



ENGLISH



Installation and user manual

Roll damping system

Inhoud

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We recommend that the VETUS roll damping system is installed by a professional installer!

1 Introduction

The VETUS roll damping system is used to reduce the rolling of a ship in waves.

The roll damping system is a system whereby wing-shaped profiles or fins stick out on both sides of the ship under water near to the intersection of the bottom and side of the hull.

2 Working

When the ship is sailing water flows past the fins. The angle which the fins make with the direction of flow can be adjusted using hydraulic cylinders. When centred this angle is zero. When the angle is changed the water exerts a force on the fins. The size and direction of this force depends on the angle between the fins and the direction of the flow along the hull.

Changing the angle of the fins allows the force created to be used to reduce the rolling of the ship. This is called roll damping or stabilising.

In order to set the fins correctly it is also necessary to install the following as well as the fins and the hydraulic system already mentioned:

- a sensor to detect the amount of rolling (the roll sensor)
- a control system which is capable of determining the correct angle for the fins from the signal provided by the roll sensor and can send a signal to the hydraulic system to set the fins to this angle.

The force created by the fins is strongly dependent on the speed of the ship through the water increasing according to the square of the speed. Thus the system is much less effective at low speeds than at higher speeds.

Each ship has its own roll time which is defined as the time taken to roll from portside to starboard and back to portside again. Motor yachts of lengths between 10 and 20 m generally have a roll time of between 2 and 5 seconds.

When the ship is sailing broadside on to waves which have a time period equal or nearly equal to the roll time of the ship it will roll considerably even when the waves are relatively low.

The ship will roll considerably less in waves that have a shorter or longer time period. It is therefore important that the fins are most effective in waves which cause the ship to roll the most and the VETUS roll damping system is therefore designed for this purpose.

3 Safety

- Never remove the cover plate from the skin unit before the roll damping system has been completely switched off.
- Never let the ship ground on the fins! They are not designed for this.

4 Included in the delivery

The following parts are included in the delivery:

A Basic set (code: STA24VA), consisting of:

- Control panel
- Junction box
- Roll sensor ('solid state' gyroscope)
- Hydraulic valve block
- Two skin units with hydraulic cylinders

B Set of 2 stainless steel fins:

- Set of fins with surface area of 0,3 m² (3.2 sq.ft) (code: **STAFIN03A**)
- Set of fins with surface area of 0,4 m² (4.3 sq.ft) (code: **STAFIN04A**)
- Set of fins with surface area of 0,5 m² (5.4 sq.ft) (code: **STAFIN05A**)
- Set of fins with surface area of 0,6 m² (6.5 sq.ft) (code: **STAFIN06A**)
- Set of fins with surface area of 0,7 m² (7.5 sq.ft) (code: **STAFIN07A**)

C Two bushes (skin lead throughs) chosen from:

- Welded bushes, steel (code: **STATHS**)
- Welded bushes, aluminium (code: **STATHA**)
- Welded bushes, stainless steel (code: **STATHSST**)
- Laminated bushes (code: **STATHG**)

Also required:

- Hydraulic pump(s)
- Hydraulic tank
- Control unit for the roll damping system

NB: The electrical installation works only on 24 Volts; a converter (12V to 24V) is also required when the ship has a 12 Volt power supply.

- 12 to 24 Volt converter (code STA12/24)

These parts do not form part of the standard delivery.

5 Installation

5.1 Introduction

The quality of the fitting determines the reliability of the roll damping system.

It is therefore of the utmost importance that the points given in this manual are followed precisely and checked thoroughly while fitting the system.

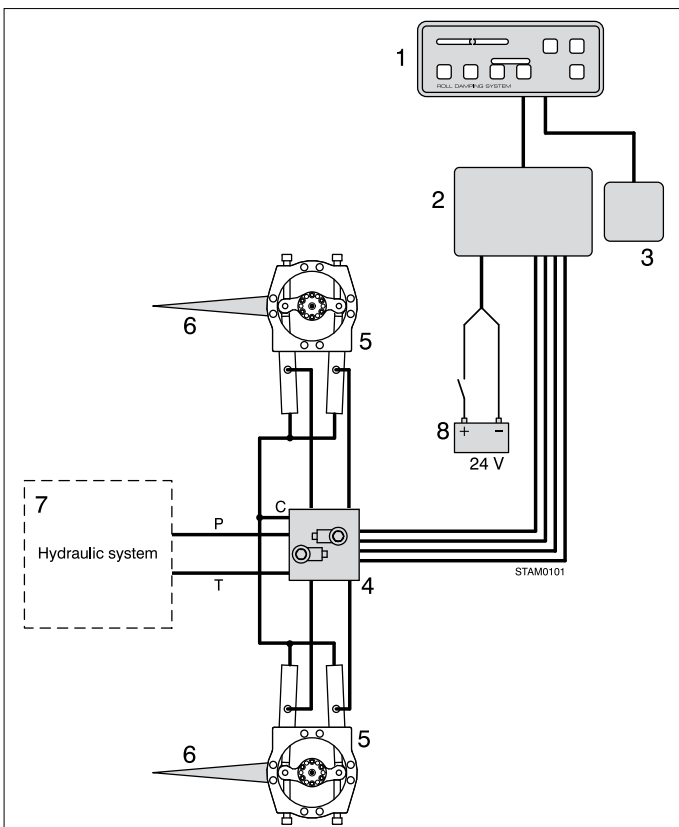


Caution: VETUS is not liable for damage or injury caused by not following the fitting instructions and safety regulations!

5.2 Description of system

The roll damping system consists of the following main parts:

- control panel (1)
- junction box (2)
- roll sensor (3)
- valve block (4)
- skin unit with hydraulic cylinders (5)
- fins (6)
- hydraulic system (7)
- power supply (8)

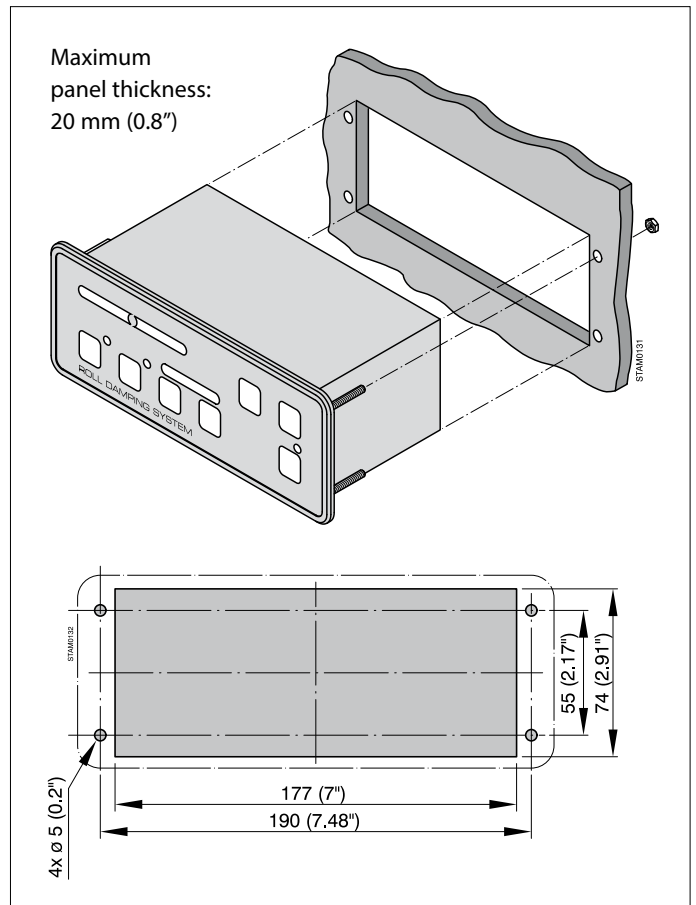


5.3 Control panel

Fit the control panel in a suitable place where the user can easily operate the push buttons. See section 16 for the main dimensions.

Cut a suitable hole in the instrument panel or a bulkhead using the template provided. Fit the control panel in the hole using the bolts supplied.

⚠ Do not overtighten the bolts.



5.4 Fins

5.4.1 Choosing the fin size

VETUS supplies fins with surface area of 0.3 m², 0.4 m², 0.5 m², 0.6 m² or 0.7 m². See section 16 for the main dimensions.

Choose the correct fin size with the help of the following formula:

$$A = \frac{3.5 \times B \times D}{T^2 \times V^2}$$

Explanation:

A	=	surface area per fin	[m ²]
B	=	width at waterline	[m]
D	=	displacement	[t]
T	=	roll time	[s]
V	=	cruising speed	[knot]

The roll time of a ship can be determined by tying the ship loosely to the quayside and then pushing it by hand to make it roll. The time taken to roll from portside to starboard and back to portside is the roll time. Always measure an average time over a number of rolls (e.g. 10 rolls).

Example:

B	=	3.6 m
D	=	23 tons
T	=	3.5 s
V	=	8.5 knots

$$A = \frac{3,5 \times 3,6 \times 23}{3,5^2 \times 8,5^2} = 0,327 \text{ m}^2 \text{ (per fin)}$$

Therefore either fins with surface area 0.3 m² or 0.4 m² can be chosen.

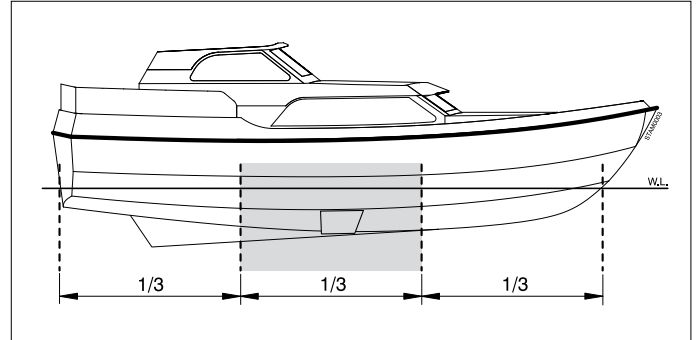
Unless the height of the fin does not allow it, it is better to choose for 0.4 m² in this case, otherwise 0.3 m².

5.4.2 Positioning the fins

When fitting the fins always follow the following guidelines:

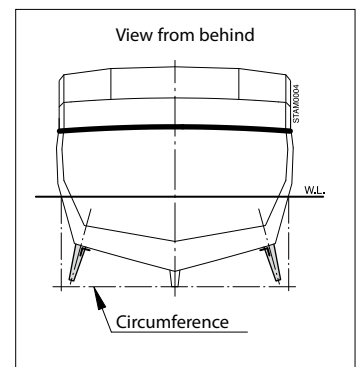
The fins must be fitted in the **centre section** of the waterline (as shown in the diagram) following the length of the ship.

It is usually better to position the fins slightly more towards the bows in order to prevent possible effects on the steering.



The position shown in the cross section is important in order to prevent the fins from being damaged if the ship should run aground.

Fit the fins at right angles to the hull.



The total fin angle is 68°. Bear this in mind when deciding where to install the fins.

5.4.3 Fitting the bushes

Welded or laminated bushes must be fitted depending on the material used for the hull. These bushes serve as skin lead throughs for the fin axes.

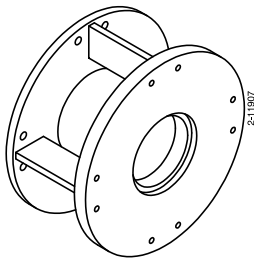
See section 16 for the main dimensions.

Use welded bushes if the hull is made from steel or aluminium.

Use laminated bushes if the hull is made from polyester or wood.

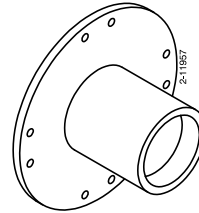
The underside of a laminated bush is made from rust proof steel, so that only the rust proof part of the bush will be in contact with the (sea)water.

When fitting the bushes consider where the skin unit is to be placed.



Bush for welding:

- Steel: **(STATHS)**
- Aluminium: **(STATHA)**
- Stainless steel: **(STATHSST)**



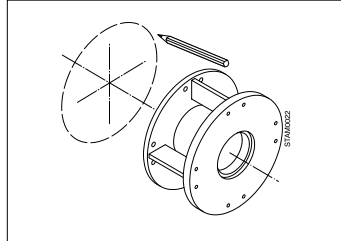
Bush for laminating (STATHG)

Welded bush

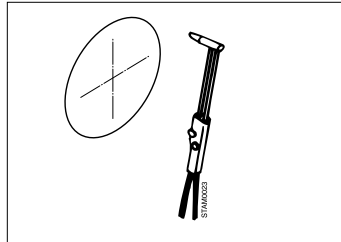
If the hull is less than 6 mm (1/4") thick it is necessary to strengthen it with a double plate where the welded bush is to be fitted.

In order to give maximum strength it is better to fit the welded bush to a strut.

- Draw the position of the welded bush on the hull.

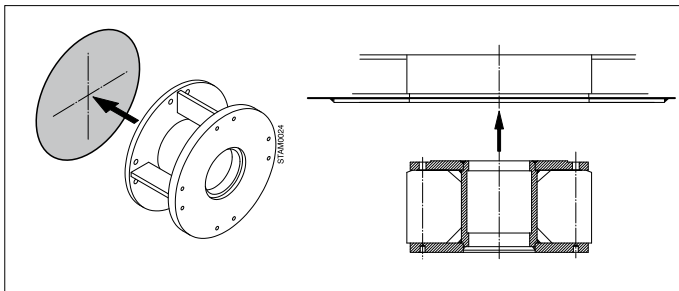


- Cut the holes using a suitable cutting torch.

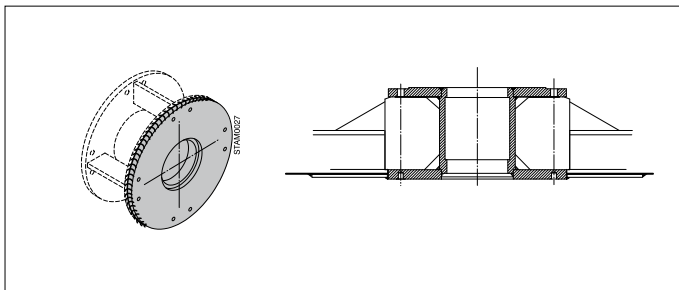


- Fit the welded bush.

The tapped (blind) holes must be on the outside.



When the bush is welded onto the hull the flange on the welded bush must be level with the surface of the hull where the bush is being fitted.

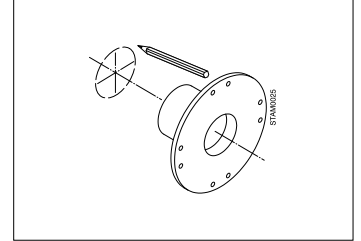


Laminated bush

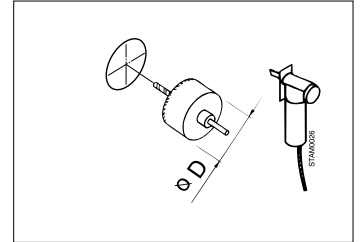
When fitting a laminated bush a **hardwood strengthening pyramid** must be fitted on the inside of the hull.

In order to do this the inside of the hull must first be smoothed thoroughly before the pyramid is fitted. Use 3M5200® or Sykaflex® glue to fix the pyramid and cover it with polyester.

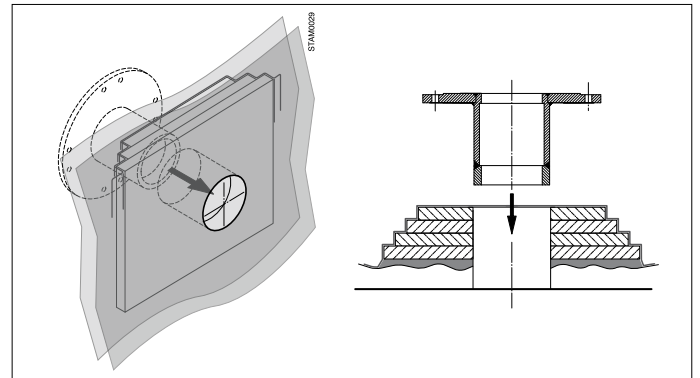
- Draw the position of the welded bush on the hull.



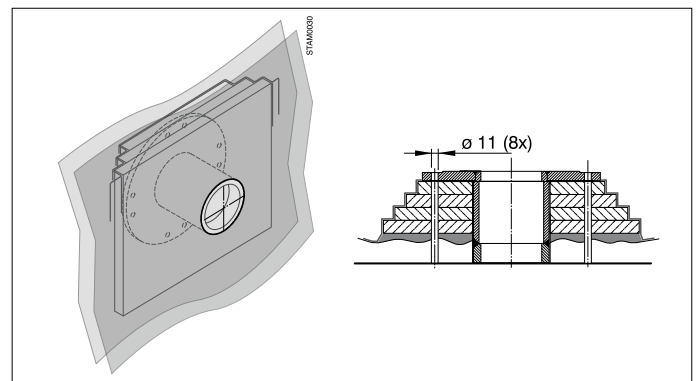
- Cut the holes (through the hull and the pyramid).



- Fit the laminated bush (from the inside).

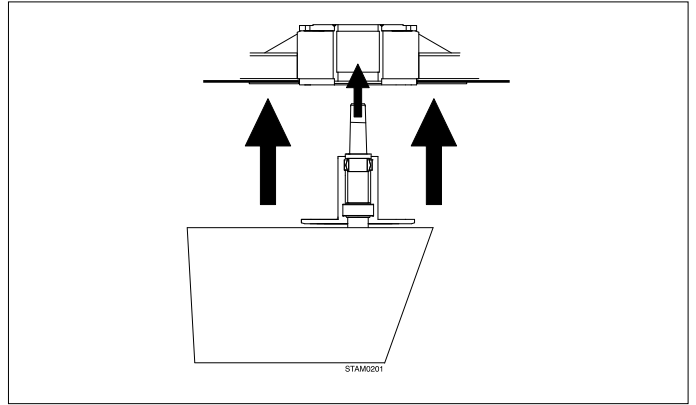


- Now drill the 8 holes $\varnothing 11$ mm (7/16" dia.) through the pyramid and the bush using the laminated bush as drilling template.

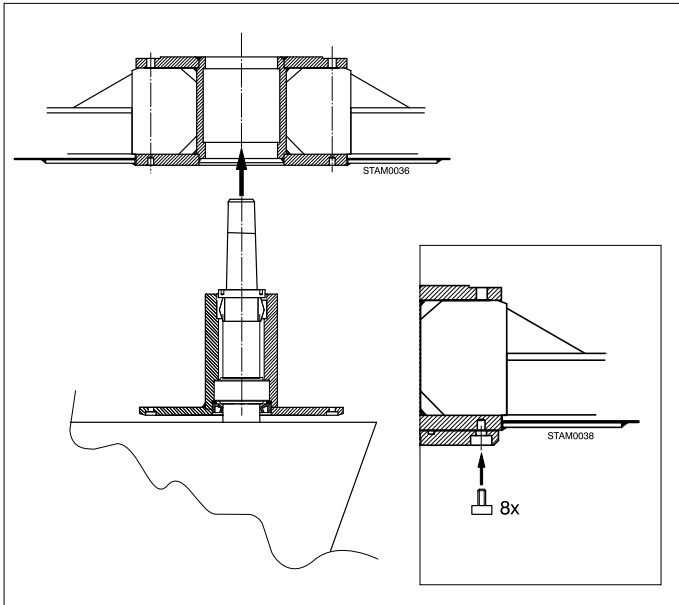


5.4.4 Fitting the fins

After the welded or laminated bushes are in place the fins with their integrated bearing unit can be fitted.

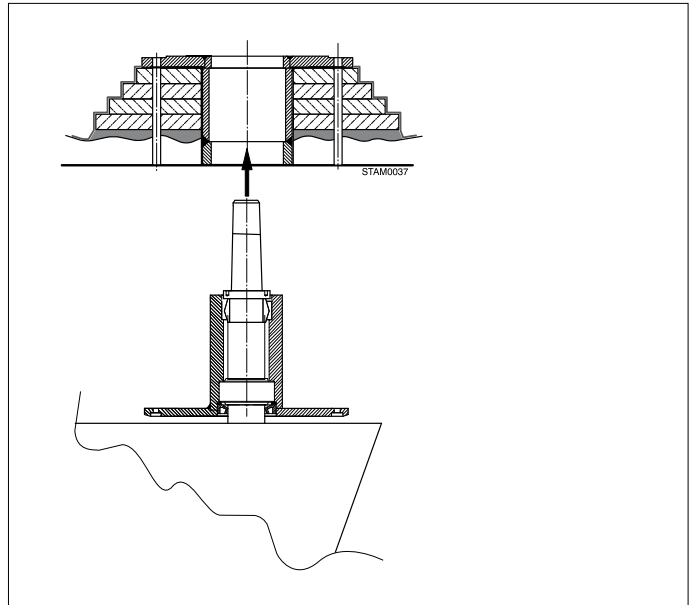


If a welded bush has been used:



- Grease the integrated bearing unit and place the fin in the bush. (Use water-resistant grease code HT5503).
- Attach the bearing unit to the bottom of the bush using the 8 bolts provided.

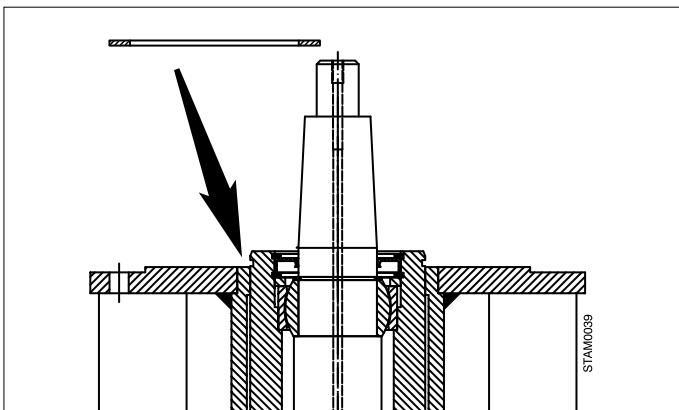
If a laminated bush has been used:



- Grease the integrated bearing unit and place the fin in the bush. (Use water-resistant grease code HT5503).
- The bearing unit is also attached directly to the skin unit and cylinders by means of bolts which pass through the whole assembly.

See section 5.5.2

For both a welded and a laminated bush:



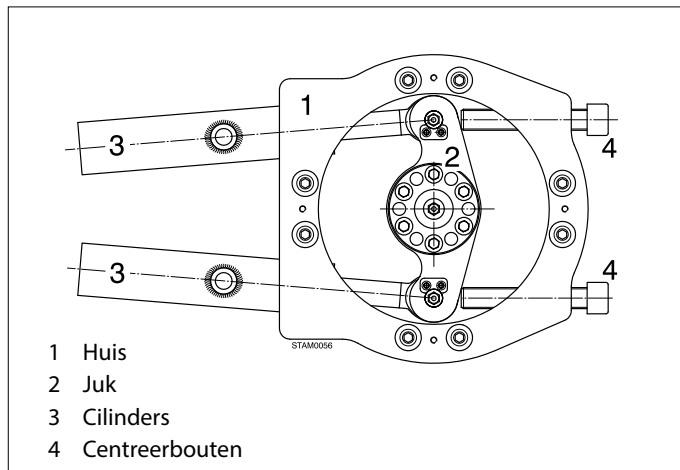
Fit the Seeger ring onto the fin-bearing unit.

5.5 Skin unit

5.5.1 Introduction

The skin unit can be placed in any suitable position around the fin axle depending on the available space to build it in.

The cylinders have already been fitted in the factory.



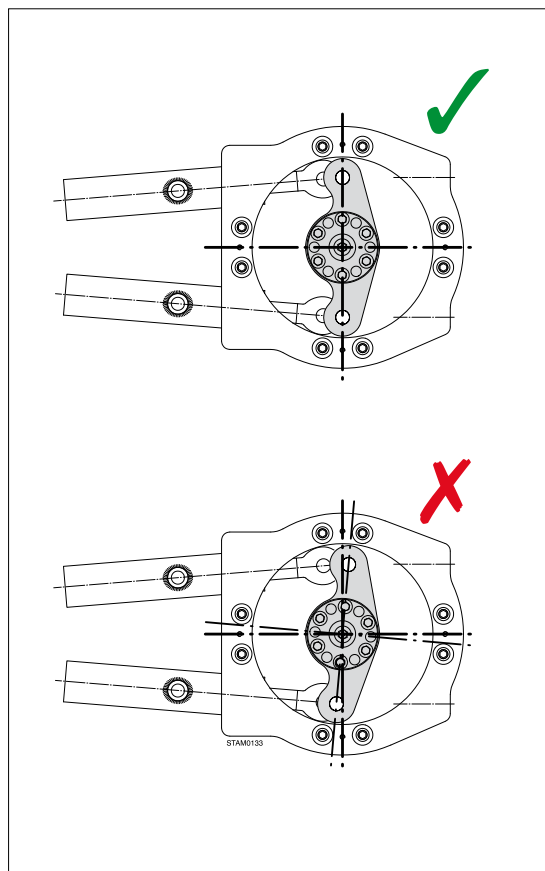
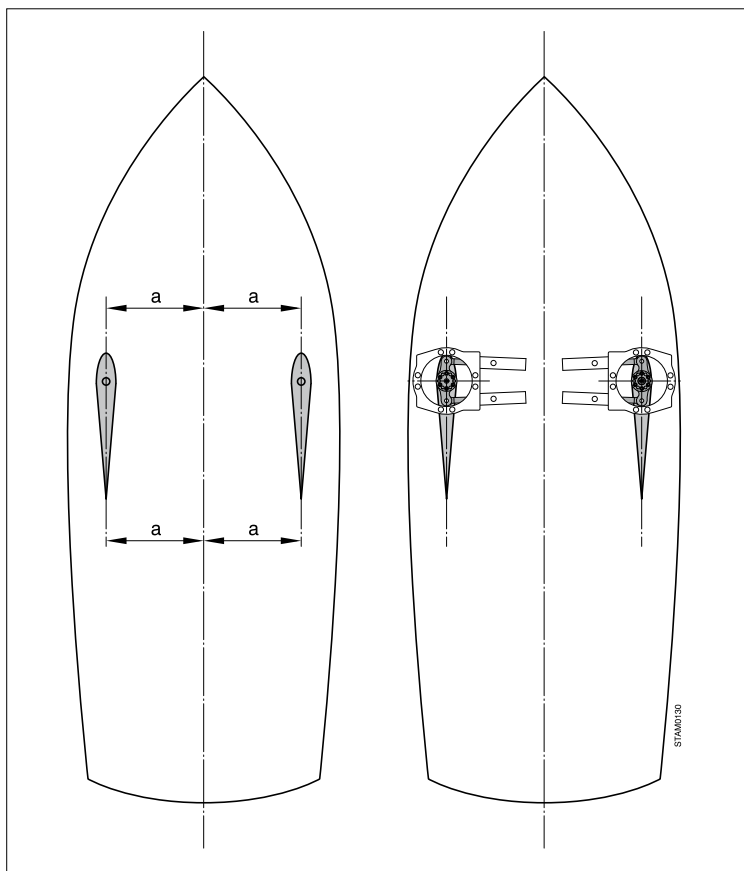
Always fit the fins parallel to the centre line of the ship.

The skin unit can be fitted in any position around the fin axle; however, the yoke must always be exactly in the middle!

Follow the instructions below to position the yoke exactly in the middle relative to the fin.

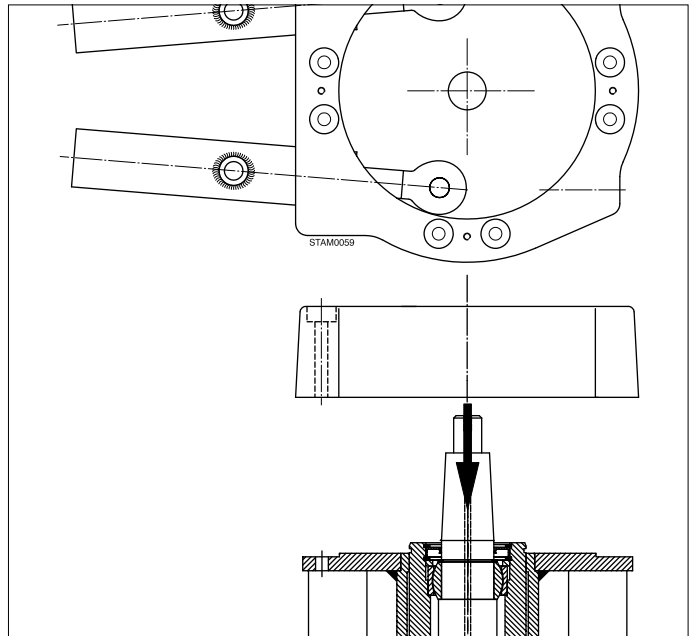
- Place the yoke on the fin spindle; it must still be possible to turn the yoke relative to the spindle.
- Screw the 2 centring bolts into the housing until they are up against the yoke and they are both projecting out the same distance.

The yoke is now fixed in the middle position and the fin can be aligned.



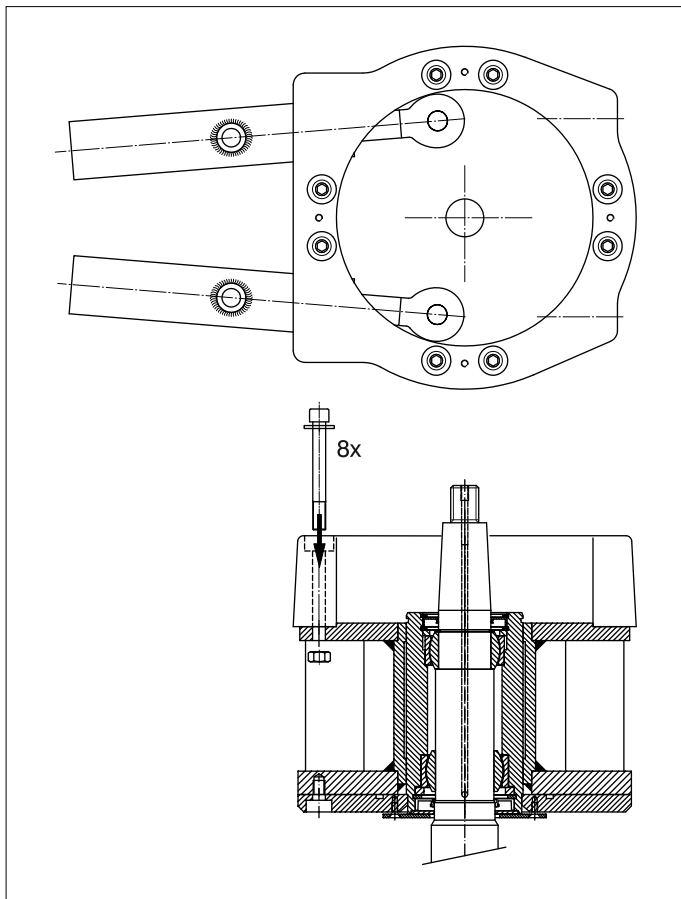
5.5.2 Fitting the skin unit on a welded bush

- Place the housing on the welded bush or the laminated bush.



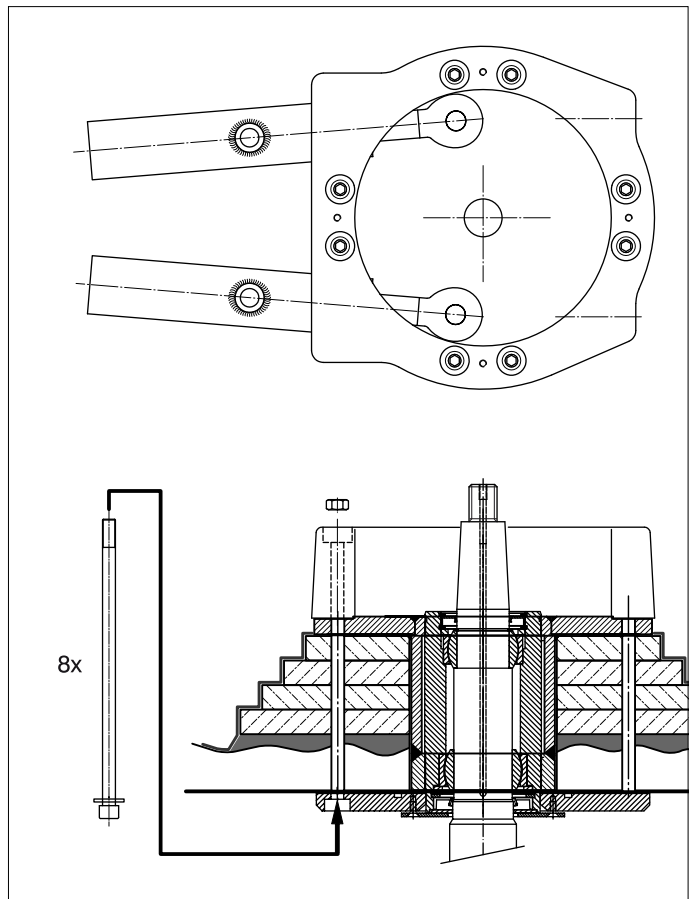
Welded bush

- Use 8 M10 bolts, rings and nuts to fix the housing in place.

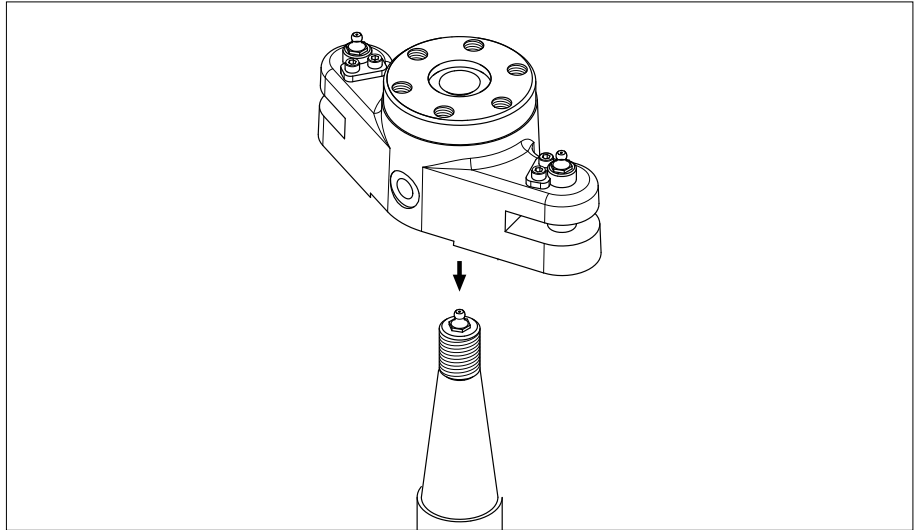


Laminated bush

- Use 8 M10 bolts and rings to fix the housing in place. Push the bolts through from the outside of the hull.
 - Use 3M5200® or Sykaflex® as sealer here also.
 - Tighten up the bolts in the housing using M10 nuts.
- Excess sealer will be pushed out while tightening up the bolts.



- Position the yoke over the fin axle.



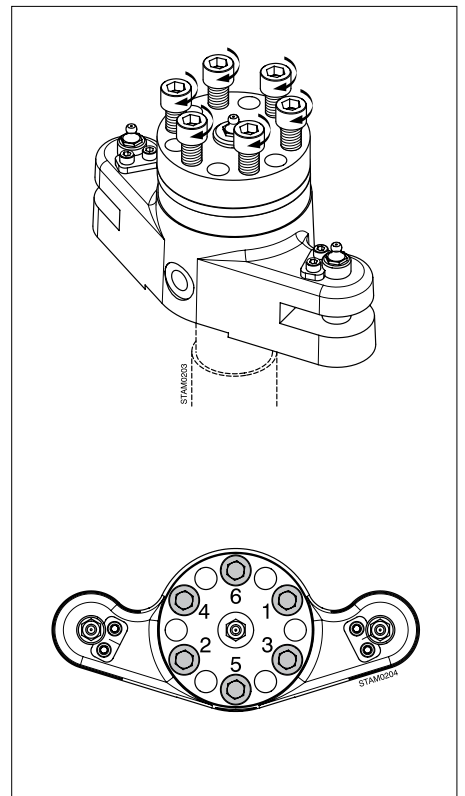
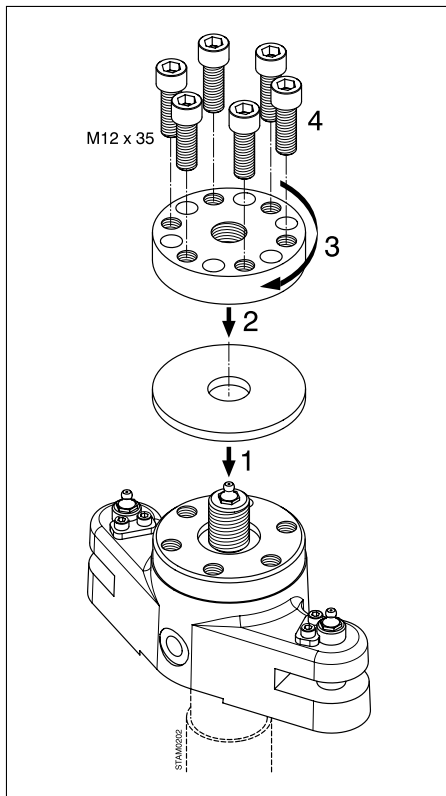
Attaching and bolting the fins

- Fit the washer on the end of the spindle (1).
- Fit the disc onto the spindle (2).
- Tighten the disc onto the spindle by hand (3).
- Fit the 6 bolts in the 6 threaded holes (4).

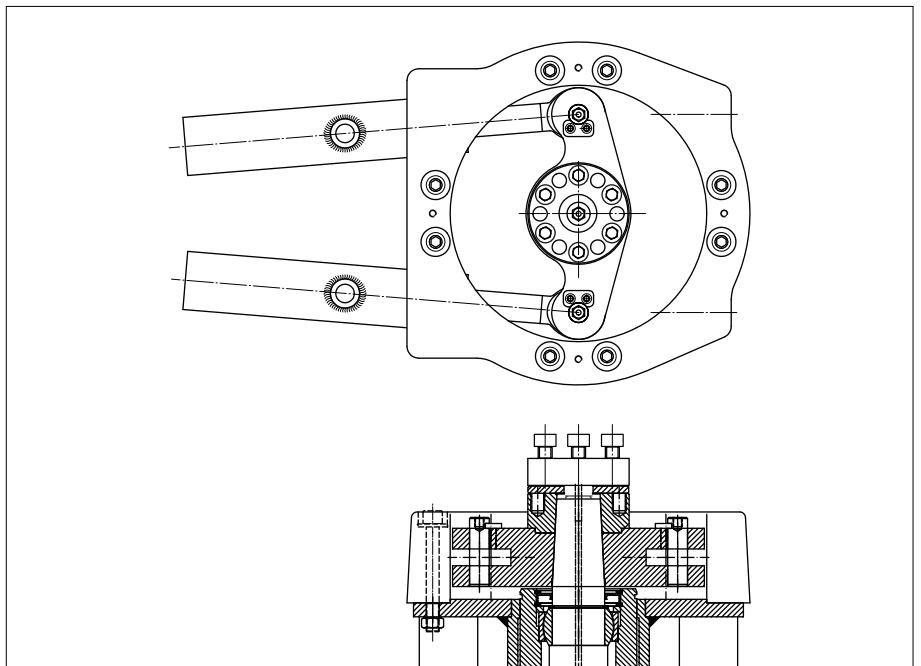
Tightening torque bolts: 58 Nm

Tighten the bolts at 58 Nm, in one go, alternating. The order in which the bolts should be tightened is shown in the opposite number diagram.

Because of the special locking method, it feels as if a bolt is not tightened to 58 Nm. Do not repeat the number diagram more than 3 times.



- Pull out the cylinder rods.
- Grease the cylinder rod head bearing (art. code: HT5503).
- Grease the cylinder pin and fix the cylinder rod head using the cylinder pin. The cylinder pin has a rib.
- Fix the locking plate on to this in order to lock the cylinder pin.
- Fit the cover plate using the 4 bolts provided.



5.6 Hydraulic installation

5.6.1 Introduction

The hydraulic part of the roll damping system can be connected to an existing hydraulic system on board if this is present. Otherwise a hydraulic system must be purchased separately.

Fitting the hydraulic system is carried out in 2 steps:

- connecting the valve block to the hydraulic system
- connecting the cylinders to the valve block

5.6.2 Valve block

There are 3 valves on the valve block:

- **The directional valve (4/3 valve):**
this controls the movement of the fins.
- **The centring valve (4/2 valve):**
this centres the fins.
- **The pressure control valve:**
this controls how far the fins are moved out.

The valve block should preferably be placed midships so that the hydraulic hoses to the cylinders on either side are of equal length.

The valve block should be fitted on a flat surface using the 4 bolts provided.

The connections for the hydraulic system are clearly marked on the valve block:

Marking:	Description:	Connection:	Minimum hose diameter
A-SB	Connection A directional valve (starboard)	1/2"	12L-2SN-3/8"
B-SB	Connection B directional valve (starboard)	1/2"	12L-2SN-3/8"
A-PS	Connection A directional valve (portside)	1/2"	12L-2SN-3/8"
B-PS	Connection B directional valve (portside)	1/2"	12L-2SN-3/8"
P	Pressure	1/2"	15L-2SN-1/2"
T	Return	1/2"	15L-2SN-1/2"
C	Connection centring valve	1/4" BSP	12L-2SN-3/8"
M	Connection for manometer	1/4" BSP	

Connect the valve block as shown in the hydraulic diagram, see section 14.

The oil flow from the hydraulic system to the valve block may not be greater than 6 litres per minute (1.3 Imp.Gal/min).

If the roll damping system is combined with a VETUS hydraulic system (VETUS Power Hydraulics) which is already fitted in the ship a pressure compensated flow control valve (HT3018) must be fitted into the system in order to satisfy this requirement. This prevents the fins from moving too fast.

The maximum pressure allowed is 160 bar.

5.6.3 Cylinders

Connect the valve block as shown in the hydraulic diagram, see section 14.

5.7 Electrical installation

5.7.1 Introduction

A junction box is provided in order to make making the electrical connections simpler and clearer.

The valves, control panel and power supply are connected to each other in the junction box.

The fuse is also on the printed circuit in the junction box (Maximum 4 A!).

5.7.2 Fitting the junction box

Fit the junction box close to the valve block.

The junction box is only suitable for 24 Volt ship's power supply.

A 12 Volt to 24 Volt converter must be used where the ship's power supply is 12 Volt. See the wiring diagram in Chapter 15.



Before connecting the cables disconnect the 24 volt ship's power supply!

- Make all connections as shown in the wiring diagram, see section 15.
- See the wiring diagram for the correct cables to use.



Making the wrong connections can cause serious damage to the operating system!

When in use the LEDs on the printed circuit show which coils are powered. This can be of help when taking the system into service.

5.7.3 Fitting the roll sensor

Fit the roll sensor with the cable swivel pointed towards the stern of the ship!

The roll sensor may be rotated about the centre line of the ship.

If the roll sensor is not positioned correctly the roll damping system will not function properly!

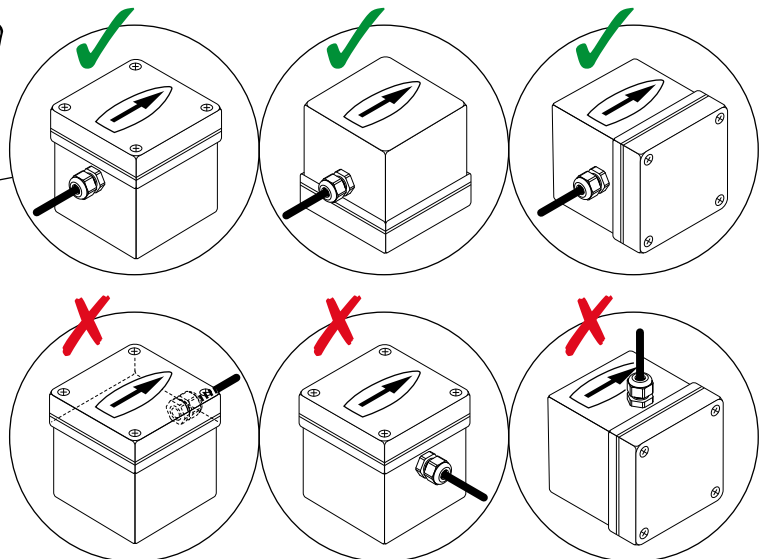
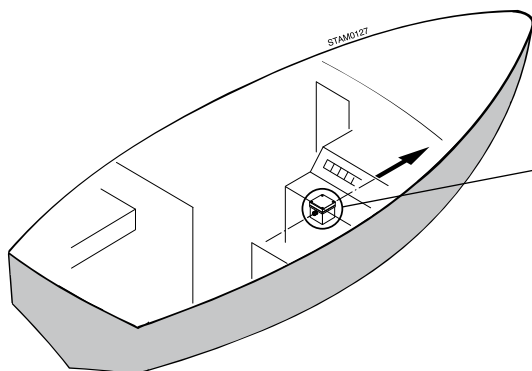
A suitable position for the roll sensor is under the dashboard.

Never fit the roll sensor in a position where strong vibrations (e.g. from the engines) will be felt during normal sailing.

- Remove the lid and fit the roll sensor to a flat surface using the 2 screws provided.

Never shorten or lengthen the cable that has already been fitted. This can affect the correct working of the roll sensor.

- Make all connections as shown in the wiring diagram, see section 15.



Fitting the roll sensor

6 Taking into service

6.1 Introduction

Taking a roll damping system into service is carried out in 3 phases:

- testing the correct working of the roll damping system, see section '6.2'
- setting the correct pressure, see section '6.3'
- carrying out a forced roll test, see section '6.4'

The phases must be carried out in the order given above!

See section 7.3, 'The control panel', for a complete description of the working of the control panel.

If the roll damping system does not behave in the way described here see section 9 'Faults'.

6.2 Testing correct working

The following conditions are required in order to test the working of the roll damping system:

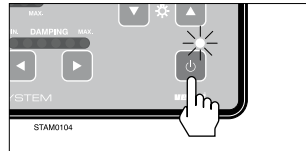
- the hydraulic system is switched off
- the ship is not sailing
- the power supply (24 V) is switched on

Step 1

- Press the on/off switch (⏻).

The control panel will switch on.

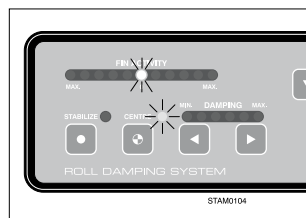
The LED above the on/off switch will light up.



There will be a bleep.



The CENTRE LED and the middle LED in the top LED bar (FIN ACTIVITY) will light up.

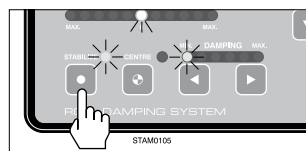


Both these LEDs will flash for about 20 seconds as part of the switching on procedure.

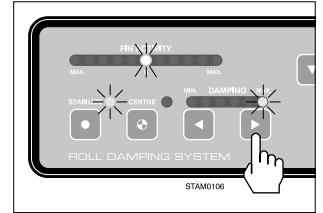
Step 2

- Press the stabilizer (●) button.

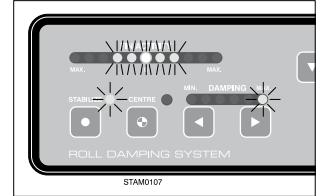
The LED CENTRE will go out and the LED STABILIZE will light up.



- Press and hold the right-hand button (▶) under DAMPING in until the LED on the far right of the DAMPING LED bar lights up and longer double bleeps are heard.



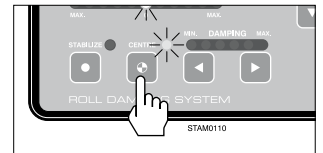
The fins will be turned through a particular angle depending on the amount of wave activity. This can be seen on the top LED bar (Fin activity).



In order to check the LED bar 'FIN ACTIVITY', someone standing on the quay must start the ship rolling by hand.

Step 3

- Press the centre (⊕) button.



- Switch on the hydraulic system.

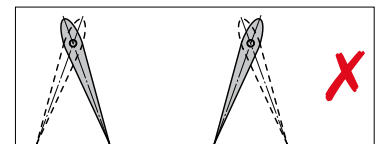
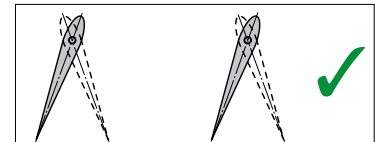
(This usually means starting the main engine so that the hydraulic pump will rotate).

- Check that there are no leaks in the hydraulic system.
- Set the controls again as described in **step 2**.
- Check at the skin units in the hull that the fins move when the ship rolls.

The fin movements will be relatively large because the ship is not sailing.

It is possible that the fins will not move when the system is first started because there is still air in the cylinders. If someone on the quay starts the ship rolling by hand, the air will automatically be dispelled from the cylinders and they will be filled with oil.

Both fins must turn in the same direction while moving.



6.3 Pressure setting

Because the operating system is used on ships with varying speeds and 5 different fin sizes can be used the pressure setting must be made on board.

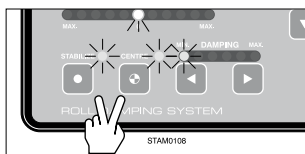
The following conditions are required in order to set the pressure setting:

- the hydraulic system is switched on
- the control panel is switched on and the system has been centred
- the ship is sailing at its normal cruising speed
- there are no or few waves

Step 4

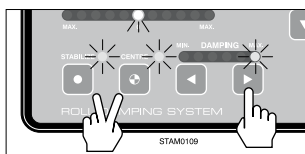
Appoint someone to keep an eye on the fin angle at one of the fin skin units.

- Press and hold down the centre (⊕) and stabilizer (●) buttons simultaneously.



Wait at least 3 seconds.

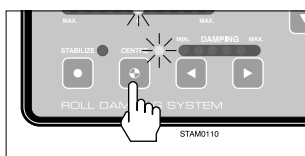
- Press and hold the right-hand button (▶) under DAMPING in until the LED on the far right of the DAMPING LED bar lights up.



The fins will now move to the maximum angle.

- Press the centre (⊕) button.

The pressure setting for the particular system will now have been set correctly.



6.4 Forced roll test

The forced roll test is the most well-known test used to check the working of a roll damping system. The roll movement is caused by reversing the signal from the roll sensor so that the system reinforces the rolling instead of damping it.

The following conditions are required in order to carry out a forced roll test:

- the hydraulic system is switched on
- the control panel is switched on
- the ship is sailing at about 1/3 of its cruising speed
- there are no or few waves



Warning!

The ship can roll considerably during a forced roll test so this test may only be carried out when sailing slowly (1/3 of the cruising speed). Make sure that everything is well secured and warn everyone on board before the test is started.

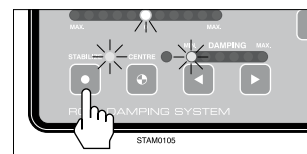
VETUS is not liable for damage or injury arising during a forced roll test caused because objects have not been fixed or because people on board have not been warned.

Step 5

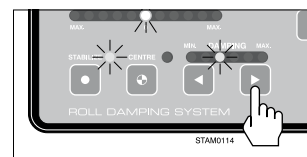
Setting the roll damping

- Press the stabilizer (●) button.

The LED CENTRE will go out and the LED STABILIZE will light up.

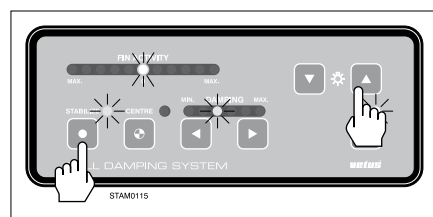


- Press the right-hand button (▶) under 'DAMPING' until one of the two middle LEDs in the LED bar 'DAMPING' lights up.

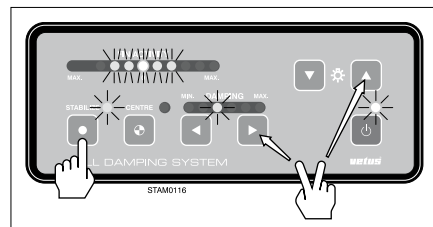


Activating the forced roll test

- Press and hold in the right-hand 'DIM' button (▲☼) and the stabilizer (●) button at the same time.



- Now also press and hold in the right-hand button (▶) under 'DAMPING'.



The ship will now begin to roll. This may take some time particularly when the weather is calm. If necessary the roll damping setting can be increased ('DAMPING').

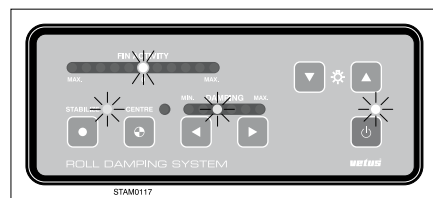
The LEDs in the 'DAMPING' bar will now go from maximum to minimum and back. The LED bar will remain in this state until the buttons are released.

If the ship does not begin to roll by itself, move the rudder from port to starboard. The ship should now begin to roll.

The rolling will increase to a maximum. Keep the buttons pressed in. The rolling will not increase further after a certain point has been reached. At that point the fins will have reached their maximum angle.

Release the buttons.

The forced roll test is ended and the induced rolling will be damped.



The system is ready for use.

7 Operating

7.1 General

The roll damping system only works when the ship is sailing, not when it is lying still.

Never let the ship run aground on the fins! They are not designed for this.

7.2 Emergency centring

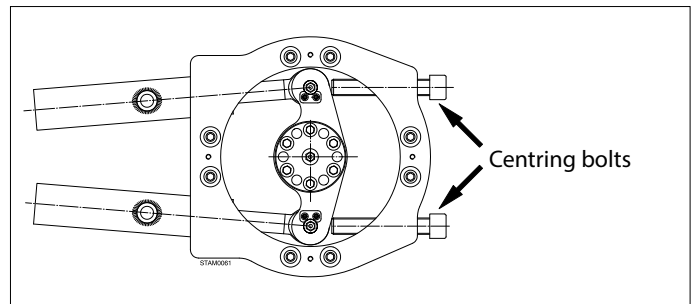
If the roll damping system has failed completely the fins can be centred using the centring bolts.

Tighten up both bolts until they are in contact with the yoke and stick out an equal distance from the housing.

Do not forget to loosen the bolts again before taking the system back into service so that the yoke can move the complete distance.

Make sure that the bolts are loosened sufficiently far out of the housing. Damage can be caused if the yoke hits the bolts during operation!

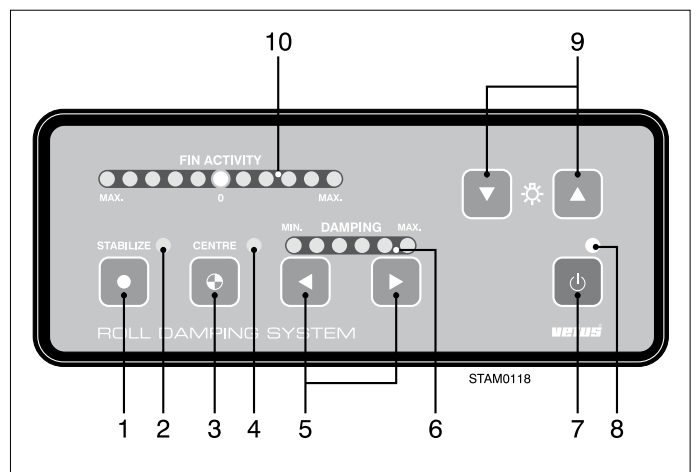
Grease the centring bolts with anti-corrosion grease, such as COPASLIP®, to prevent the bolts from seizing up.



7.3 The control panel

The control panel for the roll damping system is fitted with push buttons and indicator LEDs. These have the following functions:

- 1 ● : **The stabilizer button**
This button is used to activate the roll damping system.
- 2 STABILIZE: **Indicator LED**
This LED shows when the roll damping system is active.
- 3 ⊕ : **The centre button**
This button is used to centre the fins.
- 4 CENTRE: **Indicator LED**
This LED shows that the fins are centred.
- 5 ◀ and ▶: **The damping buttons**
The amount of roll damping can be set using these buttons.
- 6 DAMPING **LED bar**
This LED bar shows the roll damping setting.
- 7 ⏻ : **The on/off button**
This button is used to switch the control panel on and off.
- 8 On/off: **Indicator LED**
This LED shows that the control panel is switched on.



- 9 ▼ and ▲: **The dim buttons**
These buttons control the brightness of the LEDs on the control panel.
- 10 **FIN ACTIVITY LED bar:**
This LED bar shows the fin activity.

7.4 Switching on the control panel

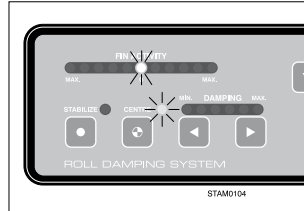
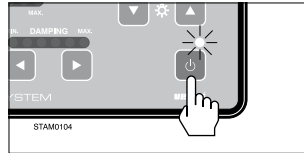
- Press the on/off switch (⏻).

The control panel will switch on.

The LED above the on/off switch will light up.

There will be a bleep.

The CENTRE LED and the middle LED in the top LED bar (FIN ACTIVITY) will light up.



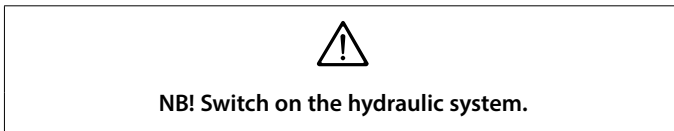
Both these LEDs will flash for about 20 seconds as part of the switching on procedure.

After the switching on procedure the CENTRE LED and the middle LED in the top LED bar (FIN ACTIVITY) will remain on.

The system is ready for use.

The fins are kept in the centre position.

If the stabilizer button is pushed during the switching on procedure there will be a double bleep to show that the roll damping system is not yet ready for activation.



7.5 Activating the roll damping system

Only activate the roll damping system on open water, never in a harbour.

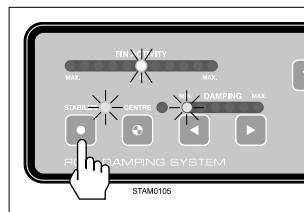
- Press the stabilizer (●) button to activate the roll damping system.

The LED CENTRE will go out and the LED STABILIZE will light up.

One LED in the bottom LED bar (Damping) will now light up.

When the roll damping system is activated for the first time after the control panel has been switched on the roll damping will always be at the minimum value.

It is not necessary to carry out the pressure setting (see 6.3) or the forced roll test (see 6.4) first. These have already been carried out when taking into service and do not need repeating.



When the roll damping system is activated after the fins have been centred the amount of the roll damping will always be the same as the last value set.

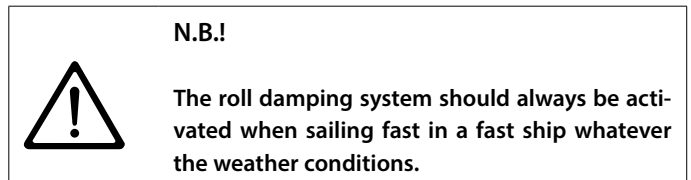
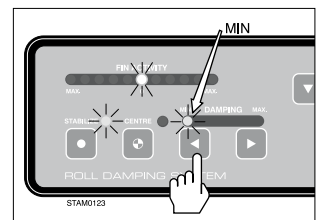
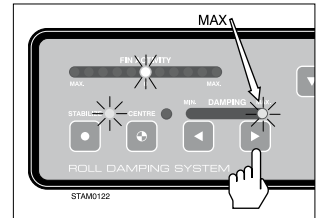
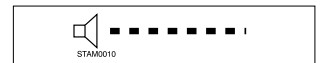
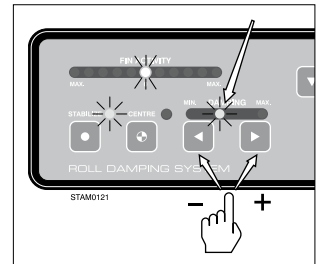
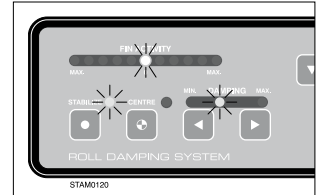
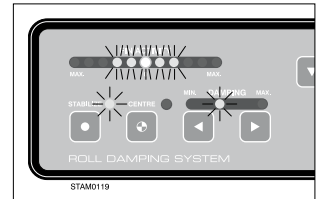
The fins will be moved through a particular angle depending on the set value for the roll damping (Damping), the speed of the ship and the amount of waves. This is shown on the top LED bar (Fin activity).

If the fins are not moved from the centre position only the middle LED lights up.

Set the desired amount of roll damping using the 'DAMPING' push buttons.

Short bleeps will be heard while the setting is carried out.

Longer double bleeps will sound if the maximum or minimum value for the roll damping has been reached.



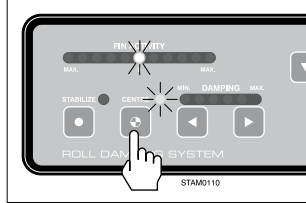
7.6 Centring the fins

The fins must be centred while manoeuvring in harbours and while reversing.

NB!

It is better to centre the fins while still sailing forwards!

- Press the centre (●) button to set the fins to the centre position.



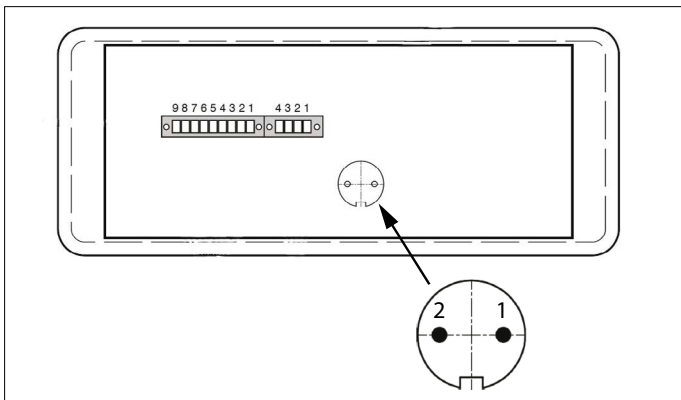
As soon as the centre (●) button is pressed on the control panel the LED STABILIZE will go out and the LED CENTRE will light up and there will no longer be any LED lit up on the bottom LED bar ('DAMPING').

No bleeps will be heard if the (◀ and ▶) buttons are pushed while the fins are centred. The (◀ and ▶) buttons have no function then.

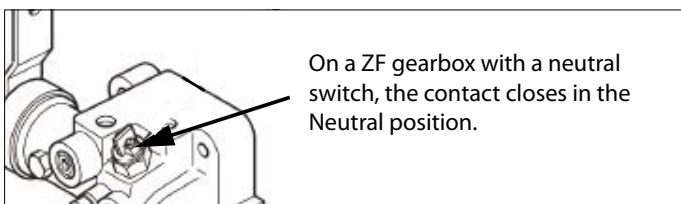
7.6.1 Automatic centring

When the ship is reversing, the VETUS stabilizer fins must be centred. This can be done manually, or by using an extra CENTRE input on the controller. On this input a switching contact can be connected that closes when the propulsion is switched to Neutral or Reverse.

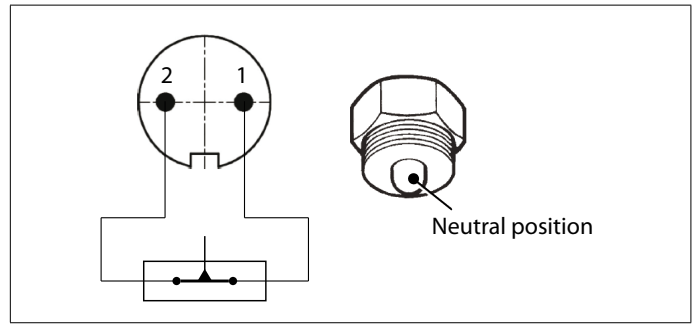
On the backside of the controller a two-pole connector is located. This should be connected to the switching contact. The two contacts in the connector, 1 and 2, must be connected to each other. The controller will now center automatically. It is now not possible to stabilize. When the propulsion is switched back to forward, one must press stabilize again to be able to stabilize.



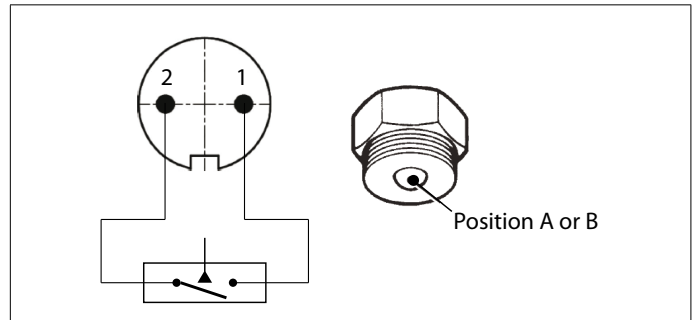
Connecting a mechanical coupling with a neutral switch



Circuit with one engine

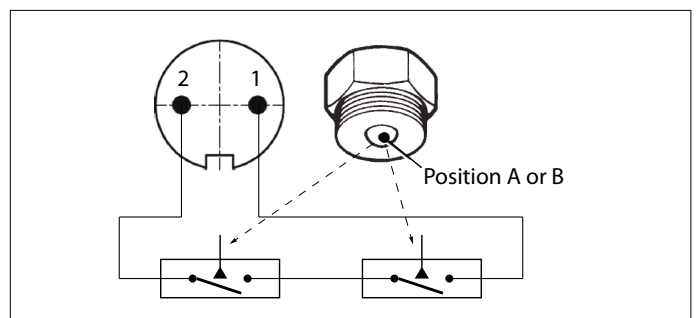
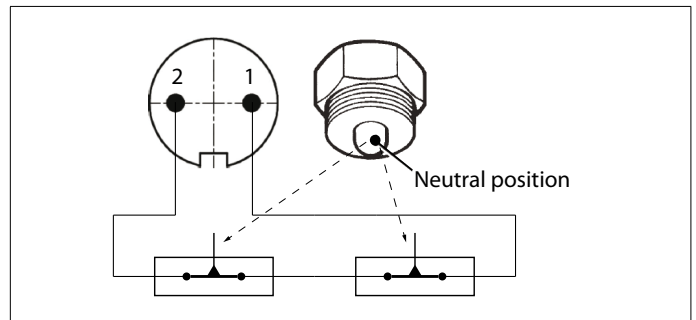


Pin 1 and 2 are now connected to each other. The fins are centered.



In forward or reverse (position A/B), pins 1 and 2 are not connected and stabilization can be performed. Do not do this when reversing!

Circuit with two engines



Connecting an electric coupling

With an electrically switched coupling, an extra relay must be fitted (not included).

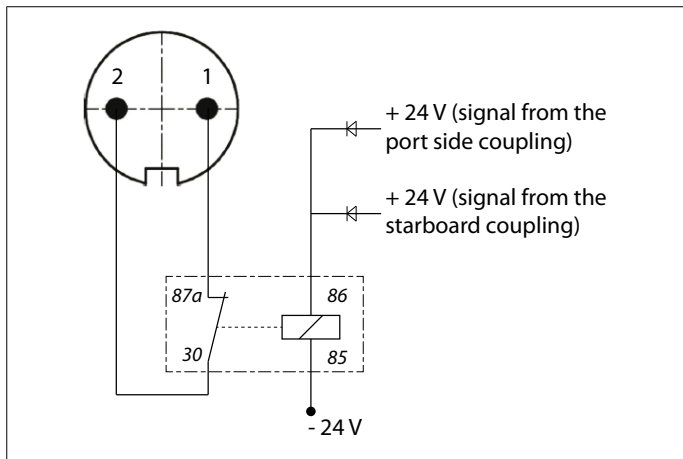
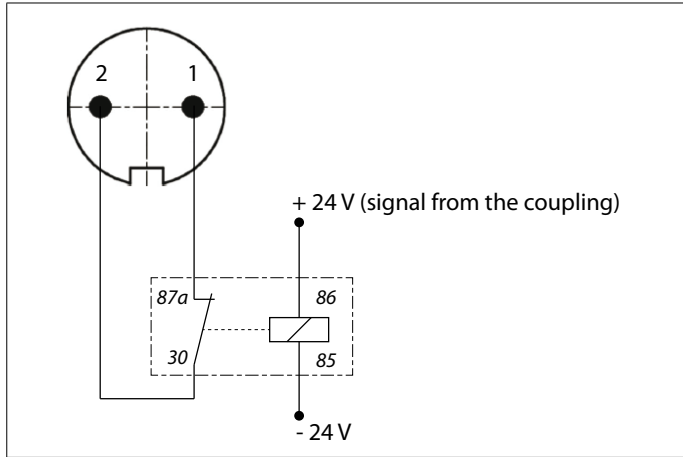
The relay must have a change-over contact, with a Normaly Open (NO) and Normaly Close contact (NC).

The Normally Close (NC) contact must be used.

The relay is switched when the gearbox is put into forward motion, when the Normally Close (NC) contact is broken and stabilization is possible.

When the clutch is put into neutral, the relay is released and the system centers itself automatically.

Circuit with one engine



Test run

Make sure that the engine(s) are not running, and that the system is active.

- Put the propulsion in forward.
- Press STABILIZE. The controller will now switch to STABILIZE.
- Put the propulsion in Neutral. The controller will now switch back to CENTRE. If STABILIZE is pressed, a double beep will be heard but the controller will remain in CENTRE.

Errors

If the system does not respond as described, the following checks can be made.

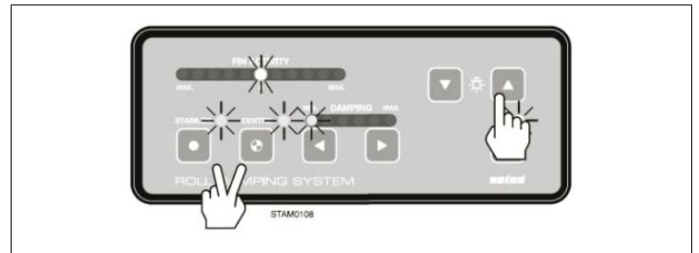
Make sure that the engine(s) are not running, but that the system is active.

- Put the propulsion in the forward position.

- Disconnect the two-pole connector and check with a multimeter on pins 1 and 2 that the CENTRE contact reacts correctly. There should be no connection between pins 1 and 2.
- Put the propulsion system in neutral. Now pin 1 and 2 should be connected.

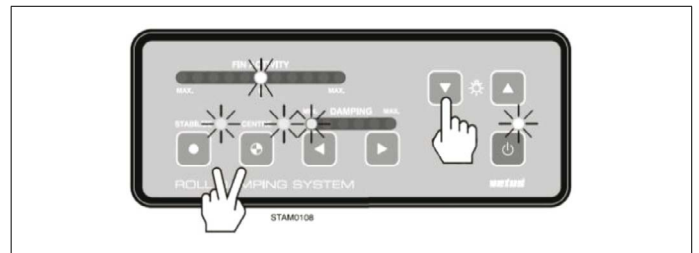
If everything is correct but the controller still does not respond correctly, it is possible that the operation of the contact in the controller is reversed. To reverse this, the following actions must be taken.

Switch on the controller. Then press and hold the STABILIZE and CENTRE buttons simultaneously. After approximately 3 seconds, a beep will sound.



Keep pressing the buttons and then press the DIM UP button. First release the DIM UP button and then the other two buttons. Perform the test again to see if the controller responds correctly.

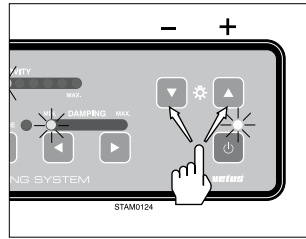
If the controller needs to be reset at a later time, repeat the steps as described. However, DIM DWN should be pressed instead of DIM UP.



7.7 Setting the brightness of the LEDs

The brightness of the LEDs can be set using the (▼ and ▲) buttons (☼).

The brightness of the ON/OFF LED decreases less than that of the other LEDs. There is therefore always an indicator light visible to show that the system is switched on.

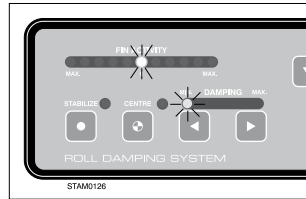


7.8 Switching off the control panel

- Press the on/off (⏻) button to switch off the control panel.

The LED above the on/off button will go out.

The middle LED in the top LED bar and the LED at the far left of the bottom LED bar will flash for about 4 seconds as part of the switching off procedure.



During the switching off procedure the fins will be centred so that they are always in the centre position when the system is not in operation.

If the on/off button is pressed again during the switching off procedure the control panel will be switched back on after about 20 seconds.

8 Roll damping system and other hydraulic equipment in 1 hydraulic system

In order to be able to use a piece of hydraulic equipment as well as possible (for example a hydraulic bow thruster) the oil supply to the roll damping system must be temporarily interrupted while the other piece of equipment is being used.

Do this in the following way:

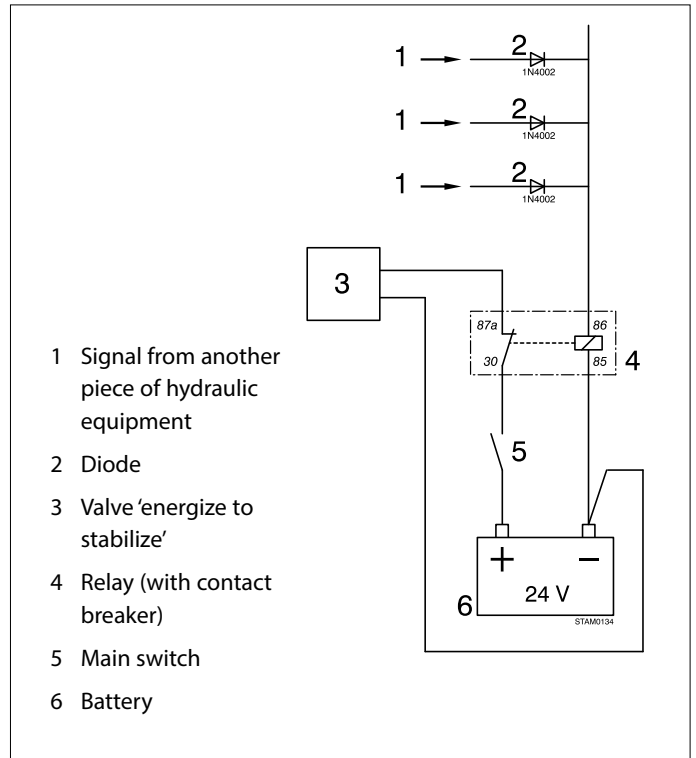
1 When using a VETUS hydraulic system:

Connect the operating and control unit (HT1024) to the connection box on the power hydraulics (HT5034).

See the appropriate manual (Electrical installation and HT1024).

2 When using a different hydraulic system:

Consult the electrical diagram alongside.



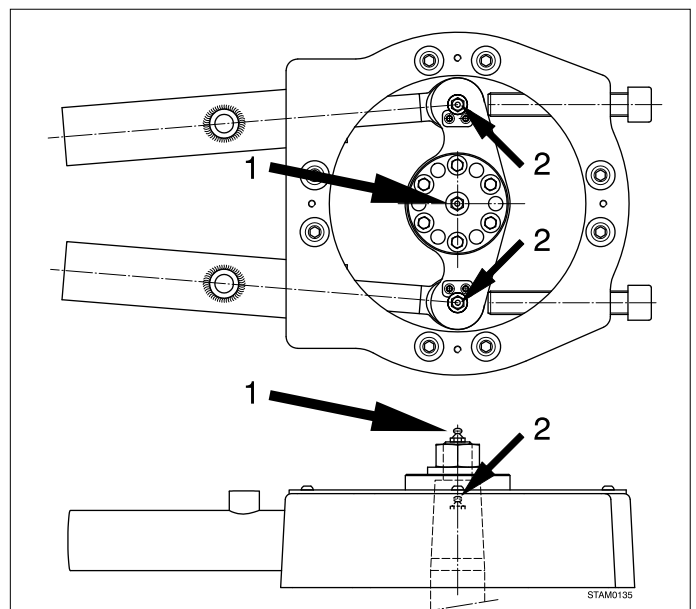
9 Maintenance

- Regularly check all hydraulic connections for leaks..
- The spindle seals and the cylinder pins must be greased regularly (about every 500 operating hours) in order to ensure that the system will work correctly.
- A grease nipple (1) is provided on the spindle for greasing the spindle seals.
- The cylinder pins also have a grease nipple (2).

See the manual for the (VETUS) hydraulic installation for maintenance required for the hydraulic system.

Use the correct grease for greasing the fin bearings. This must be water-resistant and not pollute the surface water. VETUS code HT5503.

NB Grease cartridges and a grease gun are supplied with the set.



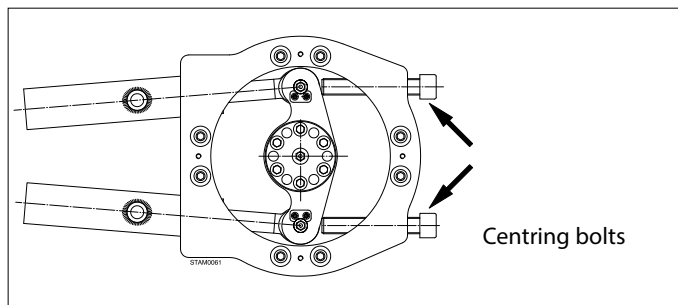
10 Laying up for winter

Use the centring bolts to fix the fins in the centre position if the ship is to be laid up for some time or is in dry dock.

Grease the centring bolts with anti-corrosion grease, such as COPASLIP®, to prevent the bolts from seizing up.

Do not forget to loosen the bolts again before taking the system back into service so that the yoke can move the complete distance.

Make sure that the bolts are loosened sufficiently far out of the housing. Damage can be caused if the yoke hits the bolts during operation

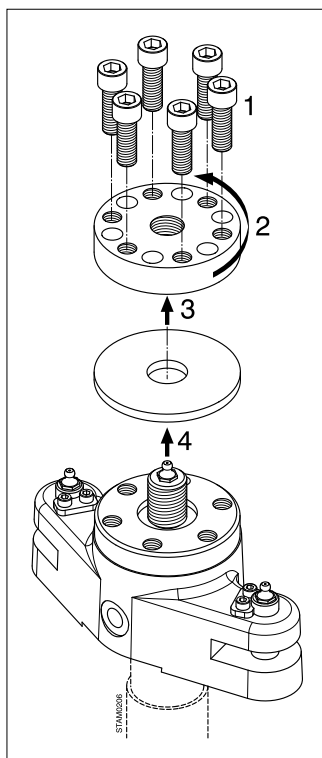


11 Dismantling the fins

The ship must be out of the water when the fins are dismantled. Take suitable precautions to catch the fins when they are removed.

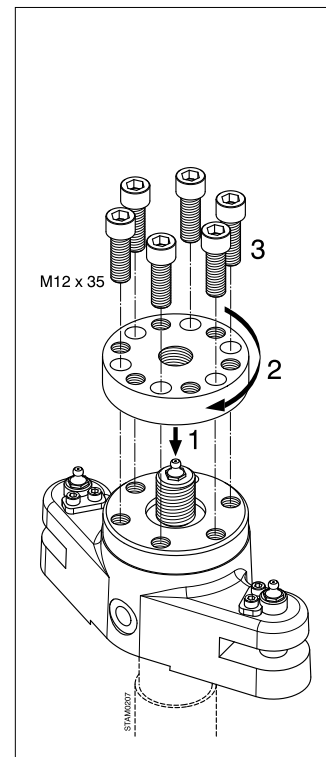
1

- Remove the bolts (1).
- Unscrew the disc (2).
- Remove the disc (3).
- Remove the washer (4).



2

- Fit the disc on the spindle (1).
- Tighten the disc on the spindle by hand (2).
- NB! Do not screw the disc right up to the yoke (3).

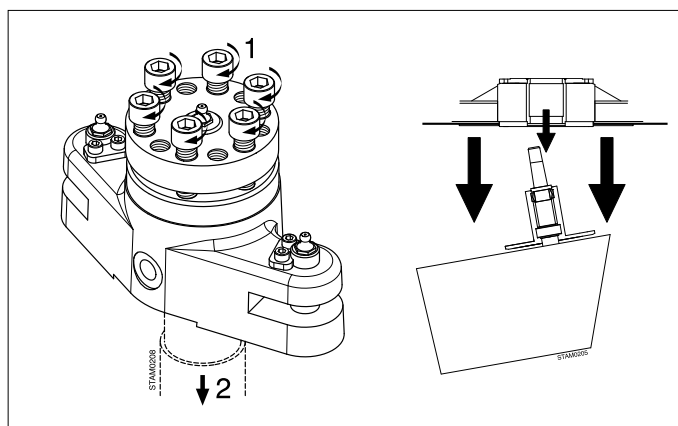


3

Fit the 6 bolts in the 6 blind holes. Make sure that the bolts are exactly over the 6 blind holes M12 in the yoke.

- Tighten the bolts equally one by one (1).
- The fin will come loose from the yoke (2).

The bolts and the disc have to be removed in order to be able to take the fins out.



12 Faults

12.1 During taking into service:

Fault	Possible cause	Solution
The control panel does not switch on.	The power supply has been connected wrongly ('+' and '-' have been reversed).	Connect the power supply correctly (see the 'Wiring diagram', section 15).
	The fuse has blown because of a fault in the wiring.	Check the wiring and replace the fuse.
The fins are not activated (No LED in the top LED bar lights up (Fin activity)).	The hydraulic system is not switched on.	Switch on the hydraulic system. (Start the main engine).
	There is no power to the centring valve.	Check the wiring.
	There is no (variable) power to the pressure control valve. This is because no pressure setting has been made.	Set the pressure setting. See section 6.3.
The ship does not roll during the forced roll test but does roll when the system is set to stabilising.	The roll sensor has not been fitted properly.	Fit the roll sensor correctly with the cable swivel pointing to the stern of the ship.
	The electrical connections to the directional valve are not correct.	Connect the directional valve correctly (see the 'Wiring diagram', section 15).
	The cylinders have not been connected to the valve block correctly.	Connect the cylinders correctly (see the 'Hydraulic diagram', section 14).
The ship does not roll during the forced roll test nor when the system is set to stabilising.	The cylinders have not been connected to the valve block correctly.	Connect the cylinders correctly (see the 'Hydraulic diagram', section 14).

12.2 During normal use:

Fault	Possible cause	Solution
The fins are not activated when the stabilizer button is pressed on the control panel.	The roll damping is set to too low a value.	Use the 'DAMPING' push buttons to increase the amount of roll damping set.
The fins make a squeaking noise when the roll damping system is activated.	Not enough grease in the spindle seals or on the cylinder pins.	Grease the system (see 'Maintenance', Chapter 9).

13 Technical data

Electrical

Supply voltage	: 24 V direct current
Absorbed current	: Max. 30 mA (in centred position) max. 3.5 A (in stabilizing position)

Hydraulic

Max. oil pressure	: 160 bar
Max. oil flow	: 6 l/min

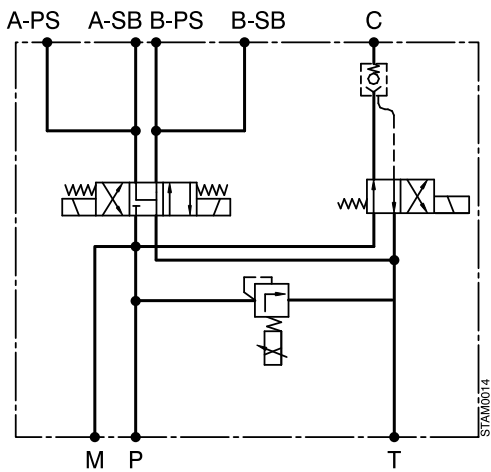
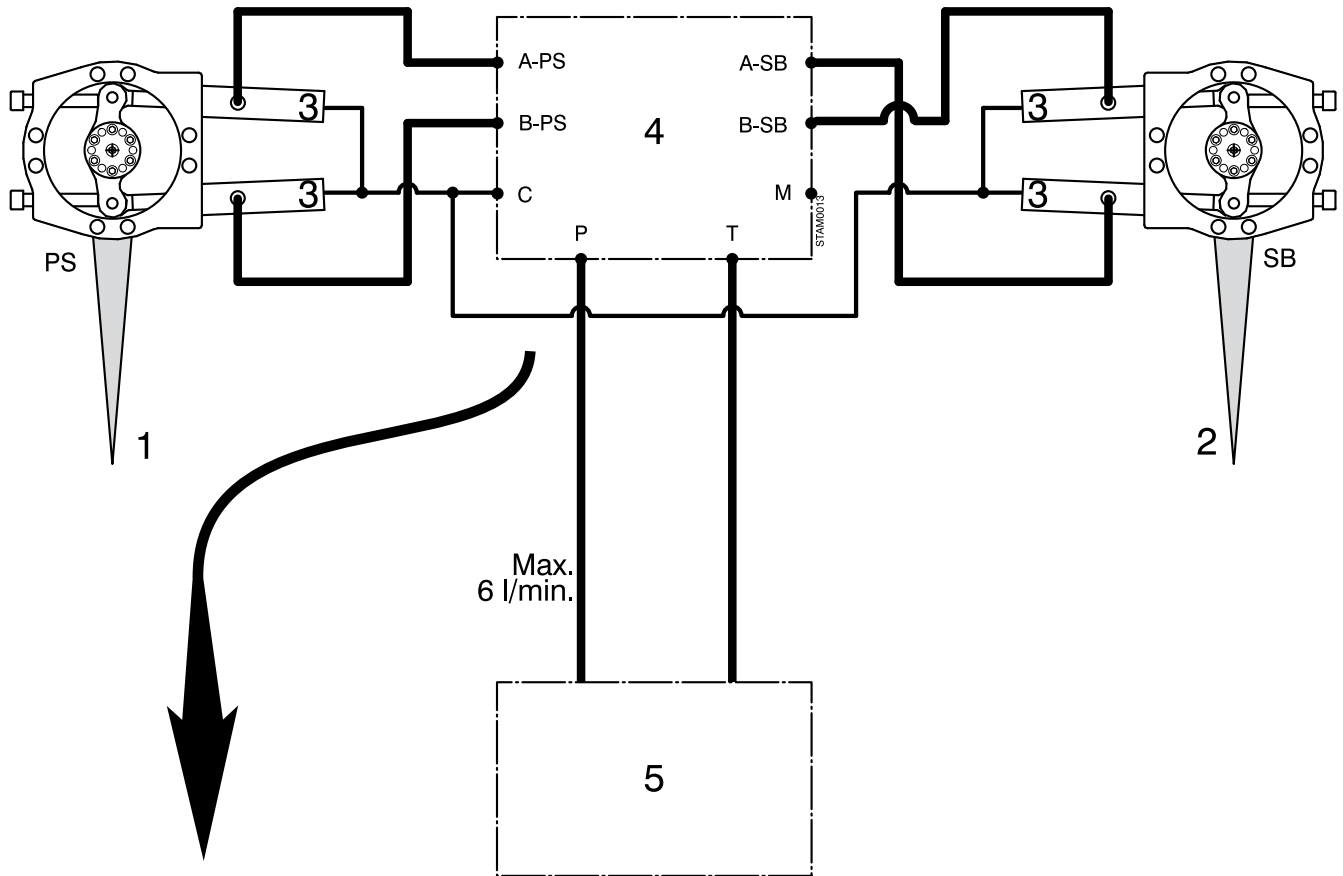
Bushes

Welded bush	: St37 / Aluminium / RVS
Laminated bush	: St37 + AISI304

Fin types

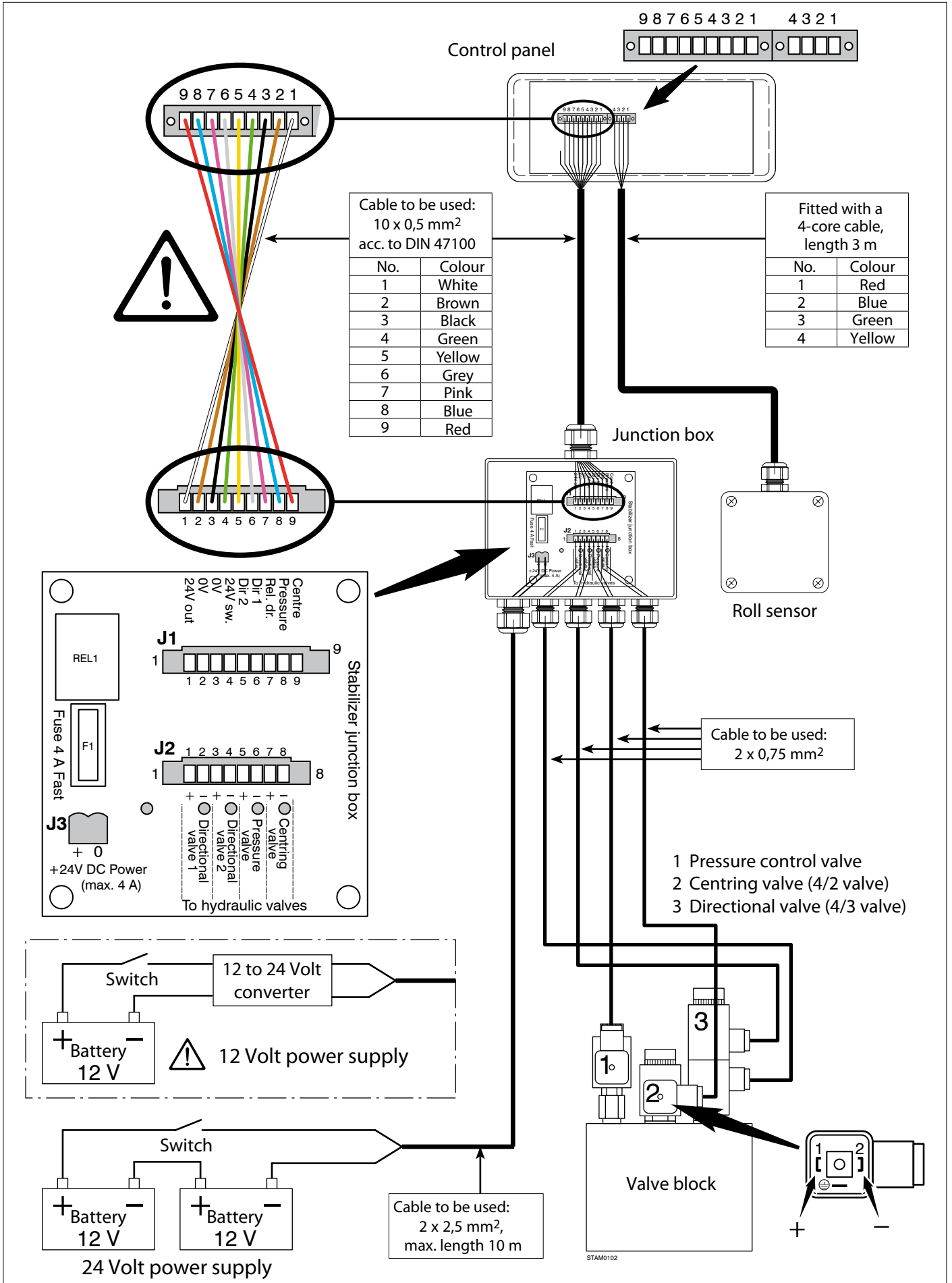
Type	: STAFIN03	STAFIN04	STAFIN05	STAFIN06	STAFIN07
Surface area (per fin)	: 0,3 m ²	0,4 m ²	0,5 m ²	0,6 m ²	0,7 m ²
Weight (per fin)	: ca. 50 kg	ca. 66 kg	ca. 82 kg	ca. 100 kg	ca. 116 kg
Maximum cruising speed	: 25 knots 46 km/hour	20 knots 37 km/hour	18 knots 33 km/hour	16 knots 30 km/hour	14 knots 26 km/hour
Material	: AISI316				
Overall fin angle	: 68°				

14 Hydraulic diagram

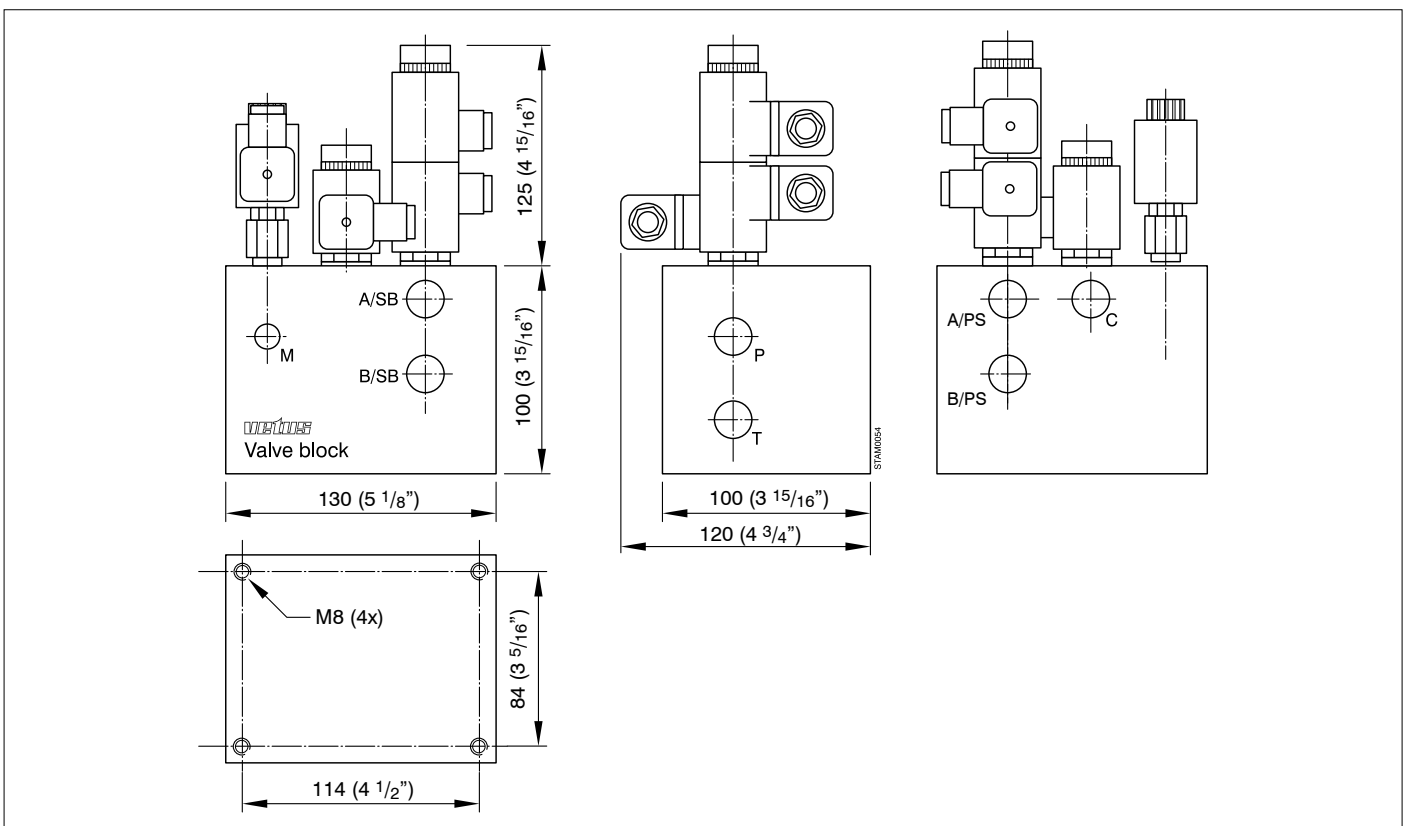
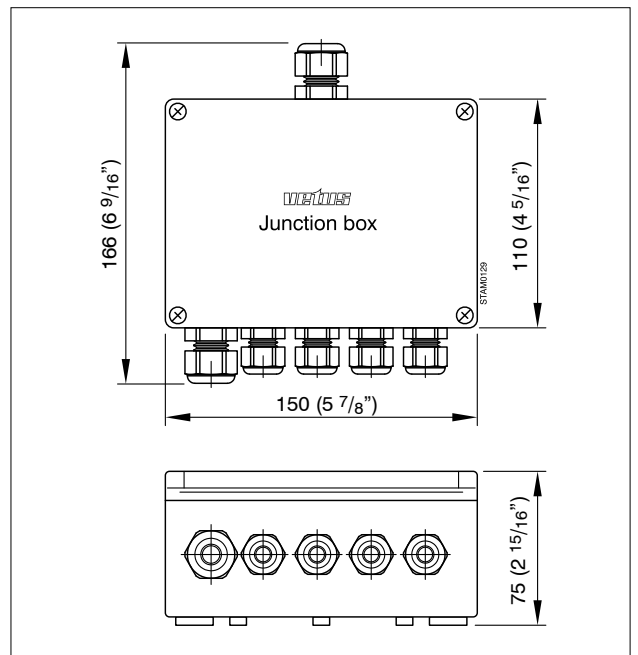
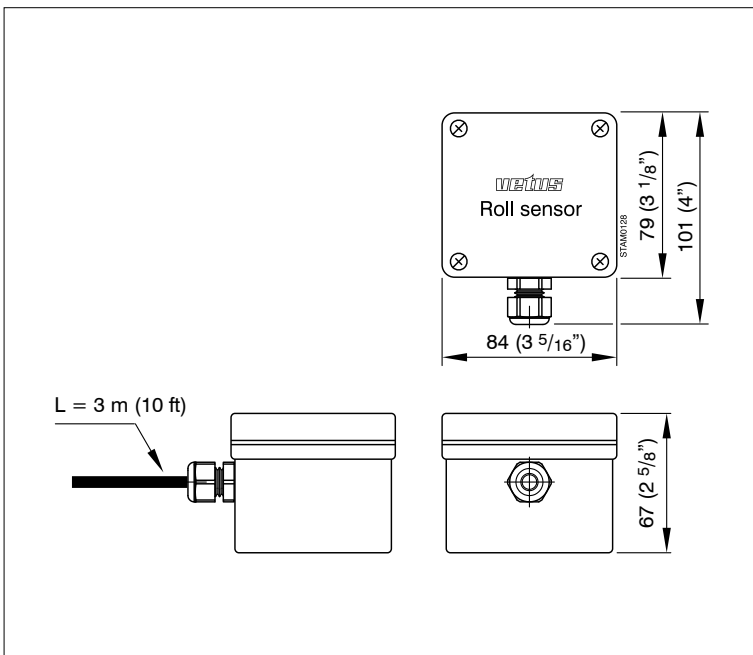
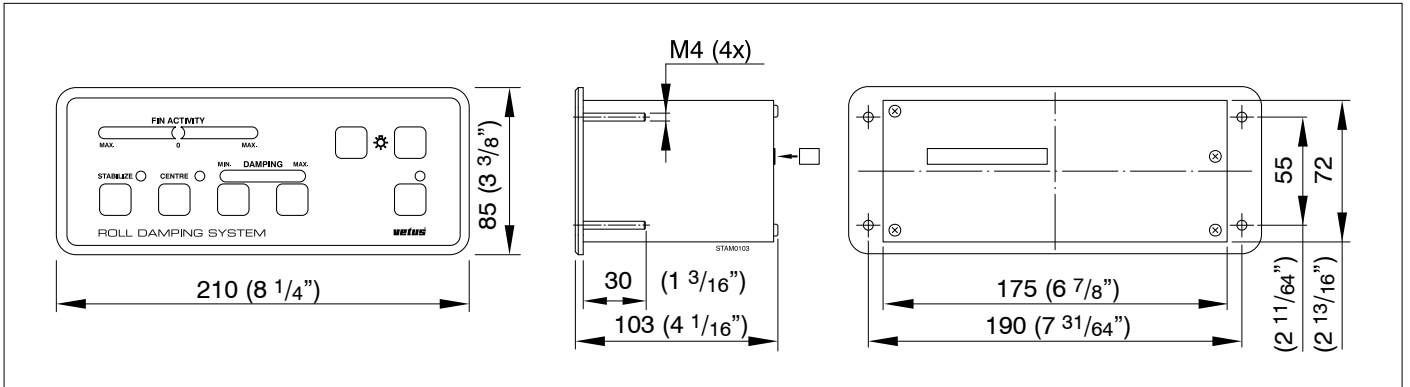


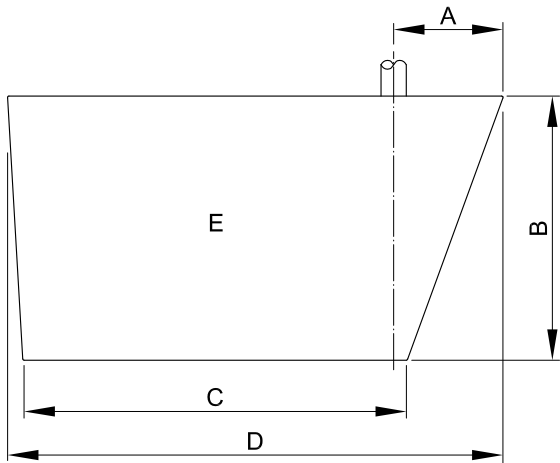
- 1 Portside fin
- 2 Starboard fin
- 3 Cylinders
- 4 Valve block
- 5 Hydraulic system

15 Wiring diagram



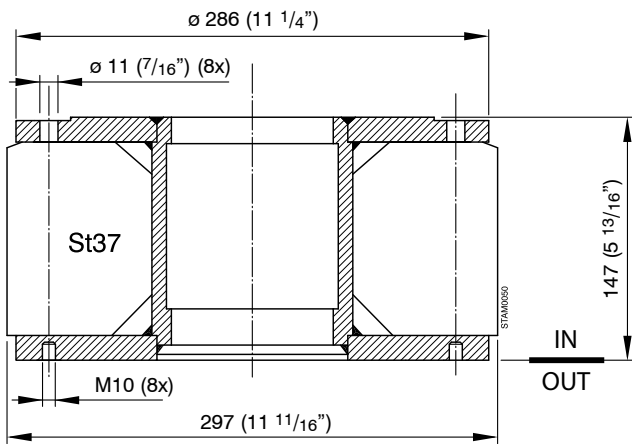
16 Main dimensions



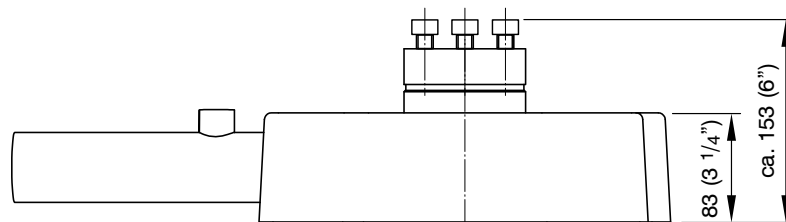
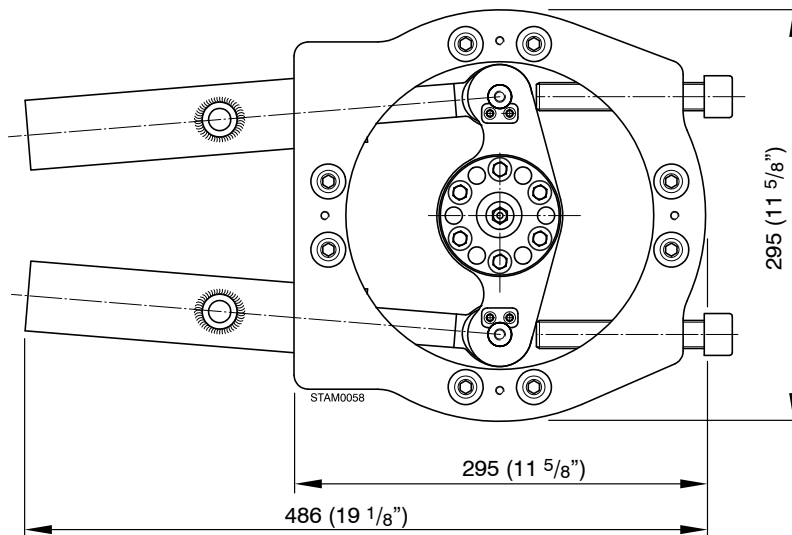
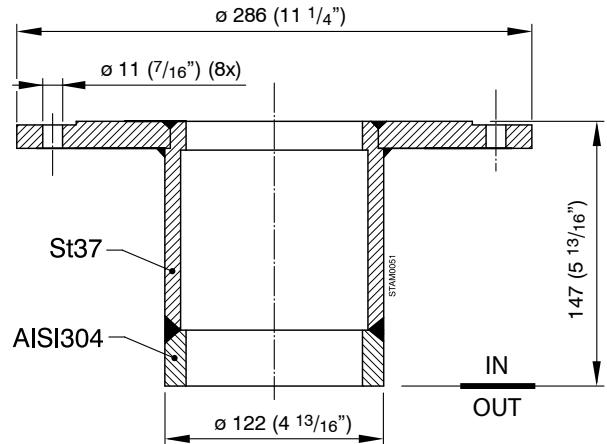


	STAFIN03	STAFIN04	STAFIN05	STAFIN06	STAFIN07
A	142 mm	176 mm	215 mm	250 mm	291 mm
	5 9/16"	6 15/16"	8 7/16"	9 13/16"	11 7/16"
B	431 mm	497 mm	554 mm	600 mm	605 mm
	16 15/16"	19 9/16"	21 13/16"	23 5/8"	23 13/16"
C	620 mm	716 mm	801 mm	873 mm	1021 mm
	24 7/16"	28 3/16"	31 9/16"	34 3/8"	40 3/16"
D	798 mm	921 mm	1024 mm	1125 mm	1318 mm
	31 7/16"	36 1/4"	40 5/16"	44 5/16"	51 7/8"
E	0,3 m ²	0,4 m ²	0,5 m ²	0,6 m ²	0,7 m ²
	3.2 sq.ft	4.3 sq.ft	5.4 sq.ft	6.5 sq.ft	7.5 sq.ft

STATHS, STATHA, STAHSST



STATHG





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