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Installatie- en gebruikershandleiding

Installations- und Benutzerhandbuch

Manuel d'Installation et d'utilisation

Manual de instalación y usuario

Manuale d'installazione e d'uso

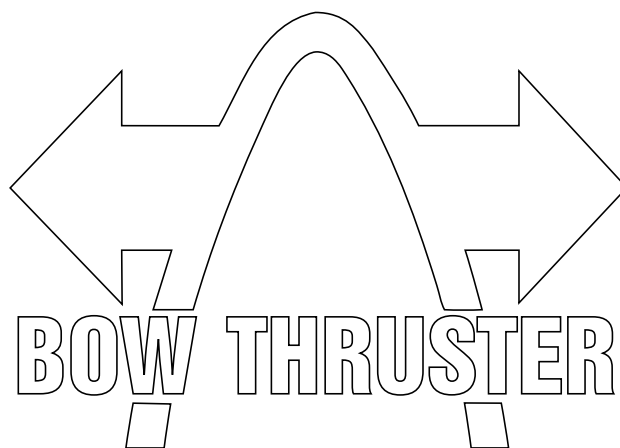
Installations- og brugervejledning

Installations- och användarmanual

Installasjons og brukerhåndbok

Asennus- ja käyttöohjeet

Instrukcja instalacji i obsługi



Installation and user manual

BOW7512D - BOW7524D

75 kgf - ø 185 mm

Zorg er voor dat de eigenaar van het schip over deze handleiding kan beschikken.

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

Sorgen Sie dafür, daß dem Schiffseigner die Gebrauchsanleitung bereitgestellt wird.

Veillez à ce que le propriétaire du bateau puisse disposer du mode d'emploi.

Asegurarse de que el propietario de la embarcación puede disponer de las instrucciones para el usuario.



Assicurarsi che il proprietario dell'imbarcazione disponga del manuale.

Sørg for, at denne brugsanvisning er til rådighed for skibets ejer.

Se till att båtens ägare har tillgång till bruksanvisningen.

Sørg for at skipets eier kan disponere over bruksanvisningen.

Käyttöohje tulee olla alusta käyttävien henkilöiden käytettävissä.

Upewnić się, że użytkownik statku jest zaopatrzony w instrukcję obsługi.

Naam en adres eigenaar	Owner's Name and Address	.....
Name und Adresse des Halters	Nom et adresse du propriétaire	.....
Nombre y dirección del propietario	Nome e indirizzo del proprietario	.....
Ejerens navn og adresse	Ägarens namn och adress	.....
Eierens navn og adresse	Omistajan nimi ja osoite	.....
Nazwisko (nazwa) i adres właściciela		.....

Boegschroeftype, serienummer	Thruster model, Serial Number	.....
Bugstrahlrudertyp, Seriennummer	Type de propulseur d'étrave, numéro de série	.....
Tipo de hélice de proa, número de serie	Tipo di propulsore di prua, numero di serie	.....
Bogpropeller type, serienummer	Bogpropeller typ, serienummer	.....
Baugfremdriftstype, serienummer	Baugfremdriftstype, serienummer	.....
Typ steru dziobowego, numer seryjny	

BOW7512D - 75 kgf - ø 185 mm - 12 Volt

BOW7524D - 75 kgf - ø 185 mm - 24 Volt

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Raadpleeg het 'Onderhouds- en garantieboek' voor Onderhoud.

Consult the 'Maintenance and Warranty Book' for Maintenance.

Zur Wartung vgl. das „Wartungs- und Garantiebuch“.

1 Introduction

These installation instructions give guidelines for fitting the VETUS bow thrusters 'BOW7512D' and 'BOW7524D'.

The quality of installation will determine how reliably the bow thruster performs. Almost all faults can be traced back to errors or imprecision during installation. It is therefore imperative that the steps given in the installation instructions are followed in full during the installation process and checked afterwards.

Alterations made to the bow thruster by the user will void any liability on the part of the manufacturer for any damages that may result.

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
- During the installation process the '**Installation recommendations for bow thrusters**', must be followed, specifically concerning:
 - 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.

- For maintenance, please consult the 'Maintenance and Warranty Book' supplied.
- 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.



NOTE

The maximum continuous length of usage and the thrust as specified in the technical details are based on the recommended battery capacities and battery cables.

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.

2 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 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 disconnect the battery terminals 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.

3 Use

- Switch on the main switch.
- Consult the handbook supplied with the control panels for instructions on using the bow thruster.

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



CARE!

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

- Switch off the main switch when leaving the ship.
- Keep in mind that the carbon brushes in the motor release fine (black) dust. Do not store fragile equipment near the bow thruster motor.

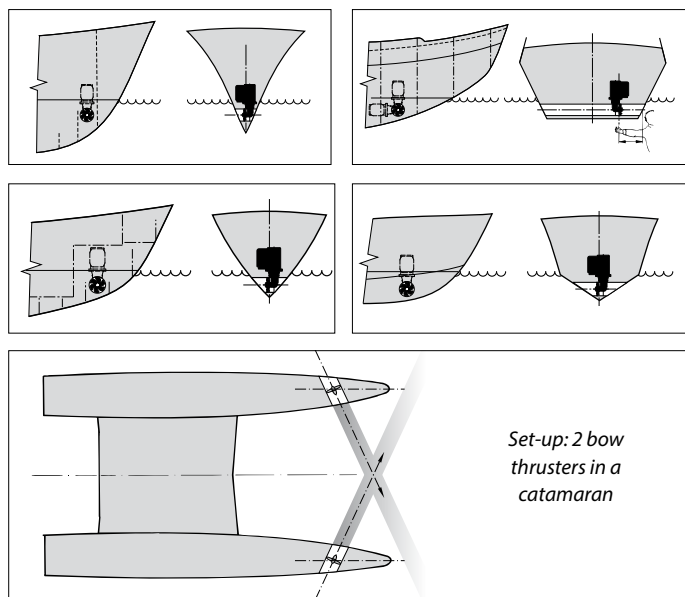


Make sure that the user of the vessel is supplied with the owner's manual.

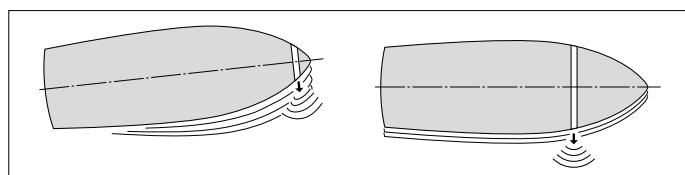
4 Installation recommendations

4.1 Positioning of the thruster tunnel

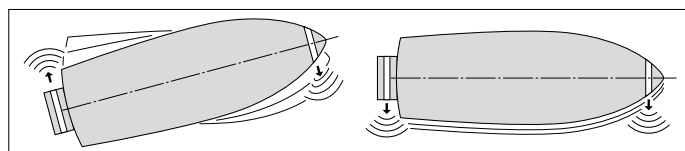
Several installation examples.



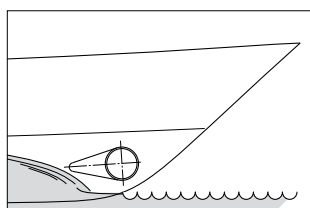
To achieve the optimum performance, position the thruster tunnel as far forward as possible.



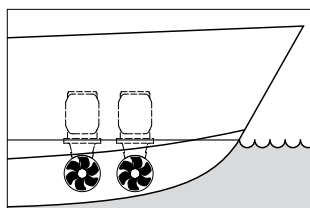
If, in addition to controlling the movement of the bow, the stern of the vessel is required to move sideways, then a second thruster may be installed at the stern.



For a planing boat the tunnel should, if possible, be so situated so 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.

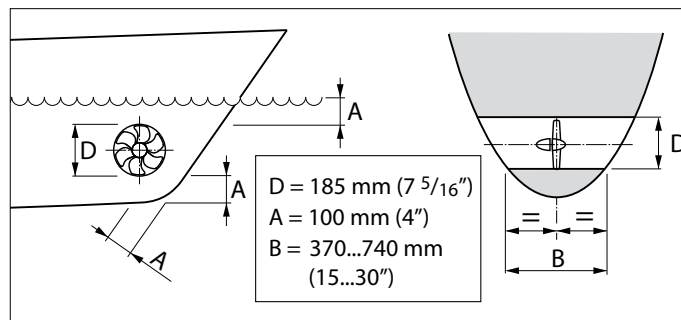


TIP:

We do not advise fitting 2 bow thrusters into one tunnel; this does not result in doubling the thrust!

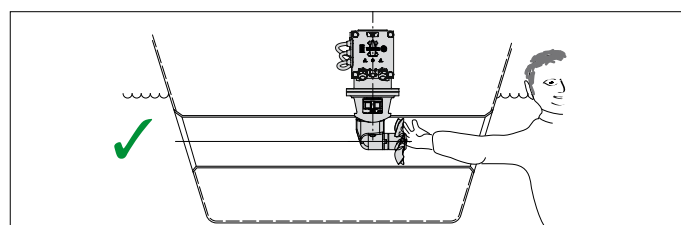
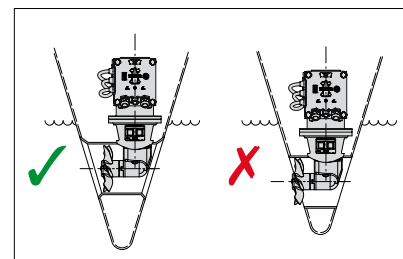
When choosing the location for the thruster tunnel, take the following into account for optimum performance:

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

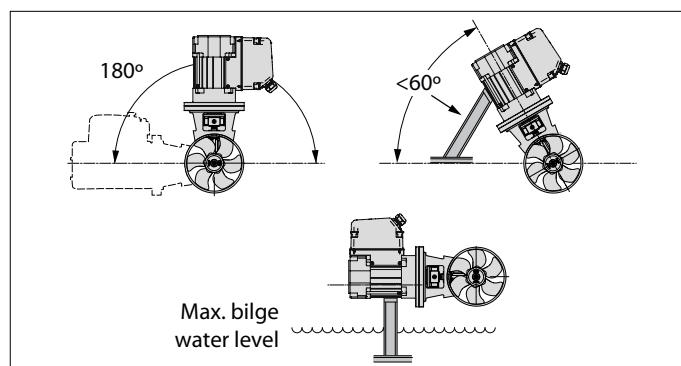


4.2 Positioning of the bow thruster in the thrust-tunnel

When determining the exact position of the bow thruster in the thrust tunnel, the tailpiece **MUST NOT** protrude from the tunnel end.



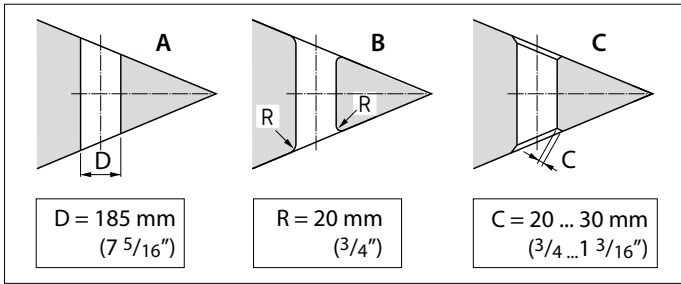
The propeller should preferably be situated on the centreline of the vessel, but it must always be accessible from the outside.



- The electric motor can be installed in various positions.
- If the motor is set up horizontally or at an angle, support is absolutely essential.
- The electric motor must be positioned in such a way that it is always well clear from the maximum bilge water level.

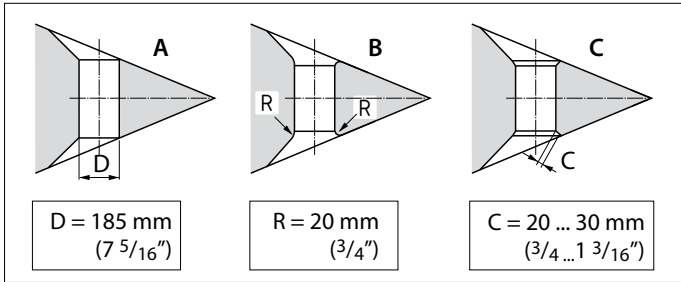
4.3 Connection of thrust tunnel to ship's hull

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



- 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.

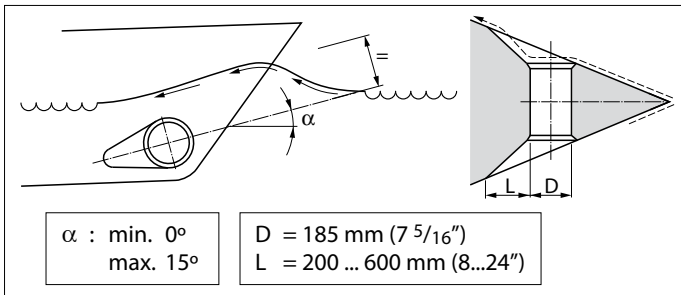
Connection of the thrust tunnel to the ship's hull with a fairing results in lower hull-resistance during normal sailing.



- 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.

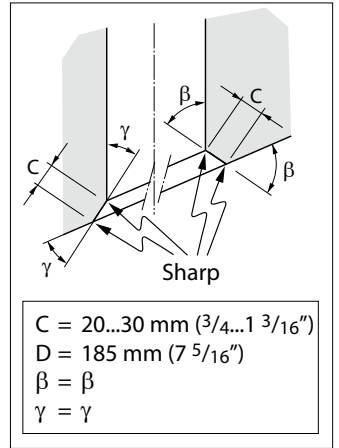
TIP:

The manner, in which the thrust tunnel is connected to the hull, has a great influence on the actual performance of the bow thruster and to the drag the hull experiences when underway.



- 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 centreline of the fairing will correspond with the anticipated shape of the bow-wave.

If the connection of the thrust tunnel and the boat's hull is to be made with a sloped side, it should be executed in accordance with the drawing.



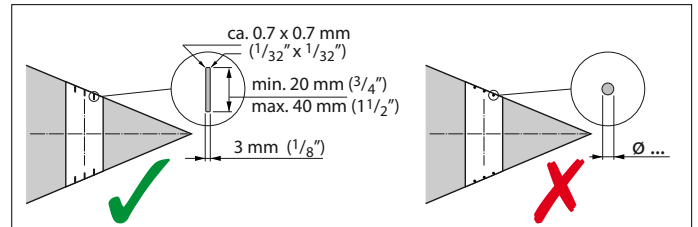
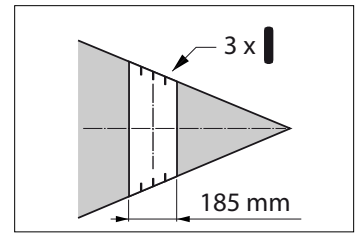
Make the sloped side (C) with a length of 0.1 to 0.15 x D and make sure that the angle between the tunnel and the sloped side will be identical to the angle between the sloped side and the ship's hull.

4.4 Grid bars in the tunnel openings

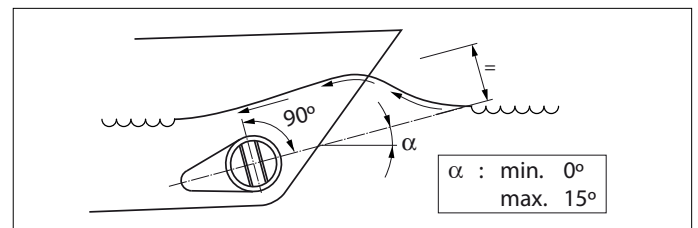
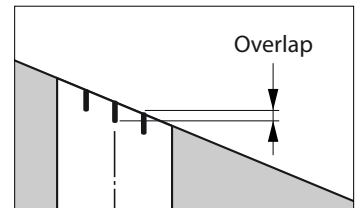
Although the thrust force will be adversely affected, grid bars may be placed into the tunnel openings, for protection of the thruster.

In order to limit the negative effect of this on the thrust and on hull resistance during normal operation as much as possible, the following must be taken into account:

- Do not fit more bars per opening than is indicated in the drawing.



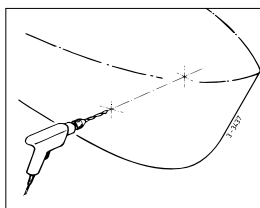
- The bars must have a rectangular cross-section.
- Do not fit round bars.
- The bars must overlap a certain amount.



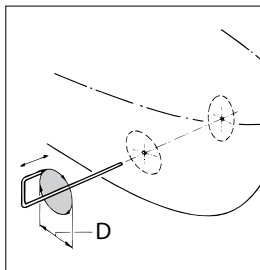
- The bars must be installed so they are perpendicular to the expected waveform.

4.5 Installation of the thrust tunnel

- Drill 2 holes in the hull, where the centreline of the thrust tunnel will be, in accordance with the diameter of the marking tool.

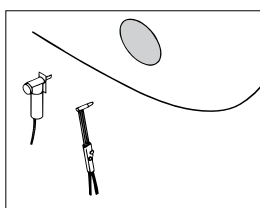


- Pass the marking tool (home-made) through both pre-drilled holes and mark the outside diameter of the thrust-tunnel on the hull.

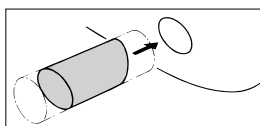


D [mm] (inches)		
Steel	GRP	Aluminium
194 (7 41/64")	196 (7 23/32")	196 (7 23/32")

- 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.



Polyester thrust tunnel:

Resin: The resin used for the polyester thrust tunnel is Isophthalic polyester resin (Norpil PI 2857).

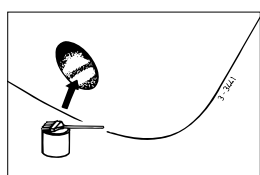
Pre-treatment: The outside of the tunnel must be roughened. Remove all of the top surface down to the glass-fibre. Use a grinding disc for this.

Important: After the tunnel 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.

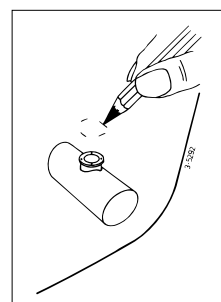
A polyester thrust tunnel should be finished as follows:

- 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.

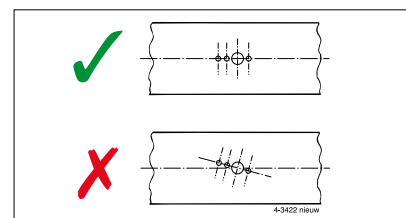
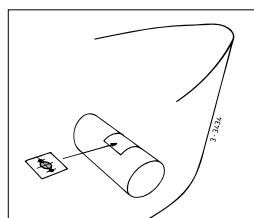


4.6 Drilling the holes in the thrust-tunnel

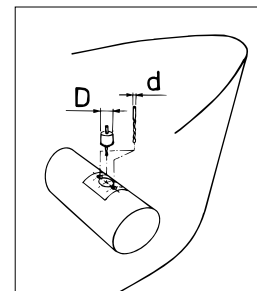
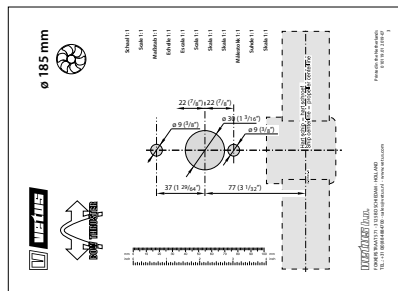
- Mark the installation position of the bow thruster by means of the intermediate flange.
- Use the drill pattern supplied, to determine the correct position of the holes to be drilled.



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

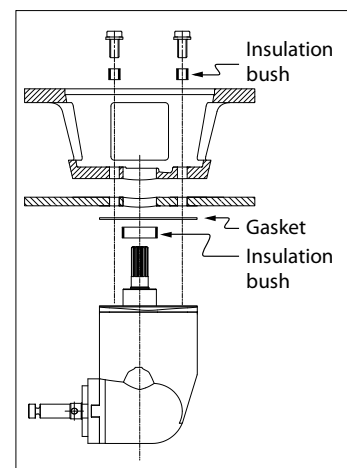


Consult the template for the dimensions of the holes to be drilled. Drill the holes through the thrust tunnel and take care that the holes are free of burrs.



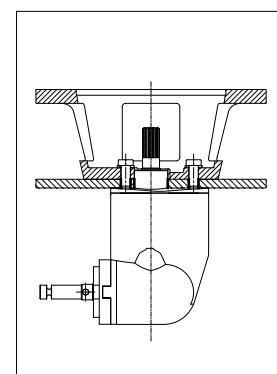
4.7 Protection of the bow thruster against corrosion

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 and the bow thruster is supplied with a zinc anode for this purpose.



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.



5 Installation

In order to install the tunnel, consult chapter 4 'Installation recommendations'.

For overall dimensions see drawing, page 110.

NOTE

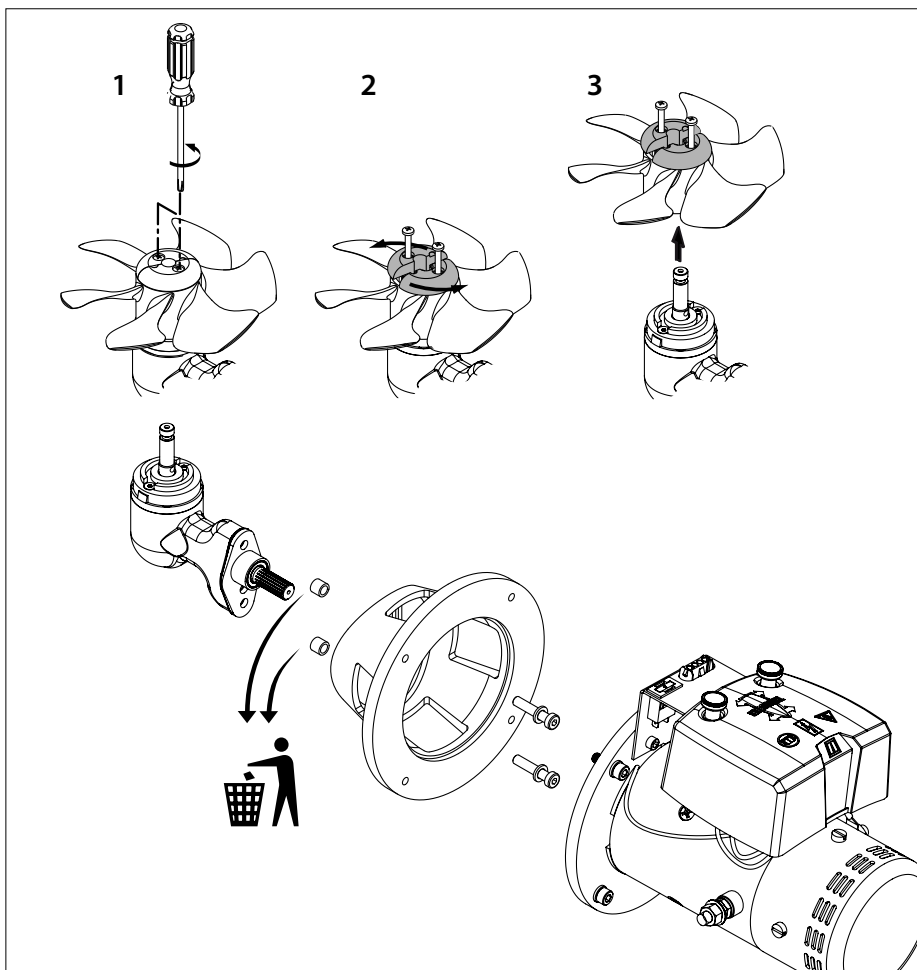
The areas in which the electric motor of the bow thruster and the battery are positioned must be dry and well ventilated.

5.1 Preparation

The bow thruster will be delivered fully assembled. Perform the following steps:

- Remove the propeller.
- Remove the motor from the intermediate flange.
- Remove the intermediate flange from the tail piece.

The 2 bushes are only required for transport and are now no longer needed.

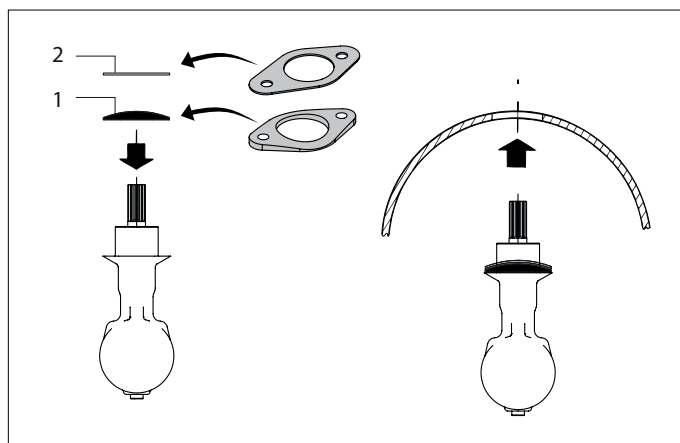


5.2 Installation tailpiece and intermediate flange

- Ensure that the plastic shim plate (1) has been positioned on the tail piece.
- Place one packing (2) between the tail piece and the tunnel.
- Apply a sealant (e.g. polyurethane or silicone) between the tail piece and packing, and between the packing and the tunnel wall.
- Place the tail piece in the hole in the tunnel.

Any extra packings used should be ones capable of justifying the tail piece.

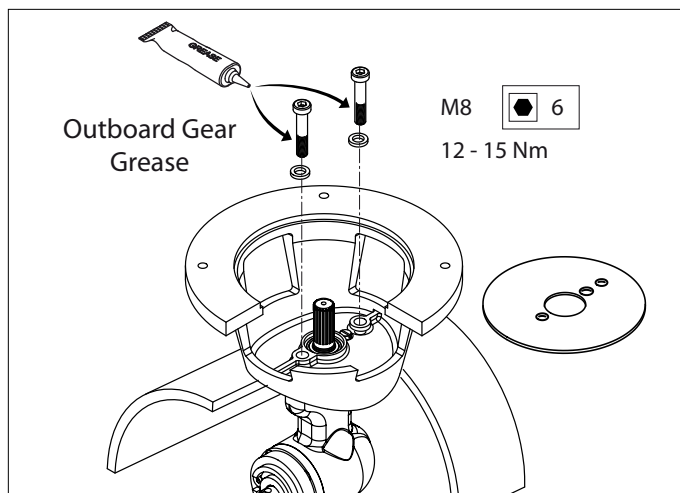
*) e.g. Sikaflex®-292.



- Grease the hole of the intermediate flange and position this flange.
- Grease the threads of the bolts with 'outboard gear grease(*)' before inserting and tightening them.

NOTE

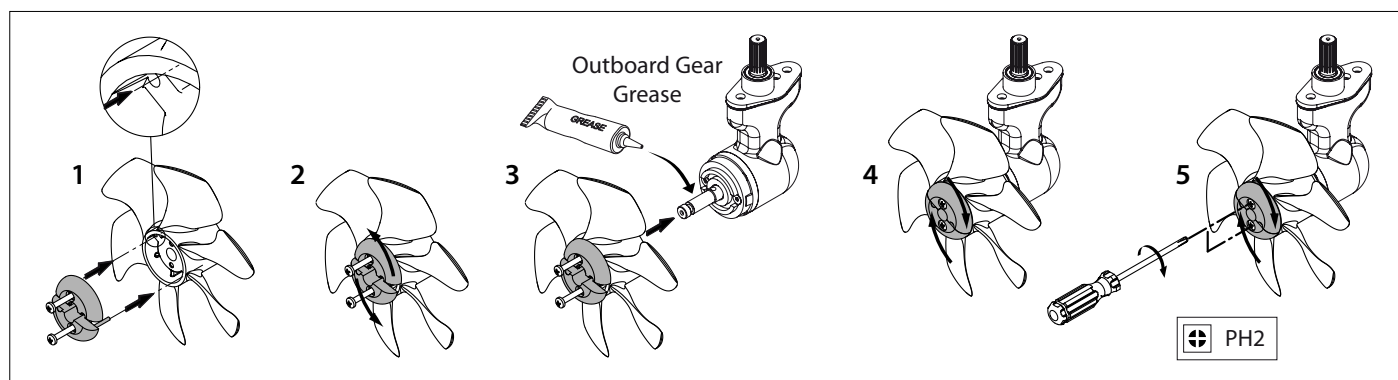
Check for possible leaks immediately the ship returns to water.



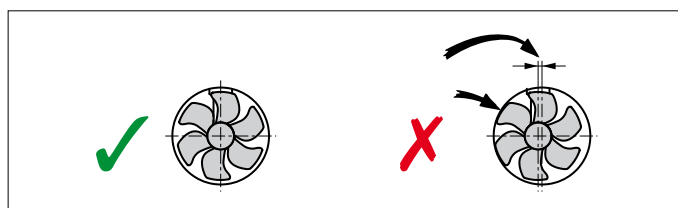
*) A suitable grease is VETUS 'Shipping Grease', Art. code: VSG.

5.3 Final assembly

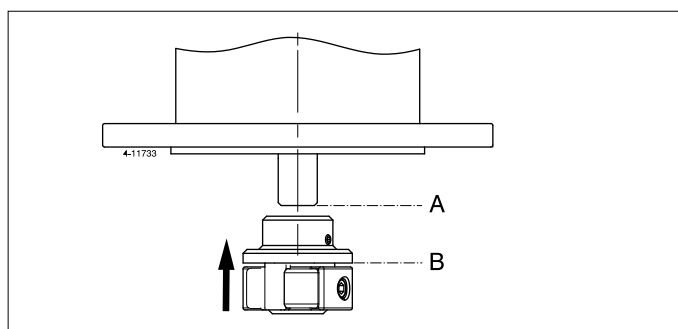
- Grease the propeller shaft with 'outboard gear grease*') and install the propeller.



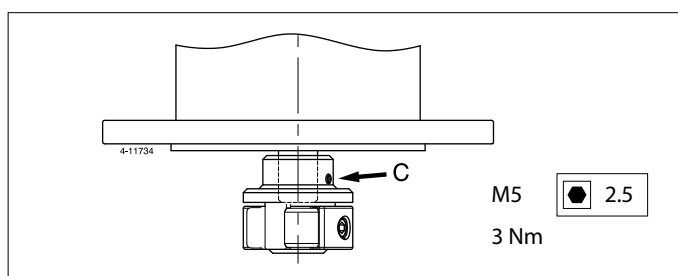
The propeller should run a minimum of 1.5 mm (1/16") free of the thrust tube wall, all round.



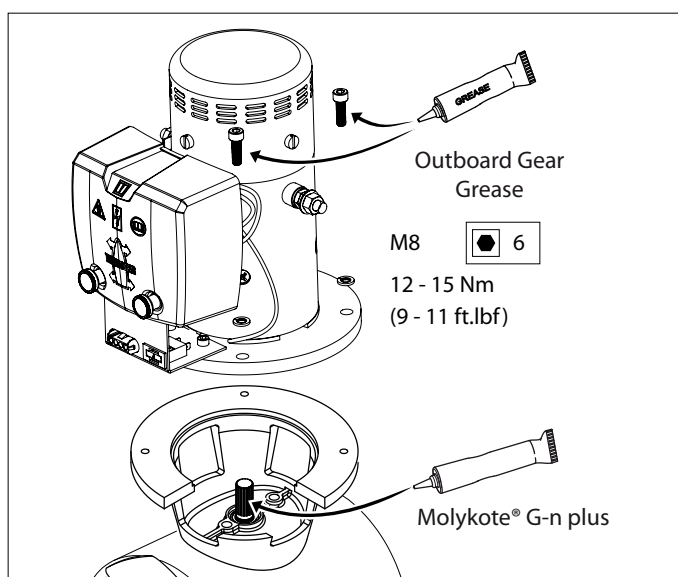
- Slide the flexible coupling onto the output spindle of the electric motor as far as necessary to allow the end of the output spindle (A) and the underside of the flange (B) to become aligned.



- Tighten the lock-screw (C).



- Grease the input shaft 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 spindle of the electric motor.



*) A suitable grease is VETUS 'Shipping Grease', Art. code: VSG.

6 Electrical installation

Check that the voltage, recorded on the motor type plate, is in agreement with the vessel's circuit voltage.

6.1 Choice of battery

The total battery capacity must be sufficient for the size of the bow thruster

See page 106 for the applicable battery capacity.

We recommend VETUS maintenance free marine batteries; these can be supplied in the following sizes: 55 Ah, 70 Ah, 90 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.



NOTE

Be sure to only use 'sealed' batteries if the batteries are located in the same compartment as the bow thruster.

The VETUS 'SMF' and 'AGM' maintenance-free batteries are ideally suited to this application.

Batteries that are not 'sealed' may produce small amounts of explosive gas during the charging cycle.

Sparks generated by the carbon brushes of the bow thruster motor may ignite this explosive gas.

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



CAUTION

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.

6.2 Main switch

The main switch must be fitted to the 'positive cable'.

The VETUS battery switch type BATSW250 is a suitable switch.



Main switch with remote control

Instead of a storage battery main switch, a **remotely controlled main switch annex emergency stop** can be installed.

This remotely controlled main switch is available for 12 or 24 Volt DC. VETUS art. code: BPMAIN12 respectively BPMAIN24.

6.3 Main power cables (battery cables)

The minimum diameter must be sufficient for the bow thruster's current draw in use and the voltage drop must not be more than 10% of the voltage supplied, consult the table on page 106.



NOTE

The maximum duration of engagement and the thrust, as specified by the technical details in your bow thruster installation and operating manual, are based on the recommended storage battery capacities and storage battery connection cables.

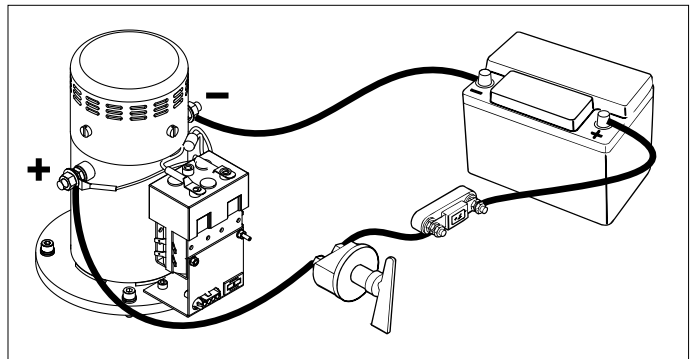
If appreciably larger batteries in combination with very short connection cables with appreciably larger diameter than recommended are used then the thrust will increase. In such cases the maximum operating time must be reduced in order to prevent damage to the motor.

6.4 Connecting the main power cables

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.

- Connect the main power supply cables.

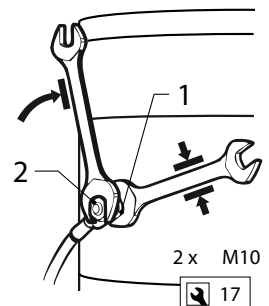


NOTE

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 9 - 11 Nm (6.5 - 8 ft.lbf).



9 - 11 Nm
(6.5 - 8 ft.lbf)

6.5 Fuses

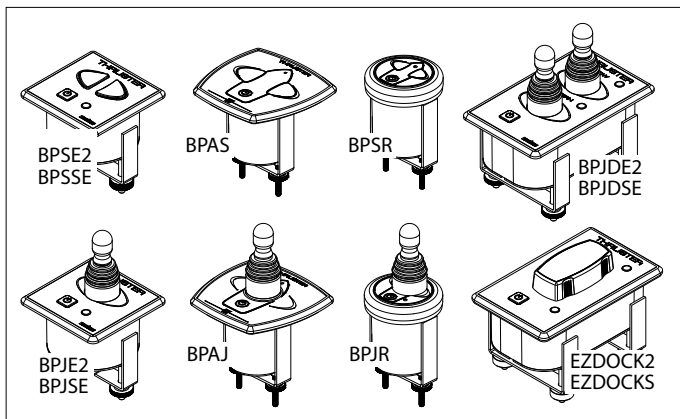
A fuse must be included in the 'positive cable' for the main switch, as close to the battery as possible. This fuse protects the on-board power cabling from short circuits. For all fuses we can supply a fuse holder, VETUS part no.: ZEHC100. See page 106 for the size of the fuse to be used.



6.6 Bow thruster control panels

- Fit the control panel next to the steering position. There must be at least 50 mm (2") space behind the panel.

If 2 bow thrusters have to be operated simultaneously, for example on a catamaran, consult the diagram on page 110.

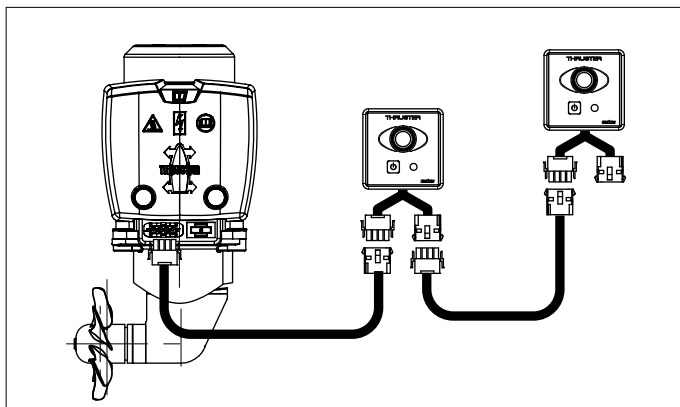


- Fit the control cable between the bow thruster and the control panel through the vessel and connect the jack connections together.

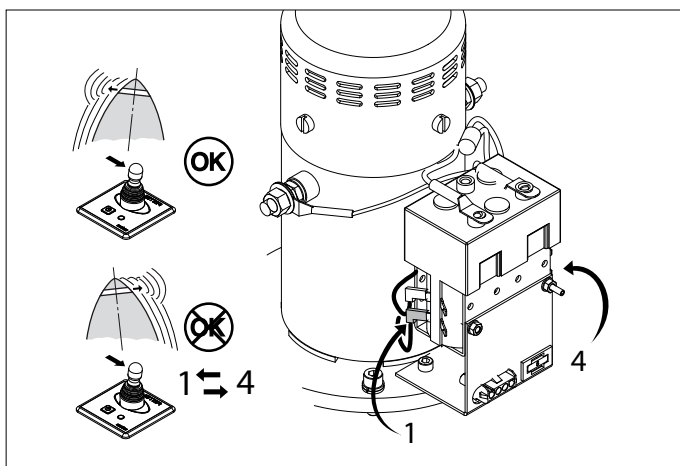
If it is necessary to cut the intermediate cable and reconnect it take care to ensure the correct colours are connected together.

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!

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.

6.7 Delay when reversing the thrust direction

If a delay is desired where one of the following operating devices is installed, a delay switch can be installed.

Operating device:

- BPJSTA, separate turn switch (Joystick),
- BPSM, operating panel for side mounting,
- FSxx, foot switch button

Delay: VETUS art. code: BPTD

7 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 LED is not lit.

- The electric motor has overheated and its thermal Protection has broken the circuit of the control current.

The panel gives a warning signal three times (. . .) and the LED will glow red.

As soon as the motor has cooled down enough, the LED will re-sume glowing green and the bow thruster can be put back in service.

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 blades of the propeller have been damaged by a foreign object having entered the propeller or tunnel.
- The drive pin on the propeller shaft has been broken by a foreign object having entered the propeller or tunnel.

Replace the drive pin and check the propeller flange for any damage.

After pressing the on/off switch on the panel, the panel is not switched on.

- The on/off switch must be pressed a **second** time within 6 seconds.

The LED will then remain green and the buzzer will confirm that the panel is ready for use by giving the signal (- . -).

^[1] The control current fuse is in the bow thruster motor. A spare fuse can be found in the relay cap, see p. 111.

^[2] See table on page 106

8 Technical data

Type	: BOW7512D	BOW7524D
Electric motor		
Type	reversible DC motor	
Voltage	12 V DC	24 V DC
Current	550 A ^[3]	315 A ^[4]
Rated output	4.4 kW	
No. of revolutions	2900 rpm	
Rating	S2 - 2 min. ^[3]	S2 - 3 min. ^[4]
Protection	IP20	
Motors conform to CE (80/336/EEC, EMC - EN60945)		
Transmission		
Gears	Bevel gear helical teeth	
Gear ratio	1.3 : 1	
Lubrication	oilbath, approx. 0.06 litre (2 fl.oz.) outboard gear oil SAE80W or EP 90	
Housing	bronze	
Propeller		
Diameter	178 mm (7")	
No. of blades	6	
Profile	asymmetrical	
Material	polyacetal (Delrin [®])	
Rated thrust	800 N (80 kgf, 180 lbf)	850 N (85 kgf, 191 lbf)
Control circuit		
Fuse	Blade type fuse 'ATO' 5 A	
Current solenoid switch	2.8 A	1.4 A
Control circuit wires	1.5 mm ² (14 AWG)	
Extension cable	6, 10, 16, 18 or 20 m (20', 33', 52', 59', or 65')	
Thrust-tunnel		
Steel model		
dimensions	O.D. 194 mm, wall thickness 5.6 mm	
treatment	blasted, coated with: SikaCor Steel Protect. Suitable for all kinds of protection systems.	
Plastic model		
dimensions	I.D. 185 mm, wall thickness 5 mm	
material	glass fibre reinforced polyester	
Aluminium model		
dimensions	I.D. 185 mm, wall thickness 5,5 mm	
material	aluminium, 6061 or 6062 (AlMg1SiCu)	
Weight		
Excl. thrust-tunnel	26 kg (57 lbs)	

Length of usage:

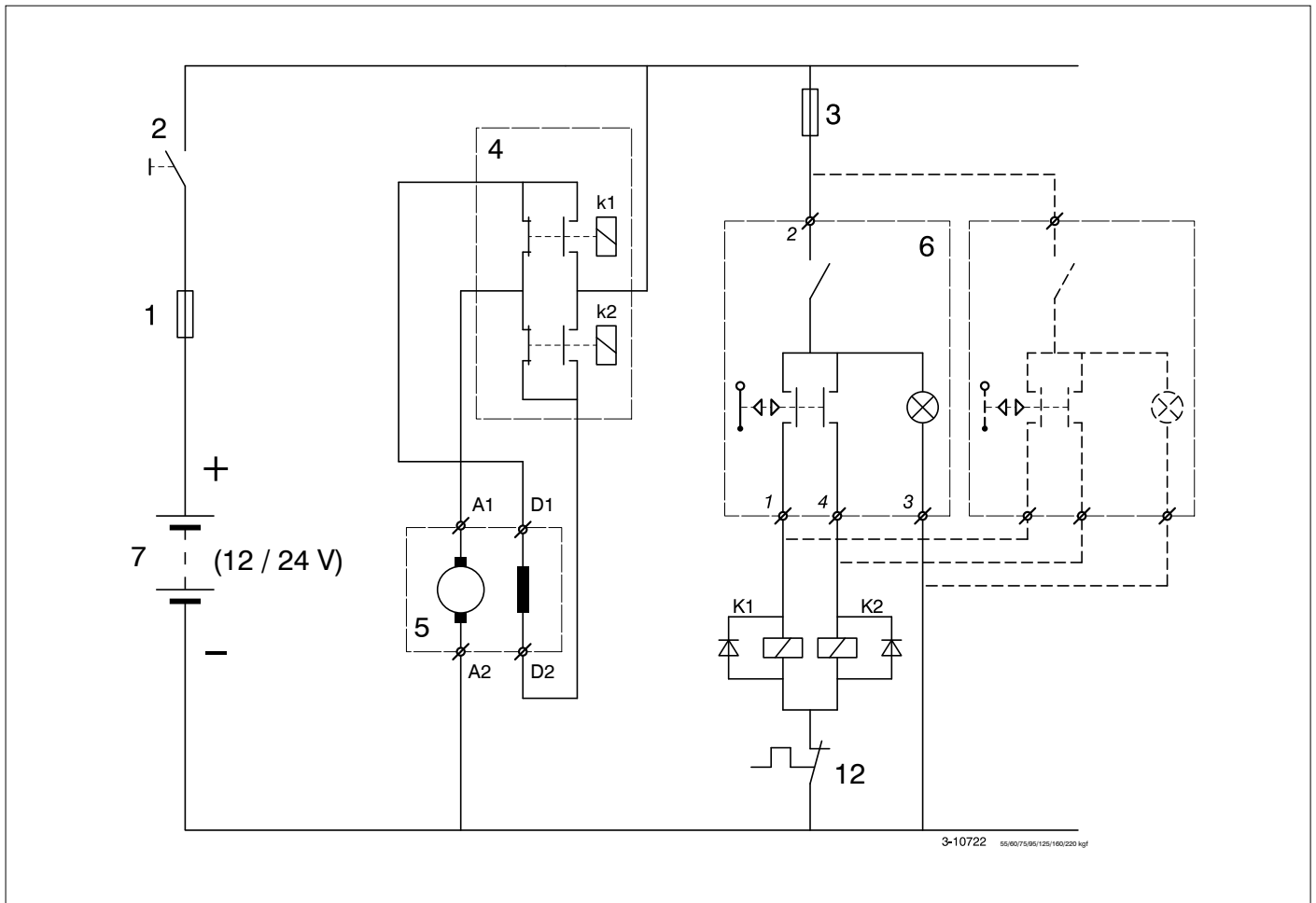
^[3] 2 min. continuously or max. 2 min. per hour at 550 A (12 Volt).

^[4] 3 min. continuously or max. 3 min. per hour at 315 A (24 Volt).

9 Accucapaciteit, accukabels
Battery capacity, battery cables
Akkukapazität, Akkukabel

Capacité de la batterie, câbles de batterie
Capacidad de las baterías, cables de baterías
Capacità della batteria e cavi della batteria

Boegschroef	Toe te passen accu(s)		Totale lengte plus- en minkabel	Draadoorsnede	Hoofdstroomzekering, zie 6.3			
	Minimaal	Maximaal			'traag'	VETUS art. code		
Bow thruster	Battery capacity required		Total length of plus- and minus cable	Cable cross-section	Main power fuse, see 6.3			
	Minimum	Maximum			'slow blow'	VETUS art. code		
Bugschraube	Zu verwendende Akkus		Gesamtlänge Plus- und Minuskabel	Drahtdurchschnitt	Hauptstromsicherung, vgl. 6.3			
	Minimum	Maximum			'träge'	Artikelnummer		
Hélice d'étrave	Batterie(s) à utiliser		Longueur totale des câbles plus et moins	Diamètre du câble	Fusible du circuit d'alimentation principale ; 6.3			
	Minimum	Maximum			'lent'	code d'art. VETUS		
Hélice de proa	Batería(s) a aplicar		Largo total cable positivo y negativo	Diámetro de hilo	Fusible de la corriente principal, ver 6.3			
	Mínimo	Máximo			'lento'	Código de art. VETUS		
Elica	Batteria(e) da usare		Lunghezza totale cavo positivo e negativo	Diametro cavi	Fusibile alimentazione principale, vedere 6.3			
	Minimo	Massimo			'a tempo'	VETUS codice art.		
BOW7512D 75 kgf - 12 V	CCA 917	CCA 1833	0 - 3,1 m	0 - 10.2 ft	50 mm ²	AWG 0	355 A	ZE355
			3,1 - 4,4 m	10.2 - 14.4 ft	70 mm ²	AWG 00		
			4,4 - 5,9 m	14.4 - 19.4 ft	95 mm ²	AWG 000		
			5,9 - 7,5 m	19.4 - 24.6 ft	120 mm ²	AWG 0000		
			7,5 - 8,7 m	24.6 - 28.5 ft	2 x 70 mm ²	2 x AWG 00		
			8,7 - 9,4 m	28.5 - 30.8 ft	150 mm ²	AWG 300 MCM		
			9,4 - 11,8 m	30.8 - 38.7 ft	2 x 95 mm ²	2 x AWG 000		
			11,8 - 14,9 m	38.7 - 48.9 ft	2 x 120 mm ²	2 x AWG 0000		
14,9 - 18,7 m	48.9 - 61.4 ft	2 x 150 mm ²	2 x AWG 300 MCM					
BOW7524D 75 kgf - 24 V	CCA 525	CCA 1050	0 - 5,4 m	0 - 17.7 ft	25 mm ²	AWG 4	200 A	ZE200
			5,4 - 7,6 m	17.7 - 24.9 ft	35 mm ²	AWG 2		
			7,6 - 10,9 m	24.9 - 35.8 ft	50 mm ²	AWG 0		
			10,9 - 15,2 m	35.8 - 49.9 ft	70 mm ²	AWG 00		
			15,2 - 20,6 m	49.9 - 67.6 ft	95 mm ²	AWG 000		
			20,6 - 26,1 m	67.6 - 85.6 ft	120 mm ²	AWG 0000		
			26,1 - 30,5 m	85.6 - 100.1 ft	2 x 70 mm ²	2 x AWG 00		
			30,5 - 32,6 m	100.1 - 107 ft	150 mm ²	AWG 300 MCM		
			32,6 - 41,3 m	107 - 135.5 ft	2 x 95 mm ²	2 x AWG 000		
			41,3 - 52,2 m	135.5 - 171.3 ft	2 x 120 mm ²	2 x AWG 0000		
			52,2 - 65,3 m	171.3 - 214.2 ft	2 x 150 mm ²	2 x AWG 300 MCM		



1	Hoofdzekering	Main fuse	Hauptsicherung	Fusible principal	Fusible principal
2	Hoofdschakelaar	Main switch	Hauptschalter	Interrupteur principal	Interruptor principal
3	Stuurstroomzekering	Control current fuse	Steuerstromsicherung	Fusible courant de commande	Fusible de circuito de control
4	Magneetschakelaar	Solenoid switch	Relais	Contacteur solénoïde	Interruptor de solenoide
5	Elektromotor	Electromotor	Elektromotor	Moteur électrique	Electromotor
6	Bedieningspaneel	Control panel	Bedienungspaneel	Panneau de commande	Tablero de mandos
7	Accu	Battery	Batterie	Batterie	Batería
8	Steker	Plug	Stecker	Prise mâle	Clavija macho
9	Contrasteker	Socket	Kontrastecker	Prise femelle	Clavija hembra
10	Verlengkabel	Extension cable	Zwischenkabel	Câble de branchement	Cable prolongador
11	Dynamo	Alternator	Lichtmaschine	Générateur	Generador
12	Thermische beveiliging	Thermal Protection	Thermosicherung	Sécurité thermique	Dispositivo térmico de seguridad

	Kleurcode bedrading:	Wiring colour code:	Farbkode für die Bedruchtung:	Code de couleur des câbles:	Código de color de los cables:
1	Blauw	Blue	Blau	Bleu	Azul
2	Rood (+)	Red (+)	Rot (+)	Rouge (+)	Rojo (+)
3	Zwart (-)	Black (-)	Schwarz (-)	Noir (-)	Negro (-)
4	Wit	White	Weiß	Blanc	Blanco

10.1 Gelijktijdige bediening van 2 boegschroeven met 1 paneel

Simultaneous operation of two bow thrusters with one panel

Gleichzeitige Bedienung von zwei Bugschrauben mit einem Armaturenbrett

Commande simultanée de 2 hélices d'étrave avec 1 panneau

Manejo simultáneo de 2 tornillos de retención con 1 panel

Comando contemporaneo di 2 eliche di prua mediante 1 solo pannello

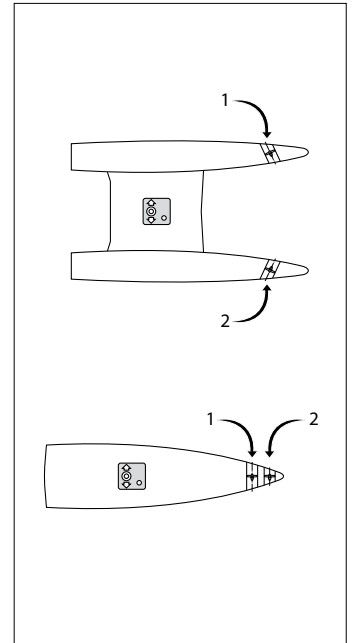
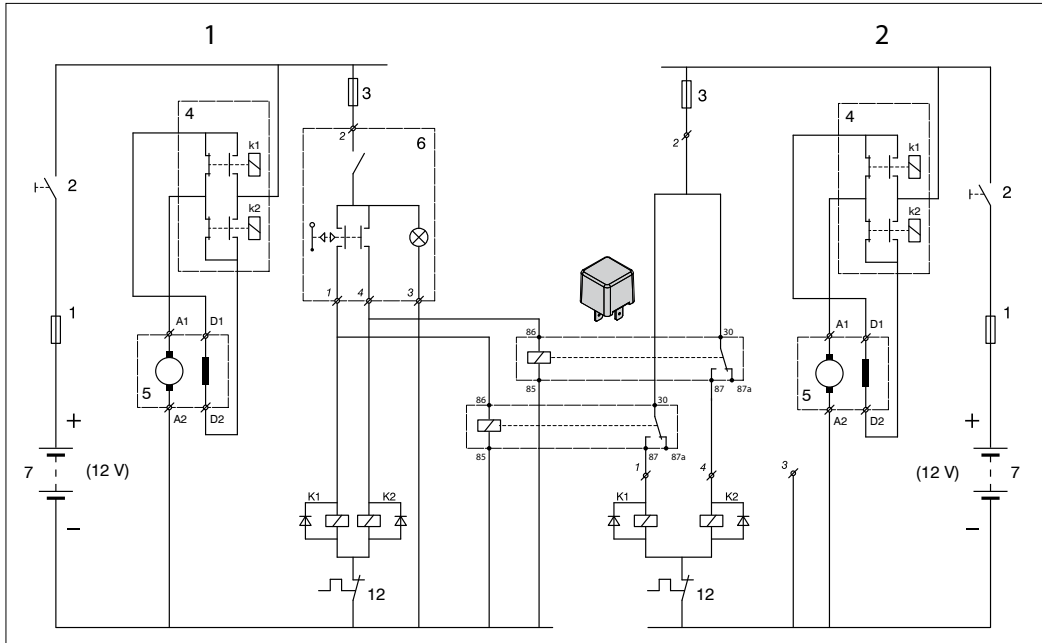
Samtidig betjening af 2 bovpropeller med 1 betjeningspanel

Samtidig manövrering av 2 bogpropellrar med 1 panel

Samtidig betjening av 2 baugpropeller med 1 panel

Kahden keukapotkurin ohjaus samanaikaisesti yhdellä panelillä.

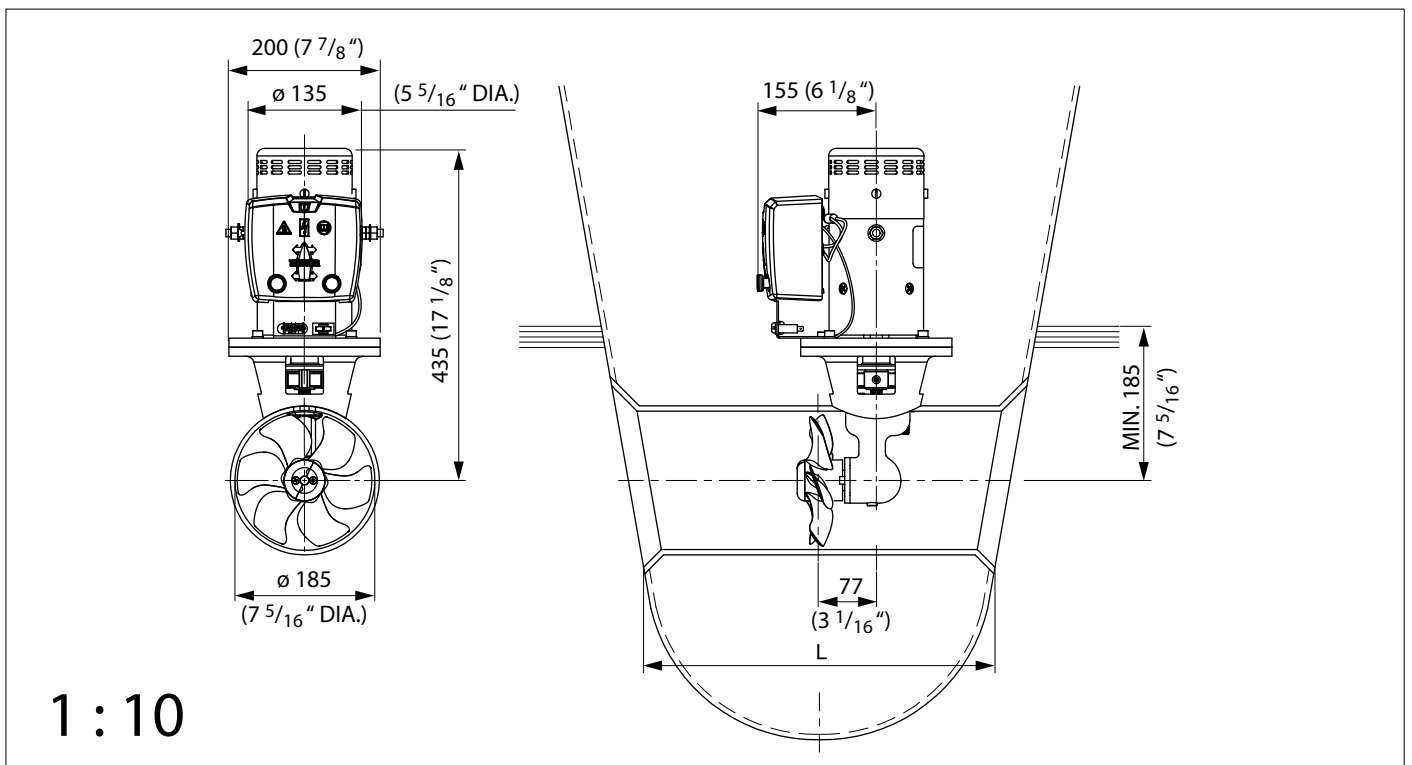
Jednoczesna obsługa dwóch pędników dziobowych przy użyciu jednego panelu

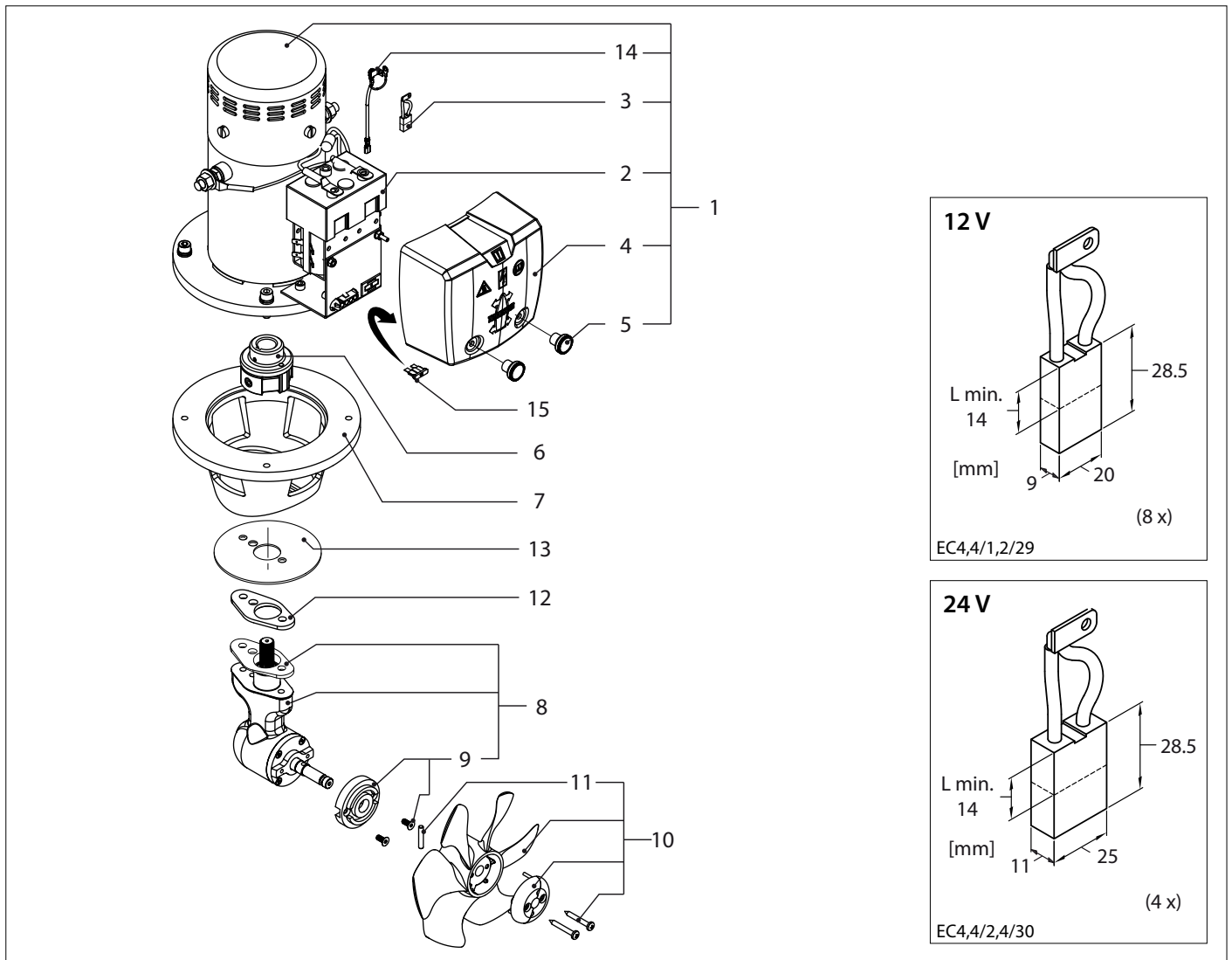


11 Hoofdafmetingen
Principal dimensions
Hauptabmessungen
Dimensions principales

Dimensiones principales
Dimensioni principali
Mål
Huvudmått

Viktigste mål
Päämitat
Główne wymiary





**BOW7512D
BOW7524D**

Service onderdelen

Service parts

pos.	qty	part	benaming	description
1	1	SET0031	Elektromotor 4,4 kW - 12 V voor BOW7512D compl. met relais	Electromotor 4.4 kW - 12 V for BOW7512D c/w solenoid switches
	1	SET0109	Elektromotor 4,4 kW - 24 V voor BOW7524D compl. met relais	Electromotor 4.4 kW - 24 V for BOW7524D c/w solenoid switches
2	1	SET0015	Set relais 12 V voor BOW7512D	Set of solenoid switches 12 V for BOW7512D
	1	SET0020	Set relais 24 V voor BOW7524D	Set of solenoid switches 24 V for BOW7524D
3	1	SET0126	Set van 8 stuks koolborstels voor BOW7512D	Set of 8 pcs of carbon brushes for BOW7512D
	1	SET0127	Set van 4 stuks koolborstels voor BOW7524D	Set of 4 pcs of carbon brushes for BOW7524D
4	1	BPC00100	Relaiskap	Relais cover
5	1	SET0006	Set van 2 stuks kartelmoeren	Set of 2 pcs knurled nuts
6	1	BP1202	Koppeling	Coupling
7	1	BP1199B	Tussenflens	Intermediate flange
8	1	SET0035	Startaak compl.	Tailpiece compl.
9	1	SET0150	Zinkanode compl. met schroeven	Zincanode c/w screws
10	1	SET0088	Schroef compl. met meeneempen en montageset	Propeller c/w drive pin and mounting set
11	1	BP275S	Meeneempennen, 5 stuks	Propeller pins, 5 pcs
12	2	BP1020	Pakking 2 mm	Gasket 2 mm
13	1	BP1021	Pakking 1 mm	Gasket 1 mm
14	1	TS110	Thermische beveiliging	Thermal Protection
15	1	BP256	Reserve zekering 5 A	Spare fuse 5 A



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