Bedieningshandleiding en installatieinstructies

Operation manual and installation instructions

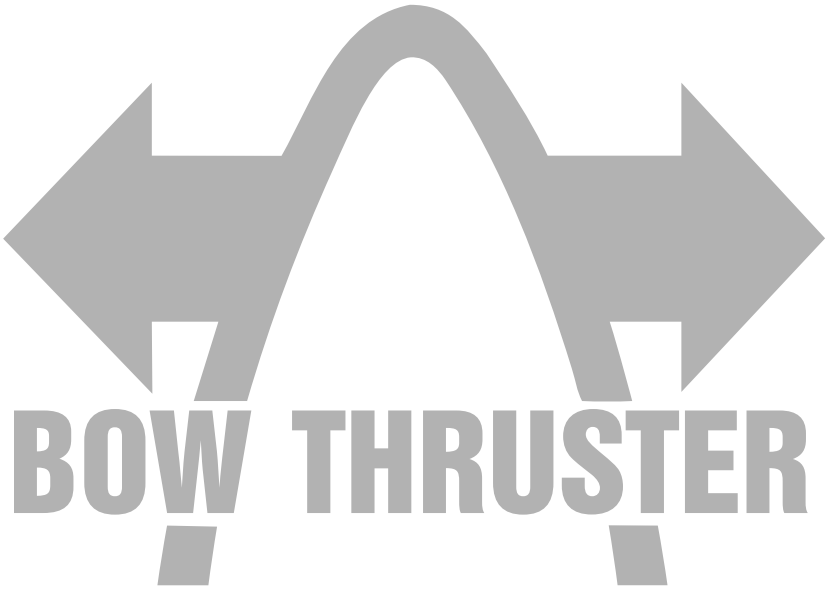
Bedienungshandbuch und Einbauanleitung

Manuel d'utilisation et instructions d'installation

Manual de manejo y instrucciones de instalación

Manuale per l'uso e istruzioni per l'installazione

vetus®



125 kgf
ø 250 mm

Introduction

The thrust given by the bow thruster will vary from vessel to vessel depending on the effect of the wind, the water displacement and the shape of the underwater hull.

The nominal thrust quoted can only be achieved under the most favourable conditions:

- Make sure that the batteries are supplying the correct voltage during use.
- Ensure that the installation has been carried out correctly according to the recommendations given in the installation instructions, in particular with reference to:
  - Sufficiently large diameter of the battery cables so that voltage drop is reduced to a minimum.
  - The manner in which the tunnel has been connected to the hull.
  - Use of bars in the tunnel openings. These bars should only be used where this is strictly necessary (if sailing regularly in severely polluted water.)
    The bars must have been fitted correctly.

Following the above recommendations will result in longer life and better performance of your bow thruster.

- Carry out the recommended maintenance regularly.
- Never allow the bow thruster to operate for a long period; the maximum length of usage is restricted because of heat release in the electric motor. After use the motor must be allowed to cool off.

The maximum continuous length of usage, which is also the maximum length per hour, is:

Bow thruster '125 kgf' - 12 V : 2.5 min. at 840 A
'125 kgf' - 24 V : 2.5 min. at 470 A

IMPORTANT!

The maximum length of usage and the thrust as specified in the technical details are based on the recommended battery capacities and battery cables; see the 'installation instructions'. If significantly larger batteries in combination with very short battery cables of significantly larger diameter than recommended are used then the thrust will increase. In such cases the maximum length of usage must be reduced in order to prevent damage to the motor.

Safety

WARNING!

When using the bow thruster watch out for swimmers or light boats which could be in the near vicinity of the bow thruster tunnel jet openings.

Pass on the safety instructions to others using the bow thruster.

General rules and laws with regard to safety and accident-prevention also need to be applied.

- Never touch the moving ends of the bow thruster whilst in operation.
- Never touch hot parts of the bow thruster and never place flammable materials in the vicinity of the bow thruster.
- Always stop the bow thruster before checking components or adjusting the bow thruster.
- Always detach the battery poles during maintenance work.
- Ensure maintenance work is safe by only using tools suitable for the purpose.
- Always deactivate the main switch when the bow thruster is not in use for long periods.

Use

CARE!

If 2 control panels are installed **never operate the bow thruster from both panels simultaneously**.

- Switch on the main switch.
- Press once on the 'ON/OFF' switch. The indication light will go on and the bow propeller is ready for use.
- The electric motor is commanded by the selector switch.

  Never switch in one movement from starboard to port-side or reverse, but wait until the propeller stands still, before giving it a command to operate the electric motor in the opposite direction.

  NOTE!
  A time-delay can be fitted between the bow thruster motor and the switch panel. This allows the electric motor to come to a stop when a switch is made from port to starboard (or vice-versa) in one movement.

- When use of the bow propeller is no longer required, again press the 'ON/OFF' switch.
- Switch off the main switch when leaving the ship.

Installation instructions

These installation instructions give guidelines for fitting the Vetus bow thrusters 'BOW12512' and 'BOW12524'.

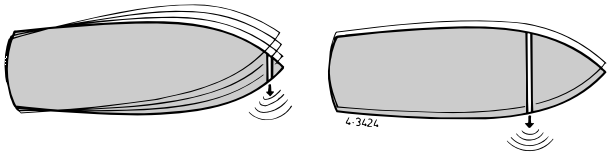
The standard of fitting determines the reliability of the bow thruster. Almost all faults experienced can be traced back to mistakes or inaccuracies during fitting. It is therefore of the utmost importance to follow the installation instructions meticulously during fitting and to check these carefully.

Make sure that the user of the vessel is supplied with the owner's manual.

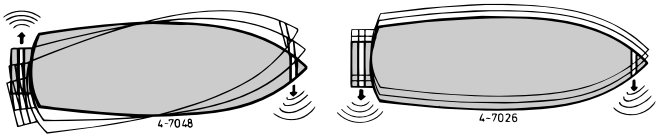
Installation recommendations

Important!
The areas in which the electric motor of the bow thruster and the battery are positioned must be dry and well ventilated.

Positioning of thrust tunnel

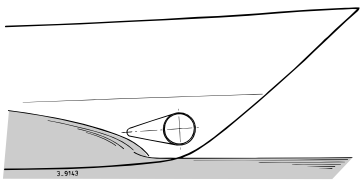


To achieve the optimum performance, position the thrust tunnel as far forward as possible. ◄

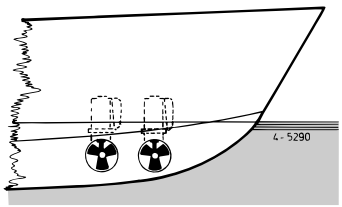


If, in addition to controlling the movement of the bow, the stern of the vessel is required to move sideways, then a second thruster may be installed at the stern. ◄

If the vessel planes the tunnel should, if possible, be so situated that when the vessel is planing it is above the water level thus causing no resistance. ◄

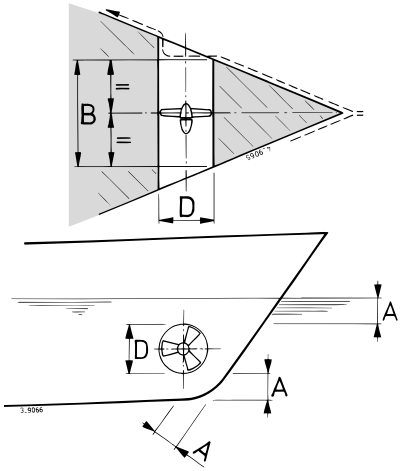


Installation of two bow thrusters in tandem (for larger boats). In this case, depending on weather conditions, one or both bow thrusters may be used.
We do not advise fitting 2 bow thrusters into one tunnel; this does not result in doubling the thrust! ◄



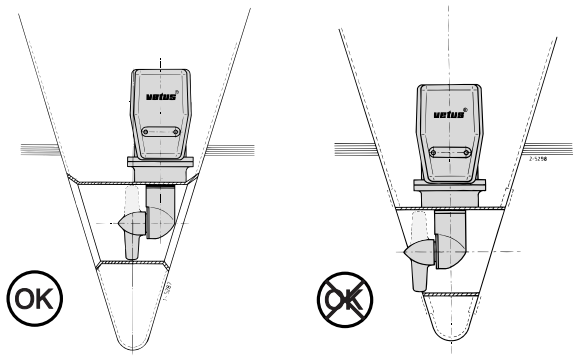
When choosing the location for the thrust tunnel, take the following into account for optimum performance:

- The distance A shown in the drawing must be at least 0.5 x D (where D is the tunnel diameter).
- The length of the tunnel (distance B) should be between 2 x D and 4 x D. ◄

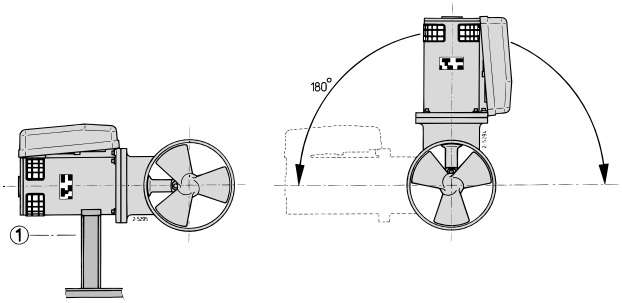


D = 250 mm (9.8")
A = min. 125 mm (4.9")
B = 500 .. 1000 mm (19.7" .. 39.4")

Positioning of the bow thruster in the thrust-tunnel



When determining the exact position of the bow thruster in the thrust tunnel, it should be taken into account that the tailpiece may NOT protrude from the tunnel end.
The thruster should preferably be situated on the centreline of the vessel, but it must always be accessible from the outside. ◄

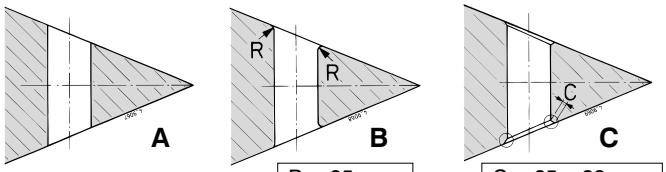


The electric motor can be installed in various positions.
If the motor is installed horizontally, a support is absolutely necessary. The electric motor must be positioned in such a way that it is always well clear from the maximum bilge water level (☛ ①). ◄

Connection of thrust tunnel to ship's hull

The manner, in which the thrust tunnel is connected to the ship's hull, is of great influence to the actual performance of the bow thruster and to the drag that the hull produces when under way.

Direct connection of the tunnel to the hull, without a fairing, produces reasonable results.

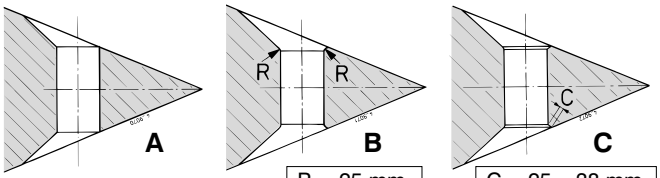


R = 25 mm (1")

C = 25 .. 38 mm (1 .. 1.5")

A The connection to the hull can be abrupt.
B It is better to make the connection rounded with radius 'R' of about 0.1 x D.
C It is even better to use sloping sides 'C' with dimensions 0.1 to 0.15 x D. ◄

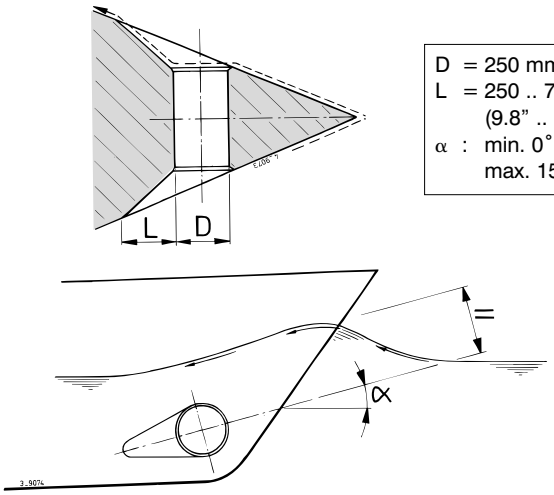
Connection of the thrust tunnel to the ship's hull with a fairing results in lower hull-resistance during normal sailing.



R = 25 mm (1")

C = 25 .. 38 mm (1 .. 1.5")

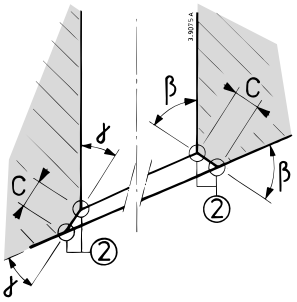
A The connection with a fairing can be abrupt.
B It is better to make the connection with a fairing rounded with radius 'R' of about 0.1 x D.
C The best connection is with a fairing using sloping side 'C' with dimensions 0.1 to 0.15 x D. ◄



D = 250 mm (9.8")
L = 250 .. 750 mm (9.8" .. 29.5")
α : min. 0°
max. 15°

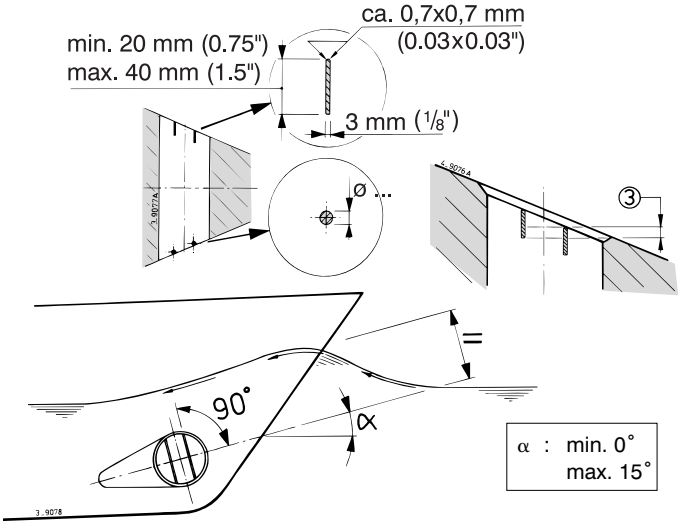
Length 'L' of the fairing should be between 1 x D and 3 x D. This fairing should be embodied in the ship's hull in such a way that the centerline of the fairing will correspond with the anticipated shape of the bow-wave. ◄

If the connection of the thrust tunnel and the ship's hull is to be made with a sloped side, it should be executed in accordance with the drawing.
Make the sloped side (C) with a length of 0.1 to 0.15 x D and make sure that the angle between the tunnel and the sloped side will be identical to the angle between the sloped side and the ship's hull. ◄



D = 250 mm (9.8")
C = 25 .. 38 mm (1 .. 1.5")
β = β
γ = γ
② = Sharp

Grid bars in the tunnel openings



α : min. 0°
max. 15°

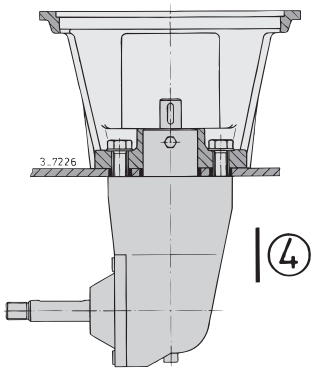
Although the thrust force will be adversely affected, grid bars may be placed into the tunnel openings, for protection of the thruster. ◄

In order to minimise as far possible the ill effects to the thrust power and the hull's resistance whilst under way, make sure that:

- no more than 4 grid bars per opening will be fitted
- the bars should have a rectangular section, as shown in the drawing, as well as a certain overlap (☛ ③).
- the bars should be positioned perpendicularly to the shape of the bow wave to be expected.

Protection of the bow thruster against corrosion
To prevent corrosion problems, do not use copper based anti-fouling. Cathodic protection is a 'must' for the protection of all metal parts under water.
In order to protect the bow thruster tailpiece against corrosion, the tailpiece is supplied with a zinc anode.

Corrosion of a steel or aluminium thrust tunnel can be reduced by ensuring that the tail piece is completely insulated from the thrust-tunnel.
NOTE: The gaskets supplied are already electrically insulated. However the bolts and the shaft need to be fitted with insulation material, for example nylon bushes. (☛ ④). ◄



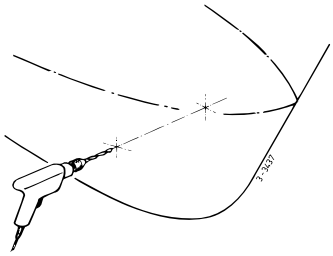
Polyester thrust tunnel:
Resin: The resin used for the polyester thrust tunnel is Isophtalic polyester resin (Norpol PI 2857).
Pre-treatment: The outside of the tunnel must be roughened.
Remove all of the top surface down to the glass-fibre. Use a grinding disc for this.
Important: Treat the end of the tunnel, after it has been sawn to length, treat the end of the tube with resin. This will prevent water seeping in.
Laminating: Apply a coat of resin as the first coat. Lay on a glass-fibre mat and impregnate with resin. Repeat this procedure until you have built up a sufficient number of layers.

Installation

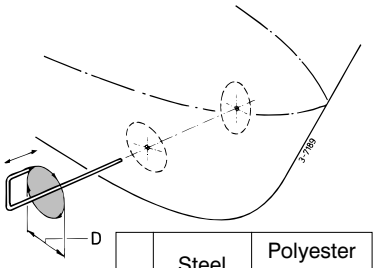
For installation examples see page 61.
For outside dimensions see page 64.

Installation of the thrust tunnel

Drill 2 holes into the ship's hull, where the centerline of the thrust tunnel will be, in accordance with the diameter of the marking tool. ◄

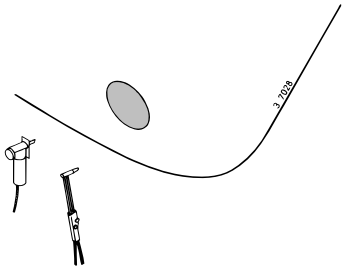


Pass the marking tool (home-made) through both pre-drilled holes and set out the outside diameter of the thrust-tunnel to the hull. ◄

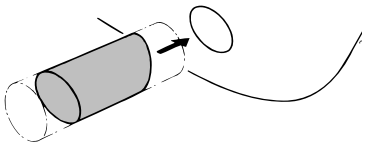


	Steel	Polyester Aluminium
D	267 mm (10.51")	264 mm (10.39")

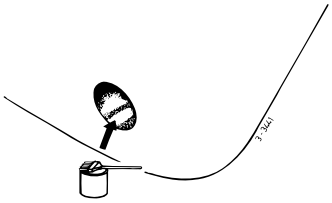
Dependent on the vessel's construction material, cut out the holes by means of a jigsaw or an oxy-acetylene cutter. ◄



Install the thrust-tunnel. ◄

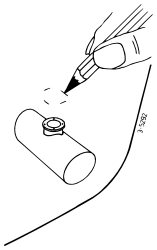


A polyester thrust tunnel should be finished as follows: Roughen the hardened resin/glass-fibre. Apply a top coat of resin. Treat the side of the tunnel which comes into contact with water with 'epoxy paint' or 2-component polyurethane paint. Then apply anti-fouling treatment if required. ◄

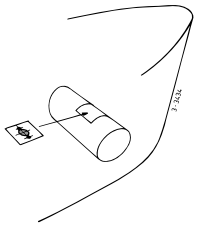


Drilling the holes in the thrust-tunnel

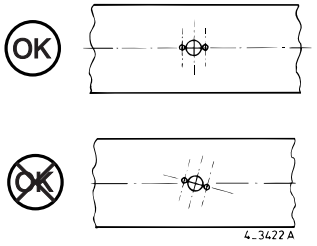
Mark the installation position of the bow thruster by means of the intermediate flange. ◄



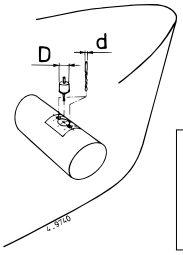
Use the drill pattern supplied, to determine the correct position of the holes to be drilled. ◄



Important: The pattern of the holes must be positioned precisely on the centerline of the tunnel. ◄



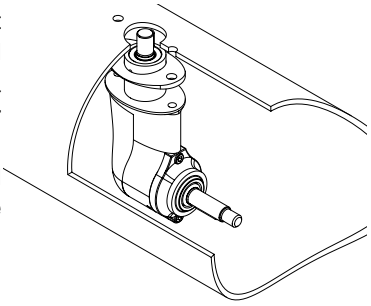
Drill the holes through the thrust tunnel and take care that the holes are free of burrs. ◄



D = 51 mm (2")
d = 13 mm (0.5")

Installation of tail piece and intermediate flange

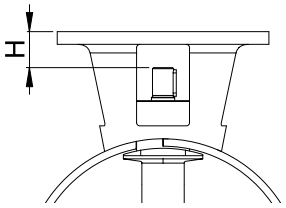
Install one (1) gasket between the tail piece and the thrust tunnel. Apply a sealant (polyure-thane* or silicon) between the tail piece and the gasket and position the tail piece into the hole in the thrust tunnel. ◄



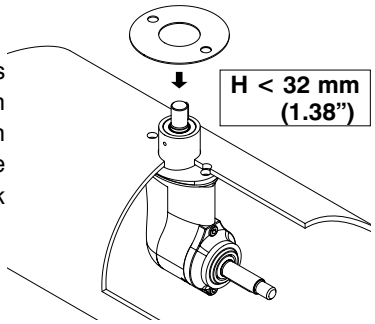
*) e.g. Sikaflex®-292.

H = 32 - 35 mm (1.26”-1.38”)

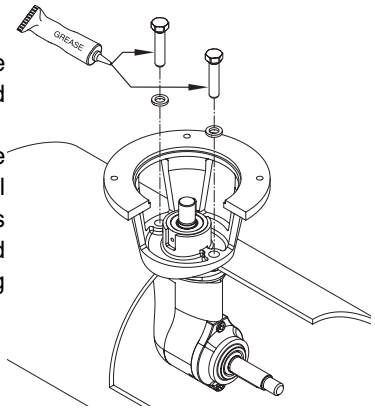
Grease the hole of the intermediate flange and position this flange. Check dimension ‘H’; it must be between 32 and 35 mm (between 1.26” and 1.38”). ◄



If the dimension ‘H’ is less than 32 mm (1.38”), fit an additional gasket between the thrust tunnel and the intermediate flange. Check again dimension ‘H’. ◄

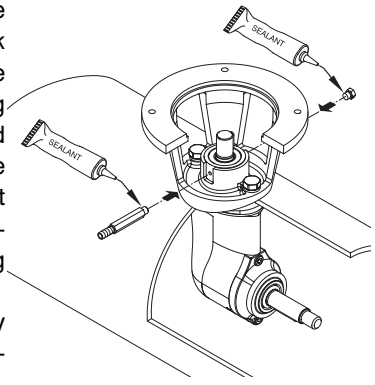


Apply a sealant between the gasket of the tail piece and the wall of the thrust tunnel.
Now fit the intermediate flange permanently to the tail piece and grease the threads of the bolts with ‘outboard gear grease’ before inserting and tightening them. ◄



Check for possible leaks immediately the ship returns to water.

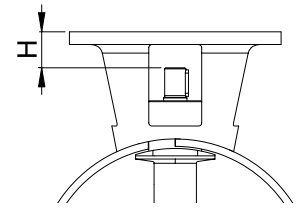
Insert the hose pillar into one of the threaded holes. Blank off the other threaded hole by means of the blind plug supplied. Apply a thread sealant when fitting the hose pillar and the blind plug, but not excessively, so as to prevent the sealant from getting into the tail piece itself.
If you wish, the tail piece may now be filled, as far as practicable, with the gear oil. ◄



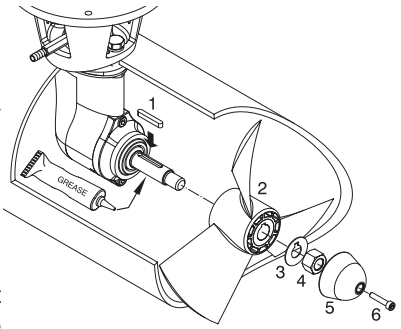
Final assembly

H = 32 - 35 mm (1.26”-1.38”)

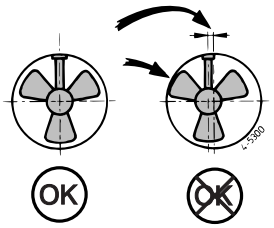
Check again dimension ‘H’. ◄



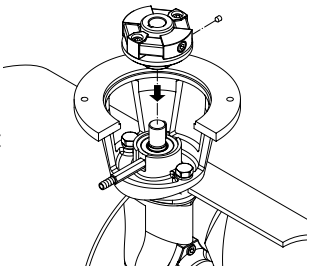
Make sure that the key (1) is properly positioned in the keyway of the shaft.
Grease the shaft with ‘outboard gear grease’ and install the propeller (2) with the lock washer (3) and the hexagonal nut (4). Secure the nut by bending the tag of the washer. Fit the zinc anode (5) to the propeller shaft by means of the bolt (6). ◄



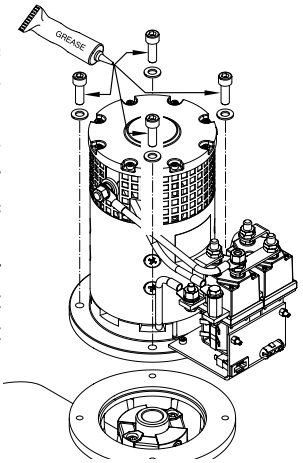
The propeller should be at **least 1.5 mm free** of the thrust tube wall, all round. ◄



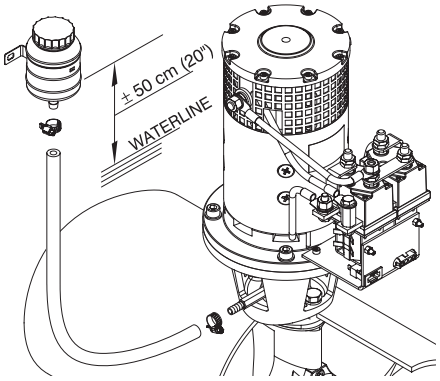
Grease the input shaft with an installation compound, like ‘Molykote® G-n plus’.
Fit the flexible coupling to the input shaft of the tail piece and secure the coupling with the locking screw. ◄



Grease the shaft of the electric motor with an installation compound, like ‘Molykote® G-n plus’.
Grease the threads of the fastenings bolts with ‘outboard gear grease’ and install the electric motor to the intermediate flange.
For a first check, turn the propeller by hand, it should turn easily, whilst being connected to the output shaft of the electric motor. ◄



Install the oil tank and connect it to the hose pillar. Fill the tank completely with oil (outboard gear oil EP 90). ◄



The power supply

Choice of battery

The total battery capacity must be sufficient for the size of the bow thruster; see the table. We recommend Vetus maintenance free marine batteries; these can be supplied in the following sizes: 55 Ah, 70 Ah, 108 Ah, 120 Ah, 143 Ah, 165 Ah, 200 Ah and 225 Ah.

We also recommend that each bow thruster is powered by its own separate battery or batteries. This allows the battery bank to be placed as close as possible to the bow thruster; the main power cables can then be short thus preventing voltage losses caused by long cables.

Always use batteries whose type and capacity are compatible for their use.

Main power cables (battery cables)

The minimum diameter must be sufficient for the bow thruster in use and the voltage drop must not be more than 10% of the voltage supplied; see the table.

A main switch and fuse must be fitted in the 'plus' cable. A Vetus battery switch is suitable here. The fuse protects the bow thruster against overvoltage and at the same time protects the vessel's wiring against short-circuits.

Fuse

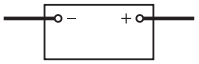
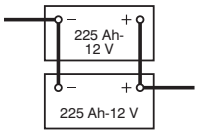
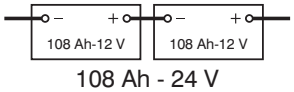
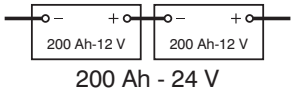
A suitable fuse is available for the bow thruster, see table. We can also supply suitable fuse holders for all fuses, Vetus art. code: ZEHC100.

IMPORTANT!

The maximum operating time and the thrust as specified in the technical details are based on the recommended battery capacity and the battery connection cables, see the 'Installation instructions'. If appreciably larger batteries in combination with very short connection cables with appreciably larger diameter than recommended are used then the thrust will increase. In such cases the maximum operating time must be reduced in order to prevent damage to the motor.

In extreme cases, for example when a battery with a capacity of five times or more than suggested is used, there is the danger of causing permanent damage to one or more of the following shaft connections:

- **The connection between motor shaft and the tail piece input shaft.**
- **The connection between the tail piece output shaft and the propeller.**

Bow thruster	Battery capacity required		Totale length of plus- and minus cable	Cable cross-section	Fuse	
	Minimum	Maximum			'slow blow'	Vetus art. code
125 kgf, 12 V	 225 Ah - 12 V	 450 Ah - 12 V	0 - 15 m	2x 95 mm² (parallel)	500 A	ZE500
			0 - 45 ft	2x AWG 000 (parallel)		
125 kgf, 24 V	 108 Ah - 24 V	 200 Ah - 24 V	0 - 35 m	120 mm²	300 A	ZE300
			0 - 102 ft	AWG 0000		

Series/Parallel switch

Where a 12 Volt circuit is fitted the installation of a series- parallel switch can be used to:

- connect 2 (12 Volt) batteries in series during use in order to provide the necessary 24 Volts to operate the 24 Volt bow thruster.
- connect the 2 (12 Volt) batteries in parallel to the 12 Volt charging system during charging.

Vetus can supply a series/parallel switch that is already fitted with the necessary help relay to allow a simple connection to the Vetus bow thruster, Vetus art. code: BPSP.

If the batteries installed for the bow thruster are also to be used for other (12 Volt) equipment then the following must be taken into consideration:

- Both batteries will supply 12 Volt current via the charging cables and the charging contacts of the series/parallel switch to the other 12 volt users.
- The maximum continuous current that may flow through the charging contacts of the series/parallel switch is 60 A.
  Never use these batteries as starter batteries and never connect an anchor winch to them.

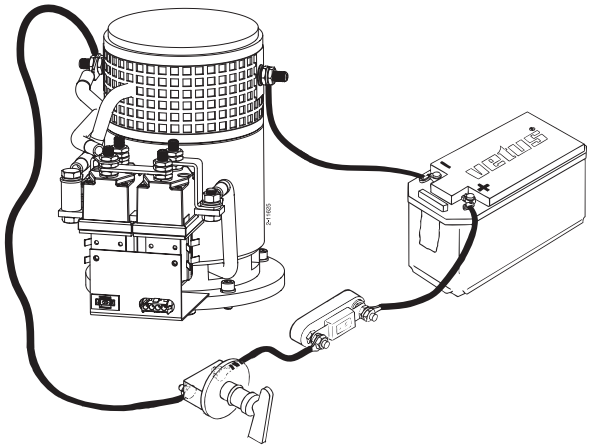
The way in which the bow thruster is controlled remains unchanged after installation of the series/parallel switch!

Electrical installation

Make sure that no other electrical parts come loose when connecting the electric cables.

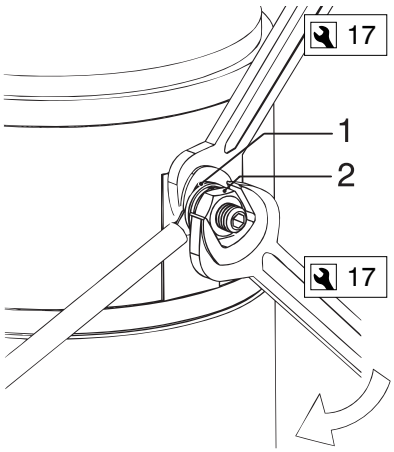
Check all electrical connections after 14 days. Electrical parts (such as bolts and nuts) may come loose as a result of fluctuations in temperature.

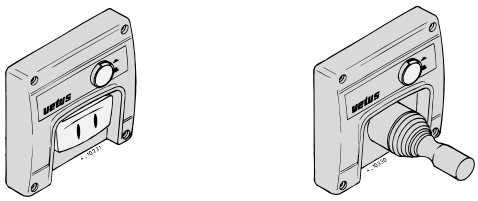
Check that the voltage, recorded on the motor type plate, is in agreement with the vessel's circuit voltage. Position the battery or batteries as close as possible to the bow thruster; the main power supply cables can then be short, which reduces the voltage drop as much as possible.



Connect the main power supply cables. ◄

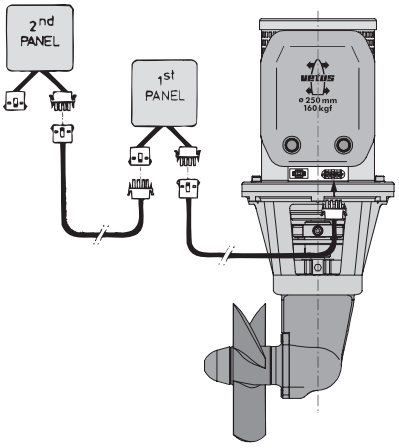
N.B.!
Be careful not to rotate the bolt and nut 1 while connecting the cables.
To prevent this happening, keep an open-ended spanner on nut 1 while screwing on bolt 2, without rotating this spanner.
The torque for nut 2 is a maximum of 11 Nm. ◄



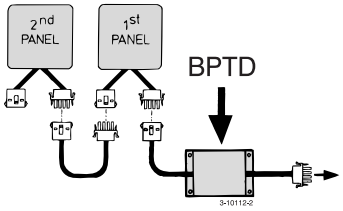


Fit the control panel next to the steering position. There must be at least 50 mm space behind the panel. ◄

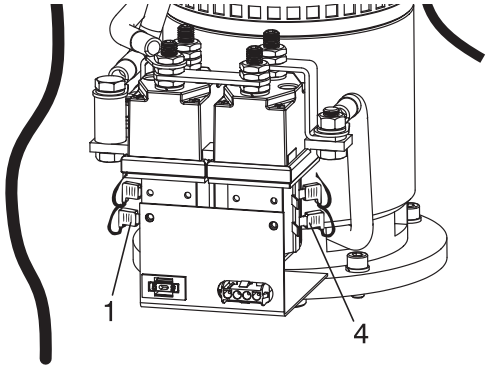
Fit the control cable between the bow thruster and the control panel through the vessel and connect the jack connections together.
If it is necessary to cut the intermediate cable and reconnect it take care to ensure the correct colours are connected together. N.B: The colours of the wire cores in the intermediate cable may differ from the wire core colours as used on the bow thruster motor and on the control panel! ◄



A time-delay (BPTD) can be fitted between the bow thruster motor and the operating panel switch. This allows the electric motor to come to a stop when a switch is made from port to starboard (or vice-versa) in one movement. ◄



If there are two steering positions, the second control panel can be connected to the first one.



If it is found during test running that the thrust direction does not correspond with the direction switch on the control panel then the blue (no. 1) and the white (no. 4) wires on the relay must be interchanged. ◄

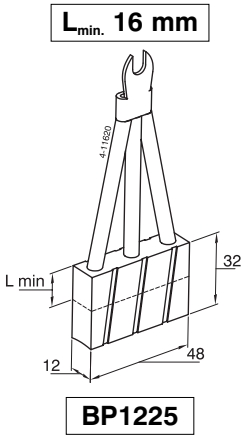
WARNING
Do NOT test the bow thruster while the ship is out of water, unless you are certain that everyone is at a safe distance from the thrust tube.
Never allow the bow thruster to run for longer than 5 seconds with the ship out of water.

Maintenance

Check the four (4) carbon brushes for wear - in normal use once per year - with very intensive use of the bow thruster, e.g. with hire vessels, once every two months.
- Remove the protective cover from the relay and then the protective cover to the brushes.
- Clean the carbon brushes, the holders and the collector. (Blow away the dust coming off the brushes.)
- Check the length of the carbon brushes and replace before the minimum length (L min) is reached. Also check the collector for excessive wear.
- The brushes can be taken out of the holders by releasing the retaining spring.

Carbon brush	Bow thruster	Motor type
BP1225 [1])	'BOW12512' (12 Volt)	TSL150-861
BP1225 [1])	'BOW12524' (24 Volt)	TSL150-865

[1]) Art. code for a set of 4 carbon brushes.



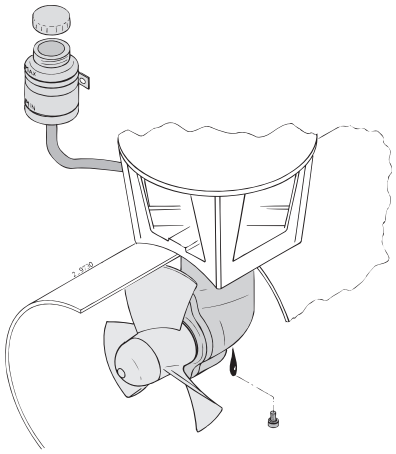
Consult with Vetus for motor types other than those given here.

Check the oil level in the oil tank regularly. The level will drop somewhat in the beginning until the tail piece is completely filled with oil.

The following maintenance should be carried out during a slipway service:

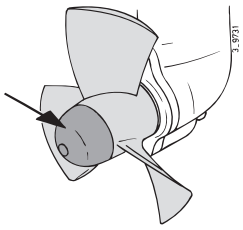
Change the oil; this must be done at least every two to four years. 250 ml oil, article code: BPEP90.

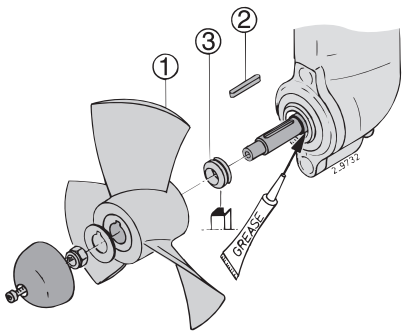
Changing the oil:



- Remove the filler cap from the tank.
- Remove the drain plug from the tail piece.
- Allow all the oil to drain out.
- Fill the tank with fresh oil and refit the drain plug as soon as oil begins to run out.
- Fill up the tank to the correct level. ◄

Check the cathodic protection and if necessary renew the zinc anode. Zinc anode, article code: BP195. ◄





In turn remove the propeller (1), the key (2) and the V-ring (3). Clean the propeller shaft and grease the running surface of the V-ring with 'outboard gear grease'. Fit a new V-ring. Put the key back in the shaft and refit the propeller. V-ring, article code: BP170. ◄

The instructions of the manufacturer should be followed for the maintenance of the batteries. Vetus batteries are maintenance free.

Trouble shooting

Electric motor does not operate

- Check that the battery main switch is 'ON'.
- Check whether the control panel fuse has burnt out. [1])
- Check if the main fuse has burnt out. [2])

In all the above cases the 'POWER' indicator lamp will not be on. Check if it is possible to turn the propeller. A piece of wood or similar could have been caught between the propeller and the tunnel.

Electric motor turns slowly

- The battery is flat.
- Bad electrical connection(s) due to e.g. corrosion.
- The carbon brushes are not making proper contact.
- The battery capacity is reduced because of very low temperatures.
- Weed or fishing line has become caught in the propeller.

Control panel fuse is burnt out [1])

- Short circuit in the operating circuit; check the wiring.

Electric motor turns (too) fast but there is no thrust

- The propeller blades are damaged because of an object in the tunnel.

The bow thruster loses oil

- **If an oil leak is noticed inside the vessel:**
  First check the hose and its connections. Check the oil seal on the input shaft of the tail piece.
- **If no oil is seen inside the vessel** then check the propeller shaft oil seal in the cover of the tail piece.

N.B. When fitting the tail piece cover both fixing screws should be installed with thread sealant (Loctite®).

[1]) The control current fuse is on the bow thruster motor.

[2])

Bow thruster	Fuse: 'slow blow'	Art. code
BOW12512 (12 V)	500 A	ZE500
BOW12524 (24 V)	300 A	ZE300

Technical data

Type	:	BOW12512	BOW12524
Electric motor			
Type	:	reversible DC motor	
Voltage	:	12 V DC	24 V DC
Current	:	840 A [1])	470 A [2])
Rated output	:	5,3 kW	
No. of revolutions	:	3350 rpm	3650 rpm
Rating	:	S2 - 2.5 min. [1])	S2 - 2.5 min. [2])
Protection	:	IP20	
Motors conform to CE (80/336/EEC, EMC - EN60945)			
Transmission			
Gears	:	Bevel gear	
Gear ratio	:	2.36 : 1	
Lubrication	:	oilbath, approx. 0.5 litre outboard gear oil EP 90	
Housing	:	bronze	
Propeller			
Diameter	:	246 mm (9.7 ”)	
No. of blades	:	3	
Blade area ratio Fa/F	:	0.56	
Profile	:	symmetrical	
Material	:	polyacetal (Delrin®)	
Rated thrust	:	1250 N (125 kgf, 275 lbf)	
Control circuit			
Fuse	:	5 A	
Current solenoid switches	:	2,8 A	1,4 A
Control circuit wires	:	1.5 mm^2 (14 AWG)	
Standard extension cable	:	6 m (20’), 10 m (33’), 16 m (53’), 18 m (59’) or 20 m (66’)	
Thrust-tunnel			
Steel model			
dimensions	:	O.D. 267 mm, wall thickness 7.1 mm	
treatment	:	blasted, coated with: ‘International’ Interplate NFA760/NFA761 primer Washprimer, suitable for all kinds of protection systems.	
Plastic model			
dimensions	:	O.D. 264,6 mm, wall thickness 7 mm	
material	:	glass fibre reinforced polyester	
Aluminium model			
dimensions	:	O.D. 264 mm, wall thickness 7 mm	
material	:	aluminium, 6061T6 (AlMg1SiCu)	
Weight			
Excl. thrust-tunnel	:	37 kg (81 lbs)	

Length of usage:

[1]) 2.5 min. continuously or max. 2.5 min. per hour at 840 A (12 Volt).

[2]) 2.5 min. continuously or max. 2.5 min. per hour at 470 A (24 Volt).