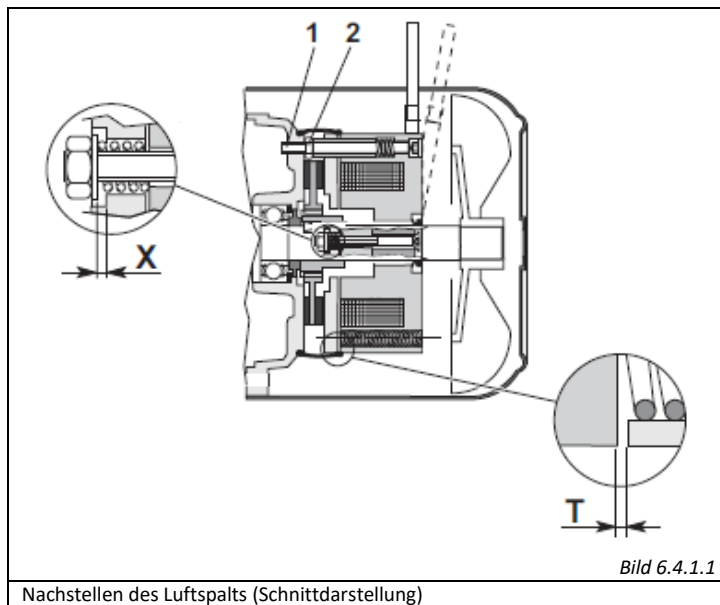


After the brake gap is adjusted, the fan cover must be reattached to make sure that no one can reach into the rotating fan when the winch is operating.

The three most commonly installed brake types are provided below. Please refer to the "Technical data" chapter from the enclosed winch certificate to see which brake is installed.

6.4.1 Setting the brake play for motors with brake type FD

The spring-loaded brake is largely maintenance-free.
 When the maximum value for air gap T specified in the "Technical data" chapter of the enclosed winch certificate is reached, air gap T must, however, still be readjusted (reset) to ensure that the brake operates safely.
 If the brake functions beyond the maximum air gap in individual cases, it does not change that fact that the brake no longer functions properly.
 In case of continued progressive wear, the function and safety function of the brake are definitely adversely affected.



Procedure for adjusting the air gap:

- Loosen nut 2.
- Depending on the motor size, air gap T must be set to the min. value of the range using the cylinder head screw (1) and the nut (2).
- Afterwards, the screw (1) must be locked into place by tightening the nut (2).
- The air gap value must be checked from time to time.
- The gap opening must be between the minimum and the highest value specified in the "Technical data" chapter of the enclosed winch certificate. Air gap values that are higher than the maximum value result in increasing brake noise and the brake may not open correctly.
- Distance "X" must be higher or equal to the value specified in the "Technical data" chapter of the enclosed winch certificate.
- The minimum thickness of the friction lining of the brake disc is 1.5 mm.

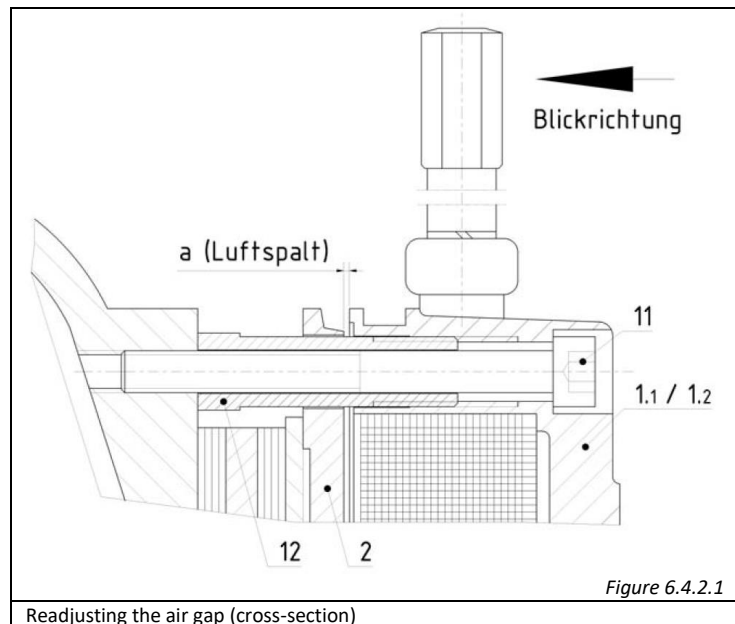
6.4.2 Setting the brake play for motors with brake type FDB / FDD

The spring-loaded brake is largely maintenance-free.

When the maximum value for air gap a specified in the "Technical data" chapter of the enclosed winch certificate is reached, air gap a must, however, be readjusted (reset) to ensure that the brake operates safely.

If the brake functions beyond the maximum air gap in individual cases, it does not change that fact that the brake no longer functions properly.

In case of continued progressive wear, the function and safety function of the brake are definitely adversely affected.



Procedure for adjusting the air gap:

- Facing the brake (see figure 6.4.2.1): Loosen the three fastening screws (pos. 11) by one half revolution anti-clockwise.
- Screw in the hollow screws (pos. 12) in the magnetic element also by rotating anti-clockwise
- Screw in the fastening screws (anti-clockwise) in the (motor) flange until the nominal air gap (measuring using a slide feeler) is present at three points on the circumference.
- Adjust the hollow screws, i.e. unscrew from the magnetic elements (anti-clockwise) until it makes firm contact on the counter friction surface
- Tighten the fastening screws with the torque according to the value from the "Technical data" chapter of the enclosed winch certificate
- Check again of the air gap and if necessary, readjust the setting

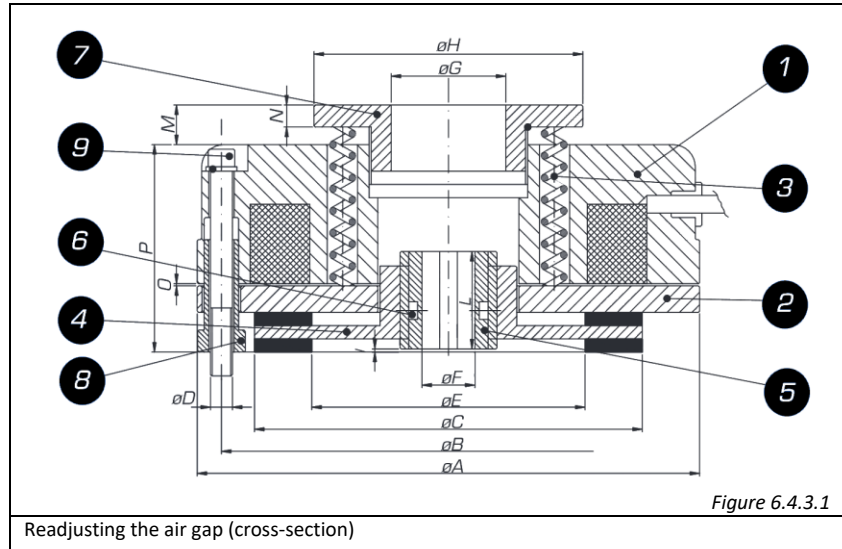
6.4.3 Setting the brake play for motors with brake type K

The spring-loaded brake is largely maintenance-free.

When the maximum value for air gap O specified in the "Technical data" chapter of the enclosed winch certificate is reached, air gap O must, however, be readjusted (reset) to ensure that the brake operates safely.

If the brake functions beyond the maximum air gap in individual cases, it does not change that fact that the brake no longer functions properly.

In case of continued progressive wear, the function and safety function of the brake are definitely adversely affected.



Procedure for adjusting the air gap:

- Before setting the air gap, make sure that the brake has cooled down.
- Loosen the locking screws (pos. 9) by one half revolution anti-clockwise.
- Now adjust the air gap O using the adjustment screws (pos. 8)
- Afterwards, tighten the locking screws (pos. 9) again and check the air gap again.
- Please refer to the "Technical data" chapter of the enclosed winch certificate for the optimum value for the air gap.
- The tolerance of the air gap to be maintained is $+0.05 / -0$
- The maximum permissible value is 0.7 mm that can be achieved due to brake wear.
- Incorrectly setting the brake play results in overheating and damage to the brake as well as irreparable damage to the brake disc.

7. OPTIONS

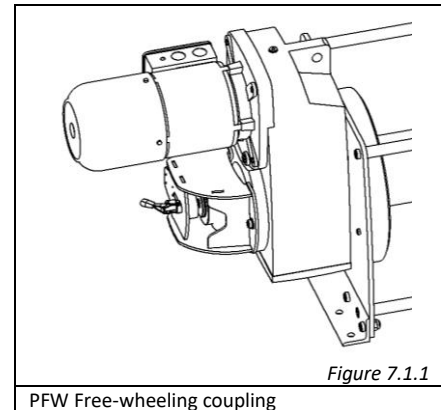
7.1 Free-wheeling coupling (FLM)

PFW winch type

The release mechanism of the free-wheeling coupling is located on the side of the gearbox facing away from the drum. It is actuated by the push rod clamping device. When actuating the push rod clamping device, a spring is pre-tensioned and the drum is separated from the drive. The cable can now be easily wound by hand and does not have to be unwound at cable speed using a motor.

To reconnect the drum, carefully lower the pressure on the push rod clamping device. If it does not return to its original position, you can simplify the connection progress by slowly pulling or unwinding the rope and simultaneously slowing reducing the pressure on the push rod clamping device.

The coupling is completely decoupled if the push rod clamping device is in its original position and has noticeable play. This is the only way to ensure that the drum and gearbox connection is not interrupted during operation.



Never use the electric control before making sure that the drum is reconnected. To make sure slowly pull the rope by hand after moving the push rod clamping device in its original position until you can hear a "snap" sound.



There is a switch integrated in the coupling console, which can be used to implement the automatic deactivation of the winch when the coupling is released.

Winch type PHW, MC & PORTY

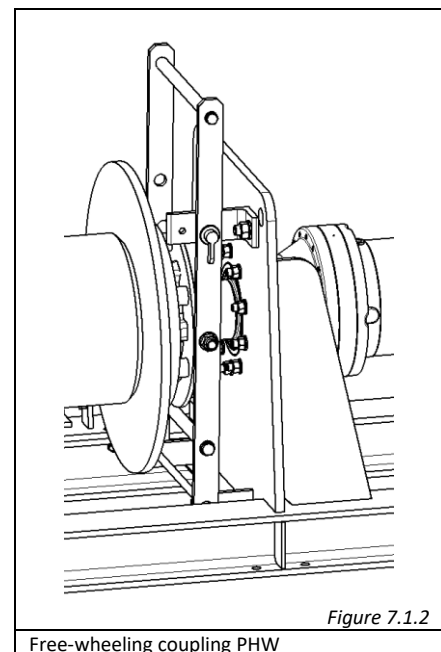
There is a release lever between the gearbox and drum, which decouples the drum from the drive shaft of the gearbox.

The locking lever is used to lock the release lever when it is locked into place or the free-wheeling position and thus prevents unintended opening or closing of the free-wheeling coupling.



Exposed and bare parts of the free-wheeling coupling must be lubricated with ball bearing grease at regular intervals. For the lubrication intervals and grease, see chapter 6.1 "Lubrication".

When it is locked into place, the forces are transferred via the radially arranged bolts. To move the coupling back into its locked positioned, press the release lever with slight pressure toward the drum and turn it until the bolts lock into the drum hub. Now lock the release lever using the locking lever.



Free-wheeling couplings are only permissible for traction winches.

Always do use protective gloves when you touch the cable.

7.2 Protective drum cover (TSH)

The protective drum cover is used to protect against injuries by being drawn into the rope drive. Please make sure that the attached standard wire guide opening is in the correct position and large enough. The opening can be enlarged if necessary.

PFW winch type

The cover has three parts and each part can be removed separately. To do this, please remove the four lynch pins and lift the cover plate off the stud.

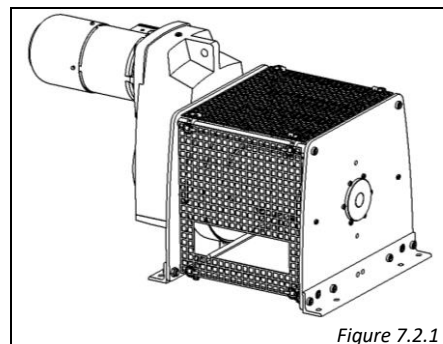


Figure 7.2.1

PFW Protective drum cover

Winch type PHW, MC and PCW

The cover consists of a solid welding grating that is screwed onto the respective base frame. The rope guide opening was adjusted to the desired rope outlet ex works.

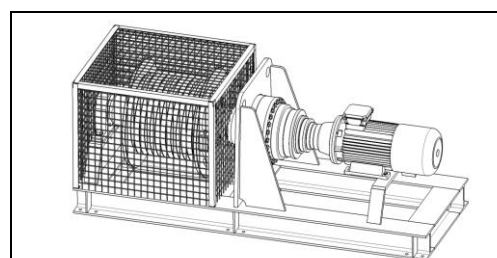


Figure 7.2.2

Protective drum cover PHW

PORTY winch type

The cover of the PORTY winch consists of a bent perforated plate that can be clamped using the bracket and clamp attached directly on the spacer rods of the PORTY frame. The cover can thus be completely removed without a tool for maintenance purposes. To do this, slightly bend lower end and remove the cover upwards.

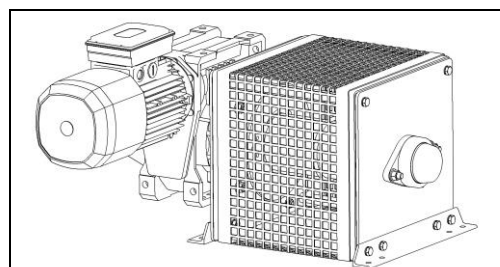


Figure 7.2.2

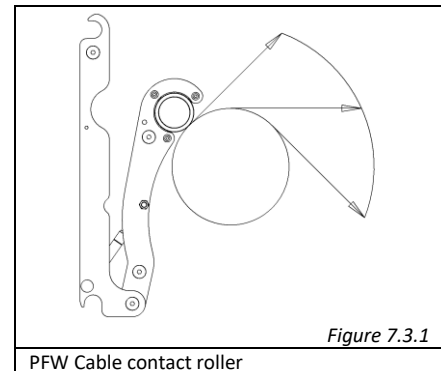
PORTY protective drum cover

7.3 Cable contact roller (SAR)

The cable contact roller supports the proper winding up of the rope without a load. The installation position depends on the rope outlet.

Winch type PFW

The cable contact roller is supplied as a completed assembly, which can be retrofit without major assembly efforts. The cable contact roller can be mounted in all eight possible positions. To install and remove, please bring the cable contact roller into the maximum deflection and block the position mounting two screws (M6x16). You can now thread in or out the cable contact roller.

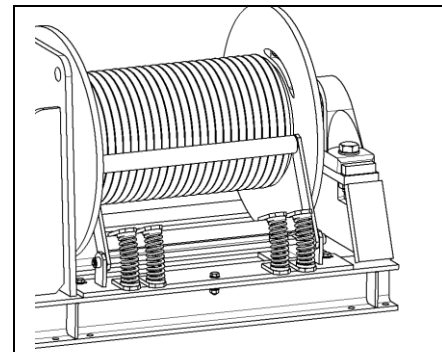


PFW Cable contact roller

Winch type PHW, MC and PCW

The heavy-duty cable contact roller consists of a main console, which is connected ex works by a screw connection to the basic frame of the winch. The installed compression springs press the ball bearing mounted roller on the rope toward the drum.

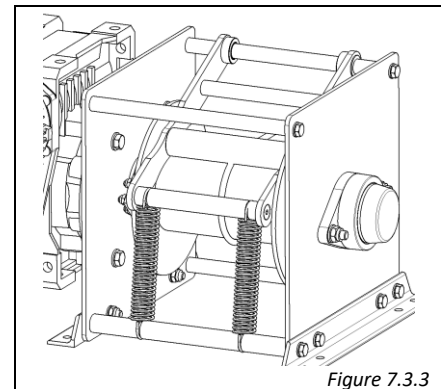
Be especially careful when testing and when performing maintenance work on the cable contact roller with regard to the pre-tensioned compression springs.



PHW Cable contact roller

PORTY winch type

The PORTY cable contact roller is mounted across from two spacer rods and must be brought into each desired position ex works to enable the rope outlet in each direction. The cable contact roller is freely mounted and automatically centres itself by the flanged wheels attached on the drum.



PORTY Cable contact roller



To mount or remove the cable contact roller, it is important to first unwind the first layer of the wound up rope.



Attention: the cable contact roller is pre-tensioned. There is a risk of crushing. When working on the cable contact roller, please make sure that the unit is de-energised and is secured against reactivation.



Regularly check that the roller and articulated joints can move freely. Otherwise, it may damage the rope and cable contact roller.

7.4 Spindle limit switch (GGS)

The spindle limit switch is used to limit the movement of the rope winch before damage can occur. It must be set during the installation.

PFW winch type

With the sizes between 750 and 3000, there are two different installation positions for the spindle limit switch. On the gearbox side (ESG), the switch is mounted below the motor directly on the gearbox. With the sizes between 250 and 500 as well as with an installed free-wheeling coupling and special motors, it is mounted on the bearing side (ESL).

In the standard version, the PFW of the gearbox limit switch has a protection class of IP65.

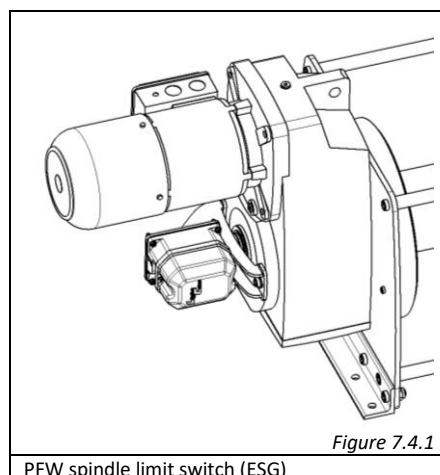


Figure 7.4.1
PFW spindle limit switch (ESG)

Winch type PHW, MC and PCW

With these winch types, the spindle limit switch is fastened and adjusted using the bolted console on the bearing block.

On request, the special spindle limit switches can be installed with higher protection classes and special contacts.

On request, it is also possible to attach an integrated incremental or absolute encoder.

PORTY winch type

The limit switch of the PORTY is connected via a removable console directly to the drum shaft and on the gearbox side.

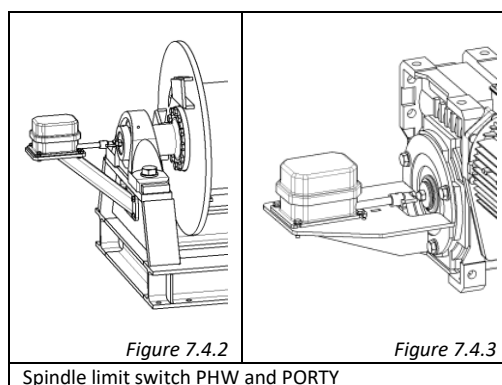
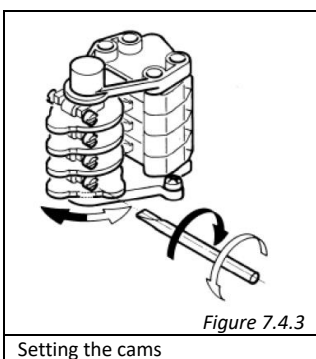


Figure 7.4.2
Figure 7.4.3
Spindle limit switch PHW and PORTY

The gearbox limit switch for PHW, MC, PCW and PORTY has the protection class IP55 as standard.

The ratio of the limit switch is designed for the rope capacity of the drum to ensure an ideal adjustment range in the switch.



Cam setting

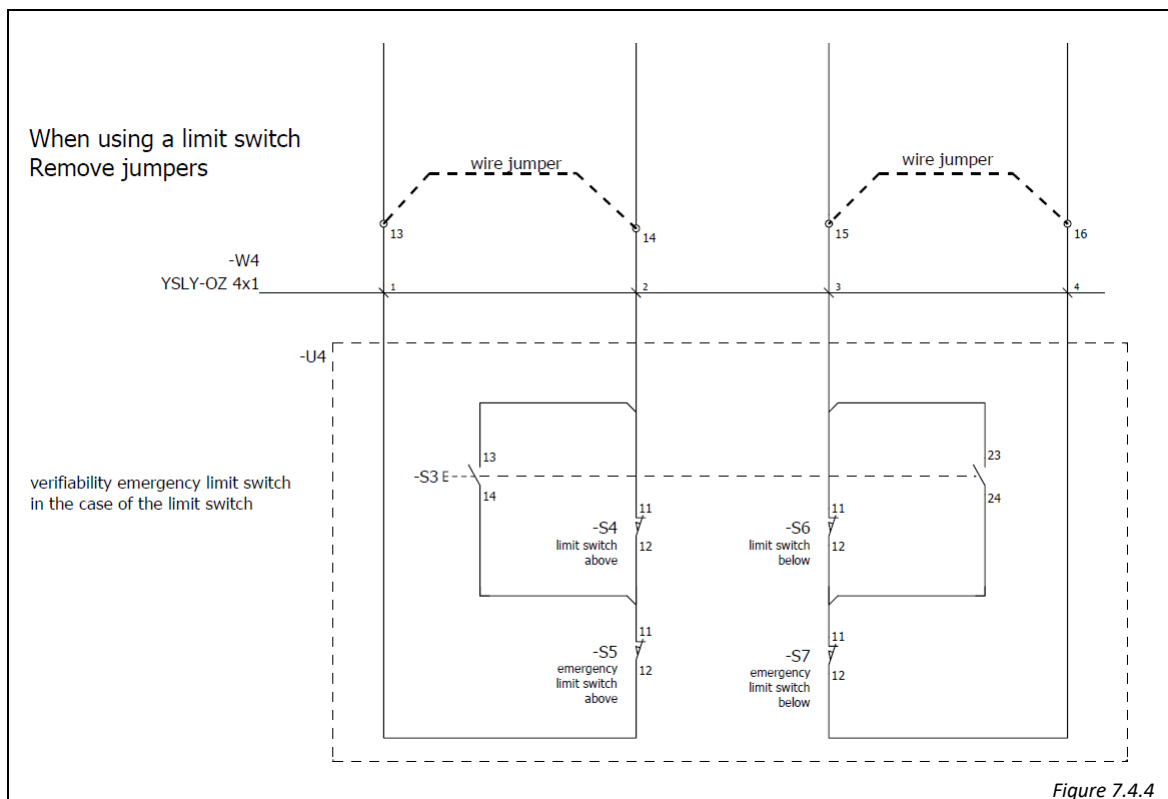
Each cam is equipped with a separate adjustment screw. The individual screws only actuate the respective cams connected to the screw without affecting the other cams in their position. The adjustment is carried out by simply turning the screw using a normal screwdriver. A completely new system for connecting the individual cams in the camshaft gear minimises the friction and simultaneously increases the switching accuracy and reliability of the cams.

Using the emergency or operational limit switch

Only a spindle limit switch with 4 contacts and the corresponding wiring may be used regularly. Other versions as well as spindle limit switches with only 2 contacts are only used as emergency limit switches and may not be used regularly. With the PFW rope winch, the switch is equipped with 4 contacts as standard. Upon ordering, we equip the switch with a key switch, which allows the user move pass the operational limit switch and thus check the emergency stop switch.



Example connection of limit switch



7.5 Slack cable switch (SSS)

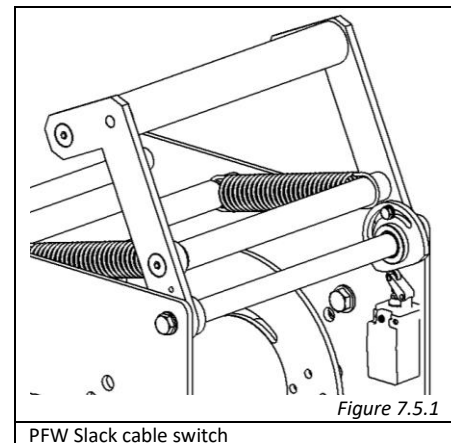
Setting the triggering point

A slack cable switch determines whether the cable is laden or unladen. The cable winch is switched off automatically once the load is set down.

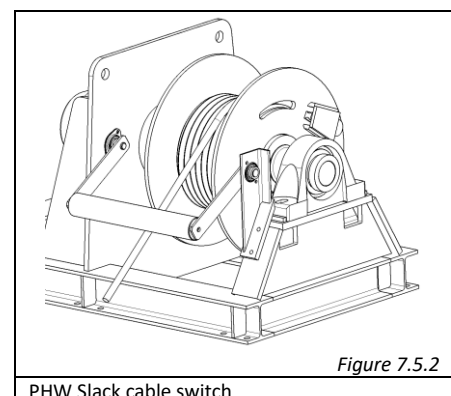
With the PFW and PORTY winch types, the rope is under a load by the springs on the roller of the rocker. If the rope is now no longer under load, the springs draw the rocker and the eccentric washer actuates the slack cable switch.

This time can be precisely set using the screw, which is in the elongated hole of the eccentric washer. Simply loosen the screw and move it in the elongated hole to influence the switching point. Afterwards, tighten the screw again.

Depending on the winch type, the slack cable switch has a more or less solid design. With the winch type PHW, PCW and MC, the pre-tension of the control roller is implemented without springs by the high weight of the roller. This design, however, has a horizontal rope outlet.



PFW Slack cable switch



PHW Slack cable switch

7.6 Hand brake release (HBL)

The motor is delivered with a brake release. You can manually release the brake by screwing the hand brake release lever into the housing and pulling against the spring force. The brake is now released until the lever is released again. This way, you can lower the loads without power.



Please note that the load is accelerated in an uncontrolled manner.



After the hand brake release is used, the hand brake release must be brought back into its original position. Otherwise, the brake does not function. To do this, simply release the hand brake release lever and press it back to its original position using the spring force. To prevent the accidental triggering of the hand brake release, you can unscrew the lever and store it in a safe place.

The hand brake release is supplied, for example, with the PORTY winch type in combination with an emergency hand crank. To manually move the winch using the crank, the brake must be released.

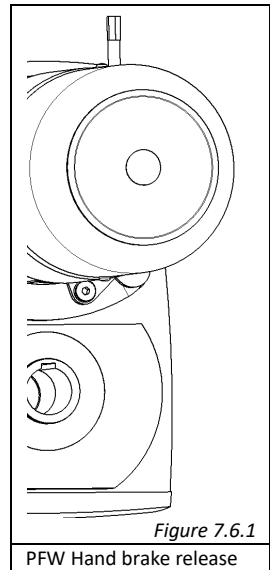


Figure 7.6.1

PFW Hand brake release

7.7 Emergency hand crank (NHK)

If the power supply fails or in case of an emergency, you can operate the winch using the emergency hand crank. You can now insert the hand crank on the hand crank mount on the rear of the motor.



When the hand crank is attached, make sure that the winch is de-energised and is secured against reactivation.



If your winch is equipped with the emergency hand crank system, it is also automatically equipped with a hand brake release so that you can release the brake while using the crank.



Please note that releasing the brake can start the turning process of the crank in an uncontrolled manner. There is a risk of injury here. Securely hold the crank and then slowly release the brake.

As a special option, the emergency hand crank, for example, with the PORTY winch type can be equipped with an electric plug-in monitor, which prevents the winch from starting when the crank is attached.

Depending on the winch type, the emergency hand crank option is only allowed for traction winches, since the load would accelerate in an uncontrolled manner without another locking mechanism on or holding the crank when releasing the brake.

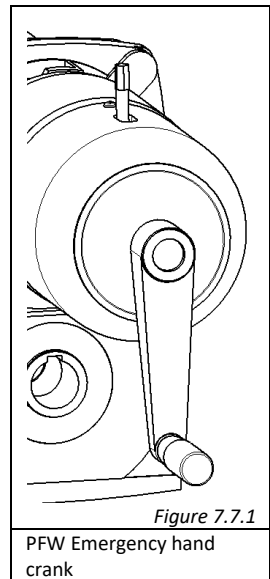


Figure 7.7.1

PFW Emergency hand crank

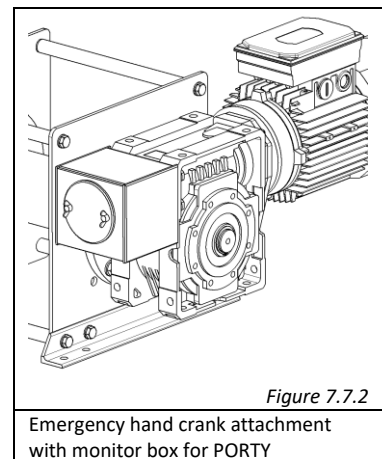


Figure 7.7.2

Emergency hand crank attachment with monitor box for PORTY

7.8 Overload protection (ULA)

To comply with the machinery directive, winches with a load-bearing capacity from 1000kg and/or with the risk of the load jamming require an overload switch-off as device protection. This is implemented using a current monitor and the displayed monitor relay. The relay is available as an option for every contactor control.

If your winch, however, was ordered with or without a control and without overload protection, you are responsible for retrofitting the unit with an overload cut-off device. The relay measures the motor current. The cut-off limit is between 110 and 125 percent of the specified nominal load in the first layer, measured in the first layer. The period of time in which measurement and switch-off takes place is a maximum of one second. The relay is preset ex works.

Subsequent adjustments should only be performed by trained personnel.

The following parameters must be defined:

1) Start (time)- no function (Y1-Y2 bridged ex works)

2) max. I_N (power) - corresponds to the load setting.

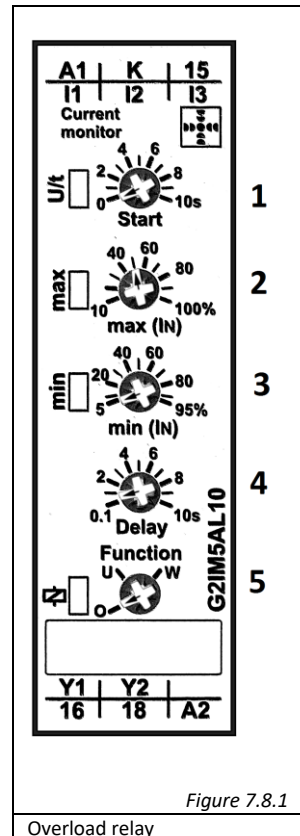
The value is set ex work during a real load test with 1.25 times the overload and is theoretically based on the nominal current comparison of the motor at full load. 100% refers to the maximum power of the overload relay (5A - type 5AL10 / 10A - type 10AL10), which is compared with the nominal power of the motor.

3) min. I_N (power) - 5% (minimum value must be set)

4) Delay (time) - delay time until the overload protection triggers.

A value of maximum 1 seconds (s) is preset.

5) Function - O (Overload) must be set.

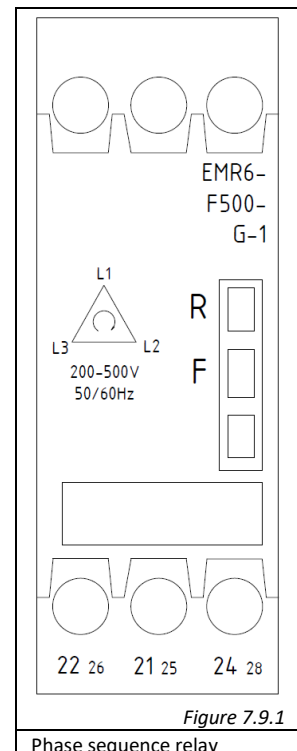


Overload relay

7.9 Mains monitoring (USW)

To ensure that the system operates safely, the voltage and phase sequence (clockwise rotating field) must be properly applied to the control.

To ensure that the system changes to a safe error state in the event of a fault, the mains supply is monitored for undervoltage and overvoltage, phase failure and phase sequence. The status can be read from the relay displayed. If the lamp lights up at "R", the connected mains is OK. If the lamp lights up at "F", there is an error and the system is switched off. In this case, the power supply should be checked and repaired.



Phase sequence relay

8. DISMOUNTING & RECYCLING



The dismantling of the winch has to be done in reverse order as the mounting of the winch. Please notice the safety instruction of this chapter also for the dismantling.

Make sure that the working area is clear before starting the dismantling. The winch has to be standing idle and has not to be under load.

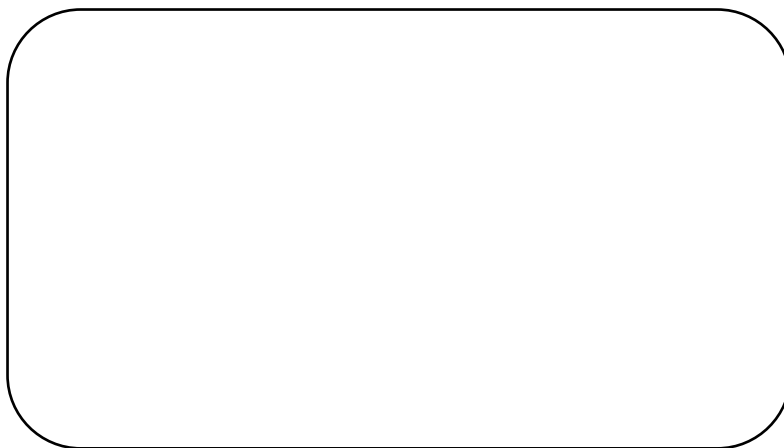
Operating material has to be disposed professionally.

Operating equipment must be disposed of according to their type. In particular, this applies to lubricants from gearboxes (old oil) and bearings (grease).

The winch can be sent to the manufacturer for disposal at no charge.
In this case, contact your specialised dealer or the manufacturer directly.

9. NOTES

[illegible]



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