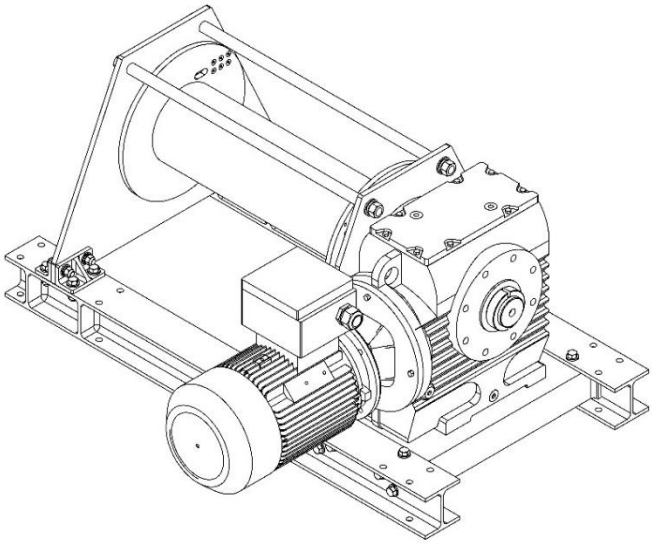
VULCAN
HOIST - PALAN

OPERATOR`S MANUAL

ELECTRIC WINCH



WARNING

DO NOT INSTALL, USE OR REPAIR THIS EQUIPMENT BEFORE READING THIS MANUAL IN ITS ENTIERETY. FAILURE TO READ AND FOLLOW THE INSTRUCTIONS DESCRIBED IN THIS MANUAL COULD RESULT IN SERIOUS INJURY, DEATH AND/OR MATERIAL DAMAGES.

WARNING

The equipment described in this manual is not designed to lift or move people nor to lift or move loads over people and must therefore not be used for such means.

WARNING

Before putting the equipment described in this manual into service, it is **strongly** recommended to familiarize oneself with the sections on using, inspecting and maintaining lifting equipment in the standards CSA B167 *Overhead cranes, gantry cranes, monorails, hoists and jib cranes* and ASME B30.7 *Winches*. To ensure a safe work environment, each worker must be trained in the equipment`s basic principles of operation and proper operating procedures.

DANGER

High voltages are used and present inside the enclosure and across the conductors of this equipment. Before performing any kind of mechanical or electrical maintenance, the machine must be disconnected from the power source and locked out/tagged out according to applicable standards. Refer to ANSI Z244.1 *Personal Protection – Lockout/Tag out of Energy Sources* for additional details.

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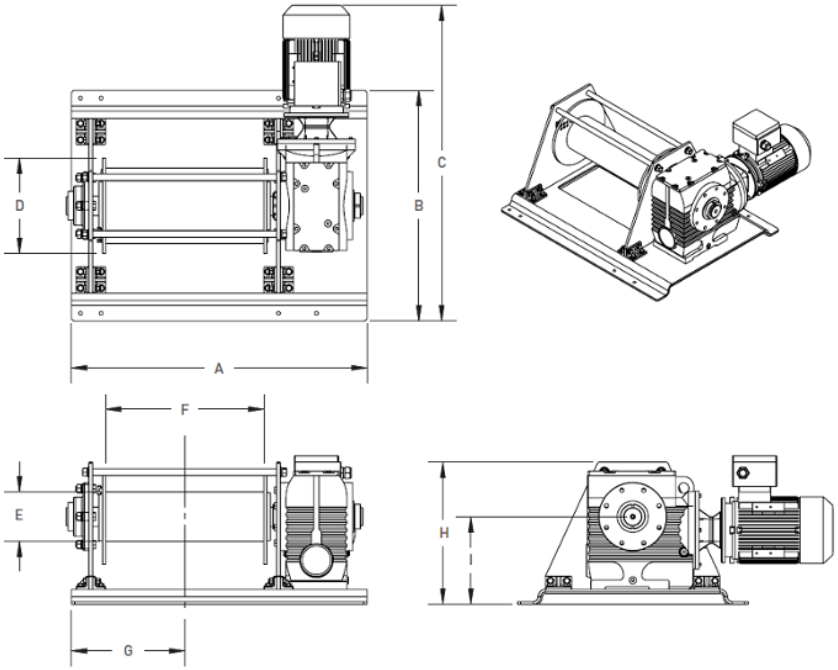
Technical Specifications

General Dimensions



General Dimensions									
Model	A	B	C	D	E	F	G	H	I
W047	29.88	21	27.00	5.75	3.38	16	13.18	9.69	6.18
W057	38.38	22	28.50	6.63	3.75	24	17.18	10.63	5.63
W067	39.38	23	29.88	7.38	3.75	24	17.18	12.25	7.75
W077	41.38	28	35.50	9.38	4.75	24	17.18	14.88	9.38
W087	42.88	30	39.63	11.25	5.75	24	17.18	17.50	11.13
W097	44.88	35	48.00	14.50	7.50	24	17.18	21.50	13.25

For non-standard and custom models, consult the drawings supplied with the equipment.

Working Loads

Limits for Hauling/Pulling								
Model	Wire Rope (in)	Wire Rope (ft) / Layer	HP[1]	Weight (lb)[2]	1st Layer	2nd Layer	3rd Layer	4th Layer
W047	1/8	115	.75	195	550 lb 22 fpm	500 lb 23.5 fpm	475 lb 25.5 fpm	450 lb 27 fpm
W057	3/16	130	1.5	290	900 lb 25 fpm	850 lb 27.5 fpm	750 lb 29.5 fpm	700 lb 32 fpm
W067	1/4	100	2	330	1650 lb 18.5 fpm	1450 lb 20.5 fpm	1300 lb 23 fpm	1200 lb 25.5 fpm
W077	5/16	100	3	510	2800 lb 13.5 fpm	2700 lb 15.5 fpm	2400 lb 17 fpm	2200 lb 18.5 fpm
W087	3/8	100	5	710	4100 lb 16 fpm	4100 lb 18 fpm	3800 lb 20 fpm	3400 lb 21.5 fpm
W097	1/2	100	7.5	1250	7000 lb 15.5 fpm	6200 lb 17.5 fpm	5600 lb 19.5 fpm	5100 lb 21.5 fpm
Limits for Lifting								
W047	1/8	115	.75	195	400 lb 22 fpm	400 lb 23.5 fpm	400 lb 25.5 fpm	400 lb 27 fpm
W057	3/16	130	1.5	290	800 lb 25 fpm	800 lb 27.5 fpm	750 lb 29.5 fpm	700 lb 32 fpm
W067	1/4	100	2	330	1400 lb 18.5 fpm	1200 lb 20.5 fpm	1050 lb 23 fpm	950 lb 25.5 fpm
W077	5/16	100	3	510	1900 lb 13.5 fpm	1900 lb 15.5 fpm	1900 lb 17 fpm	1850 lb 18.5 fpm
W087	3/8	100	5	710	2800 lb 16 fpm	2800 lb 18 fpm	2800 lb 20 fpm	2600 lb 21.5 fpm
W097	1/2	100	7.5	1250	5400 lb 15.5 fpm	4800 lb 17.5 fpm	4350 lb 19.5 fpm	3950 lb 21.5 fpm

ATTENTION

The specifications above are based on the recommended wire rope cable. Changing the size or the construction of the wire rope will affect the performance of the machine and the working loads would have to be recalculated.

[1] Motor HP may vary with the application and certain options

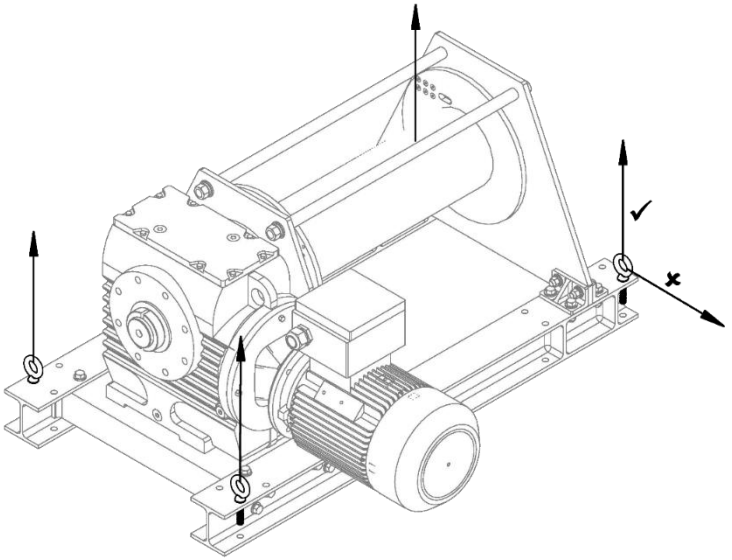
[2] Excluding control enclosure and cable weights; may vary for certain options

ATTENTION

The wire rope capacity depends on the rolling tension and the distribution of the wire rope over the drum. The actual capacity may be 25-30% below the specified length due to uneven winding of the wire rope or crisscrossing of the wire rope

Unpacking

Some models are equipped with lifting lugs to facilitate manipulation of the equipment during the installation. Never load the lugs sideways.

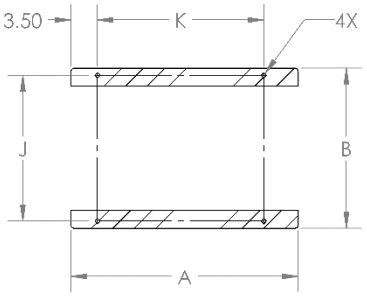


ATTENTION

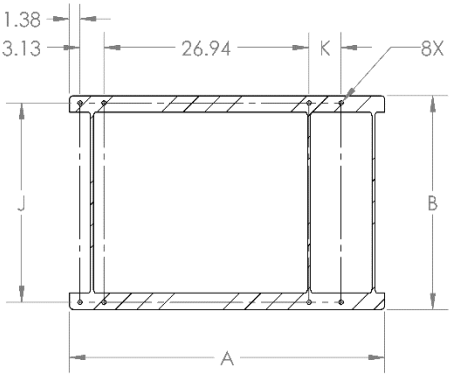
Any lugs and additional bolt holes serve to help maneuver the equipment during installation. Never use these holes or lugs to support a part or the entirety of the load.

Installation

Footprint



W047, W057, W067



W077, W087, W097

Winch Footprint					
Model	Anchor Bolts	A	B	J	K
W047	4	29.88	21	19.13	21.83
W057	4	38.38	22	20.13	30.40
W067	4	39.38	23	21.38	30.73
W077	8	41.38	28	26.13	4.23
W087	8	42.88	30	28.13	4.97
W097	8	44.88	35	32.63	5.76

WARNING

Always use the recommended number of anchor bolts (dia. ½, grade 5 or higher) to fix the winch to the floor or the supporting structure. Failure to do so may damage the equipment and/or the supporting structure.

DANGER

It is the user`s responsibility to ensure the floor and/or the supporting structure can safely carry the working loads with an appropriate factor of safety. The deflection of the structure must be negligible under the working load. Failure to respect these recommendations may damage the equipment and/or the supporting structure.

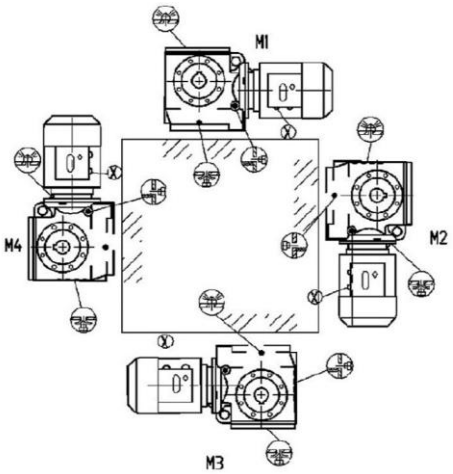
Gear Reducer Orientation and Lubrication

It is important to always maintain an adequate level of gear oil for the size and orientation of the reducer. Unless otherwise specified, the reducer is filled for horizontal use. Consult the maintenance section for recommended gear oil types and amounts.

WARNING

Low oil level may result in premature wear of the gears. Consult the maintenance section for the recommended oil types and amounts.

The reducer is always shipped with standard plugs to prevent oil from leaking during transportation. The client must install the vent plug according to the reducer orientation before putting the winch into service. The vent plug is supplied in a plastic bag taped to the reducer.



Symbol	Definition
	Vent plug
	Level plug
	Drain plug

*make sure the vent plug is always on the top side to ensure no leakage during the use or the transportation of the equipment

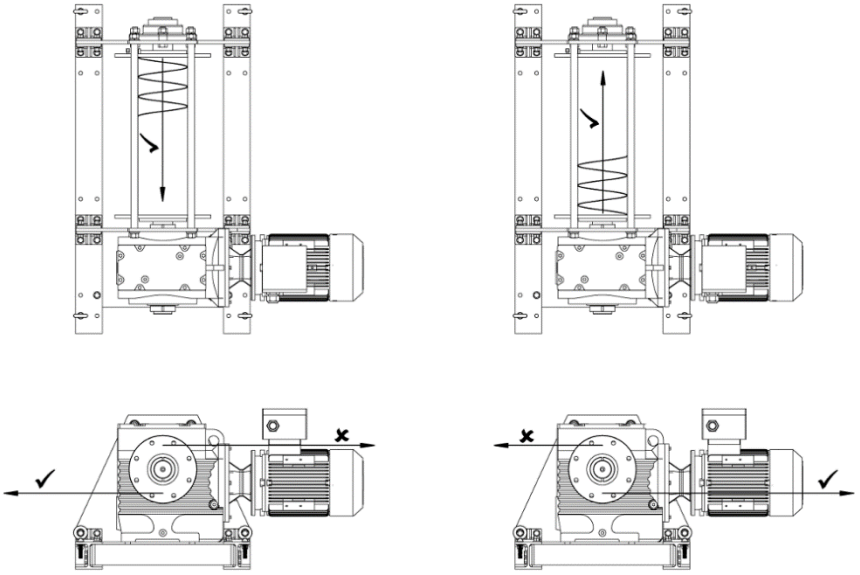
WARNING

Failure to install the vent plug may result in pressure built-up as the reducer heats up causing the seals the blow out and spill the oil.

Winding of the Wire Rope

WARNING

The wire rope must always be installed on the drum in a way that allows it to come out from underneath the drum as indicated on the diagram below:



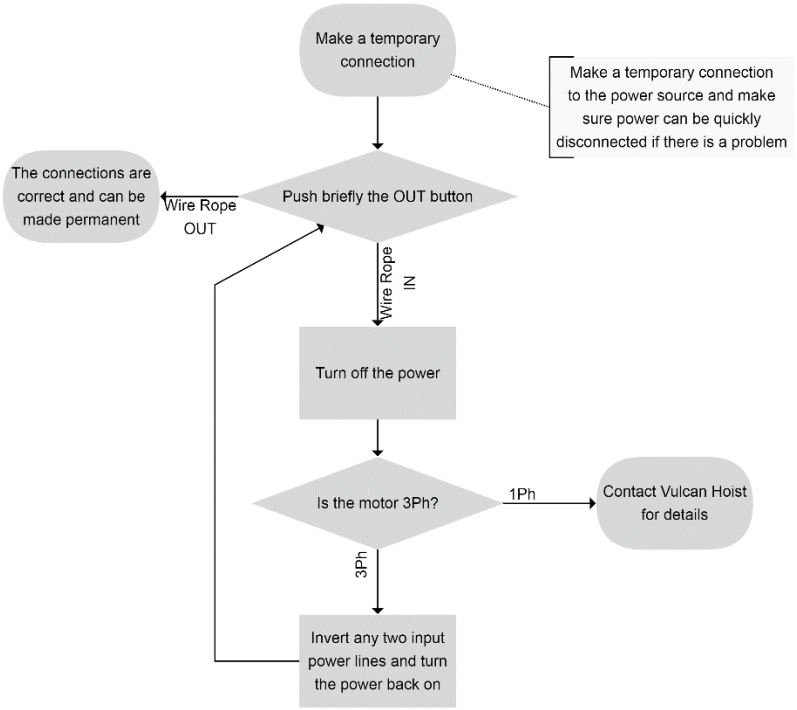
Electrical Connections

WARNING

If the motor rotation is reversed some options (like the limit switches) will not function properly which may lead to injury or equipment damage.

All electric connections must be performed by a qualified electrician. Do not neglect to verify the current draw and the length of the power cable. Improper connections or conductor sizing may cause the winch to overheat even with no load.

The winch must be connected to the power source such that the motions correspond to the indications on the control pendant, in other words the IN button makes the wire rope wind on the drum where as the OUT button unwinds the wire rope. The connection procedure steps are illustrated on the next page.



WARNING

Never change the wiring in the control pendant to reverse the motions, options like limit switches will not function properly.

ATTENTION

Never connect 115V single phase motors in a standard household socket. Even tough some models may work; household circuits are not sized for such applications and the winch may interfere with other devices on the circuit. Always consult a qualified electrician when connecting industrial equipment to the electrical grid.

Check the voltage at the machine. The voltage should remain within ±5% of the motor`s nominal voltage when the winch runs at full load.

Signs of Inadequate Wiring or Power Source
Rumbling or buzzing coming from the brake, motor or contactors
Flickering of lights wired to the same circuit as the winch
Excessive heating of the motor, internal components, electric conductors or connectors
Motor stalls easily and cannot lift/pull the working load
Fuses burn often, or breakers trigger frequently

WARNING

Even though some models are equipped with thermal relays to protect motors from overheating or from phase loss, it is the responsibility of the client to ensure the equipment is wired to the electric grid in accordance with applicable laws and electric standards and the means of disconnecting and protecting the equipment from overcurrent are adequately sized.

Using the Equipment

Before using any industrial equipment, the operator must be instructed on how to use the equipment, how to stop the equipment in the event of an emergency and how to identify, avoid and prevent risk situations. Before starting the machine, the operator must ensure the maneuver can be performed safely (ex.: the equipment is in order, the lift path is clear, the load will not go over other workers, etc.). When using the machine, the operator must remain alert and monitor the surrounding environment for arising dangers and, if a danger arises, stop the equipment in a safe manner.

WARNING

The misuse of the winch can be very dangerous and could lead to serious injury, death and/or property damage. To avoid risk situations, the operator must know and follow the proper procedures described in this section.

DANGER

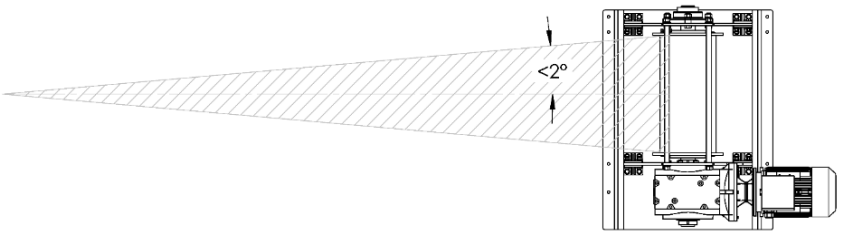
The winches can develop forces larger than the working load limits. It is the operator`s responsibility to ensure the load never exceeds the working load limit for the corresponding wire rope layer.

DANGER

All winches for lifting applications are always equipped with a brake motor. Never use a winch without a brake motor to lift loads or pull them over a steep slope where the load would be in danger of sliding or rolling down.

ATTENTION

Never exceed a fleet angle of ±2° as indicated in the image below:



Dangerous Practices to be Avoided
DO NOT use a damaged, broken or otherwise malfunctioning winch
DO NOT use a winch before having read and understood the operator`s manual
DO NOT use a winch that has been modified without the written approval of the manufacture or a qualified engineer
DO NOT lift or pull more than the working load limit
DO NOT use the winch if the wire rope is twisted, pinched, damaged or shows signs of excessive wear
DO NOT use a winch to lift, support or otherwise move people
DO NOT lift loads over people
DO NOT use a winch if people are not at a safe distance from the load or the machine and remain at a safe distance throughout the whole maneuver
DO NOT attempt to lengthen or repair a damaged or broken wire rope
DO NOT use the wire rope as a sling or wrap it around the load in a choke
DO NOT lift with the tip of the hook or over the safety latch
DO NOT lift the load if with the weight is not evenly distributed across all wire rope lines that pass through the pulley
DO NOT use the wire rope as an electric ground
DO NOT allow a welding electrode to touch the wire rope or the hook
DO NOT remove or modify the cautionary labels on the winch
DO NOT use a winch whose nameplate or safety and warning labels are missing or illegible
DO NOT shock load the winch
DO NOT let an unqualified person to adjust or repair the equipment
DO NOT jog the load with the winch

Recommended Practices
Inspect the winch at the beginning of each work shift. See *Daily Inspection* for details
Protect the wire rope from weldment splashes and other contaminants
Be familiar with all the equipment`s functions and safety procedures
Turn off/lock out/tag out any malfunctioning equipment and inform the person in charge as soon as possible
Make sure the limit switches (if applicable) function properly
Signal your intent to move a load to people around you
Signal the approach of a load to people around you
Keep both feet firmly on the floor while using the equipment
Use the safety latches on the hooks to prevent any below the hook accessories from accidentally falling off
Ensure the entire path of the load is clear before moving the load
Make sure the hook moves in the same direction as indicated on the control pendant
Inspect the hook regularly, replace damaged or worn parts and keep a detailed register of all repairs made
Replace damaged or worn parts only with components from the original manufacturer
Make sure the safety latches are closed before lifting a load and they do not carry any part of the load
Do not shake the load when suspended on the hook

WARNING

The wire rope clamps on the drum are not designed to carry the full load of the winch. You must always keep a minimum of 5 well tensioned wire rope turns on the drum before moving a load.

Inspection

Daily Inspection

The operator must conduct a daily inspection on the equipment at the beginning of each shift or when the winch is used for the first time during the shift. The daily inspection is a visual and auditory examination of the machine. The following procedures should be carried out with no load:

	Daily Inspection
1	Make sure the equipment is not tagged out of service
2	Make sure all functions work properly (up/down, emergency stop, horn, etc.) and they agree with the indications on the control pendant
3	Check if the braking distance is normal
4	Check the hook for damage like cracks, grooves, excessive opening, wear, torsion or other
5	Make sure the safety latch is present and closes/opens properly
6	Check the wire rope for signs of excessive wear like distortion, bird cages, crushed sections, pinched sections, displaced or exposed core cable or other
7	Check the wire rope for rust
8	Check the wire rope cable for broken wires; note the number and distribution of the broken wires
9	Test the operation of all travel limiting devices
10	Check for oil leaks around and underneath the winch
11	Check if the winch makes any irregular or unusual noises during operation
12	Make sure all nameplates and safety labels are present and legible
13	Check for broken, loose or missing structural components like fasteners, brackets, link, anchors and others

Periodic Inspection

An in-depth inspection of the equipment must be carried out on a regular basis by a qualified person. The winch and its components are examined to ensure the equipment is safe for use. The periodic inspections vary in frequency and details according to the intensity of the equipment use but must include at least the daily inspection procedure and a verification of the items listed below:

Periodic Inspection	
1	Low oil level
2	Loose or missing bolts, nuts or rivets
3	Excessive gear backlash (should not be perceptible by the naked eye)
4	Signs of wear, corrosion, cracks or distortion on the winch components such as, but not limited to: pulleys, bearings, chassis, drum, drum flanges, anchor bolts, wire rope clips, shackles, bolts, shafts, gears, etc.
5	Wear or damage to the hook, see *Hook Measuring and Discard Criteria* for details
6	Excessive wear of the wire rope drum
7	Cracked welds
8	Signs of heat damage, distortion, contamination or wear on the electric and mechanical components of the brake
9	Excessive brake opening – readjust or replace brake disc according to wear. Consult the brake manufacturer or Vulcan Hoist for details
10	Signs of pitting or other deterioration of the contact points on the electric contactors
11	Problems with the normal use of the control buttons
12	Damaged electric wire insulation
13	Malfunction of heating elements (if applicable) on the reducer, motor, brake, etc.
14	Inconsistent operation or poor reliability of the travel limiting devices (if applicable)
15	Damage to the supporting structure or cracks in the concrete below the winch
16	Damaged or missing nameplate
17	Missing or illegible safety labels
18	Wire rope cable showing signs of excessive wear such as, but not limited to: wear, distortion, bird cages, crushed sections, pinched sections, displaced or exposed wire rope core, corrosion. For more details, consult *Wire Rope Discard Criteria*

As a rule of thumb (unless indicated otherwise), replace any component whose wear on any one dimension exceed 2.5% of the original nominal value.

Inspection Log Book

A detailed log book must be kept of all inspections, repairs and modifications carried out on the equipment as well as a follow up on the wear of major components like the wire rope cable, the hook, the gear reducer, the drum, etc. These reports must be conserved for future reference and easily accessible to members of the inspection, maintenance and repair crews.

Hook Measuring and Discard Criteria

It is recommended to replace any hook showing one or more of the following signs of wear:

Hook Discard Criteria	
1	Missing or illegible working load limit identification
2	Pitting, corrosion, cracks, grooves or deep lines on the hook body
3	Signs of weld or heat damage on the hook body, shank or swivel block
4	Wear on any dimension of the hook body exceeding 10% of the original value
5	Permanent deformation of the hook opening exceeding 5% of the original value

ATTENTION

It is the user`s responsibility to measure and record the initial hook dimensions for future reference, since the shape and exact dimensions of the hooks vary slightly from one hook to the other.

WARNING

If the hook opening exceeds the acceptable limits replace the hook. DO NOT attempt to close the hook. The hook strength will be lowered.

Wire Rope Discard Criteria

The precise discard criteria for the wire rope must be determined by a qualified person while keeping in mind the characteristics of the application. As a rule of thumb, any cable that shows one or more of the signs below should be replaced:

	Wire Rope Discard Criteria
1	Six random broken wires over one cable lay or three broken wires in the same strand over one cable lay
2	One broken wire close to an end fitting or a connector (bell fitting, spelter, etc.)
3	One broken wire from the wire rope core which protrudes or loops out from the wire rope structure
4	Sharp bends, crushed sections, bird cages or any other sign of damage that results in severe distortion of the wire rope structure
5	Signs of heat damage (characteristic color change for example)
6	Reduction of the nominal diameter of 5% or more

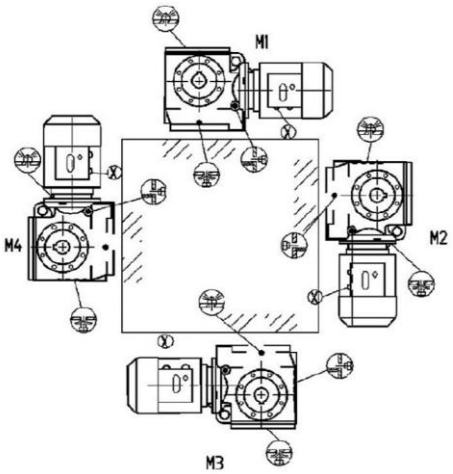
Maintenance

A log book of maintenance procedures, inspections findings and all repairs carried out on the equipment must be kept for future reference.

Gear Reducer Lubrication

Vent Plug and Level Plug

Install the bent plug according to the reducer orientation before putting the machine into service:



Symbol	Definition
	Vent Plug
	Level Plug
	Drain Plug

*make sure the vent plug is always on the top side to ensure no leakage during the use or the transportation of the equipment

A minimum level of oil must be maintained to ensure proper gear lubrication:

Reducer Orientation and Oil Amounts				
Reducer	M1 (L)	M2 (L2)	M3 (L)	M4 (L)
47	0.4	0.8	0.9	1.0
57	0.5	1.1	1.5	1.5
67	1.0	2.0	2.6	2.9
77	1.8	3.9	5.0	5.8
87	3.8	7.4	8.7	10.8
97	7.0	14.0	16.0	20.5

Change the oil after the first 6 months then once every two years or more frequently based on the use intensity

- Discard the old oil in accordance with local laws and regulations
- Do not mix different oil types inside the reducer. Certain oils may react and affect the functionality of the reducer or damage the gears

Recommended Oil Types

Temperature	Grade
-30 à 15°C	ISO VG 150 or equivalent
-15 à 3°C	ISO VG 220 or equivalent
-3 à 23°C	ISO VG 320 or equivalent
23 à 40°C	ISO VG 460 or equivalent
40 à 80°C	ISO VG 680 or equivalent

Unless indicated otherwise, reducers are filled with Meropa 320 gear lubricant

External Use

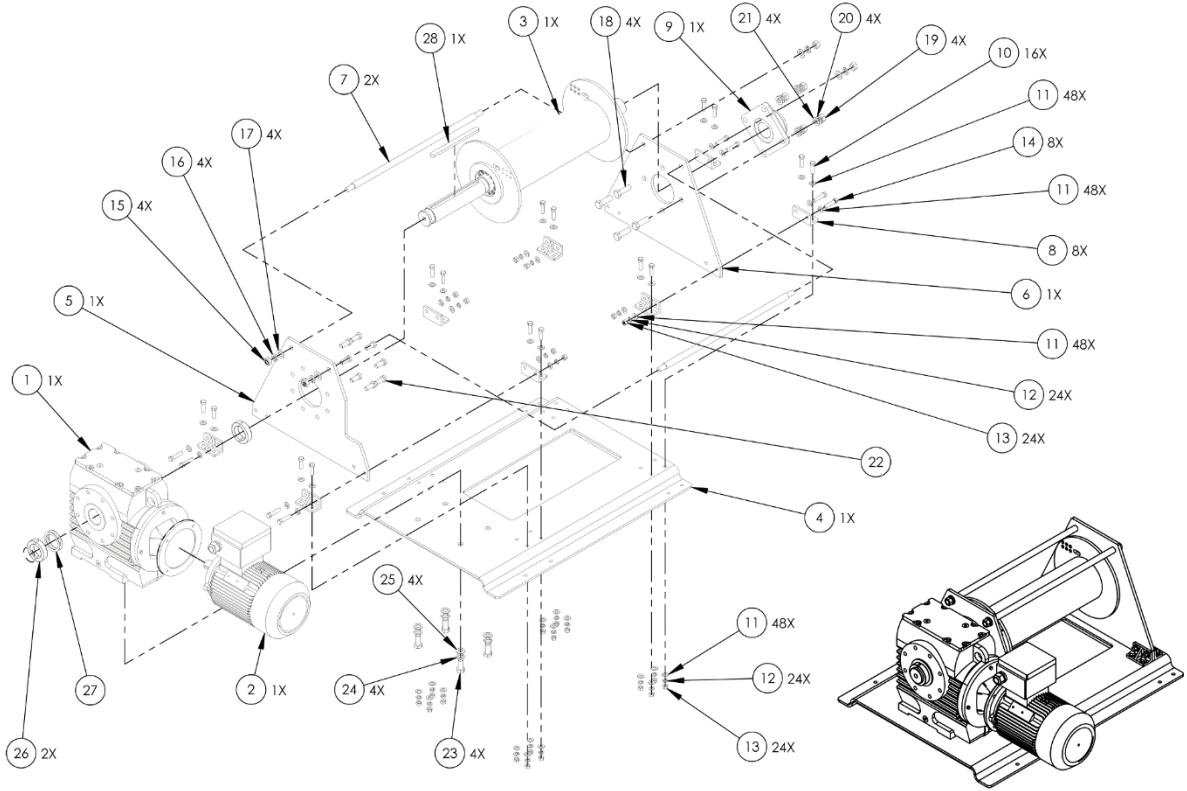
In the case of external use, the winch must be covered and protected from rain at all time. The risk of corrosion is increased further if high concentrations of salt and/or humidity are present in the air. For such applications it may be necessary to perform additional inspections and lubricate components more frequently.

Operating Environment

Unless indicated otherwise, the winch does not meet the requirements for the following operating environments and must not be used in those environments:

- Prolonged exposure to temperatures below -20°C
- Presence of explosive gasses or vapours
- Presence of volatile solvents
- High concentration of dust or particulate matter
- Acidic or otherwise highly corrosive environment

Part List


28 1X
3 1X
18 4X
9 1X
21 4X
20 4X
19 4X
10 16X
11 48X
14 8X
11 48X
8 8X
6 1X
11 48X
12 24X
13 24X
22
4 1X
7 2X
17 4X
16 4X
15 4X
5 1X
1 1X
25 4X
24 4X
23 4X
2 1X
27
26 2X
11 48X
12 24X
13 24X

Part List													
Ref	Description	Part No. W047	Qty	Part No. W057	Qty	Part No. W067	Qty	Part No. W077	Qty	Part No. W87	Qty	Part No. W097	Qty
1	Reducer	WCH-100-4	1	WCH-100-57	1	WCH-100-67	1	WCH-100-77	1	WCH-100-87	1	WCH-100-97	1
2	Motor		1		1		1		1		1		1
3	Drum	WCH-A002-47	1	WCH-A002-57	1	WCH-A002-67	1	WCH-A002-77	1	WCH-A002-87	1	WCH-A002-97	1
4	Winch Base	WCH-004-47	1	WCH-004-57	1	WCH-004-67	1	WCH-004-77	1	WCH-004-87	1	WCH-004-97	1
5	Side Plate	WCH-007-47M	1	WCH-007-57M	1	WCH-007-67M	1	WCH-007-77M	1	WCH-007-87M	1	WCH-007-97M	1
6	Side Plate	WCH-007-47B	1	WCH-007-57B	1	WCH-007-67B	1	WCH-007-77B	1	WCH-007-87B	1	WCH-007-97B	1
7	Support Shaft	WCH-008-47	2	WCH-008-57	2	WCH-008-67	2	WCH-008-77	2	WCH-008-87	2	WCH-008-97	2
8	Support	WCH-006A	8	WCH-006A	8	WCH-006A	8	WCH-006BR	8	WCH-006BR	8	WCH-006BR	8
9	Flange Bearing	HAR173	1	HAR174	1	HAR175	1	HAR176	1	HAR177	1	HAR178	1
10	Hex Bolt	HAR139	16	HAR139	16	HAR139	16	HAR139	16	HAR139	16	HAR139	16
11	Flat Washer	HAR157	48	HAR157	48	HAR157	48	HAR157	48	HAR157	48	HAR157	48
12	Split Washer	HAR140	24	HAR140	24	HAR140	24	HAR140	24	HAR140	24	HAR140	24
13	Hex Nut	HAR141	24	HAR141	24	HAR141	24	HAR141	24	HAR141	24	HAR141	24
14	Hex Bolt	HAR142	8	HAR142	8	HAR142	8	HAR142	8	HAR142	8	HAR142	8
15	Hex Nut	HAR144	4	HAR144	4	HAR144	4	HAR141	4	HAR145	4	HAR143	4
16	Split Washer	HAR054	4	HAR054	4	HAR054	4	HAR140	4	HAR146	4	HAR059	4
17	Flat Washer	HAR147	4	HAR147	4	HAR147	4	HAR157	4	HAR158	4	HAR006	4
18	Hex Bolt	HAR159	4	HAR159	4	HAR148	4	HAR148	4	HAR148	4	HAR149	4
19	Hex Nut	HAR150	4	HAR150	4	HAR151	4	HAR151	4	HAR151	4	HAR152	4
20	Split Washer	HAR153	4	HAR153	4	HAR154	4	HAR154	4	HAR154	4	HAR155	4
21	Flat Washer	HAR156	4	HAR156	4	HAR160	4	HAR160	4	HAR160	4	HAR161	4
22	Hex Bolt	HAR164	4	HAR164	8	HAR162	4	HAR162	8	HAR163	8	HAR163	8
23	Hex Bolt	HAR169	4	HAR169	4	HAR170	4	HAR171	4	HAR171	4	HAR172	4
24	Split Washer	HAR165	4	HAR165	4	HAR166	4	HAR154	4	HAR154	4	HAR155	4
25	Flat Washer	HAR167	4	HAR167	4	HAR168	4	HAR160	4	HAR160	4	HAR161	4
26	Shaft Collar	HAR179	2	HAR180	2	HAR181	2	HAR182	2	HAR183	2	HAR184	2
27	Shim Washer	HAR185	2	HAR186	2	HAR187	2	HAR188	2	HAR189	2	HAR184	2
28	Shaft Key	HAR191	1	HAR192	1	HAR193	1	HAR194	1	HAR195	1	HAR196	1

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