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Installatie instructies

Instrucciones de instalación

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Einbauanleitung

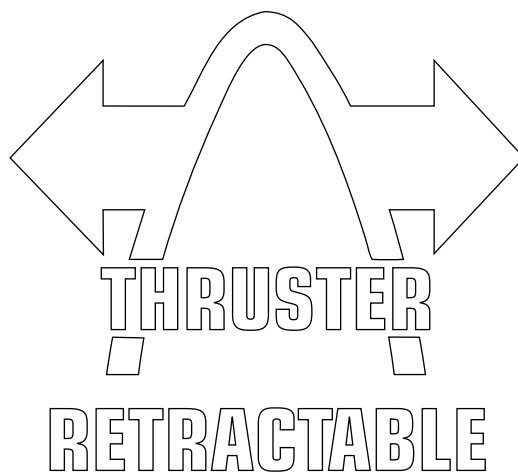
Istruzioni per l'installazione

Installasjonsinstrukser

Instructions d'installation

Installationsinstruktioner

Asennusohje



Installation manual

Retractable Thrusters

55 kgf - ø 150 mm
60 kgf / 75 kgf / 95 kgf - ø 185 mm
125 kgf / 160 kgf - ø 250 mm

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Raadpleeg de eigenaarshandleiding voor Bediening, Onderhoud, Storingen en Technische gegevens.'

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Consult the owner's manual for Operation, Maintenance, Trouble shooting and Technical data.

1 Safety

Warning indications

The following warning indications are used in this manual in the context of safety:



DANGER

Indicates that great potential danger exists that can lead to serious injury or death.



WARNING

Indicates that a potential danger that can lead to injury exists.



CAUTION

Indicates that the usage procedures, actions etc. concerned can result in serious damage to property. Some CAUTION indications also advise that a potential danger exists that can lead to serious injury or death.



NOTE

Emphasises important procedures, circumstances etc.

Symbols



Indicates that the relevant procedure must be carried out.



Indicates that a particular action is forbidden.

Pass the safety precautions on to other people who will use the thruster.

General rules and laws concerning safety and accident prevention must always be observed.

2 Introduction

These manual give guidelines for fitting the Vetus retractable bow thruster model 'STE....

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 actual thrust force, as performed by the bow thruster, will give different results with each individual vessel, depending on wind catch, displacement and shape of the underwater section.

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

- During use ensure a correct battery voltage.
- The installation is carried out in compliance with the recommendations given in this installation instruction, in particular with regard to:
 - Sufficiently large diameter of the battery cables so that voltage drop is reduced to a minimum.



NOTE

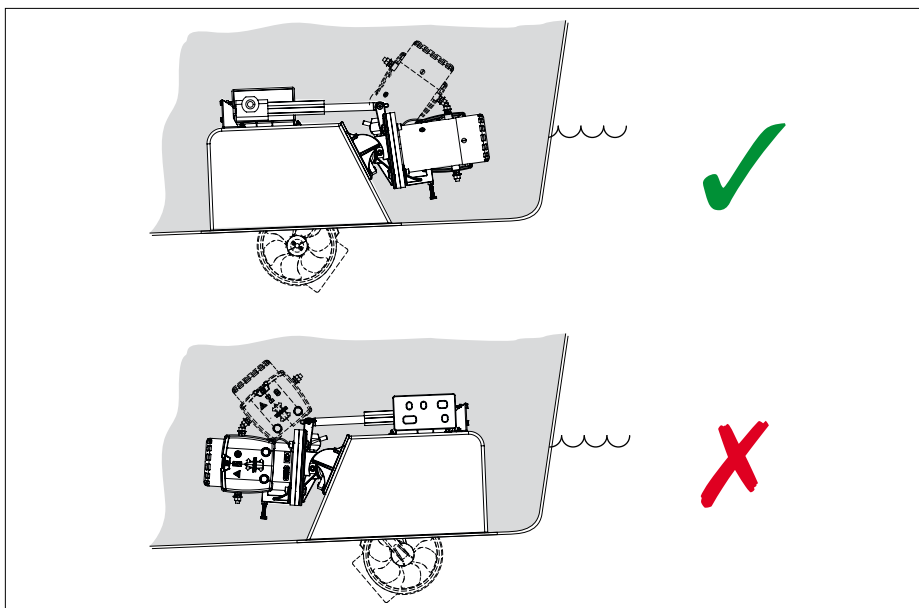
Check for possible leaks immediately the ship returns to water.



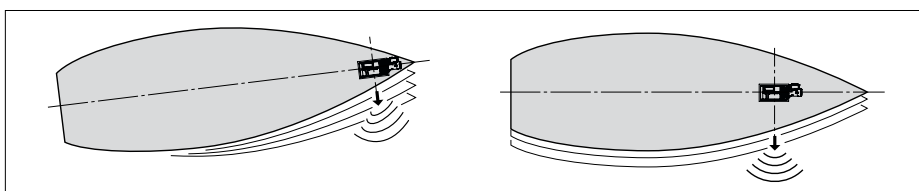
Make sure that the user of the vessel is supplied with the owner's manual.

3 Positioning the bow thruster

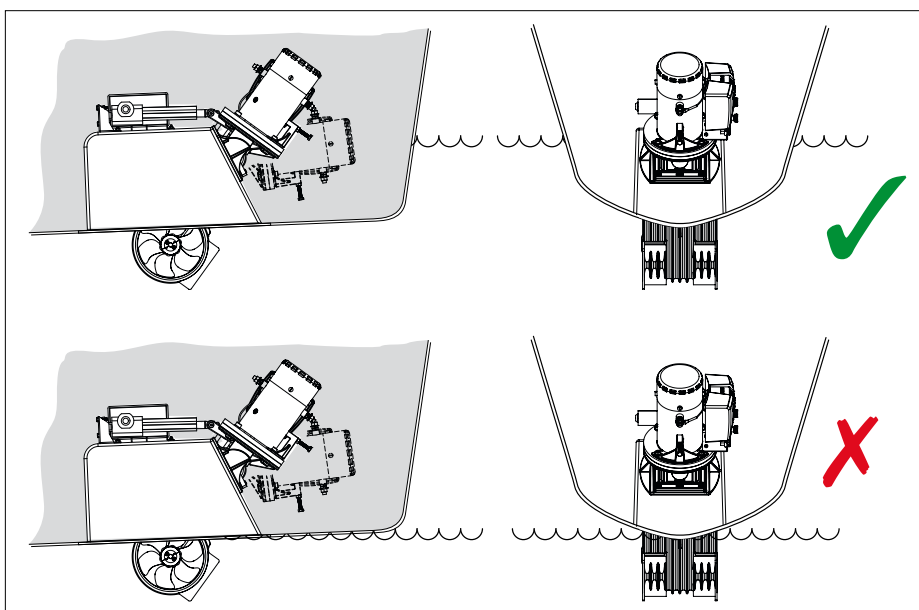
The electric motor of the bow thruster must point to the bow of the ship.



To achieve optimal results, the bow thruster must as much as possible be fitted at the front of the ship.

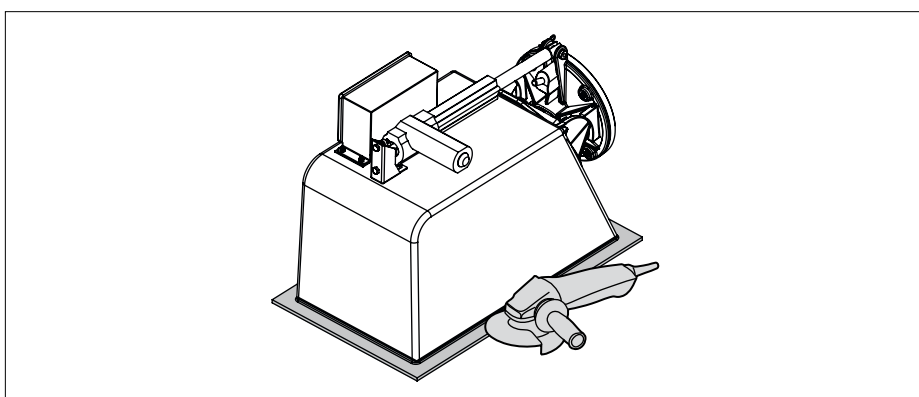


The thruster must be sufficiently under the water line to prevent air from being drawn in.

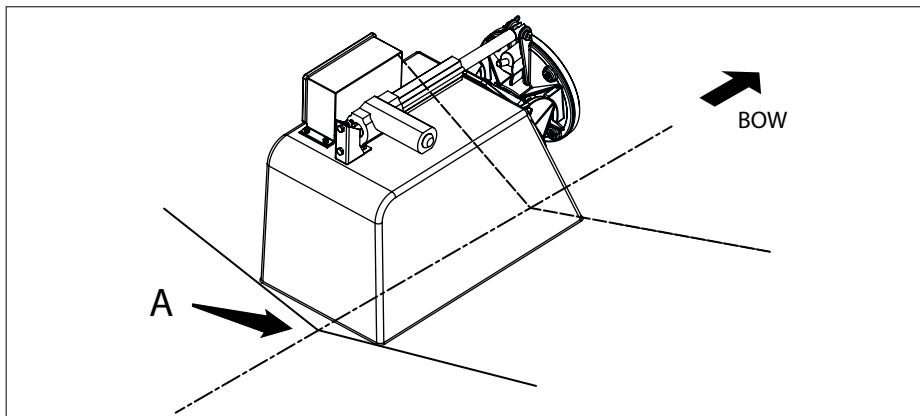


4 Fitting the housing

- Remove the flange from the housing by grinding or sawing.



- Determine the location where the housing should be placed, and mark 'A' on the back.

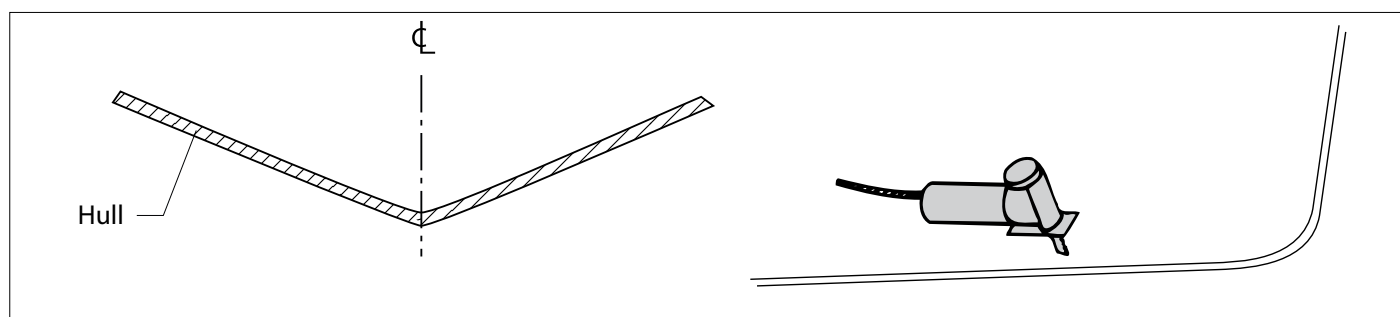


Making the opening can be done from either the inside or from the outside.

Although simpler from the inside then the opening should be made from the outside.

It is more difficult to determine the right dimensions of the opening from the inside in case of a larger thickness of the ship's hull.

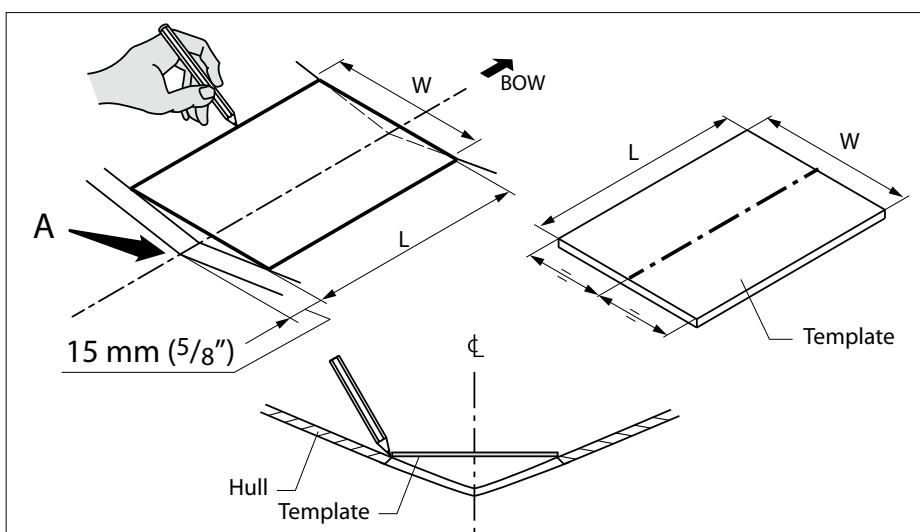
4.1 Making the opening from the inside



- Draw the opening to be sawn out for the hatch.

We recommend using a template for this purpose.

A template is not provided, but you can easily create one yourself using a piece of waste sheet material or sturdy cardboard.

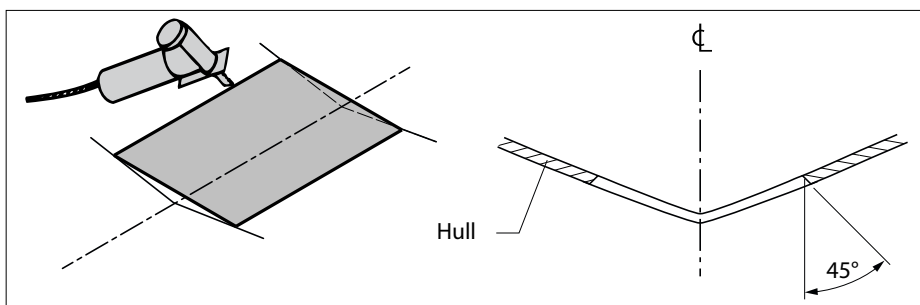


Bow thruster	Tunnel tube diameter		W		L	
	[mm]	[in]	[mm]	[in]	[mm]	[in]
55 kgf	ø150	6	224	8 3/4	285	11 1/4
60 kgf / 75 kgf / 95 kgf	ø185	7 5/16	254	10	322	12 5/8
125 kgf / 160 kgf	ø250	10	384	15 1/8	450	17 3/4

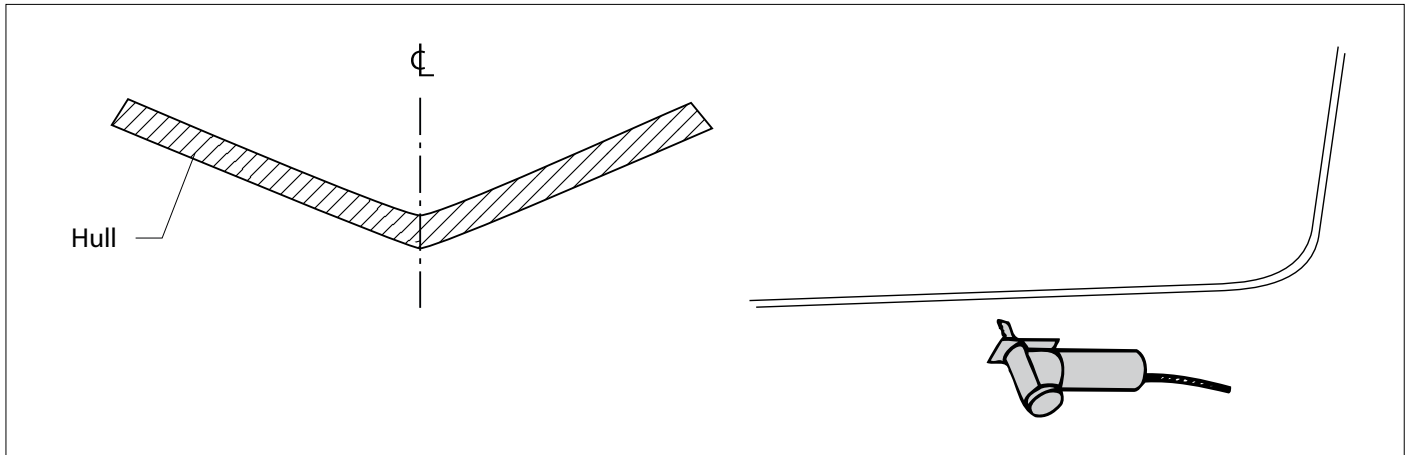
- Saw the opening in the hull.

Preferably saw at an angle of 45° in relation to the ship's centre line.

After the bow thruster has been fitted, the sawn-out section can be used as a hatch to close the opening while sailing.



4.2 Making the opening from the inside

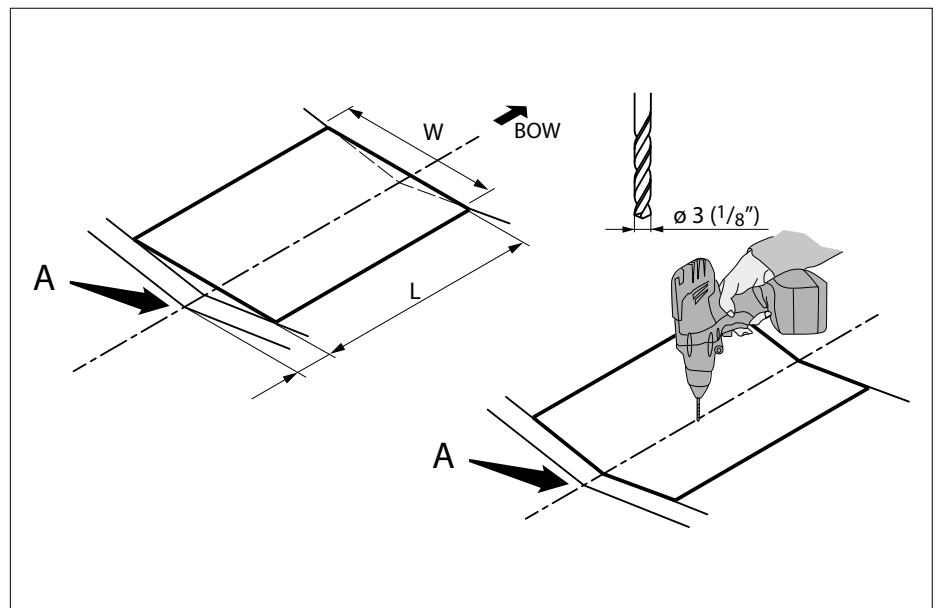


The location where the opening has to come made in relation to point 'A' can now be determined.

- Drill a hole as precisely as possible in the area on the centre line of the ship where the opening has to come.

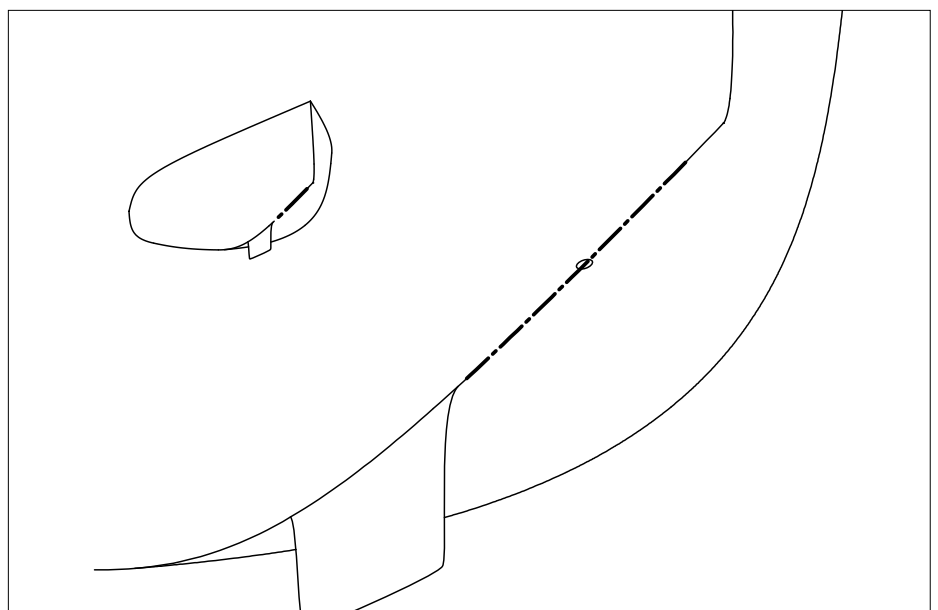
Apply a drill with a diameter of 3 mm.

This 3 mm hole is a reference for sawing the opening from the outside.



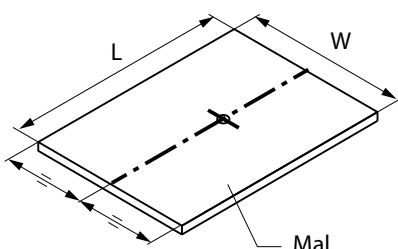
- Draw a centre line on the outside of the hull.
- Look from a point in front of the boat to the keel to draw the centre line on the outside.

Use the hole of 3 mm as a reference.



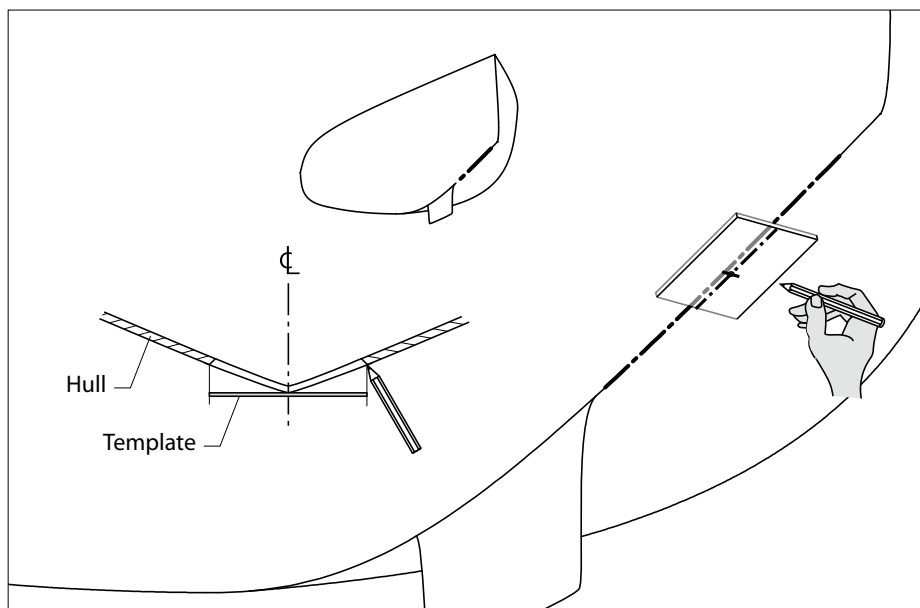
To draw the opening a template is required.

A template is not provided, but you can easily create one yourself using a piece of waste sheet material or sturdy cardboard.



Bow thruster	Tunnel tube diameter		W		L	
	[mm]	[in]	[mm]	[in]	[mm]	[in]
55 kgf	ø150	6	224	8 3/4	285	11 1/4
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125 kgf / 160 kgf	ø250	10	384	15 1/8	450	17 3/4

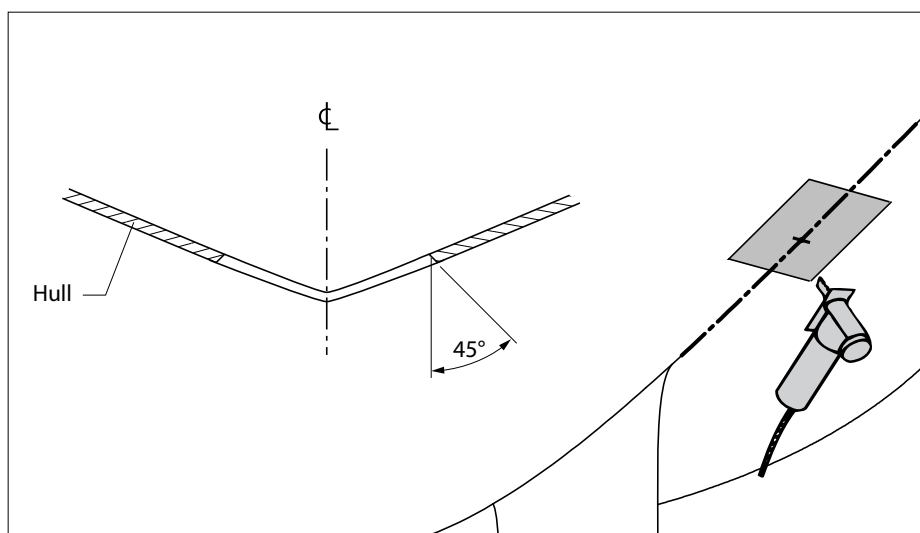
- Draw the opening to be sawn out.



- Saw the opening in the hull.

Preferably saw at an angle of 45° in relation to the ship's centre line.

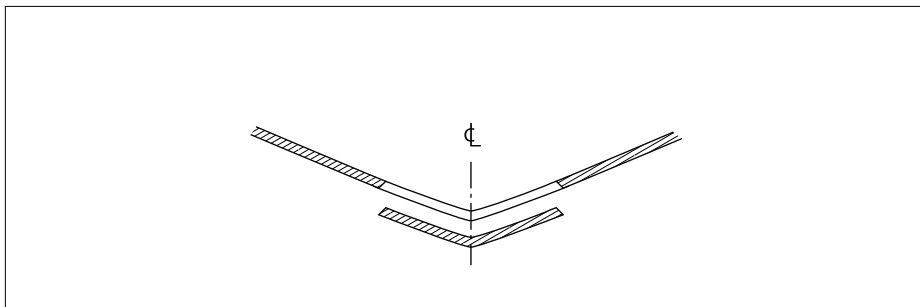
After the bow thruster has been fitted, the sawn-out section can be used as a hatch to close the opening while sailing.



4.3 Finishing of the opening

- Finish the sawn-out section of the hull so that it fits properly into the opening in the hull.

Due to the angle the hatch has been sawn out (45°) the hatch fully closes the opening once the bow thruster is retracted.

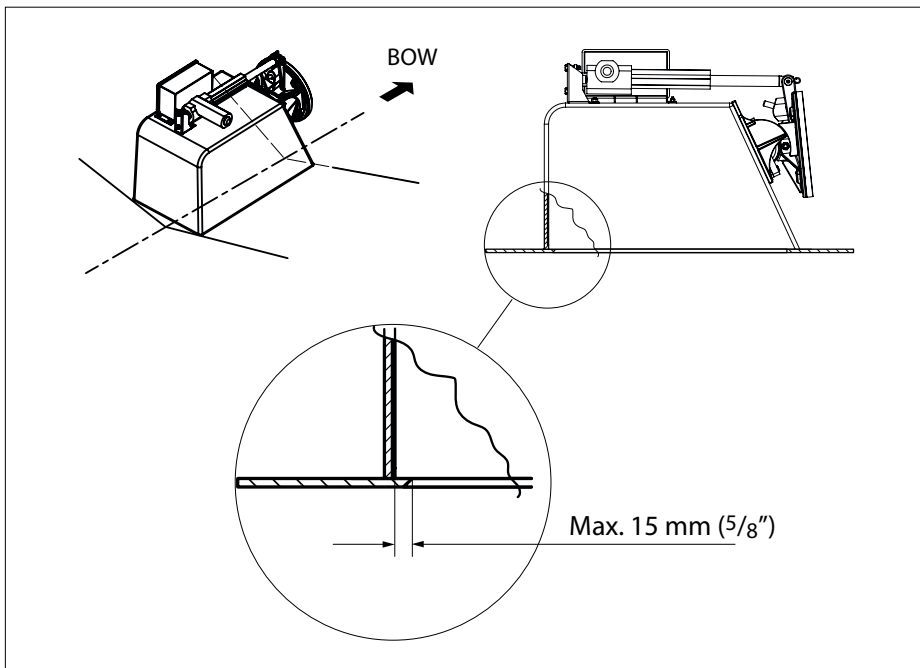


4.4 Installation of housing

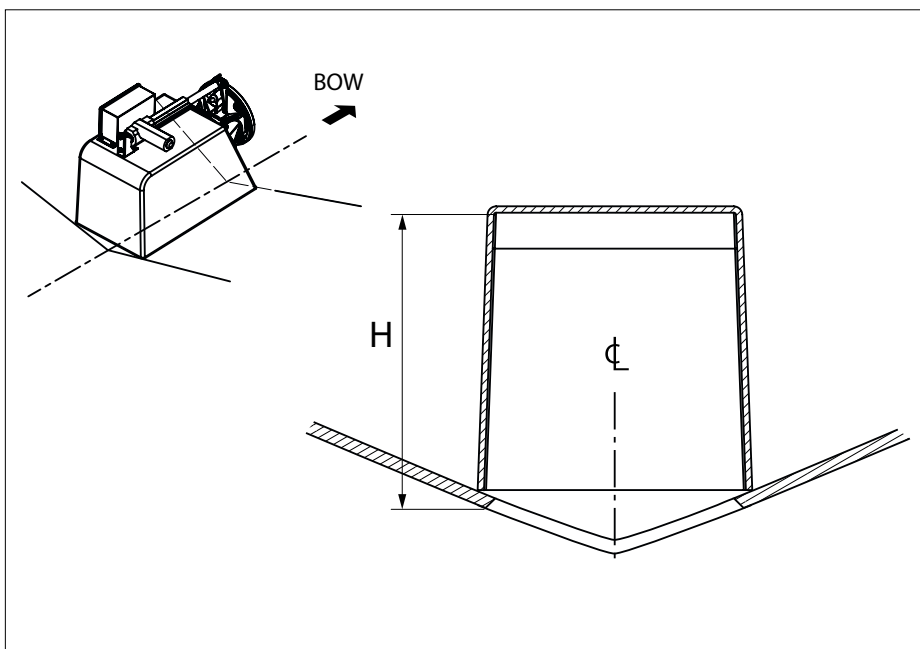
- Position the housing on the opening.

 **NOTE**

The interior of the housing must not sit beyond the opening in the hull further than 15 mm (5/8").

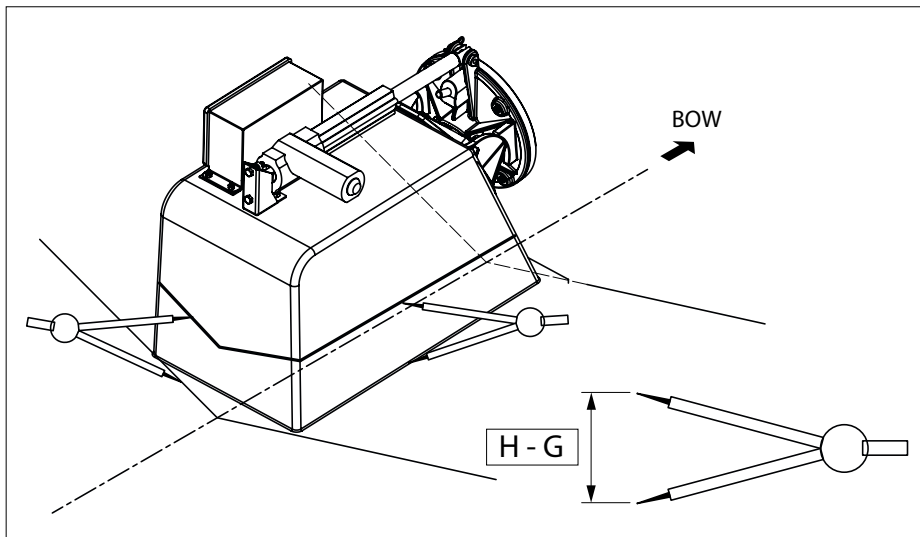


- Measure the dimension 'H'.
- Calculate the difference between 'H' and dimension 'G' from the table.

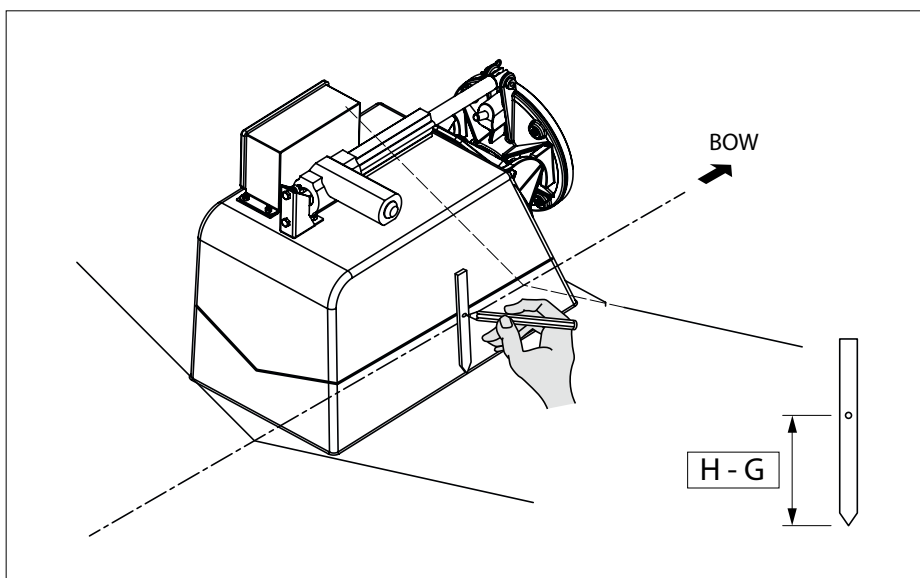


Bow thruster	Tunnel tube diameter		G	
	[mm]	[in]	[mm]	[in]
55 kgf	ø150	6	180	7 1/16
60 kgf / 75 kgf / 95 kgf	ø185	7 5/16	210	8 1/4
125 kgf / 160 kgf	ø250	10	275	10 13/16

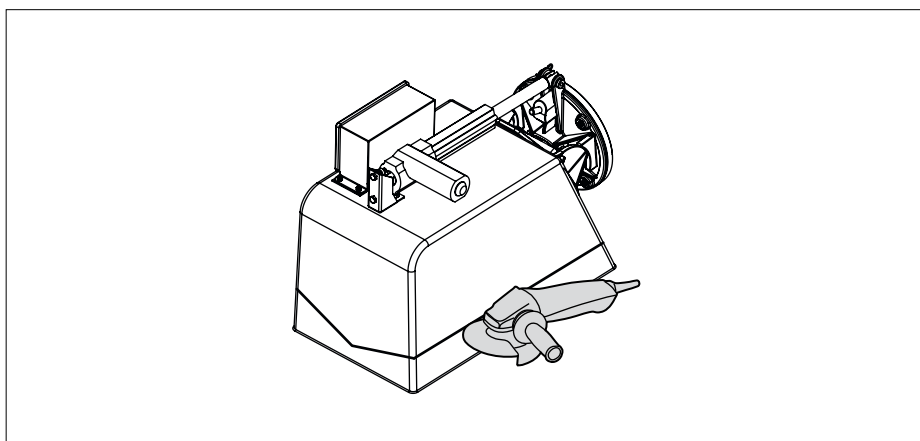
- Use a compass to mark out the difference between the dimensions 'H' and 'A' on the housing.
- Fully mark out the outline of the housing.



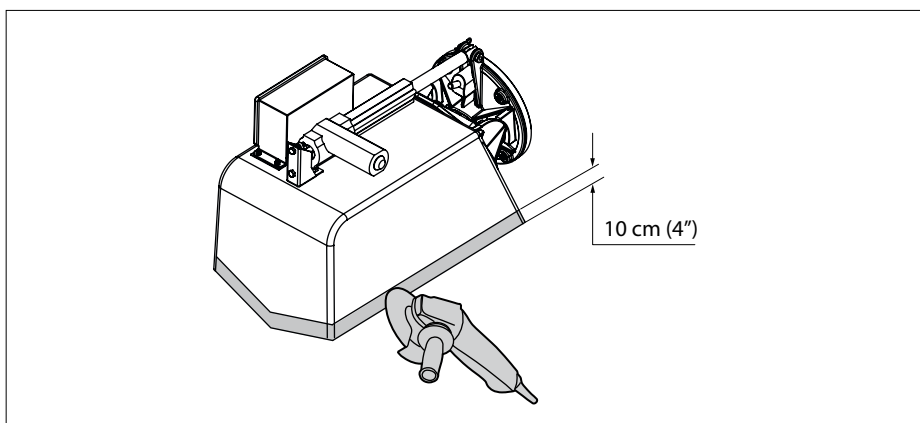
- A scribing block can be made as pictured and used instead of a compass.
- The scribing block is a pointed fillet with a hole at dimension H - G.



- Saw off the housing according to the line marked out.




- Also remove the coated layer of the bottom 10 cm (4") of the housing by sanding or grinding.
- This is essential in order to achieve a good adhesion with the polyester.

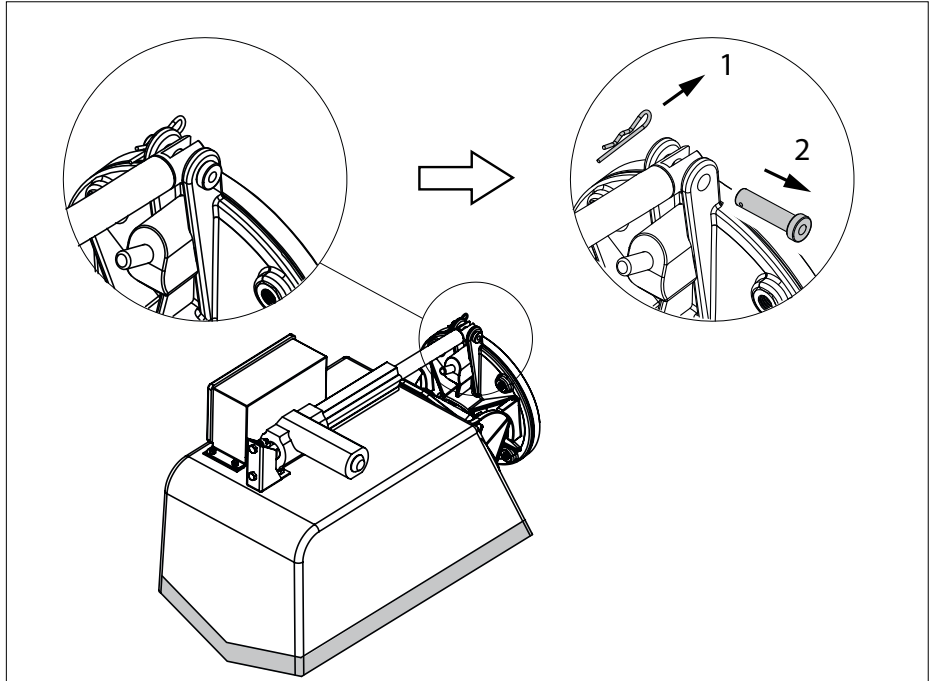


- Temporarily remove the safety clips (hair-pin spring) and shear pin.

The tunnel can now freely move up and down.

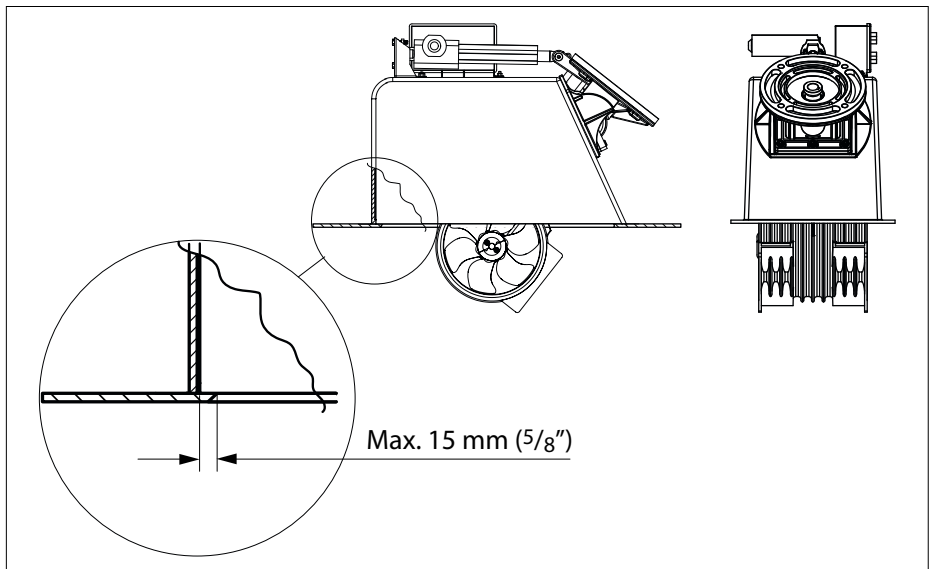
 **NOTE**

First after checking whether the tunnel can freely move up and down and fitting the hatch, the shear pin and the safety clips must be refitted.



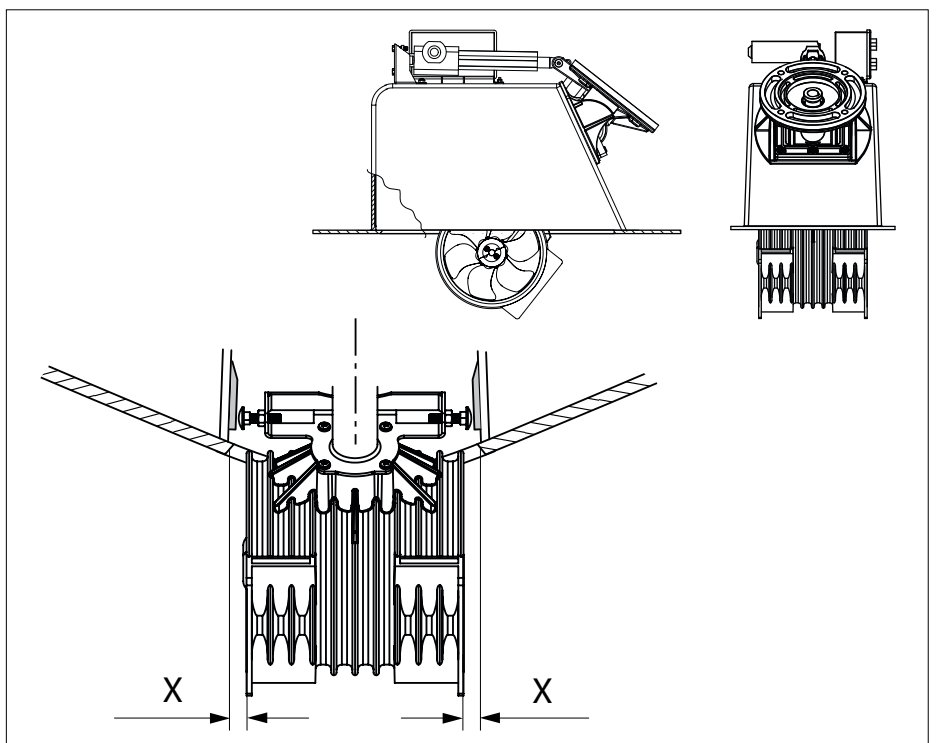
- Replace the housing.

Ensure that the interior of the housing must not sit beyond the opening in the hull further than 15 mm (5/8").



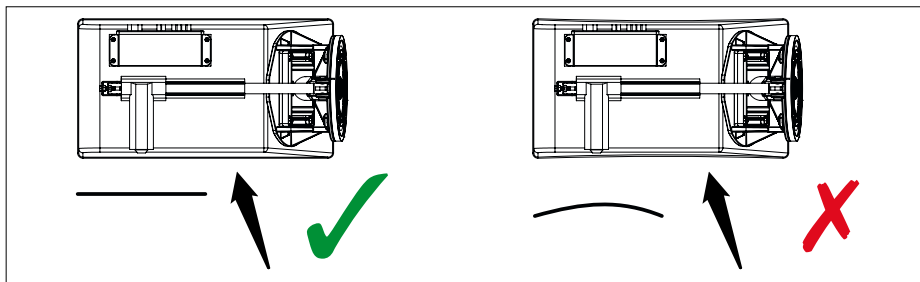
Make sure the housing lies athwart centered, so that the free space is equal on both sides of the tunnel.

- Check that the tunnel can freely move up and down, and that it remains free from the hull when fully folded out.



- Check that the sides of the housing are not concave.

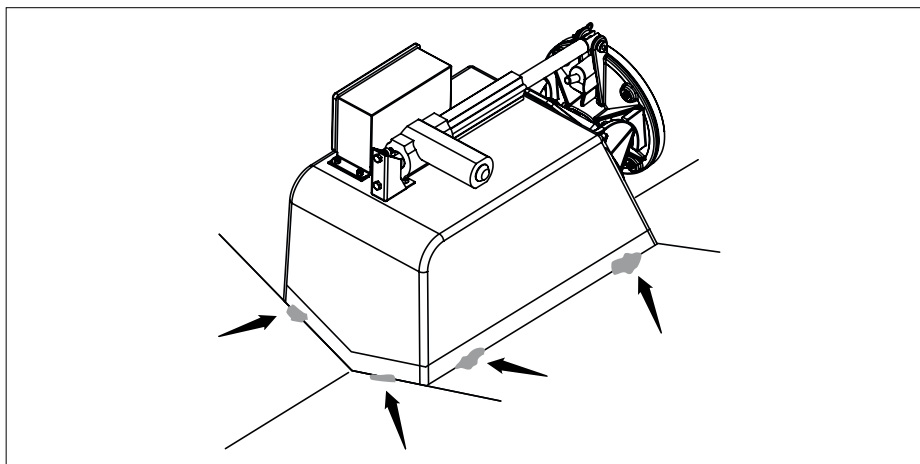
If the sides are indeed concave, introduce struts before securing the housing to the hull.



- Now tack the housing to the hull with a quick-drying filler.

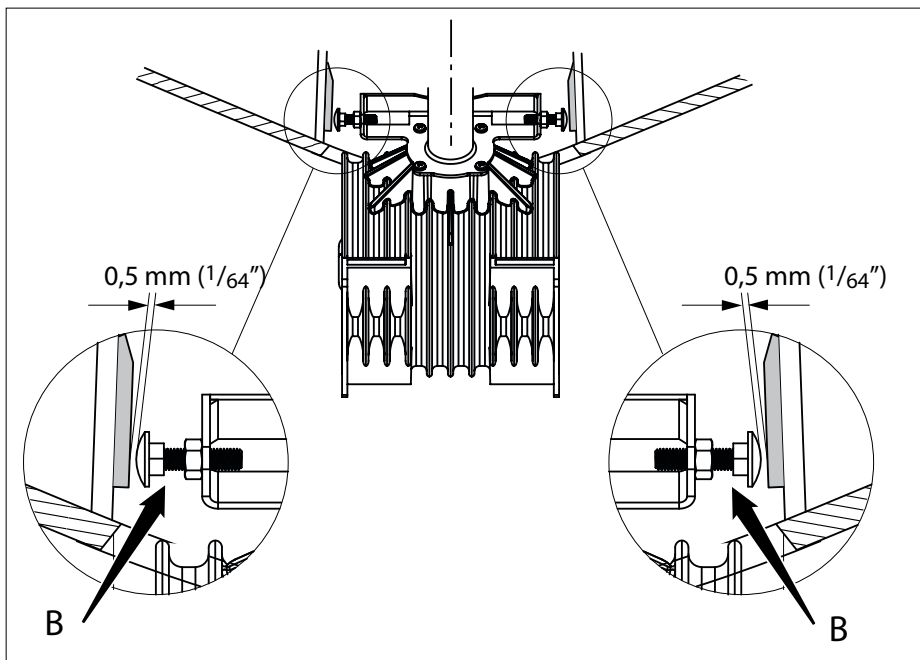
NOTE

Only definitively secure housing with epoxy and fibreglass mat after the hatch has been fitted.



- Adjust the bolts 'B'.

The clearance between the head of the bolts 'B' and the supporting surfaces must be 0.5 mm (1/64").

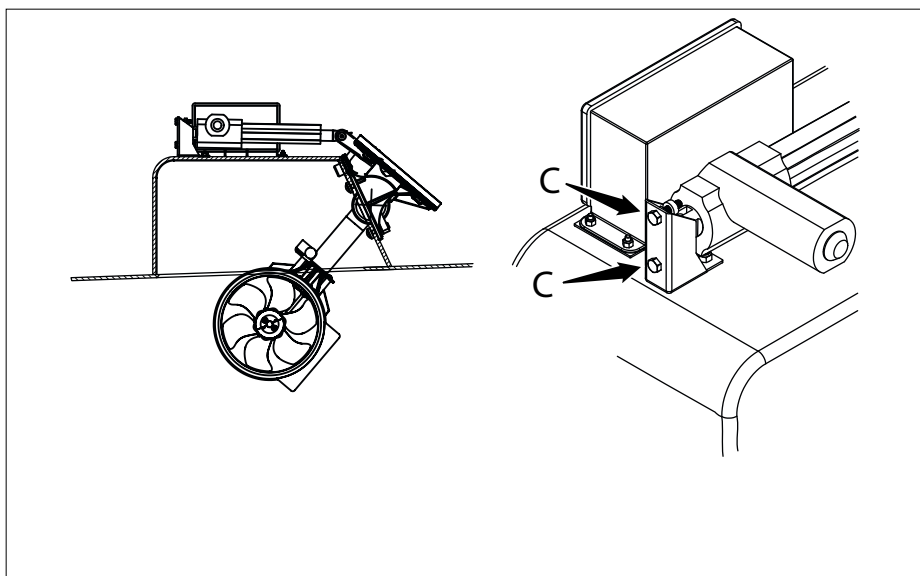


- Check the adjustment of the actuator.

NOTE

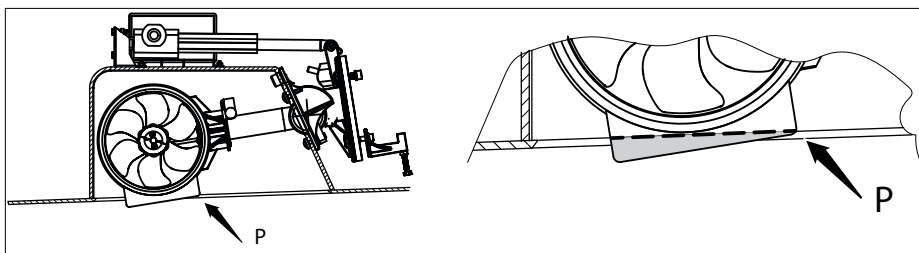
With the plunger of the actuator fully extended the corner 'P' must be minimal 3 mm (1/8") higher than the inside of the ship's skin.

- Re-adjust the actuator if required using the 2 bolts 'C'

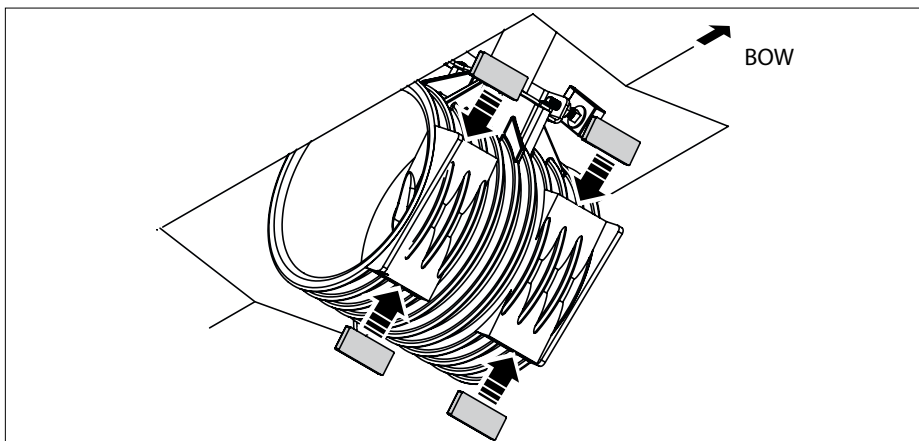


4.5 Fitting the hatch

- Lower the tunnel enough so that the corner 'P' is level to the inside of the hull.
- On both flanges of the tunnel, mark out which part of the flanges protrude underneath the ship, and saw these sections off.

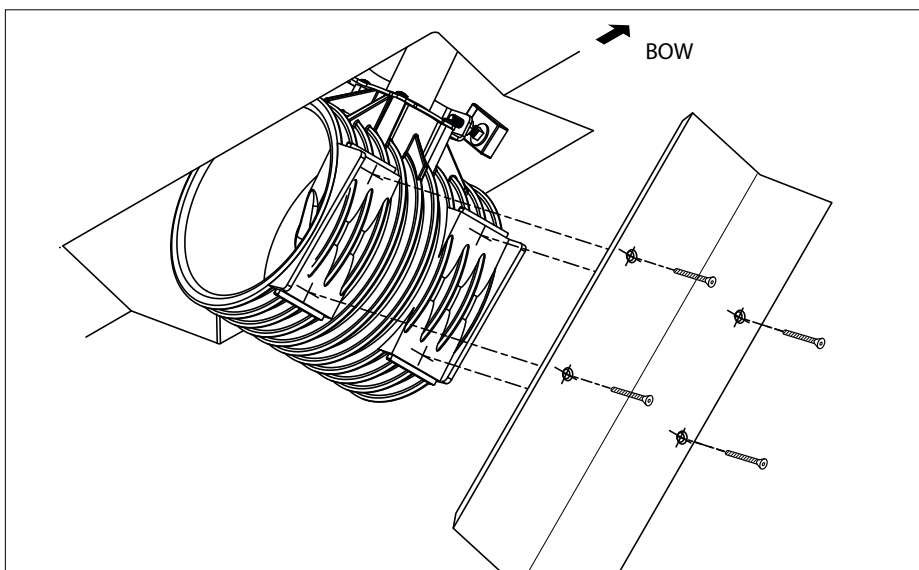


- Place the 4 assembly blocks provided in the tunnel.



The screws for attaching the hatch to the tunnel must enter the tunnel at the location where the assembly blocks have been placed.

- Determine in the hatch where the 4 holes for these screws should be made.
- Drill these holes in the hatch and counter-sink them so that the heads of the screws do not extrude.



- Secure the hatch on the tunnel with 2 screws and check the following:

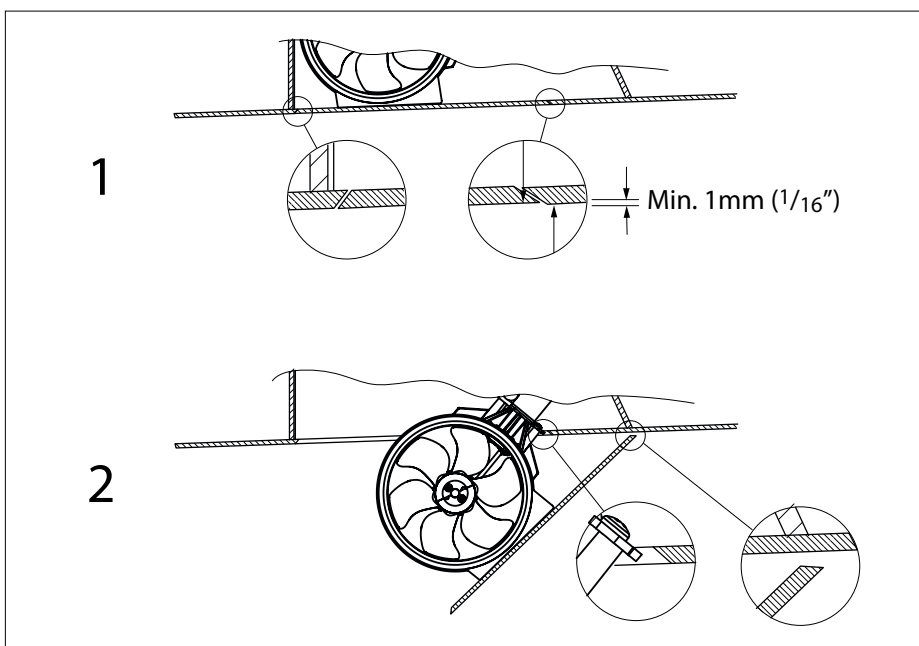
- 1) In closed position, the hatch should fit properly with the ship's hull.

On the front, the hatch should be at least 1 mm ($1/16''$) higher than the outside of the ship's skin.

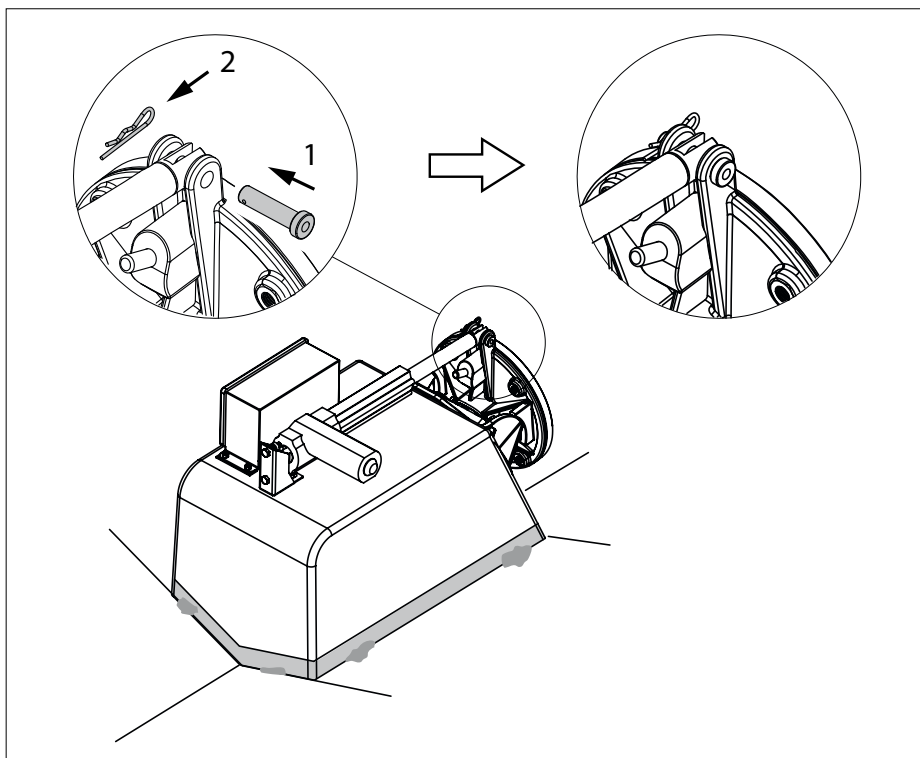
On the sides and the rear, the hatch should sit flush with the ship's skin.

- 2) In opened position, the hatch should remain free of the ship's skin on the front; it may be necessary chamfer the hatch.

Once the hatch has been correctly positioned, it can be definitively screwed on.



- After checking whether the tunnel can freely move up and down and fitting the hatch, the shear pin and the safety clips must be refitted.



4.6 Laminating the housing

Resin: The resin applied for the housing is vinylester resin.

In order to connect the housing to the hull of the boat we recommend to apply epoxy resin. As an alternative to epoxy resin, vinylester resin can also be used.

The use of polyester resin as an alternative to epoxy resin is not recommended.

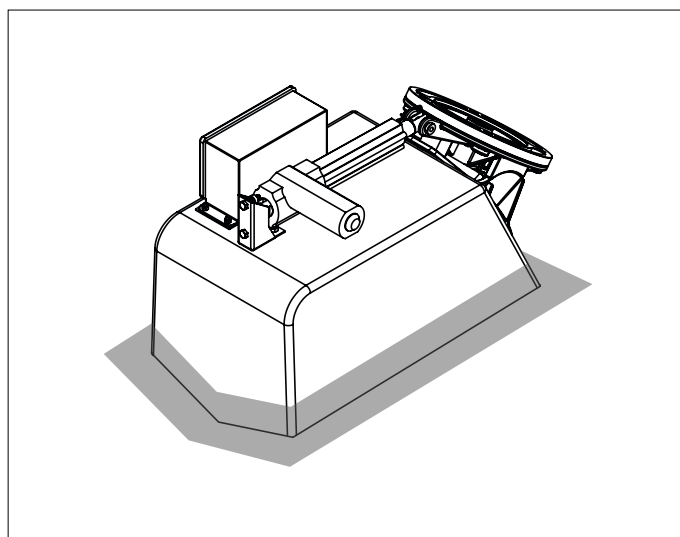
Preliminary treatment: The outside of the housing and at least 10 cm of the ship's skin around the housing must be roughened.

- Use a grinding wheel to remove the entire top layer down to the glass fabric.

Laminating: Consult the boat designer for the number of layers and the method that should be applied.

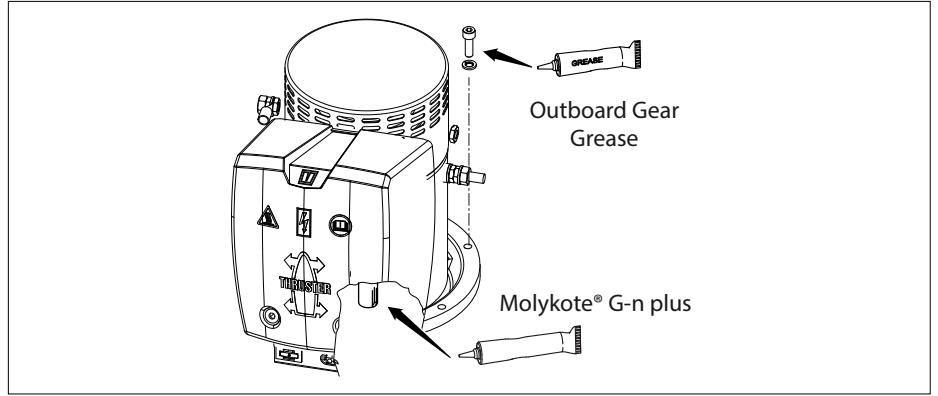
For laminating, apply at least 6 layers, starting with 1 x 300 gm mat and then 5 x 600 gm mat.

- As a first layer, apply a layer of resin. Apply a glass mat and impregnate this with resin. Repeat until a sufficient number of layers has been applied.
- Laminate on the front up to a height just under the hinge section.



5 Final assembly

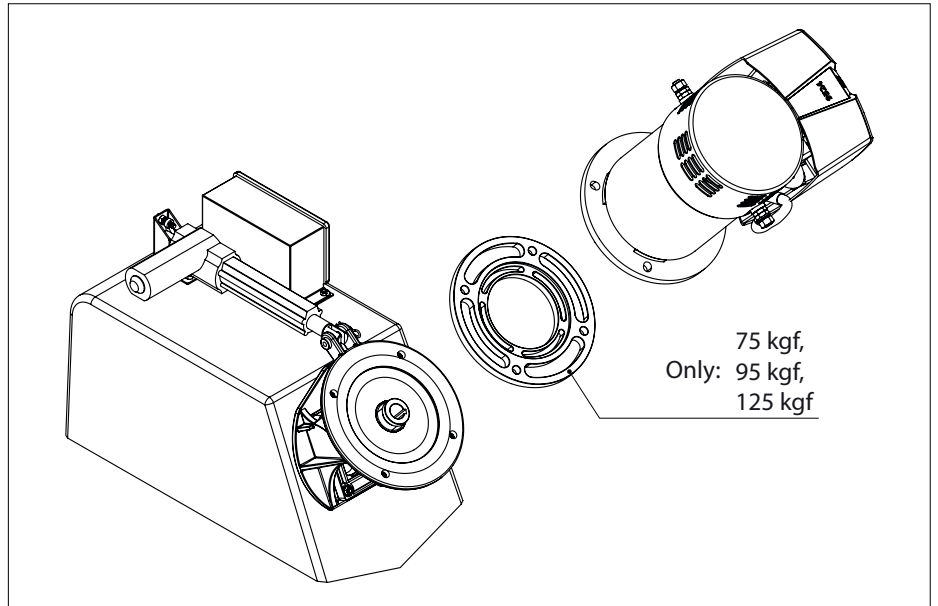
- Grease the shaft of the electric motor with assembly compound, such as Molykote® G-n plus.
- Grease the screw thread of the bolts with outboard gear grease.



- Position the motor with the spacer *) on the flange.

If necessary turn the motor shaft so as to be able to slide it into the hollow shaft.

*) Only: 75 kgf, 95 kgf & 125 kgf.



- Fit the top 2 bolts.
- Place the support (S) on the bottom of the motor flange and then attach the bottom 2 bolts.

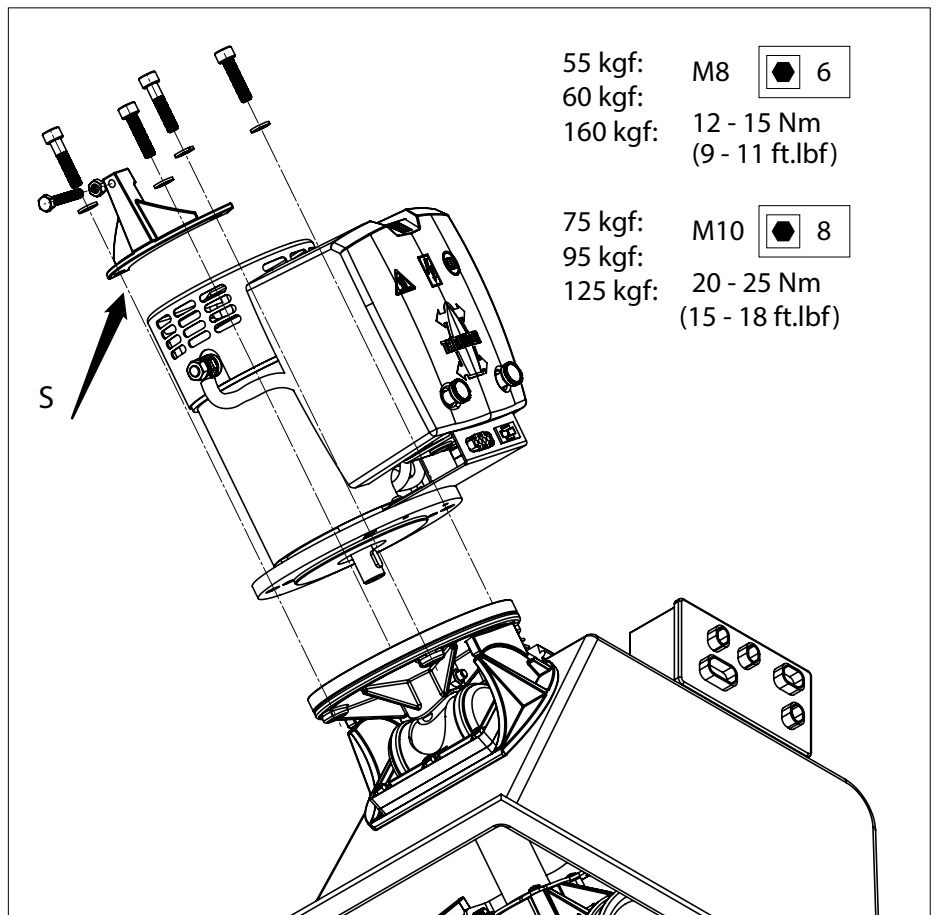
Note 1

The shape of the support may differ from the one pictured it depends on the type of thruster.

Note 2

A support is not provided for the 160 kg thruster.

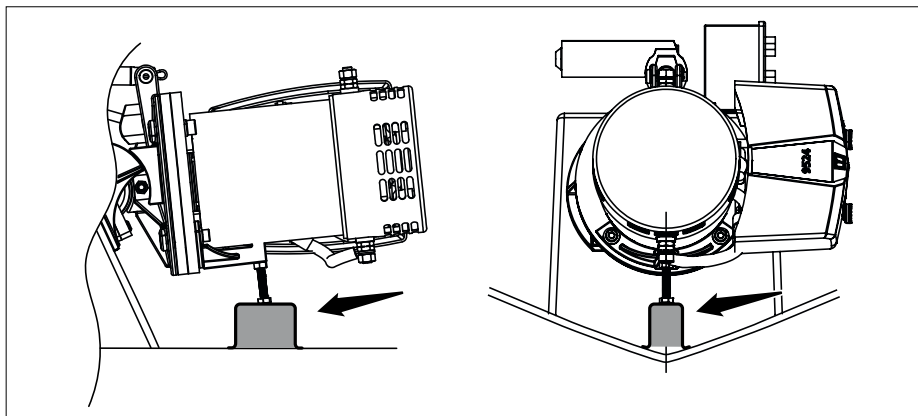
- Check, inside the tunnel, by turning the propellor by hand; it should rotate easily and the electric motor shaft should also turn.



 **NOTE**

Support for the motor is absolutely essential.

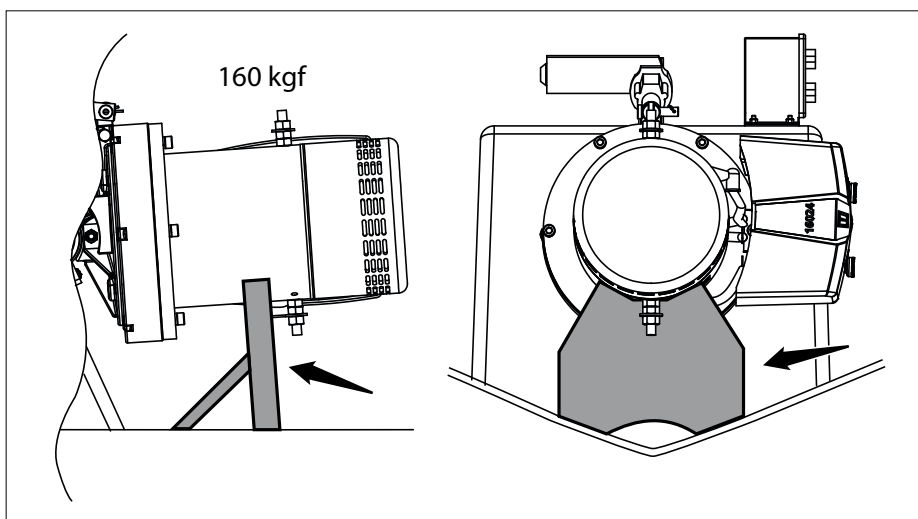
- If necessary, introduce a filling block at the point where the support bolt is located.



- You have to make the support for the 160 kgf thruster by yourself. This can be for instance as indicated in the drawing.

 **NOTE**

Support for the motor is absolutely essential.



6 Electrical installation

6.1 Choice of battery

The total battery capacity must be sufficient for the size of the bow thruster; see the table.

See page 198 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.

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

 **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.

 **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 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, consult the table on page 199.



NOTE

The maximum operating time 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 considerably larger batteries in combination with very short connection cables with considerably 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.

6.3 Main Switch

A main switch must be included on the 'positive cable'.

A Vetus battery switch is a very suitable choice. Consult the following table for the correct type of battery switch.

Art. code Vetus Battery Main Switch			
Bow Thruster 'STE .. 12D'	Art. code:	Bow Thruster 'STE .. 24D'	Art. code:
55	BATSW250	55	BATSW250
60		60	
75		75	
95	BATSW600	95	BATSW600
125		125	
		160	BATSW600

The BATSW250 is also available with two poles, (Vetus art. code BATSW250T).

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 direct voltages.

Vetus art. code: BPMAIN12 respectively BPMAIN24.

6.4 Fuse

In addition to the main switch, a fuse must be included in the 'positive cable'.

See page 199 for the size of the fuse to be used.

The fuse prevents the bow thruster from overloading, as well as protecting the on-board network from short circuiting.

We can also provide a fuse holder for all types of fuses. Vetus art. code: ZEHC100.

6.5 Connecting 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).

6.6 Connecting control voltage cables

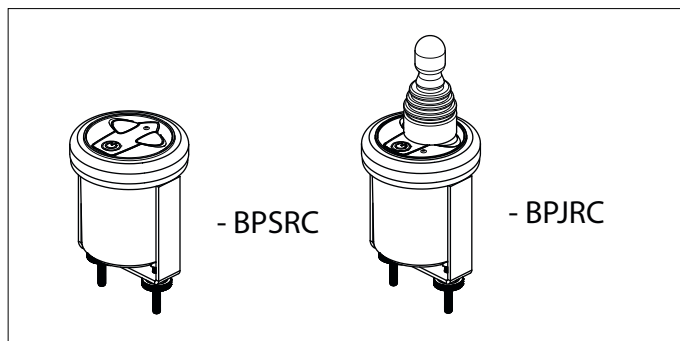
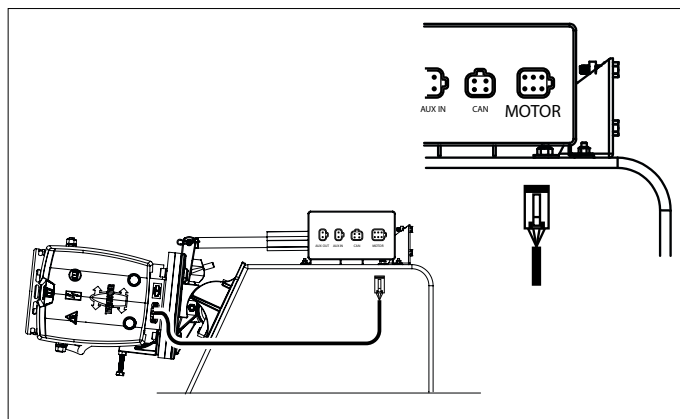
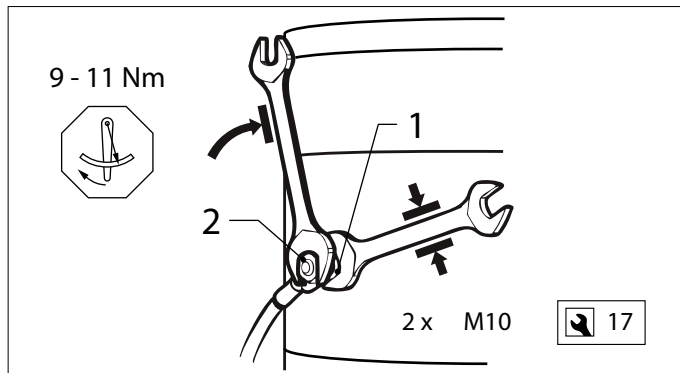
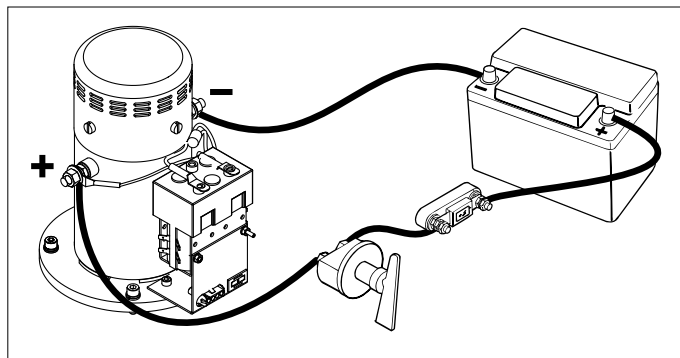
- Connect the motor's control voltage cable to the connection box.

- Mount the control panel at the helm position. There must be 90 mm of free space behind the panel.

NOTE

Make sure that the voltage stated on the motor type plate is identical to the ship's power supply voltage.

See pages 198 and 199 for the applicable battery capacity, the size of main power supply cables and fuse to use.



- Connect the panel as shown in the diagram.

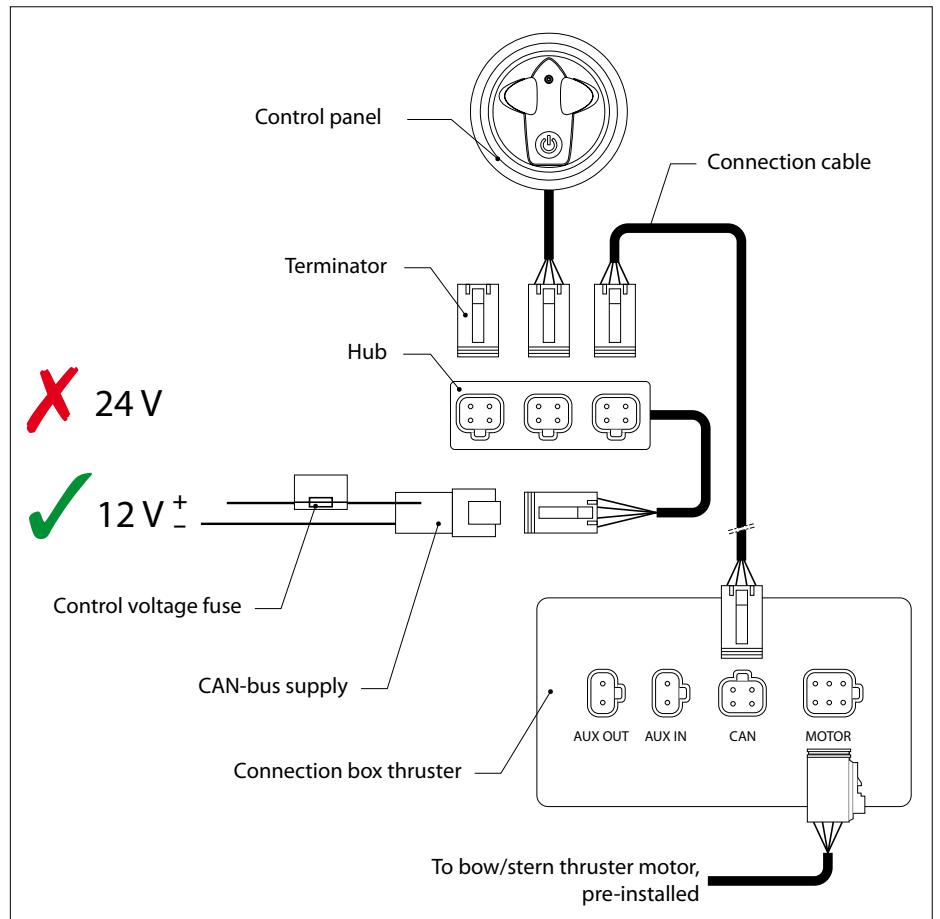
See diagrams on page 193 if several panels have to be connected.

See also diagrams on page 194 and 196 if you have installed both a retractable bow and a retractable stern thruster.

- Connect the hub to a 12-Volt power supply.

 **NOTE**

The hub should also be connected to 12 Volts in the case of a 24-Volt bow thruster.



7 Configuration of the installation

Both the panels and the bow thruster / stern must be configured correctly.

7.1 Configuring the bow and / or stern thruster

Bow thruster

If only one (1) **retractable** bow thruster is installed configuration is not necessary.

Stern thruster

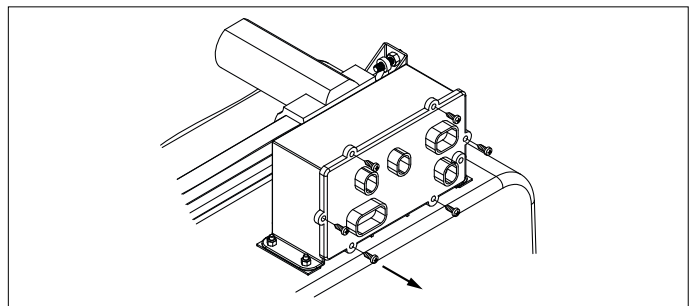
If only one (1) **retractable** stern thruster is installed configuration is not necessary, but consider the stern thruster panels as bow thruster panels when configuring.

Bow thruster + Stern thruster

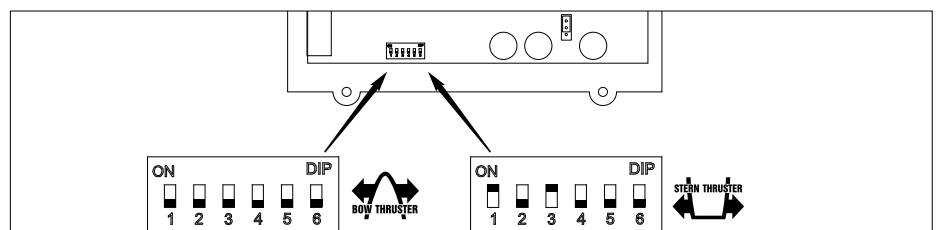
The default configuration is for use as a bow thruster.

Only the configuration of the stern thruster must be adapted.

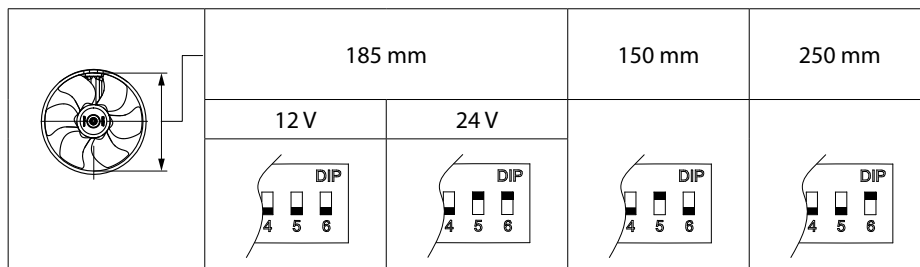
- Remove the cover from the junction box by removing the screws.



The DIP switches must be configured as shown in the drawing.

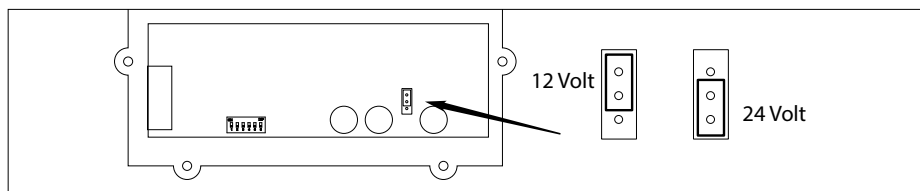


7.2 Setting for the size of the thruster



7.3 Setting 12 or 24 Volt

The setting for the voltage must match the voltage on board.



7.4 Configuring the panels

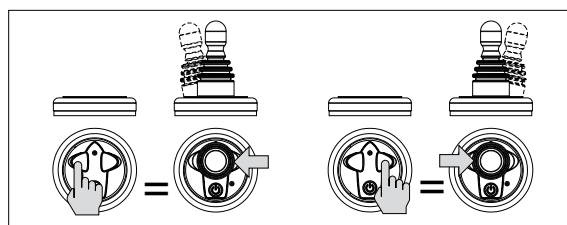
If several panels are installed configuration is required.

The illustrated operations must be performed on EACH panel installed.

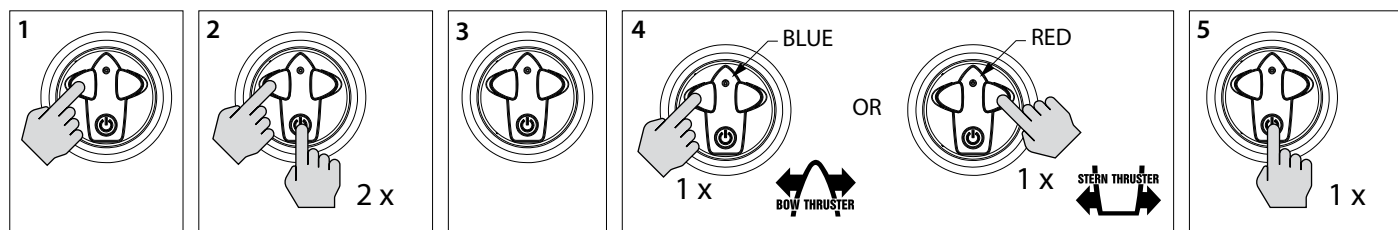
Note:

During operation '2' the button marked with '1' must be kept pressed while the On / Off button is pressed 2 times!

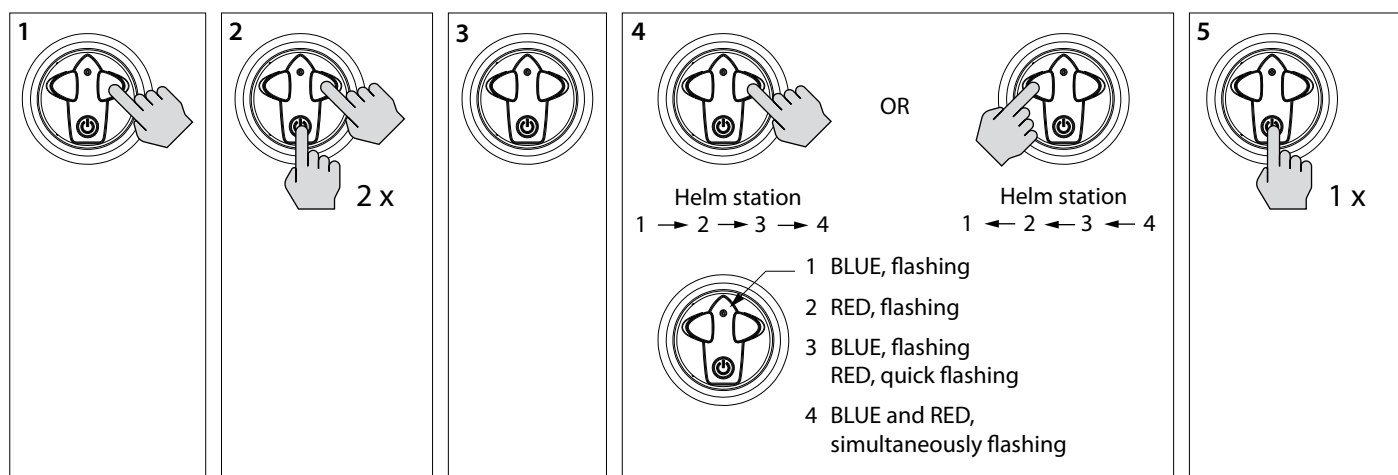
Configuration operations with a joystick panel



Configuring a panel for bow thruster or stern thruster



Configuring a panel for helm station



NOTE

With a bow and stern thruster panel, together at the same helm station, the helm station number entered must be the same.

8 Test run

- Turn on the main switch.
- Press the on/off button on the panel twice.

After pressing the button twice, the bow thruster should rotate outward.

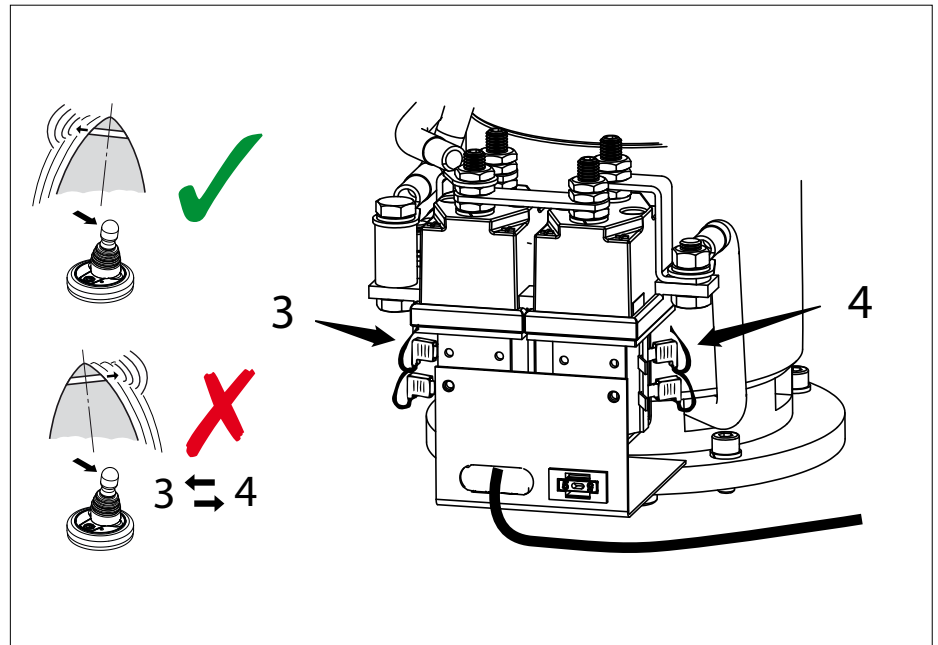
If it is found during test running that the thrust direction does not correspond with the direction switch on the control panel then the brown (no. 3) and the green (no. 4) wires on the relay must be interchanged.



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.

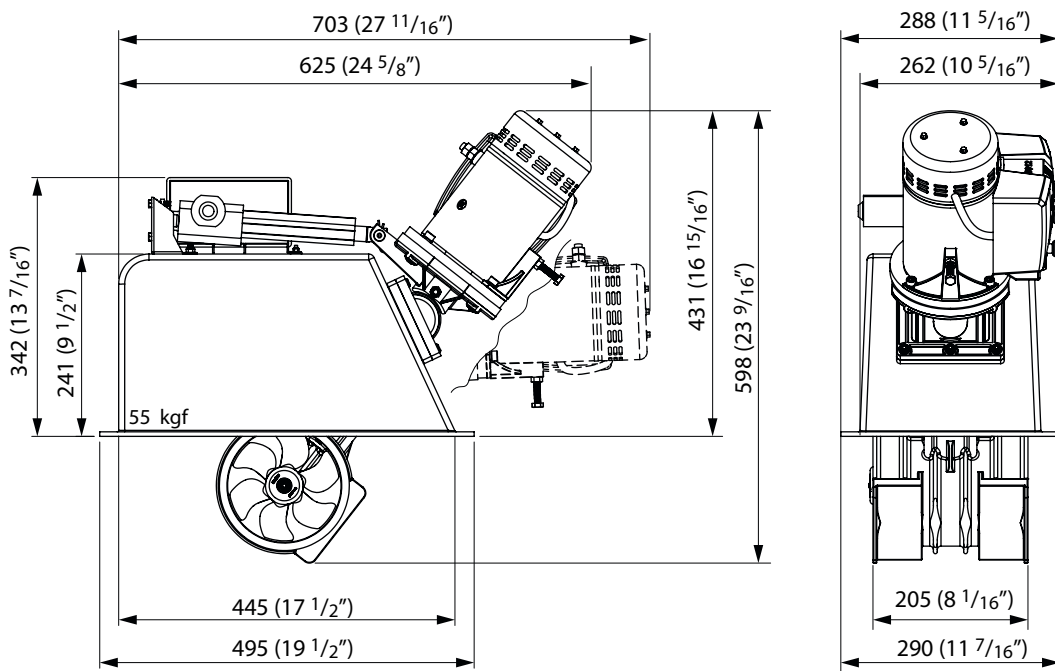
Never allow the bow thruster to run for longer than 5 seconds with the ship out of water.



9 Hoofdafmetingen
 Principal dimensions
 Hauptabmessungen
 Dimensions principales
 Dimensiones principales

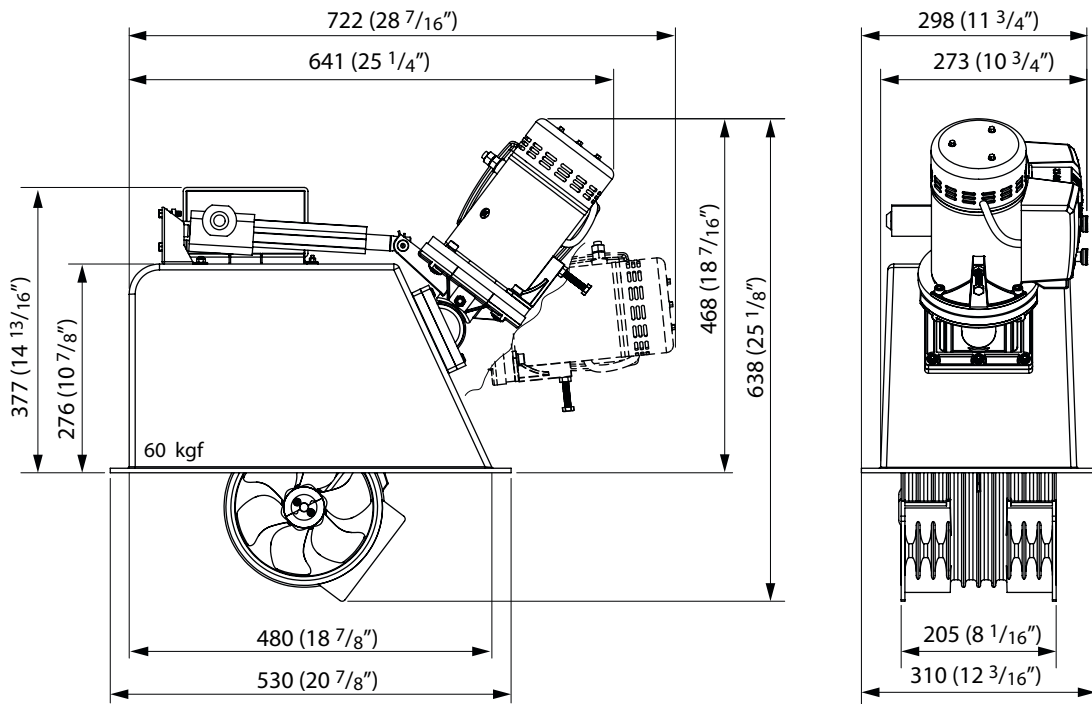
Dimensioni principali
 Mål
 Huvudmått
 Viktigste mål
 Päämitat

STE5512D
 STE5524D



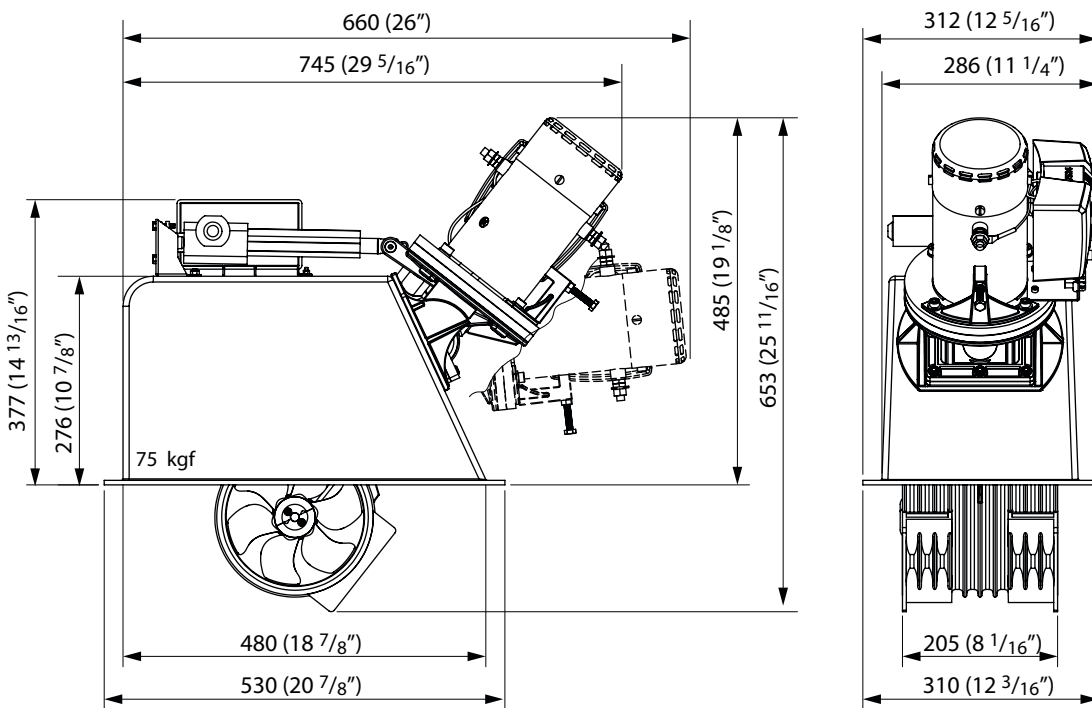
1 : 10

STE6012D
STE6024D



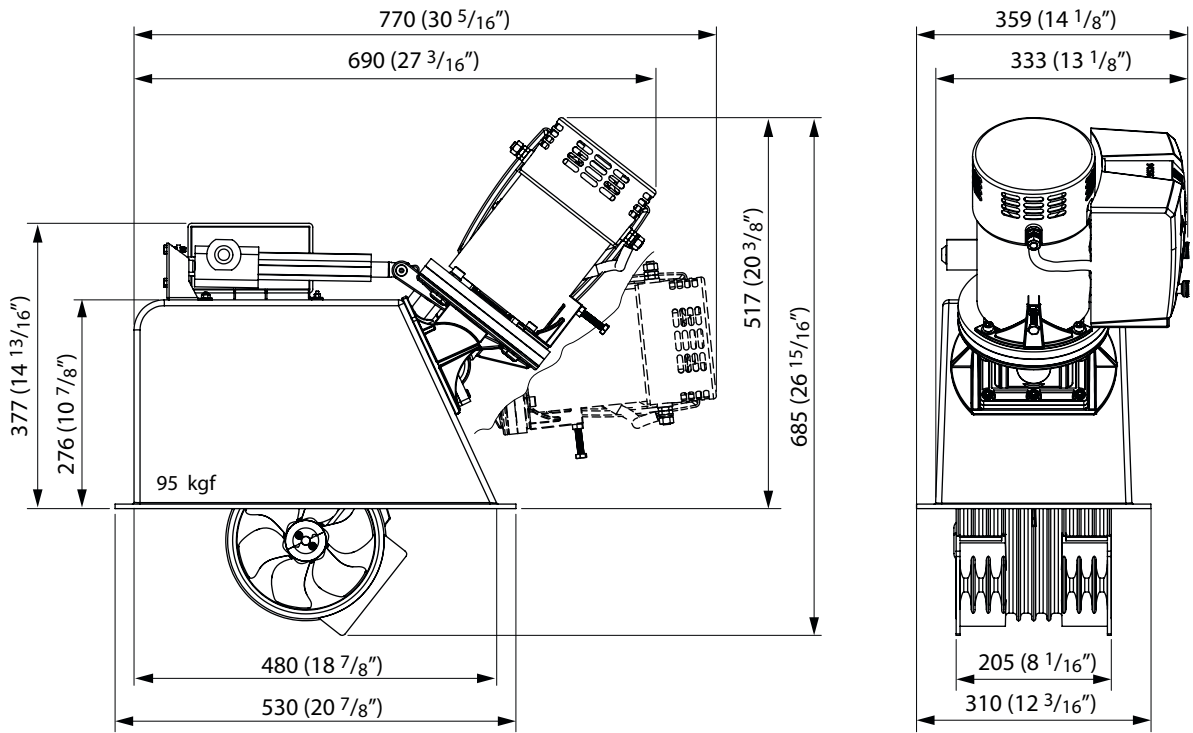
1 : 10

STE7512D
STE7524D



1 : 10

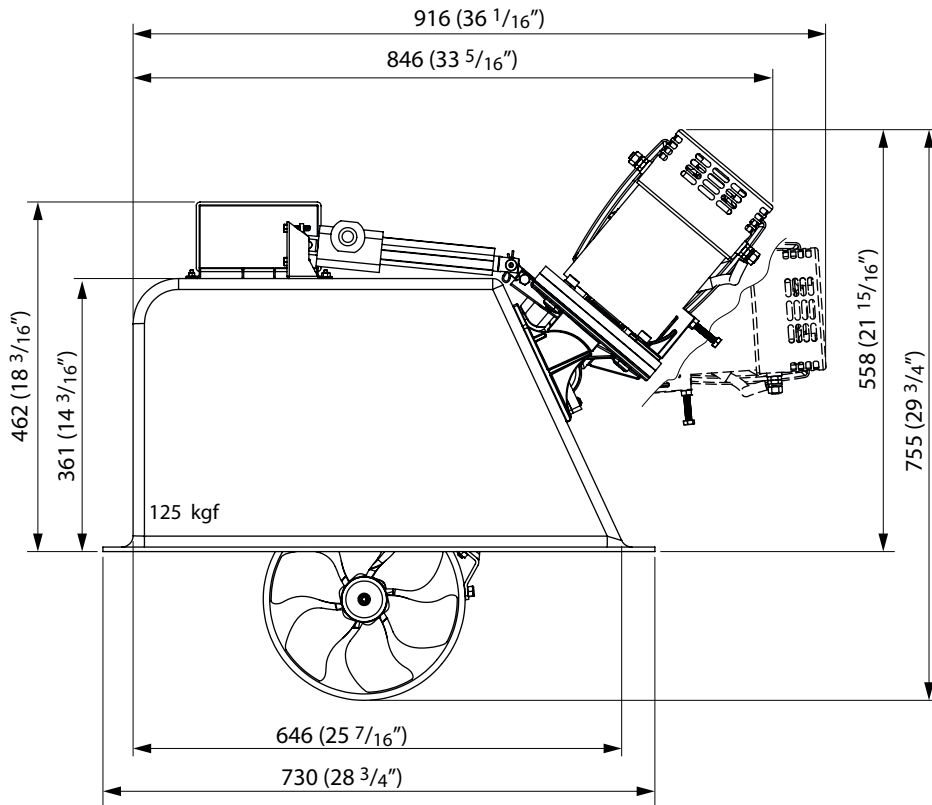
STE9512D
STE9524D



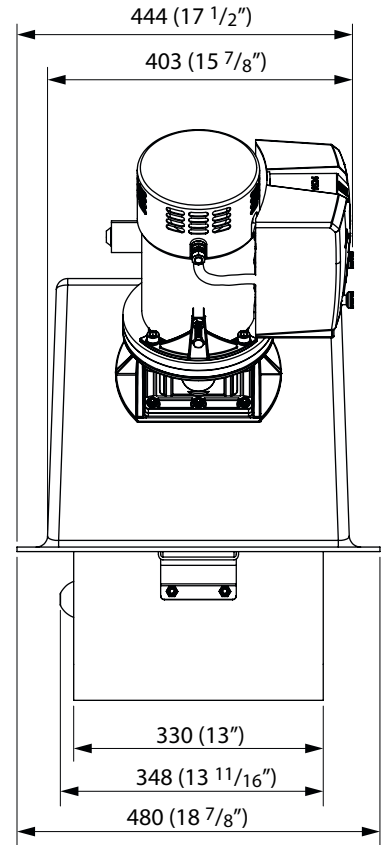
1 : 10

STE12512D

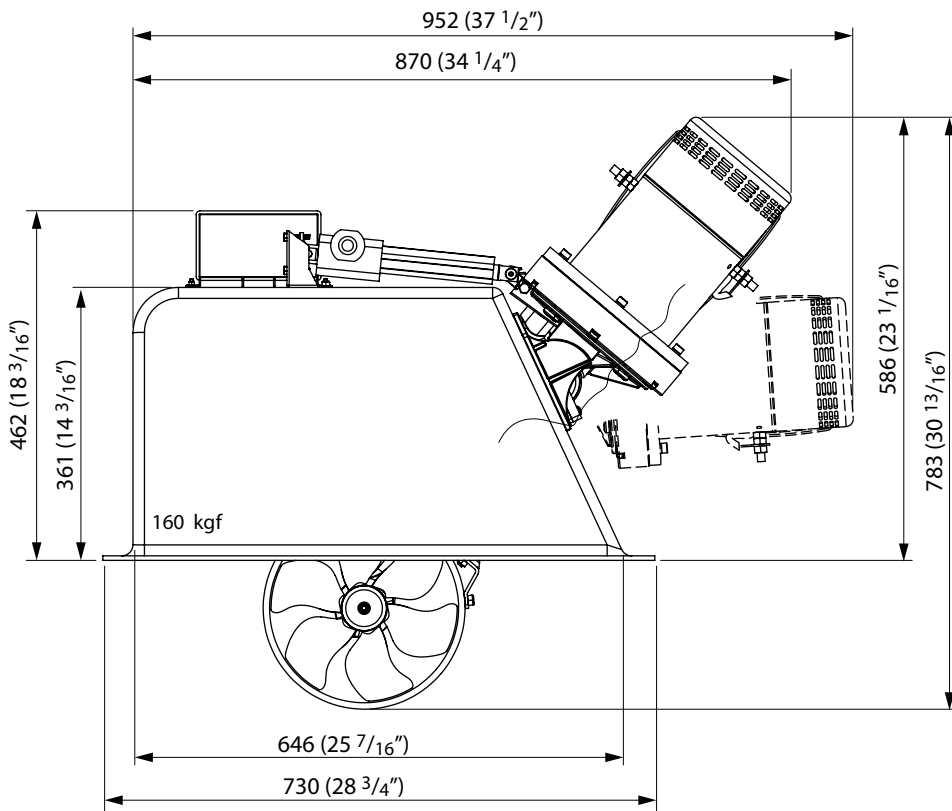
STE12524D



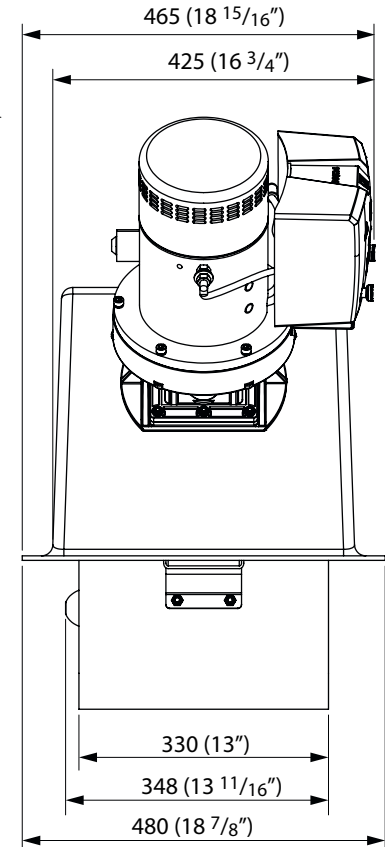
1 : 10



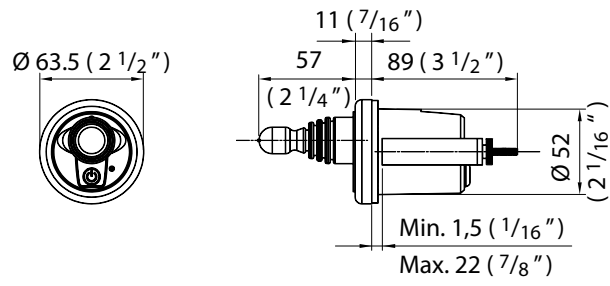
STE16012D



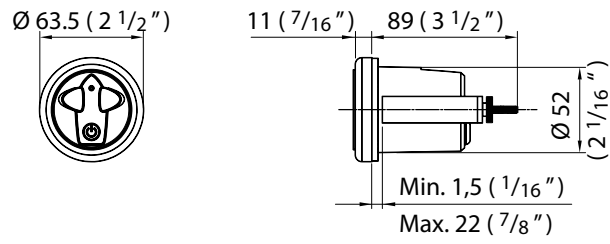
1 : 10



BPJRC

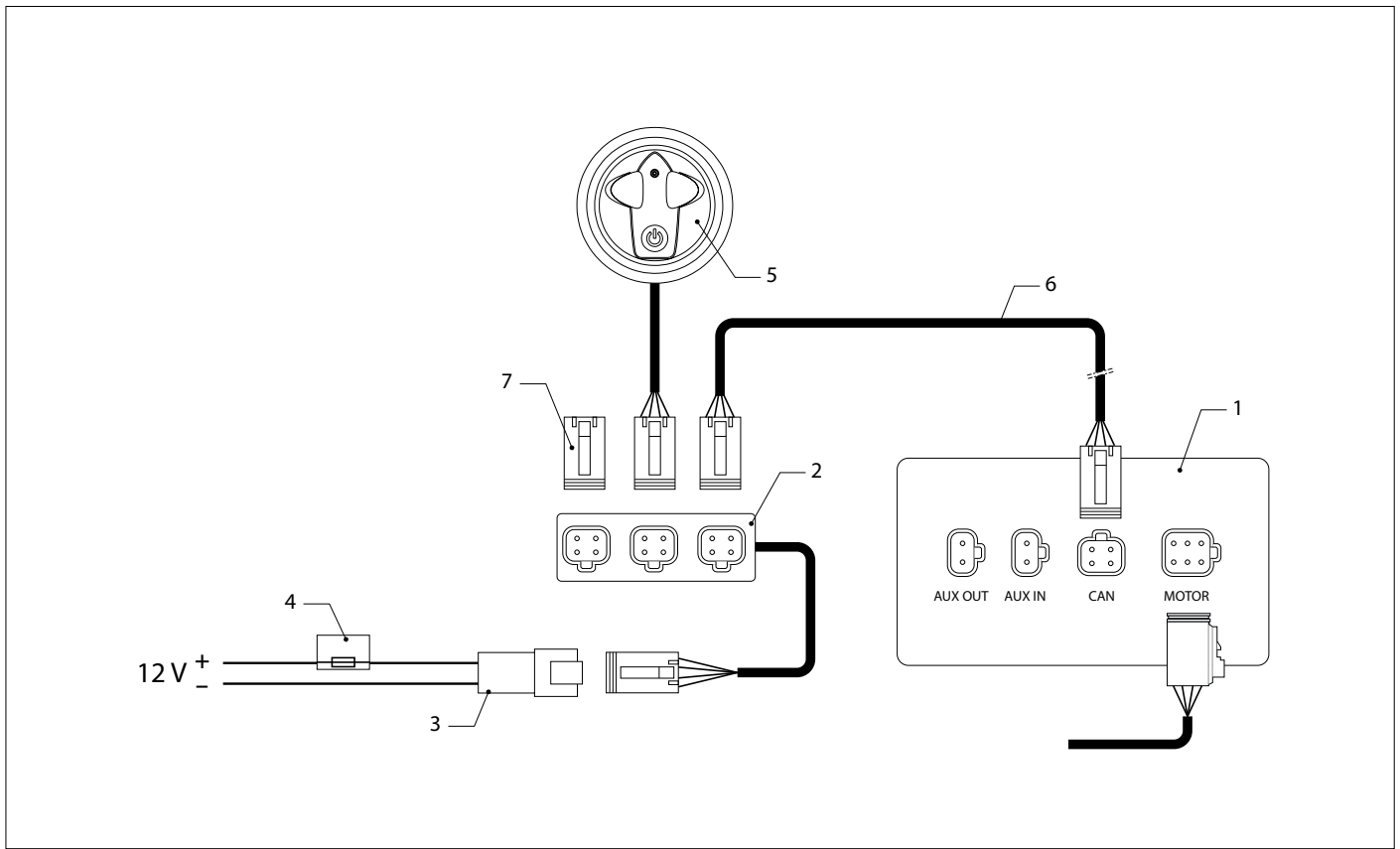


BPSRC



Wiring diagrams

Diagrammes de câblage



Eén intrekbare boegschroef (of intrekbare hekschroef)
Eén stuurstand

One (1) retractable thruster (bow or stern)
One (1) helm station

Ein (1) einziehbares Strahlruder (Bug oder Heck)
Eine (1) Helmstation

Un (1) propulseur rétractable (proue ou étrave)
Un (1) poste de barre

Un (1) propulsor retráctil (proa o popa)
Una (1) estación de timón

Un (1) propulsore a scomparsa (prua o poppa)
Una (1) plancia di comando

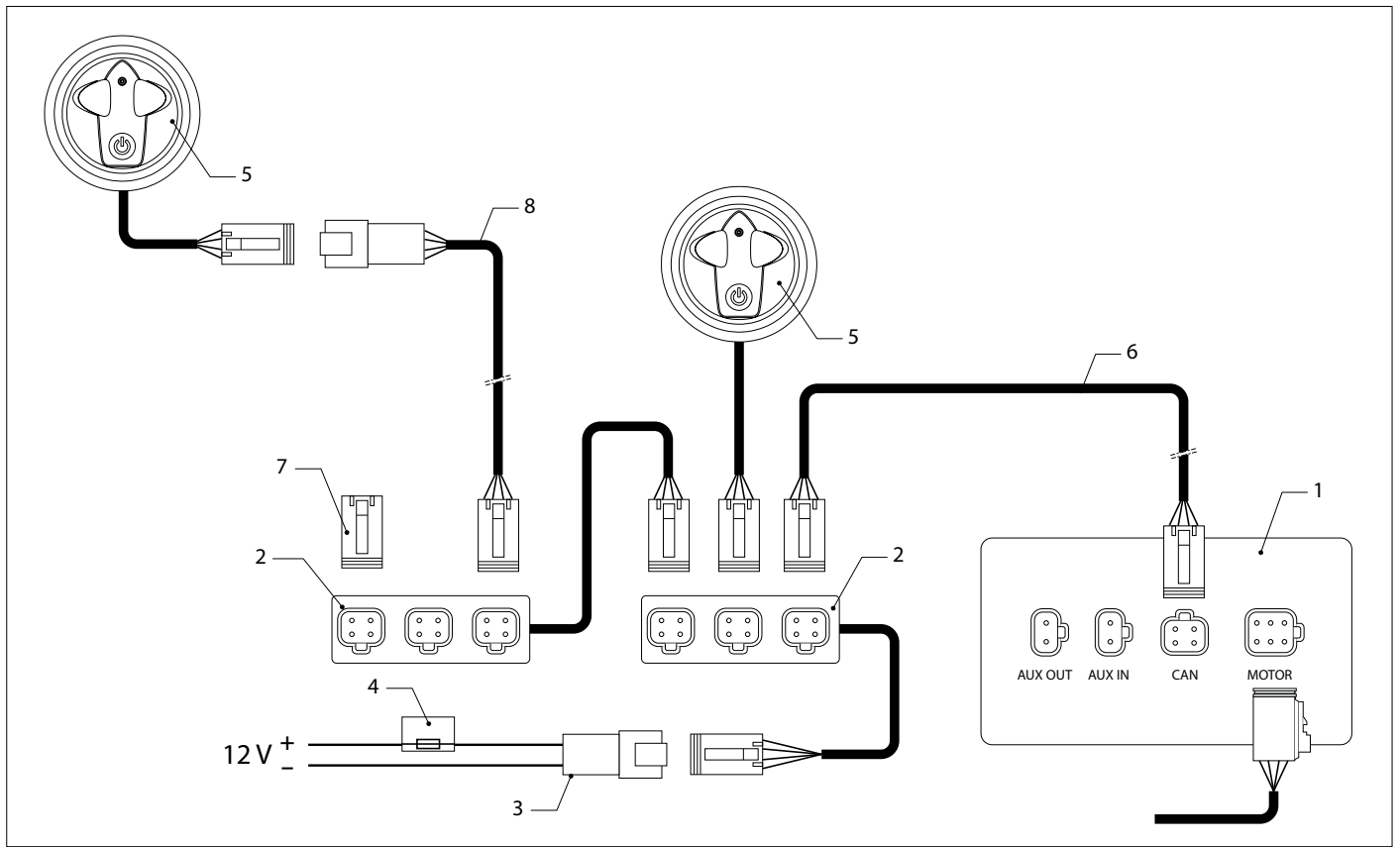
Én (1) indtrækkelig propel (bov- eller hækepropel)
Én (1) rorstation

En (1) infällbar propeller (för eller akter)
En (1) manöver station

En (1) uttrekkbar propell (baugen eller hekk)
En (1) rorkanaler

Yksi (1) sisään vedettävä potkuri (keula- tai perä-)
Yksi (1) ruoriasema

1	Aansluitkast boegschroef (of hekschroef)	Connection box thruster (or stern thruster)	Anschlussbox Strahlruder (Bug oder Heck)	Boîtier de connexion du propulseur (proue ou étrave)	Caja de conexión propulsor de proa (o popa)
2	Hub	Hub	Hub	Moyeu	Concentrador (Hub)
3	CAN-bus voeding	CAN-bus supply	CAN-Bus-Versorgung	Alimentation CAN-Bus	Suministro de bus CAN
4	Stuurstroomzekering	Control voltage fuse	Sicherung der Steuerungsspannung	Fusible régulateur de tension	Fusible de voltaje de control
5	Bedieningspaneel	Control panel	Schalttafel	Panneau de contrôle	Panel de control
6	Aansluitkabel	Connection cable	Verbindungskabel	Câble de raccordement	Cable de conexión
7	Terminator	Terminator	Abschluss	Termineur	Terminador
8	Verlengkabel	Extension cable	Verlängerungskabel	Câble d'extension	Cable de extensión



Één intrekbare boegschroef (of intrekbare hekschroef)

Twee stuurstanden

One (1) retractable thruster (bow or stern)

Two (2) helm stations

Ein (1) einziehbares Strahlruder (Bug oder Heck)

Zwei (2) Helmstationen

Un (1) propulseur rétractable (proue ou étrave)

Deux (2) postes de barre

Un (1) propulsor retráctil (proa o popa)

Dos (2) estaciones de timón

Un (1) propulsore a scomparsa (prua o poppa)

Due (2) plance di comando

Én (1) indtrækkelig propel (bov- eller hækepropel)

To (2) rorstationer

En (1) infällbar propeller (bog eller akter)

Två (2) manöverstationer

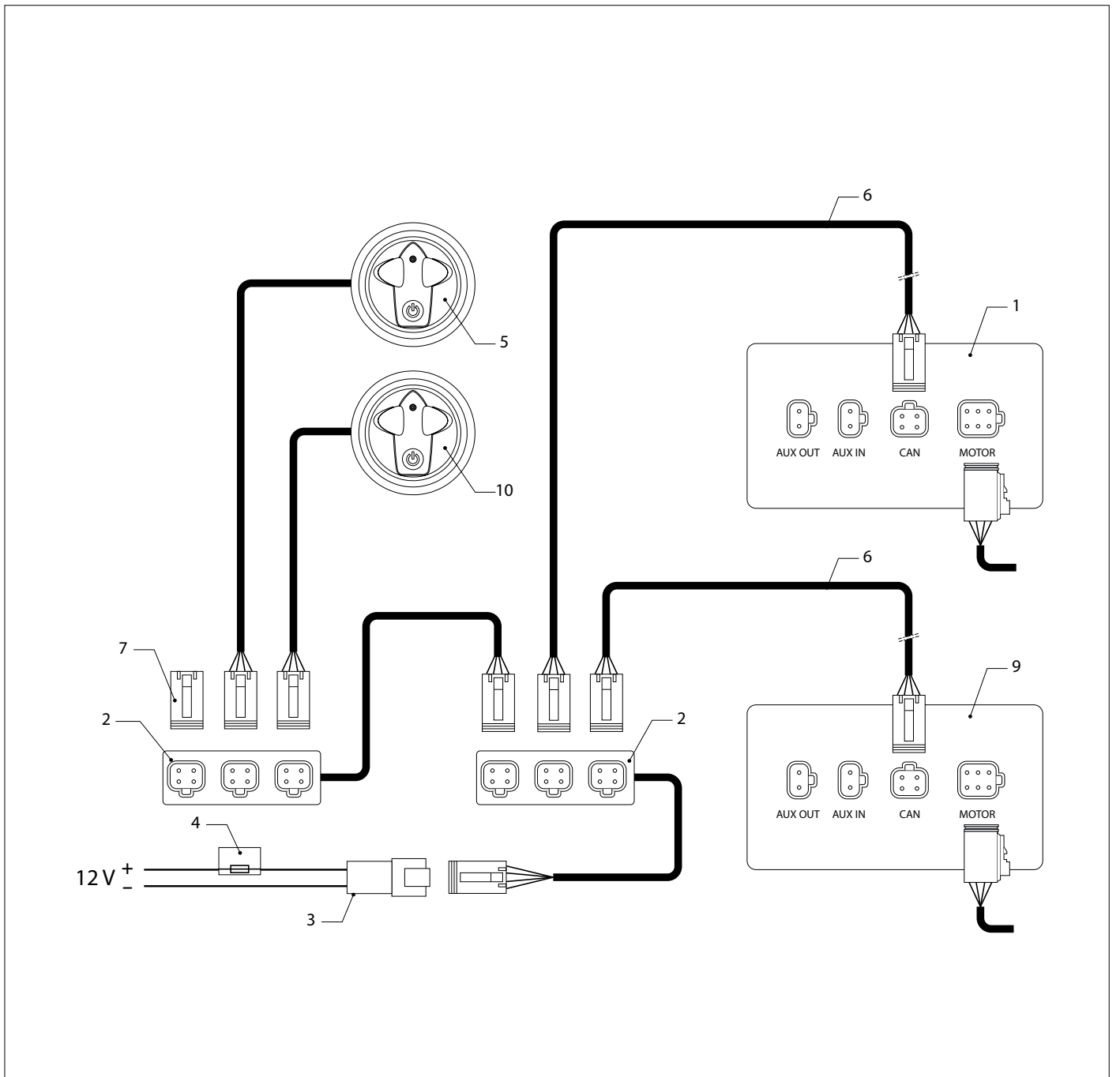
En (1) uttrekkbar propell (baugen eller hekk)

To (2) rorkanaler

Yksi (1) sisään vedettävä potkuri (keula- tai perä-)

Kaksi (2) ruoriasemaa

1	Scatola di connessione del propulsore (o propulsore di poppa)	Propellens klemkasse (eller hækepropel)	Anslutningsbox propeller (eller akterpropeller)	Tilkoblingsboks for propell (eller hekkthruster)	Potkurin (tai peräpotkurin) liitäntärasia
2	Mozzo	Nav	Hubb	Hub	Keskitin
3	CAN-bus di alimentazione	CAN-busforsyning	CAN-bus tilførsel	CAN-bus tilførsel	CAN-väylän syöttö
4	Fusibile della tensione di comando	Styrespændingssikring	Kontroll spänning säkring	Sikringskontroll for spenning	Ohjauksen sulake
5	Pannello di controllo	Betjeningspanel	Kontrollpanel	Kontrollpanel	Ohjauspaneeli
6	Cavo di connessione	Tilslutningskabel	Anslutningskabel	Tilkoblingskabel	KytKentäkaapeli
7	Terminatore	Impedansmodstand	Terminator	Terminator	Terminaattori
8	Cavo di prolunga	Forlængerkabel	Förlängningsladd	Skjøteledning	Jatkojohto



1	Aansluitkast boegschroef	Connection box bow thruster	Verbindungsbox von Bugstrahlruder	Boîtier de connexion du propulseur à étrave	Caja de conexión propulsor de proa
2	Hub	Hub	Hub	Moyeu	Concentrador (Hub)
3	CAN-bus voeding	CAN-bus supply	CAN-Bus-Versorgung	Alimentation CAN-bus	Alimentación del CAN-bus
4	Stuurstroomzekering	Control voltage fuse	Steuerstrom Sicherung	Fusible régulateur de tension	Fusible de tensión de control
5	Bedieningspaneel boegschroef	Control panel bow thruster	Bedienfeld von Bugstrahlruder	Panneau de commandes du propulseur d'étrave	Panel de control propulsor de proa
6	Aansluitkabel	Connection cable	Verbindungskabel	Câble de raccordement	Cable de conexión
7	Terminator	Terminator	Abschluss	Termineur	Terminador
8	Verlengkabel	Extension cable	Verlängerungskabel	Câble d'extension	Cable de extensión
9	Aansluitkast hekschroef	Connection box stern thruster	Verbindungsbox Heckstrahlruder	Boîtier de connexion du propulseur de proue	Caja de conexión propulsor de popa
10	Bedieningspaneel hekschroef	Control panel stern thruster	Bedienfeld von Heckstrahlruder	Panneau de commandes du propulseur de proue	Panel de control propulsor de popa

Intrekbare boegschroef EN intrekbare hekschroef

Eén stuurstand

Retractable thrusters (bow AND stern)

One (1) helm station

Einziehbare Strahlruder (Bug UND Heck)

Eine (1) Helmstation

Propulseurs rétractables (proue OU étrave)

Un (1) poste de barre

Propulsores retráctiles (proa Y popa)

Una (1) estación de timón

Propulsori a scomparsa (prua E poppa)

Una (1) plancia di comando

Indtrækkelige propeller (bov- OG hækpropel)

Én (1) rorstation

Infällbar propeller (bog OCH akter)

En (1) manöverstation

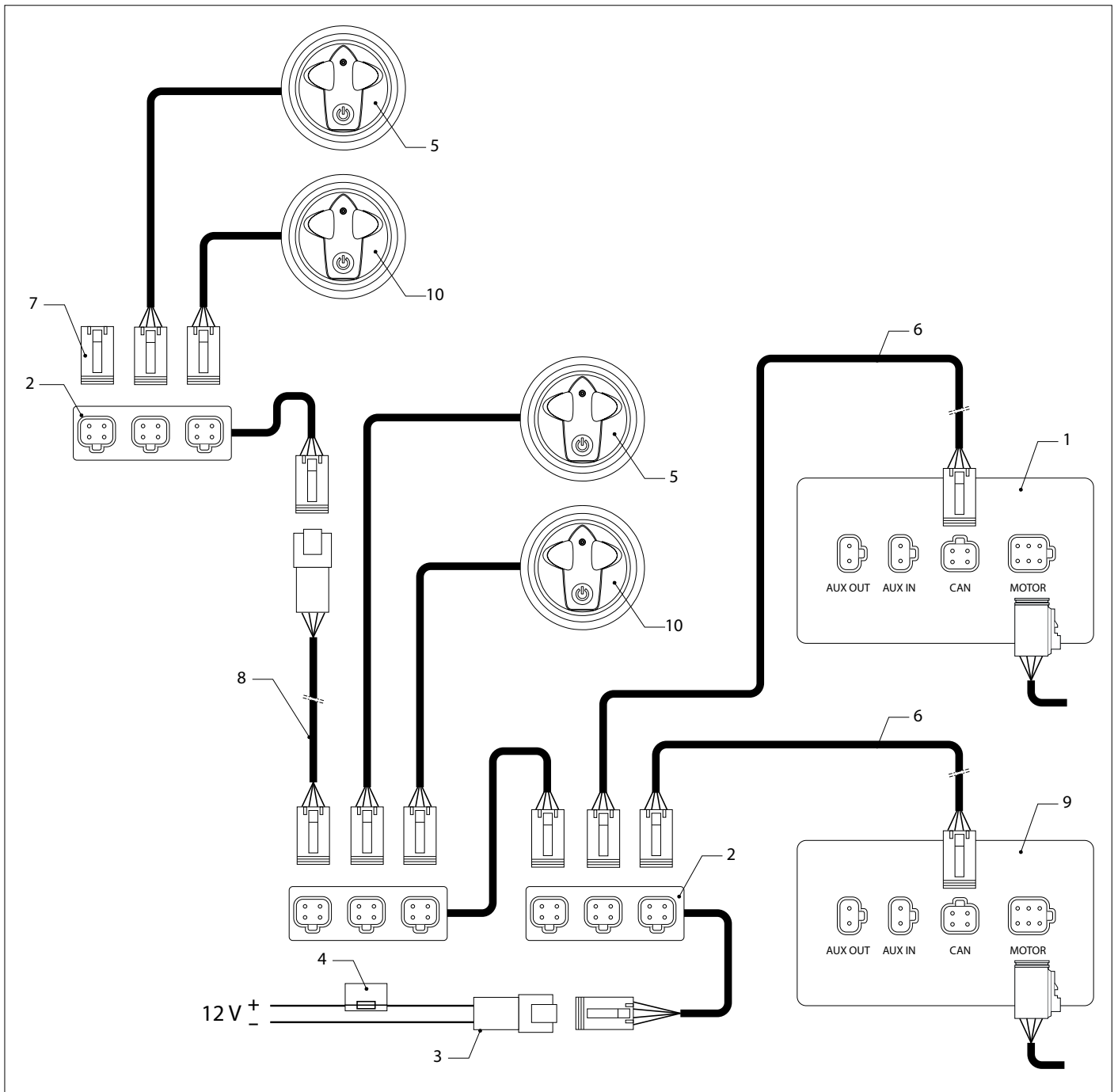
Uttrekkbar propeller (baug OG hekk)

En (1) rorkanaler

Sisään vedettävät potkurit (keula- JA perä-)

Yksi (1) ruoriasema

1	Scatola di connessione del propulsore di prua	Bovpropellens klemkasse	Kopplingsbox bogpropeller	Koblingsboks for baugpropell	Keulapotkurin liitäntärasia
2	Scafo	Nav	Hubb	Hub	Keskitin
3	Alimentazione CAN-bus	CAN-busforsyning	CAN-bus tillførsel	CAN-bus tilførsel	CAN-väylän syöttö
4	Fusibile della tensione di comando	Styrespændingssikring	Kontroll spänning säkring	Sikringskontroll for spenning	Ohjausjännitteen sulake
5	Pannello di controllo del propulsore di prua	Betjeningspanel til bovpropel	Kontrollpanel bogpropeller	Kontrollpanel for baugpropell	Keulapotkurin ohjauspaneeli
6	Cavo di collegamento	Tilslutningskabel	Anslutningskabel	Tilkoblingskabel	Kytentäkaapeli
7	Terminatore	Impedansmodstand	Terminator	Terminator	Terminaattori
8	Cavo di prolunga	Forlængerkabel	Förlängningssladd	Skjøteledning	Jatkojohto
9	Scatola di connessione del propulsore di poppa	Hækpropellens klemkasse	Kopplingsbox akterpropeller	Koblingsboks for hekkthruster	Peräpotkurin liitäntärasia
10	Pannello di controllo del propulsore di poppa	Betjeningspanel til hækpropel	Kontrollpanel akterpropeller	Kontrollpanel for hekkthruster	Peräpotkurin ohjauspaneeli



1	Aansluitkast boegschroef	Connection box bow thruster	Verbindungsbox von Bugstrahlruder	Boîtier de connexion du propulseur à étrave	Caja de conexión propulsor de proa
2	Hub	Hub	Hub	Moyeu	Concentrador (Hub)
3	CAN-bus voeding	CAN-bus supply	CAN-Bus-Versorgung	Alimentation CAN-bus	Alimentación del CAN-bus
4	Stuurstroomzekering	Control voltage fuse	Steuerstrom Sicherung	Fusible régulateur de tension	Fusible de tensión de control
5	Bedieningspaneel boegschroef	Control panel bow thruster	Bedienfeld von Bugstrahlruder	Panneau de commandes du propulseur d'étrave	Panel de control propulsor de proa
6	Aansluitkabel	Connection cable	Verbindungskabel	Câble de raccordement	Cable de conexión
7	Terminator	Terminator	Abschluss	Termineur	Terminador
8	Verlengkabel	Extension cable	Verlängerungskabel	Câble d'extension	Cable de extensión
9	Aansluitkast hekschroef	Connection box stern thruster	Verbindungsbox Heckstrahlruder	Boîtier de connexion du propulseur de proue	Caja de conexión propulsor de popa
10	Bedieningspaneel hekschroef	Control panel stern thruster	Bedienfeld von Heckstrahlruder	Panneau de commandes du propulseur de proue	Panel de control propulsor de popa

Intrekbare boegschroef EN intrekbare hekschroef
Twee stuurstanden

Het schema kan worden uitgebreid tot maximaal vier (4) stuurstanden.

Retractable thrusters (bow AND stern)
Two (2) helm stations

The diagram can be extended to up to four (4) helm stations.

Einziehbares Strahlruder (Bug UND Heck).
Zwei (2) Helmstationen

Das Diagramm kann auf bis zu vier (4) Helmstationen erweitert werden.

Propulseurs rétractables (étrave ET proue).
Deux (2) postes de barre

Le diagramme ci-dessus peut être étendu à quatre (4) postes de barre.

Propulsores retráctiles (proa Y popa).
Dos (2) estaciones de timón

El diagrama anterior puede ampliarse hasta cuatro (4) estaciones de de timón.

Propulsori a scomparsa (prua E poppa).
Due (2) plance di comando

Lo schema di cui sopra può essere esteso a un massimo di quattro (4) plance di comando.

Indtrækkelige propeller (bov- OG hækpropel).
To (2) rorstationer

Diagrammet ovenfor kan udvides til maks. fire (4) rorstationer.

Infällbar propeller (bog OCH akter).
Två (2) manöverstationer

Diagrammet ovan kan utökas med upp till fyra (4) manöverplatser.

Uttrekkbar propeller (baug OG hekk).
To (2) rorkanaler

Skjemaet ovenfor kan utvides til opptil fire (4) rorkanaler.

Sisään vedettävät potkurit (keula- JA perä-)
Kaksi (2) ruoriasemaa

Yllä oleva kaavio voidaan laajentaa enintään neljään (4) ruoriasemaan.

1	Scatola di connessione del propulsore di prua	Bovpropellens klemkasse	Kopplingsbox bogpropeller	Koblingsboks for baugpropell	Keulapotkurin liitäntärasia
2	Scafo	Nav	Hubb	Hub	Keskitin
3	Alimentazione CAN-bus	CAN-busforsyning	CAN-bus tillførsel	CAN-bus tilførsel	CAN-väylän syöttö
4	Fusibile della tensione di comando	Styrespændingssikring	Kontroll spänning säkring	Sikringskontroll for spenning	Ohjausjännitteen sulake
5	Pannello di controllo del propulsore di prua	Betjeningspanel til bovpropel	Kontrollpanel bogpropeller	Kontrollpanel for baugpropell	Keulapotkurin ohjauspaneeli
6	Cavo di collegamento	Tilslutningskabel	Anslutningskabel	Tilkoblingskabel	KytKentäkaapeli
7	Terminatore	Impedansmodstand	Terminator	Terminator	Terminaattori
8	Cavo di prolunga	Forlængerkabel	Förlängningssladd	Skjøteledning	Jatkojohto
9	Scatola di connessione del propulsore di poppa	Hækpropellens klemkasse	Kopplingsbox akterpropeller	Koblingsboks for hekkthruster	Peräpotkurin liitäntärasia
10	Pannello di controllo del propulsore di poppa	Betjeningspanel til hækpropel	Kontrollpanel akterpropeller	Kontrollpanel for hekkthruster	Peräpotkurin ohjauspaneeli

11 Accucapaciteit	Capacité de la batterie	Batteriets kapacitet	Akkukapasiteetti
Battery capacity	Capacidad de las baterías	Batterikapacitet	
Akkukapazität	Capacità della batteria	Batterikapacitet	

Boegschroef	Toe te passen accu(s), minimaal	Toe te passen accu(s), maximaal
Bow thruster	Battery capacity required , minimum	Battery capacity required , maximum
Bugschraube	Zu verwendende Akkus , Minimum	Zu verwendende Akkus , Maximum
Hélice d'étrave	Batterie(s) à utiliser , minimum	Batterie(s) à utiliser , maximum
Hélice de proa	Batería(s) a aplicar , mínimo	Batería(s) a aplicar , máximo
Elica	Batteria(e) da usare , minimo	Batteria(e) da usare , massimo
Bovpropel	Batterikapacitet , min.	Batterikapacitet , max.
Bogpropeller	Lämpligt batteri , min.	Lämpligt batteri , max.
Baugpropell	Nødvendig batterikapacitet , min.	Nødvendig batterikapacitet , maks
Keulapotkuri	Vaadittava akkukapasiteetti , minimi	Vaadittava akkukapasiteetti , maksimi

BOW5512D 55 kgf - 12 V	CCA 700 - 12 V 85 Ah - 12 V BCI 31 - 700		CCA 1300 - 12 V 200 Ah - 12 V BCI 8D - 1300	
BOW5524D 55 kgf - 24 V	CCA 500 - 24 V 2 x 55 Ah - 12 V 2 x BCI 90 - 500		CCA 650 - 24 V 2 x 70 Ah - 12 V 2 x BCI 91 - 650	
BOW6012D 60 kgf - 12 V	CCA 650 - 12 V 70 Ah - 12 V BCI 91 - 650		CCA 1000 - 12 V 145 Ah - 12 V BCI 4D - 1000	
BOW6024D 60 kgf - 24 V	CCA 500 - 24 V 2 x 55 Ah - 12 V 2 x BCI 90 - 500		CCA 650 - 24 V 2 x 70 Ah - 12 V 2 x BCI 91 - 650	
BOW7512D 75 kgf - 12 V	CCA 900 - 12 V 125 Ah - 12 V BCI 4D - 900		CCA 1800 - 12 V 2 x 125 Ah - 12 V 2 x BCI 4D - 900	
BOW7524D 75 kgf - 24 V	CCA 650 - 24 V 2 x 70 Ah - 12 V 2 x BCI 91 - 650		CCA 1000 - 24 V 2 x 145 Ah - 12 V 2 x BCI 4D - 1000	
BOW9512D 95 kgf - 12 V	CCA 1000 - 12 V 145 Ah - 12 V BCI 4D - 1000		CCA 2000 - 12 V 2 x 145 Ah - 12 V 2 x BCI 4D - 1000	
BOW9524D 95 kgf - 24 V	CCA 650 - 24 V 2 x 70 Ah - 12 V 2 x BCI 91 - 650		CCA 1000 - 24 V 2 x 145 Ah - 12 V 2 x BCI 4D - 1000	
BOW12512D 125 kgf - 12 V	CCA 1400 - 12 V 220 Ah - 12 V BCI 8D - 1400		CCA 2800 - 12 V 2 x 220 Ah - 12 V 2 x BCI 8D - 1400	
BOW12524D 125 kgf - 24 V	CCA 750 - 24 V 2 x 100 Ah - 12 V 2 x BCI 31 - 750		CCA 1500 - 24 V 4 x 100 Ah - 12 V 4 x BCI 31 - 750	
BOW16024D 160 kgf - 24 V	CCA 950 - 24 V 2 x 125 Ah - 12 V 2 x BCI 4D - 950		CCA 1900 - 24 V 4 x 125 Ah - 12 V 4 x BCI 4D - 950	

12 Accukabels
Battery cables
Akkukabel

Câbles de batterie
Cables de baterías
Cavi della batteria

Batterikabler
Batterikablar
Batterikabler

Akkukaapelit

Boegschroef	Totale lengte plus- en minikabel	Draaddoorsnede	Zekering 'traag'	Vetus art. code
Bow thruster	Total length of plus- and minus cable	Cable cross-section	Fuse 'slow blow'	Vetus art. code
Bugschraube	Gesamtlänge Plus- und Minuskabel	Drahtdurchschnitt	Sicherung 'träge'	Artikelnummer
Hélice d'étrave	Longueur totale des câbles plus et moins	Diamètre du câble	Fusible 'lent'	code d'art. Vetus
Hélice de proa	Largo total cable positivo y negativo	Diámetro de hilo	Fusible 'lento'	Código de art. Vetus
Elica	Lunghezza totale cavo positivo e negativo	Diametro cavi	Fusibile 'a tempo'	Vetus codigo art.
Bovpropel	Total længde af positiv og negativ batterikabel tilsammen	Tråddiameter	Sikring 'træg'	Vetus artikelnr
Bogpropeller	Total längd kabel till plus- och minuspol	Kabelns dimension	Säkring 'trög'	Vetus artikelnr
Baugpropell	Total lengde pluss- og minuskabel	Ledningtverrsnitt	Sikring 'treg'	Vetus art. kode
Keulapotkuri	'Miinus'- ja 'plus'- kaapeleiden kokonaispituudet	Kaapelikoko	Sulake hidas	Vetus koodi

BOW5512D	0 - 12 m	70 mm ²	250 A	ZE250
55 kgf - 12 V	0 - 40 ft	AWG 00		
BOW5524D	0 - 23 m	35 mm ²	125 A	ZE125
55 kgf - 24 V	0 - 73 ft	AWG 2		
BOW6012D	0 - 11 m 11 - 16 m	50 mm ² 70 mm ²	200 A	ZE200
60 kgf - 12 V	0 - 31 ft 31 - 40 ft	AWG 1 AWG 0		
BOW6024D	0 - 20 m	25 mm ²	100 A	ZE100
60 kgf - 24 V	0 - 57 ft	AWG 4		
BOW7512D	0 - 8 m 8 - 11 m	70 mm ² 95 mm ²	355 A	ZE355
75 kgf - 12 V	0 - 27 ft 27 - 34 ft	AWG 00 AWG 000		
BOW7524D	0 - 21 m	50 mm ²	200 A	ZE200
75 kgf - 24 V	0 - 60 ft	AWG 1		
BOW9512D	0 - 10 m 10 - 12 m	95 mm ² 120 mm ²	425 A	ZE425
95 kgf - 12 V	0 - 37 ft	AWG 0000		
BOW9524D	0 - 21 m	50 mm ²	200 A	ZE200
95 kgf - 24 V	0 - 59 ft	AWG 1		
BOW12512D	0 - 9 m 9 - 12 m	120 mm ² 150 mm ²	500 A	ZE500
125 kgf - 12 V	0 - 28 ft 28 - 36 ft	2 x AWG 0 2 x AWG 00		
BOW12524D	0 - 20 m	70 mm ²	300 A	ZE300
125 kgf - 24 V	0 - 64 ft	AWG 00		
BOW16024D	0 - 29 m	120 mm ²	355 A	ZE355
160 kgf - 24 V	0 - 85 ft	AWG 0000		

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