



VRC4500 - VERTICAL WINDLASS

INSTALLATION AND INSTRUCTION MANUAL

(MUST BE READ PRIOR TO INSTALLATION AND OPERATION)

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SCOPE OF SUPPLY

Equipment Supplied includes the following items

ITEM / FEATURE	DESCRIPTION
1	6 x VRC4500 Vertical Windlass Fitted with a single gypsy. Gypsy to suit 12.5mm U2 STUD LINK Fluted Capstan Finish Electric Motor Cone Drive
2	Polished 316 Stainless Steel Finish
3	Stainless Steel Clutch handle
4	35 degree Brake
5	Installation manuals

GENERAL DESCRIPTION

The VRC4500 Model Vertical Windlass is powered by an electric motor through a single stage worm drive reduction. The windlass consists of a gypsy and capstan mounted on a stainless steel drive shaft supported by low friction bearings, mounted on a Stainless Steel base plate.

The clutch handle fitted into the Clutch Nut is used to de-clutch the drive and free wheel the chain gypsy. The brake band controls the run of the anchor and chain. The capstan is keyed directly to the drive shaft and the gypsy is driven by engaging the clutch. All components are of bronze or stainless steel construction.

LINE: 12.5mm U2 (Kenters)

GEARBOX:

Manufacturer: STM
Description: Single Stage 90 Degree Worm Wheel Gearbox
Model: RMI 110 F2
Ratio: 70:1

MOTOR:

Manufacturer: WEG
Model: 440V / 4kW / 3Ph / 50Hz

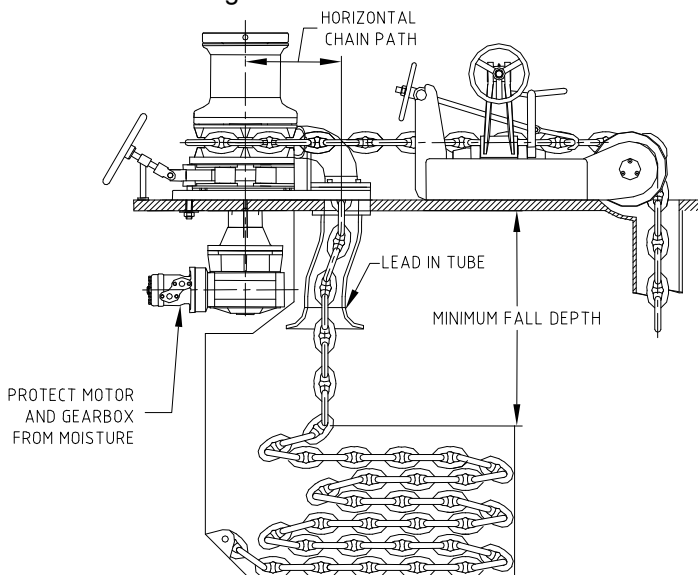
LOCATING THE WINDLASS

When installing the windlass it is important to consider the following requirements for efficient operation of the whole anchoring system.

- A clear and horizontal Chain Path
- Correct Positioning and Locker Depth
- Maximizing the Wrap of Chain around the Gypsy
- Position of the Motor and Gearbox Under deck
- Insulation of Dissimilar Metals

The windlass should be positioned centrally over the chain locker. This helps to maximize the fall of chain down to the locker as it piles up when retrieving the anchor (See the fall depth table).

It is a common mistake to locate the windlass too far forward, or too close to the bulk head, where there is insufficient room for the chain and anchor stowing. In installations where this is not possible a length of 'lead in' tube with a belled end and a bore of at least 2 times the chain width can be used to guide the chain to the centre of the chain locker. This extension needs to be a minimum of 45° to 90° from the under deck. Angles less than 45° will increase chain drag within the tube.

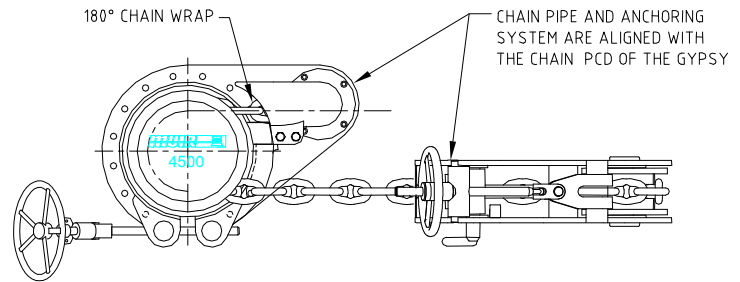


The gear drive can be fitted in multiple positions to allow the chain to fall away from the motor. If the motor is positioned near the falling chain then the lead in tube is also recommended to protect the motor from water.

Chain Size	Minimum Fall Depth To Top Of Heaped Chain
Up to 1/2" (13mm)	36" (914mm)
5/8" to 7/8" (16 to 22mm)	48" (1220mm)
1" (25mm) and Above	48" (1220mm) or Greater

When fitting the base plate all mating surfaces should be coated with sealant, to ensure enough is applied allow it to squeeze out as the mounting bolts are tightened.

After fitting the base plate in the desired position the windlass can be reassembled using the assembly instructions on the following page.



The chain pipe should be fitted last making sure to match the height of the chain from the gypsy. Ideally this should line up with the chain after it has wrapped 180 degrees around the gypsy; this angle of wrap should not be less than 140 degrees for the correct operation. Refer to diagram in appendix for correct chain pipe and peeler setup

If the windlass is to be mounted on a steel or alloy deck an insulator, preferably some form of rigid plastic must be used to avoid contact of dissimilar metals. It is also advisable to insulate the mounting bolts with plastic sleeves.

If the vessel has a curved deck an appropriately shaped mounting block must be used.

Reassemble the windlass, fitting the shaft and top assembly complete, (refer exploded view) using a waterproof grease to lubricate all parts and running gear.

It is important to thoroughly lubricate all mating surfaces with grease suitable for marine applications before use. As the windlass will be operating in an extremely corrosive environment it is also highly recommended that corrosion protection be used on the external surfaces of the motor, gear drive and adaptor, and also in any areas where water may lie to protect against moisture in the chain locker (See the maintenance section for additional information).

ELECTRICAL INSTALLATION

Ensure all wiring is completed as per supplied wiring diagram and that all circuit components and wire is suitable for the system rating. To maintain the manufacturer's warranty on the windlass a suitably rated overload protection must be installed to protect the motor.

HYDRAULIC INSTALLATION

To ensure minimal pressure loss or heat build up, it is recommended that hydraulic piping of the following minimum size is used.

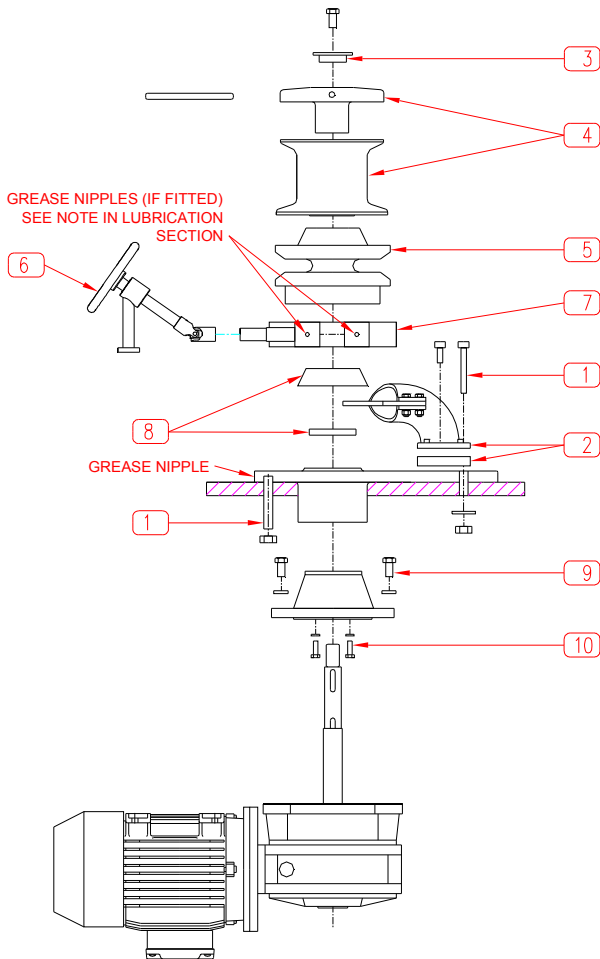
Length of Line	Pipe Size (Outside Diameter)
Up to 30' (9.1m)	5/8" (16mm)
Over 30' (9.1m)	3/4" (19mm)

To maintain the manufacturer's warranty on the windlass a pressure relief valve must be installed to the hydraulic circuit. Muir also recommends that a counterbalance valve be installed to the hydraulic motor to prevent runback.

Note 1: For round base model windlasses the brake locator is mounted to the deck.

Note 2: Tighten and slacken brake band to positions to centralize brake band position before drilling locator to deck.

- This operation can be performed from above and below deck. The deck plate in each case remains in place
- The reduction gear and motor assembly can be removed by first undoing the lock bolt located under the gear drive in the end of the main shaft.
 - By undoing the bolts located between the gear drive and adaptor flange the reduction assembly can be removed. (The adaptor is bolted internally to the base plate.)
 - To remove the drive shaft and top assembly, first to remove the drive key from the lower section of the shaft, the top assembly and running gear can be lifted clear of the base plate supported by the chain gypsy



DISMANTLING THE TOP ASSEMBLY

1	The base must be secured to the deck using the bolts (studs) provided. The deck structure must be suitable reinforced to support the winch. It is important to stiffen the underside of the deck with a doubling plate.
2	Remove chain pipe and spacer (if fitted) from deck. Note: During pre-assembly chain pipe, make sure the peeler lines up with core of the gypsy to ensure correct fitting.
3	Remove bolt and plug from top of the clutch nut.
4	Wind the clutch nut off the shaft anti clockwise then remove the capstan.
5	Remove the chain gypsy.
6	Remove brake 45 degree hand wheel assembly.
7	Lift the brake band after releasing bracket. Taking care to align with the brake mount.
8	Lift off bottom cone and remove seal.
9	Remove reduction box and shaft from deck adaptor by removing adaptor bolts
10	Remove gearbox adaptor bolts and separate base and adaptor. Undo the motor mounting bolts and remove the motor and torque limiter (if supplied). Undo gearbox bolts on gearbox adaptor and lift off the gearbox. For gearbox lifting, refer to section 4 – gearbox specification.

COMMISSIONING PROCEDURE

1. Ensure all electrical wiring to controls and motor is completed to the specification outlined in the wiring diagram supplied.
2. Grease all nipples as shown on the diagram above. (And as describe in page 8).
3. Check that the gear drives is filled with the correct quantity and type of oil as detailed in the Appendix.
4. Disengage the clutch by turning clutch nut anti clockwise.
5. Disengage the brake using hand wheel.
6. Rotate the motor by power or by the motor shaft to ensure windlass is free to rotate.
7. Start the windlass with no load and ensure that direction of rotation is correct and check that windlass is operating with no undue noise or vibration.
8. Continue running-in the motor and gear drive for 30 minutes. Re check gear drives oil level and grease points.
9. If the torque limiter is present by the factory refer to gearbox information for detail on adjustment

BOLT TORQUES

It is important that all bolts are tightened appropriately to ensure service reliability and structural integrity. The following are suggested torque/preload values for the general bolt sizes found on Muir Windlasses. Muir also recommends the use of thread locking compounds on threads to reduce loosening and corrosion.

Bolt Tightening Torque and Pre Load						
Stainless Steel Class 70	M8	M10	M12	M16	M20	M24
Tightening Torque (Nm)	16.6	35	61.2	152	296.4	512.8
Pre Load (Nm)	10.8	17.2	25	46.6	72.7	104.8

LOWERING THE ANCHOR

It is important that the windlass operator understands the operation and safety instructions included before controlling the equipment supplied to ensure safe, correct and efficient use. Always keep clear of running gear and chain when operating.

The windlass can be powered up and down; this gives the option of using the power system to release the anchor chain, or by releasing the clutch and controlling the chain release with the brake band.

Before attempting to lower the anchor by the free wheel method, apply the brake, ensure the gypsy is disengaged by rotating the clutch nut in an anti clockwise direction until the dog clutch is clear. The chain stopping device can now be disengaged (if fitted), check the area is clear then proceed to lower the chain and anchor by slowly releasing the brake and using the brake to control the rate of descent. Once the anchor is set at the required depth the brake must be tightened and the chain stopper must be engaged to take the load off the windlass while at anchor.

If powering down, engage the clutch drive by turning the hand wheel in a clockwise direction until the clutch is engaged, release the brake band by turning the handle anti-clockwise.

When using the brake, it is first necessary, after ensuring the brake is applied (turning the handle clockwise), to release gypsy drive by rotating the windlass clutch, with the lever handle, anticlockwise. This applies to both cone and dog clutch.

A chain stopping device must be fitted forward of the windlass to take the mooring load off the windlass as this will result in serious damage being done to the winch.

By slowly releasing the brake the fall of the anchor can be controlled. Once the anchor is set at the required depth the gypsy pawl or chain lock (if fitted) and brake band can be tightened. It is recommended that a chain lock be fitted forward of the windlass to take the load

off the windlass main shaft. Do not leave the anchor load directly on the running gear as this may result in serious damage to the drive gears. Always ensure the chain lock then the brake band takes the load in that order.

If this is not possible use a snubber line forward of the windlass to take loading off the windlass. Make sure that the brake is fully engaged while at anchor.

RETRIEVAL

Before lifting the anchor ensure the clutch and brake are fully engaged and locked into position before releasing chain securing device. Engage the clutch by tightening the clutch top (turn the lever handle clockwise). The anchor can now be raised by operating the control.

Clutch Operation

To ensure correct engaging of the dog clutch is as follows:

1. Ensure the four drives are aligned correctly and will not contact when the clutch is engaged. This can be done in two ways:
 - By utilizing the controls to inch the windlass, or by using the brake to correctly align the drive.
2. Engage the drive by turning the clutch nut clockwise until they are fully engaged.
3. Slowly slacken the brake to allow the gypsy to rotate. This will allow the faces of the drive to contact and become fully engaged
4. When engaged the brake may be slackened fully and windlass operated.

The above functions will allow the drive to be successfully engaged to operate the windlass in the recovery operation to retrieve the chain. Should the windlass be required to lower the chain the above functions must be reversed.

RAISING THE ANCHOR

Before lifting the anchor ensure that the clutch is fully engaged and locked into position before releasing the brake band and then the chain stopping device.

The anchor can now be lifted by operating the control.

IMPORTANT NOTES ON SAFE OPERATION

- The windlass is not to be used for lifting people aloft.
- Ensure no one is swimming nearby as anchor is lowered or retrieved.
- Ensure that hands, feet, hair and clothing are kept clear of the windlass and chain when in operation.
- DOG CLUTCHES DO NOT SLIP: To avoid damage to the gearbox, windlass or vessel by bringing the anchor up hard against the vessel it is practical to mark the chain in several positions, approx 5 meter intervals from the anchor to alert the operator to the anchor position. As the anchor breaks the water the control should be released and the windlass inched until the anchor is in the stowed position.
- Under no circumstances should the winch be operated if it is stalled or overloaded.
- Never engage the clutch as the anchor is free falling, use the brake band to control the speed.
- Engage the chain stopper and devils claw when traveling to ensure that the anchor is held secured
- Vessel movement or vibration may cause the anchor to drop whilst the vessel is underway. If a devils claw is not fitted, a tensioned line must be fitted.
- If easy anchor retrieval is impaired by high winds, heavy seas or the anchor is snagged, ease the load by motoring slowly into the wind. The winch is not designed to proper the vessel.

ELECTRIC OR HYDRAULIC MOTORS

Although these motors are water resistant some protection from the sea air and should be provided by spraying the outside with water repellent spray every 6-8 weeks or covering the motor with a protective coating. Any damage to the external paint should be repaired immediately

GEARBOX

Prior to operating the windlass it is necessary to fill the gearbox with lubricant to the level mark on the sight glass. Once filled check the oil level every 6-8 weeks.

Refer to the appendix for gearbox information and recommended lubrication intervals.

The gearbox assembly is water resistant and should be protected in the same way as the motor.

CORROSION PREVENTION

As the windlass will be operating in an extremely corrosive environment it is highly recommended that Denso Tape (grease tape) be used on the external surfaces of the Hydraulic motor, hose ends, gearbox and adaptor, and corrosion protection be used in any areas where water may lie (e.g. top of gearbox output shaft) to protect against moisture. Products such as TECHTYL under body anti-corrosion film are ideal for this application.

LUBRICATION

Before using the windlass ensure all grease nipples are checked and lubricated and that the gearbox is filled to the required level or quantity.

It is important to thoroughly lubricate all mating surfaces with grease suitable for marine applications Greasing points for the various parts of the windlass are as follows:

1. **Brake band Grease nipples:** Located on each brake band lug to lubricate thread and shaft. Apply 1-2 pumps to each. NOTE: Alternate design (NO GREASE NIPPLES) – disassemble shaft, grease shaft and brake band lugs, reassemble.
2. **Base Grease nipple:** Located in the top flange of the base plate, lubricates the rotation of the shaft in the base plate bearing. Apply 3-4 pumps.

It is recommended that lubrication is performed on a regular basis, at least 4-6 times a year, and increased if usage is higher than normal.

GENERAL MAINTENANCE

Twice yearly it is recommended that the above deck running gear is disassembled, all salt crust removed, the parts thoroughly cleaned, greased and the windlass reassembled.

It is good practice to wash salt water off all running parts with fresh water, after every use to avoid corrosion. The use of a close fitting cover when the winch is not in use is highly recommended.

Ensure the main drive shaft remains greased at all times.

Before installation always store the unit vertically or in a similar position as to install.

RECOMMENDED LUBRICANTS

Worm Wheel Gearbox Oils

Type of oil	Manufacturer
Tivela S 320	SHELL
Blasia S 320	AGIP
Klübersynth GH 6 320	KLUBER
Glygoyle 320	MOBIL
Alphasyn PG 320	CASTROL
Carter SY 320	TOTAL

A more comprehensive list may be found in the Appendixes of this manual.

Grease

An extreme lithium based grease with anti corrosion properties and suitable for marine use is recommended. E.g. BP Energrease MM-EP2

Hydraulic Fluid

We recommend CASTROL AWS32 or equivalent



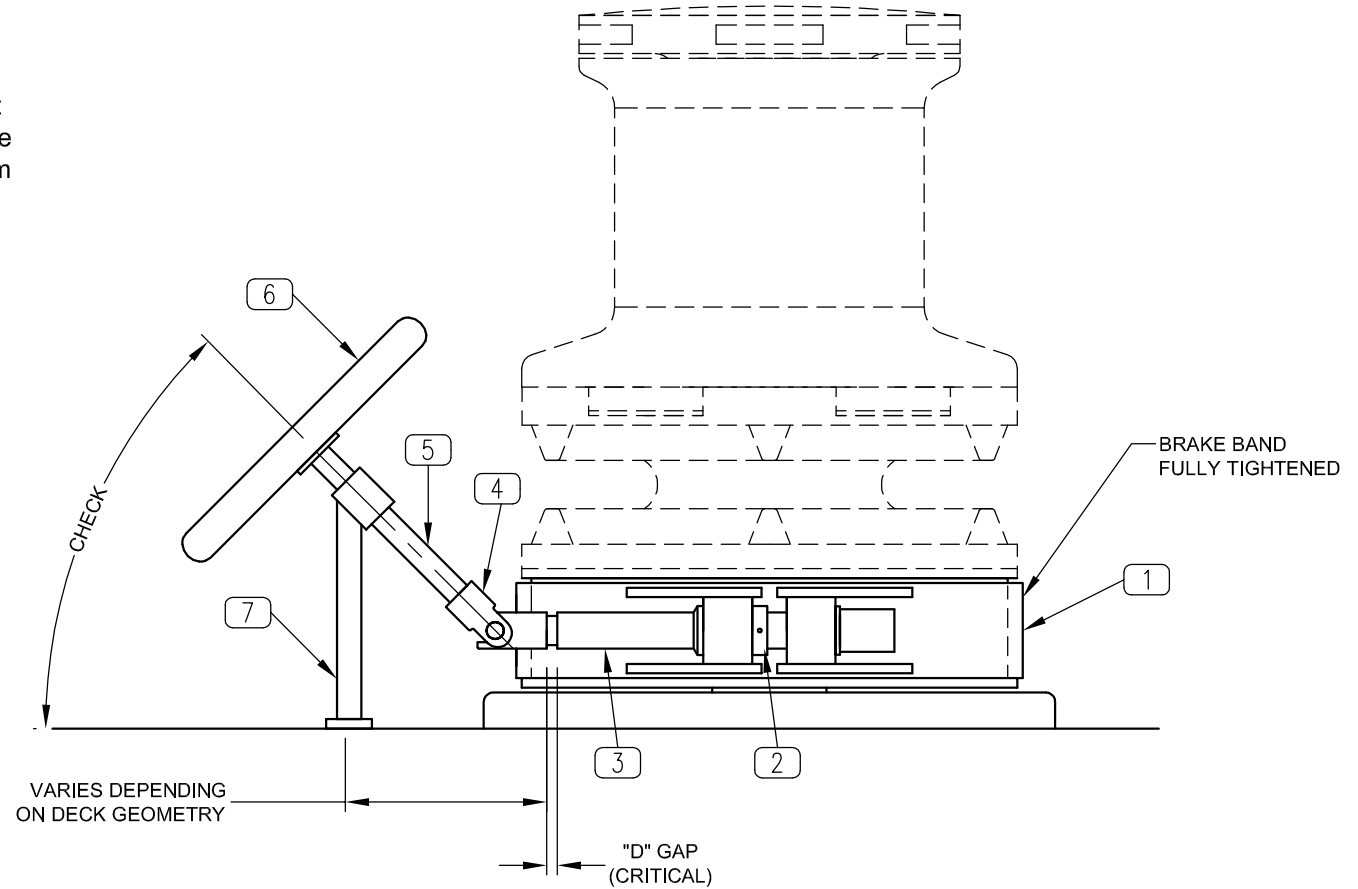
WINDLASSES AUSTRALIA

BRAKE HANDLE INSTALLATION

INSTRUCTIONS

- A. Install winch assembly including brake band (Item 1), brake shaft (Item 3) and thrust collar (Item 2).
- B. Temporarily connect the brake handle assembly to the brake band. (Items 4,5,6). Do not install the brake shaft bracket (Item 7).
- C. Using the brake shaft assembly, tighten the brake band to its maximum.
- D. The handle (Item 6) and brake shaft bracket (Item 7) can now be positioned ensuring that there is exactly "**D**"mm Gap (the value in the table below) between the universal joint (Item 4) and the shoulder on the brake shaft (Item 3). It is also important to ensure that the brake handle shaft (Item 5) is positioned at the correct angle.
- E. Secure all fasteners and test brake release operation.

MODEL	D (mm)
VRC4500/6000	10
VRC8000/11000	11
VRC13000/15000	13
VRC18000	13
VRC20000	15
VRC22000	18
VRC24000	25



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