# Operating, Maintenance and Parts Manual
# WCH-3500-1065-160 CAPSTAN PLANETARY WINCH


## THIS UNIT REQUIRES OIL BEFORE USE

www.GEARS AND WINCHES.com.au

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## OVERVIEW

This manual is supplied with a hard copy which is to be kept with the winch at all times. Another will be sent electronically to you for storage, reference and replacement circumstances.

Gears and Winches have supplied the following equipment:

- WCH – 3500 – 1065– 160 Capstan Planetary winch

## OVERALL ARRANGEMENT

The winch comprises of a planetary gearbox driven by a hydraulic motor, coupled to a simple capstan head and mounted to a base frame.

## PERFORMANCE SUMMARY

The winch has been designed in accordance with the following standards:

- AS3990 Structural Steel
- AS1418 Cranes including hoist and winches M5 classification of mechanisms. Class T2 utilisation of mechanisms
- AS1403 Design on rotating steel shafts

The basic performance data are presented below:

| | |
|---|---|
| Rated Capacity: | 3500kg |
| Drum Diameter: | 180 dia |
| Gearbox Type: | Hi Efficiency planetary gearbox |
| Wire Rope Details: | n/a |
| No. of Rope Falls: | n/a |
| Max. Fleet Angle: | 1.5° |

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**Table 1: Performance & Specifications of winch**

| | |
|---|---|
| **General** | |
| Manufacturer | Gears and Winches |
| Model | WCH-3500-1065-160 |
| Rated Capacity | 3000KG |
| Operating Tension | 35KN |
| Holding Tension | |
| Rope Speed | 20M/PER MIN |
| **Mechanical** | |
| Rope Specification | Per customer supply |
| Breaking Load | |
| Drum Diameter | |
| No. of Layers | |
| **Electric Brake Motor** | |
| Manufacturer | |
| Motor Power | |
| Voltage | |
| Braking Torque | |
| **Gearbox** | |
| Brand | BREVINI |
| Model | EM1065.MN1 MALE OUTPUT SHAFT |
| Ratio | 6:1 HYDRAULIC MOTOR HR250CC OR SIMILAR |
| **Weights** | |
| Winch Assembly | |
| Drive Unit | |
| **Design** | |
| Application | |
| Design Life | Continuous 5000 hours |
| No. of starts per/hr | Continuous |
| Duty | Continuous |
| Operating Hours | |
| **Design Ambient Temp** | |
| Max. | |
| Min: | |
| **Configuration** | |
| Drum | |
| Drum Diameter | 180 |
| Reeving | |
| *Fail Safe Brake | |
| *Power has to be applied for the brake to disengage | |
| Service Brake | |
| Manual Locking Pins | |
| Control | |

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# GENERAL INSTRUCTIONS

The initial installation or mounting of any Winch is critically important for proper operation and performance. If the winch is mounted unevenly the centre line of the unit can be distorted to a point where the winch will not operate in either direction. It is therefore very important that the following instructions are observed when a Winch is installed. Please spend a bit of quality time on this – it will pay off in the long run.

1. Make certain that the mounting platform is sufficiently strong (at least twice the rated load of the winch) in order to avoid deflection when the load is hauled or lifted.

2. These units are very versatile they may be mounted directly onto the floor or a separate frame, we recommend the use of independent washers under each mounting bolt hole in case of unevenness of the floor, this will minimise the chance of distorting the frame. It is imperative that whatever these winches are bolted to is robust, safe and strong.

3. Set the winch in/on mounting platform and make sure good surface contact is made on all mounting pads of the winch. (We suggest that a bitumen or tar based coating be placed on the base of the winch to minimise rusting and deterioration of the frame.)

4. Install mounting bolts and tighten firmly.

5. We advise the entire winch should be sprayed with a film of de-watering fluid i.e. WD40, Inox etc., and the winch rope should be sprayed with de-watering fluid regularly to avoid oxidization.

**REMEMBER THINK SAFETY AT ALL TIMES**

**PLEASE NOTE – ANY UNAUTHORISED MODIFICATION OF OUR PRODUCTS MAY VOID WARRANTY.**

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# TROLLEY CAPSTANS

Please note these units are fitted with a handle that can be located in either a mobile position, or pull towards to you approximately 15°, this will allow the wheels to touch the ground and the unit can then be move freely to the next job location.

The handle can be position vertically at which point the frame would be mounted squarely on the ground. The unit must be affixed properly to the ground or to a frame before any hauling can proceed.

Please see **General Fitting instructions** above.

**Generic operating instructions for Capstan winches**:

Capstan winches by design are very simplistic to use, one loop around the capstan with moderate pressure applied will generally achieve 1/5 of the rated load of the winch, 2 loops around the capstan and moderate pressure will achieve ½ of the rated load of the winch. 3 loops around the capstan with moderate pressure will achieve full load capacity.

These units are very safe in their application, because once the pressure has been released from the capstan head and the rope falls to the ground the unit will cease to move.

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BREVINI RIDUTTORI, 27/01/2015

## GEARBOX AND MOTOR SELECTION FOR WINCH

**N.B. The efficiencies are theoretic.**

| | | Capstan Hyd |
|---|---|---|
| Line pull last layer = F | (kg) | 3500 |
| Wire diameter = d | (mm) | 1 |
| Wire diameter + 4% | (mm) | 1.04 |
| Drum diameter | (mm) | 179 |
| Drum length | (mm) | 145 |
| Number of layers | | 1 |
| Speed of last layer | (m/min) | 18 |
| Output torque last layer = T2 | (Nm) | 3,091 |
| Output speed = n2 | (rpm) | 31.84 |
| **Type of gearbox / winch** | | **EM1065** |
| Gearbox ratio | | 6 |
| Gearbox efficency (0,97 each stage) | | 0.97 |
| Input torque last layer = T1 | (Nm) | 531 |
| Input speed = n1 | (rpm) | 191 |
| Input power | (kW) | 10.62 |
| **Type of motor** | | **HR250** |
| Displacement of the motor | (cm3/rev) | 250 |
| Mechanic efficency | | 0.7 |
| Volumetric efficiency | | 0.8 |
| Motor oil flow = Q | (lt/min) | 60 |

| | | |
|---|---|---|
| **Type of brake** | | **NON** |
| Nominal static braking torque | (Nm) | |
| Increasing factor for parking brake | | |
| Effective theoretic braking torque needed in parking condition | (Nm) | #VALUE! |

## 3.5 T0NNE1 LAYER 0 TO 18 M/MIN @ 60LTRS&190 BAR

| Layer nr. | Layer diameter (mm) | Wire length (m) | Output torque (Nm) | Mot. diff.pres. (bar) | Wire speed (m/min) |
|---|---|---|---|---|---|
| 1 | 180 | 78.54 | 3,091 | 191 | 18.00 |
| 2 | 182 | 157.98 | 3,127 | 193 | 18.21 |
| 3 | 184 | 238.33 | 3,162 | 195 | 18.42 |
| 4 | 186 | 319.59 | 3,198 | 197 | 18.62 |
| 5 | 188 | 401.76 | 3,234 | 199 | 18.83 |
| 6 | 190 | 484.83 | 3,269 | 202 | 19.04 |
| 7 | 193 | 568.81 | 3,305 | 204 | 19.25 |
| 8 | 195 | 653.70 | 3,341 | 206 | 19.46 |

| Turns 1st. layer |
|---|
| 3 |
| Turns length (m) |
| 1.70 |


| Rope position 1 / 0 |
|---|
| 0 |

vers. d/d 29-07-98

## SAFETY RULES FOR DRUM WINCH AND CAPSTAN WINCHES

- This winch is designed for hauling only. Under no circumstances, should it be used for the movement of humans or lifting.
- The winch should be mounted on a flat, solid surface as level as possible. This will ensure that the steel rope will arrange neatly on the drum. This will avoid any irregular damage to the rope and will eliminate distortion of frame.
- If your winch is electrical powered make sure your power source complies with the voltage indicated on the electric winch before connecting the power wires to the power source.
- Connect the plug firmly to ensure proper connection. Tighten the terminals securely.
- Make sure the electric winch has been properly grounded. The power circuit must be equipped with an electric circuit breaker (E.L.C.B.)
- Before operating the electric winch, read and follow the instructions for allowable weight and voltage etc. indicated on the attached plate.
- Hydraulic driven winches make sure all the hoses are tight. On the initial start-up gently as you go make sure there is no leaks.
- Do not exceed the rated lifting capacity of the winch. Allowable hauling weight is indicated on the attached plate.
- The winch should be operated by a skilled operator. Before operating the winch check again to ensure all lock screws are tightened securely without loosening.
- Before operating the winch check to see if the steel rope drum runs to the correct direction and the brake works normally if applicable.
- Do not allow any person to be near the winch when operating. Think safety at all times.

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## GENERAL SAFETY PRECAUTIONS

### Moving Part Hazard

To prevent serious injury and property damage:-

- Do not operate or install winch without reading and understanding the operator's manual.
- Keep hands clear of wire rope, hook and fairlead opening during operation and when spooling.
- Stand clear of wire rope and load during operation.
- Keep others away.

## SAFETY RULES

- Inspect winch installation and wire rope condition before operating winch
- Do not use to move persons.
- Do not exceed winch's rated capacity.
- Never touch wire rope or hook while in tension.
- Be certain the anchor you select will withstand load.
- Never wrap wire rope back onto itself.
- Use a choker chain, wire choker rope or tree truck protector on the anchor.
- Prior to initiating winching operation be sure any element which can interfere with safe winching operations is removed.
- Take your time. Sloppy rigging causes accidents

## CAUTION

To avoid injury and property damage:

- **KNOW YOUR WINCH:** Take time to fully understand your winch and the winching operation.
- Do not use winch to secure a load during transport.
- Do not submerse in water.
- Wear heavy leather gloves when handling the wire rope.
- Never winch with less than five (5) wraps of wire rope around the drum.

**THINK SAFE – BE SAFE**

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## MAINTENANCE FOR DRUM WINCH AND CAPSTAN WINCHES

## SCHEDULED

### Each Use

1. Visually inspect all bearings/seals for signs of leakage. Repair where necessary.
2. Check winch wire rope for any obvious damage such as signs of fraying and replace if necessary, and check rope terminations for tightness
3. Check gearbox for leaks
4. Check all wiring for loose wires and/or damage to electrical devices
5. Check rope clamp bolts

### During Maintenance

1. Carry out all checks before operating shift
2. Lubricate the winch bearing and labyrinth.
3. Lubricate locking pin bush.
4. Check tightness of all bolts and nuts.
5. Check level of oil in the gearbox.
6. Tighten rope clamp bolts.

### Annually

1. Re-tighten all gearbox mounting bolts, bearing mounting bolt and foot mounting bolts – inspect for general deterioration. Do not allow winch to become rust encrusted.

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## PARTS REPLACEMENT

### Roller Bearings

Rolling bearing must be lubricated to prevent inter-metallic contact between rolling elements, raceways and cage, and also to protect the bearing against corrosion and wear.

Lubricating qualities of the grease deteriorate with time as a result of mechanical working and age. Additionally, lubricants become contaminated with service and must therefore be replenished or changed from time to time.

The bearings should be re-lubricated at approximately 200 hours operating time or at least twice a year, whichever is more frequent. After 6 re-lubrication intervals, the bearing housing should be opened and the used grease removed before fresh grease is added.

Under normal operating conditions, the free space in the bearing and housing should only be partly filled (say 30%-50%). Overfilling causes rapid rise in temperatures, particularly at high speeds.

### Bearing Inspection and Cleaning

The condition of the bearings can be monitored by listening to the sound of the bearing while running, measuring the temperature of the bearing or examining the condition of the lubricant. It will usually be sufficient to examine the bearings at the frequency stated above, and thoroughly clean down with solvent. It is important to oil and re-grease the bearing components immediately, in order to prevent corrosion.

### Bearing Storage

Before packing, bearings are normally treated with rust preventative compound. If this is the case, bearings can be stored in the original unbroken package for a number of years, providing that the relative humidity of the storage room does not exceed 60%.

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## Mounting and Dismounting Bearings

Skill and cleanliness when mounting ball and roller bearings are prerequisites for ensuring satisfactory performance and for preventing premature bearing failure.

All components of the bearing housing (shafts, seals, housing) should be carefully cleaned and all burrs removed. The bearings should be left in their original packages until immediately before mounting. Preservatives and corrosion inhibitors should be washed off with solvent just prior to fitting.

It is very important that the bearing rings, cages and rolling elements do not receive direct blows during mounting as this will cause damage. Under no circumstances should pressure be applied to one ring in order to mount the other ring. Before mounting, the seating surface should be lightly smeared with oil.

Where possible the bearing is mounted on the shaft first. If this is not convenient, the bearing is installed into both components simultaneously. Where it is necessary to use heat, the bearing must not be heated above 125˚C since the structure of the bearing material may change with resultant alterations to dimensions and hardness.

Bearing may be heated in an oil bath, however direct heat should never be used.

## Test Running

After mounting, the bearings are lubricated and the quietness of operation and temperature of running are checked during a test run. Normally the noise produced when amplifying the sound with a screwdriver is an even ‘purring’. Whistling or screeching indicates defective lubrication.  Uneven rumbling or hammering sounds indicate dirt or damage caused during installation. Abnormally high temperatures can arise from too much lubricant, too little clearance or excessive seal friction.

## Dismounting Bearings

If the bearings are to be used again after removal, the dismounting force should, on no account, be applied through the rolling elements. Where possible, the looser half of the bearing should be dismounted first.

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**Seal Replacement**

Rotating labyrinth components are secured to shafts with M8 grub screws. Particular care must be taken with aluminium labyrinth components to avoid stripping threads.

Before installation, seals should be checked for cleanliness, the lips should be checked to ensure that no cuts or distortions are present. The garter spring must be correctly seated. Pre-lubricate oil seals by immersion in SAE 20 mineral oil.

Lubricate the shaft before installing the seal. When installing seals over keyways, particular care must be taken to shield the seal from damage (the shaft usually assists with this). Failure to do so may result in damage to the sealing lip of the sealing element being turned back. The latter condition will displace the garter seal.
When inserting a seal into a housing, pressure must be uniformly distributed around the ring, and applied as near as possible to the outside diameter. Care must be taken to ensure that the seal does not enter the housing in a tilted position. Guiding tools which provide a uniform pressure and a square orientation should always be used.

**LUBRICANTS**

**Table 2: Lubricants suitable for winch**

The following table shows acceptable lubricants. Do not mix brands, for example, if the choice for the bearing is Mobile, do not use Shell or BP without first thoroughly washing the previous lubricant from the bearing housing.

| SERVICE ITEM | BRAND | LUBRICANT |
|---|---|---|
| Winch Reducer Box (check vendor info for quality) | Shell | Omala EP220 |
| | Esso | Spartan EP 220 |
| | Castrol | Alpha SP220 |
| Winch Bearing | Shell | Retinax EP2 Grease |

**It is your obligation to check to see if we have filled the gear box in our factory with Alpha SP220.**

**PLEASE USE AND DISPOSE OF LUBRICANTS WITH THE ENVIRONMENT IN MIND**

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## COMMISSIONING

The following commissioning procedure shall be carried out before the winch is operated for the first time. It is also carried out after major servicing of the unit.

### Lubricants

It is your responsibility that the gearbox is filled with oil.

- Fill gearbox with specified oil
- Grease bearing (this has been done prior to leaving factory)

### Correct Rotation of Motors

Check correct rotation direction of the winch by bump starting the motor and observing direction of motor. If direction is incorrect, reverse contactor polarity, bump start the motor to ensure correct direction.

**NOTE: ENSURE THE FAILSAFE BRAKE IS DISENGAGED BEFORE ATTEMPTING TO ROTATE THE MOTOR OR WINCH**

### Correct Brake Motor Operation

The winch drive is supplied with a brake motor. Ensure that wiring is correct according to the diagram supplied. See Vendor documents for more details.

If the brake is operating correctly, the motor will start and run without any abnormal effects. If the motor does not turn and/or the current overload relay trips stop the motor immediately and investigate. See vendor documents for details on brake wiring etc.

### Correct Functioning of Sensors

Check correct functioning of all fault indicators and system interlocks.

### Final Tests – All Equipment

Carry out final check on tightness of bolts, correct installation of split pins, lynch pins and R-pins etc.

Operate the winch so that the counterweight is raised and lowered to the limits of travel. Repeat the process four (4) times. Check all bolts for tightness and all drives and bearings for lubricant loss. Check rope terminations.

# WINCH INDUSTRIES PTY LTD
# GENERAL WARRANTY

Winch Industries Pty. Ltd warrants parts and labour, directly to the first purchaser of each winch against defects in material and workmanship appearing under normal use and service only for a period of two (2) years from the date of purchase. If you discover a covered defect, Winch Industries will, at its option, repair, replace or refund the purchase price of this winch or winch parts at no charge to you, provided you return it during the applicable warranty period, transportation charges prepaid, to Winch Industries Service Department or Factory Authorized Servicing Distributor. (You can obtain additional information from Winch Industries directly at the address printed below). Please attach your name, address, telephone number, and a description of the problem and a copy of the bill of sale bearing the appropriate proof of original retail purchase, to each product returned for warranty service. To obtain any warranty coverage, it is absolutely necessary that you present proof of purchase acceptable to Winch Industries, such as a copy of the purchase receipt.

This warranty applies only to winches sold and/or manufactured by Winch Industries which can be identified by the “Winch Industries” trademark, trade name or logo affixed to them. This warranty does not apply if the product has been damaged by accident, abuse, misuse, collision, overloading, exhaust, or misapplication, or has been improperly installed, has been improperly used, has been improperly serviced or has been modified without the written permission of Winch Industries. This warranty does not apply if any Winch Industries serial number has been removed or defaced. The finish and wire rope on the product are excluded from this warranty.

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