

HUMPHREE®

OPERATOR'S MANUAL

FIN AND INTERCEPTOR SYSTEM

For software versions 5.5.x

HCS-5



FOREWORDS

Congratulations to your new Humphree system!

Humphree systems provide effective solutions to enhance your vessels performance in both calm and rough water. Depending on configuration, Humphree systems can provide the following benefits and features:

- Reduced vessel resistance
- Reduced wake wash
- Increased speed and vessel range
- Easy adaptation to your specific hull shape
- Protected inboard electric servo actuators
- No environmental pollution from hydraulic oil
- Selected composite materials eliminating corrosion
- Operator control of running trim and list
- Automatic trim control
- Automatic list control
- Heel control when turning with coordinated turn
- Active damping of pitch and roll motions
- Zero speed stabilisation
- No anchor walking
- Auxiliary steering using vertical Interceptors
- Remote control or monitoring from external system

For more information, see www.humphree.com

Contents

GENERAL SAFETY INFORMATION	4
Interceptor safety information	4
Fin safety information	5
IMPORTANT NOTICES	6
THE INTERCEPTOR WORKING PRINCIPLE	6
THE FIN WORKING PRINCIPLE	6
GENERAL SYSTEM OVERVIEW	7
CONTROL FUNCTIONS OVERVIEW.	8
STARTING UP THE SYSTEM - FIRST TIME	9
TURNING SYSTEM OFF	10
Finlock Mode	11
TURNING SYSTEM ON	12
MAIN SCREEN FOR INTERCEPTOR SYSTEM.	12
MAIN SCREEN FOR FIN AND INTERCEPTOR SYSTEM.	12
How to trim the vessel.	13
Force Retract	14
Function keys (soft keys)	14
Center key	14
DIMMER	15
MANUAL TRIM	16
USING AUTO FUNCTIONS	16
Automatic Trim Control (AUTO TRIM)	16
Automatic List Control (AUTO LIST)	17
Coordinated Turn Control (COORDINATED TURN)	20
Active Ride Control (ACTIVE)	20
Zero Speed Stabilisation (ZERO SPEED)	21
Interceptor Steering Assistance (INTERCEPTOR STEERING)	24
GENERAL MENUS	26
Main Menu	26
System Information	26
License key - upgrading the system	27
Settings.	27
Alarms	30
Error Correcting Actions	30
MAINTENANCE	33
Regular maintenance	33
Annual maintenance	33
Removing the interceptor servo unit	34
Checking the interceptor shaft torque	34
Moving the interceptor blade up	34
Locking the interceptor blade	34
SERVICE NETWORK	35
APPENDIX	35

ON/OFF

MAIN SCREEN

KEYS

DIMMER

USING AUTO

ALARMS

GENERAL SAFETY INFORMATION

Installation procedures performed incorrectly could lead to personal injury, damage to the Humphree fin and interceptor System or damage to other property.

Please read the operators manual carefully before starting to operate the Humphree fin and interceptor system and pay extra attention to the safety information.

Safety information in this manual is presented in the way shown and explained below.

**WARNING!**

Failure to pay attention to a warning or follow any instructions included in the warning could lead to personal injury or death.

**IMPORTANT!**

Failure to pay attention to important information or follow an important instruction could lead to damage or malfunction of the Humphree interceptor system or other property.

NOTE!

A note contains information that will facilitate the work during the operation of the Humphree interceptor system.

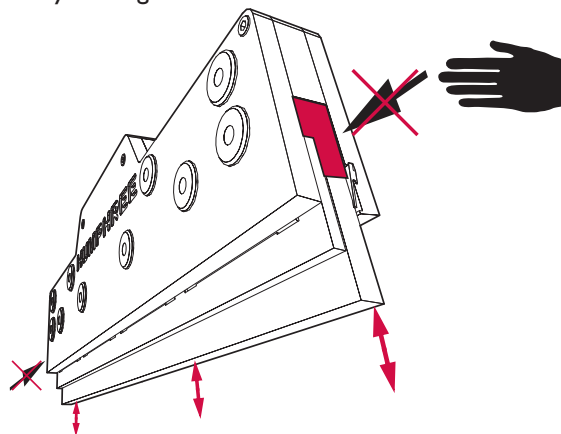
Interceptor safety information

**WARNING!**

When installing the Humphree interceptor system make sure that there is no electrical current connected to the system. (Isolate shore electrical current to the engine block, battery charger or accessories mounted on the engine.)

**WARNING!**

Sharp edges, watch your fingers.



Fin safety information

**WARNING!**

Before docking the Humphree system shall be switched off by the Humphree main switch.

**WARNING!**

Before installation or service, the electrical power to the servo units with dedicated power supply shall be switched off.

**IMPORTANT!**

Fins shall be in neutral position before the boat is lifted out of the water. The lifting device and/or struts shall be placed in such a way that the fins are not damaged.

To create a safe workplace in the area around the fins it is recommended to have an enclosed area of at least 1.5 x fin length 360° around the fin.

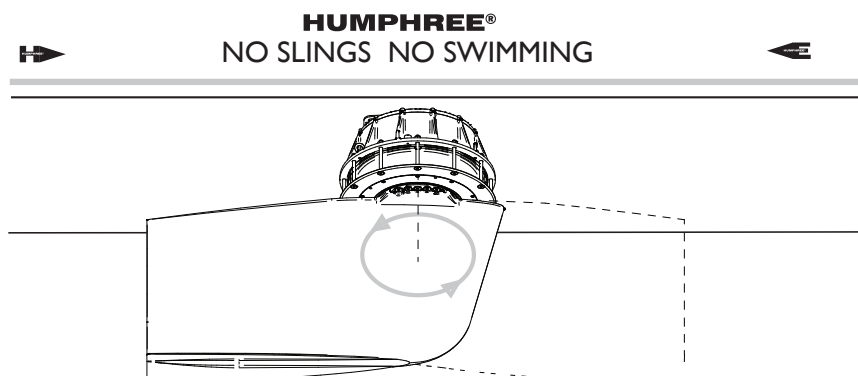
**WARNING!**

There is a risk of being squeezed between the fin and the hull when working in the area of the fin, work with caution in the area around the fins.

**WARNING!**

When the fins are enabled in zero speed mode they are rotating. Swimmers must stay away from the fins due to the risk of injury.

For safety around the vessel, make sure the installer has applied appropriate warning signs prominently on the hull above the waterline above each fin.

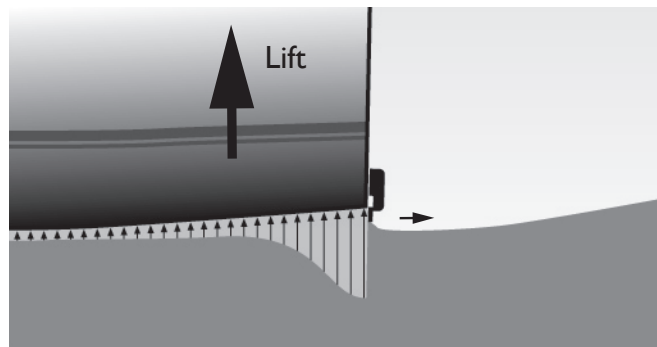


IMPORTANT NOTICES

- The information in this document is the property of Humphree and may not be copied or communicated to a third party, or used for any purpose other than that for which it is supplied, without the express written consent of Humphree. This information is given in good faith based upon the latest information available to Humphree, no warranty or representation is given concerning such information, which must not be taken as establishing any contractual or other commitment binding upon Humphree or any of its subsidiary or associated companies.
- If this manual is lost or worn, see www.humphree.com or contact your local Humphree dealer.
- The contents of this manual and equipment specifications are subject to change without notice.
- All illustrations in this manual are schematically correct but may not be exact copies of the corresponding equipment on your vessel.
- The screens shown in this manual may not match in detail the screens you see on the display. The screens you see depends on software versions, system configuration and system settings.
- Humphree will assume no responsibility for damage caused by improper use or modification of the fin and interceptor system parts, or claims of loss of profit by a third party.
- The fin and interceptor systems are protected by patent.

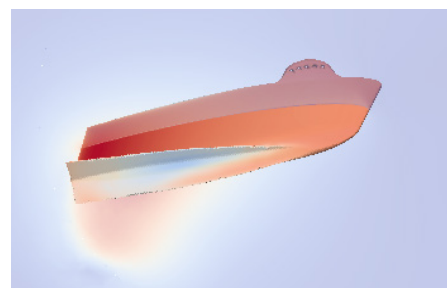
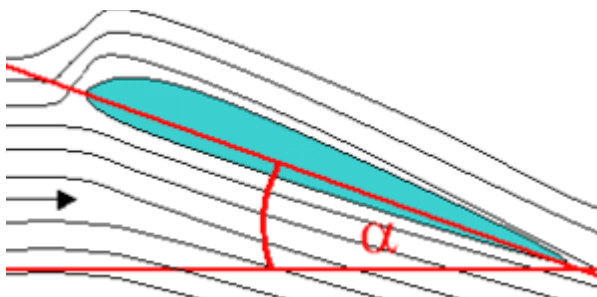
THE INTERCEPTOR WORKING PRINCIPLE

The fundamental working principle of an interceptor is to generate an increase in pressure on the hull bottom plate directly ahead of the transom by intercepting the flow with a blade. The blade only has to extend a few millimetres below the transom edge to substantially raise the pressure over a large area. This results in a high hydrodynamic lift. The lift of the interceptor is superior to any other transom-mounted lifting device. This makes it a most suitable device for providing forces to optimise running trim and actively dampen vessel motion.



THE FIN WORKING PRINCIPLE

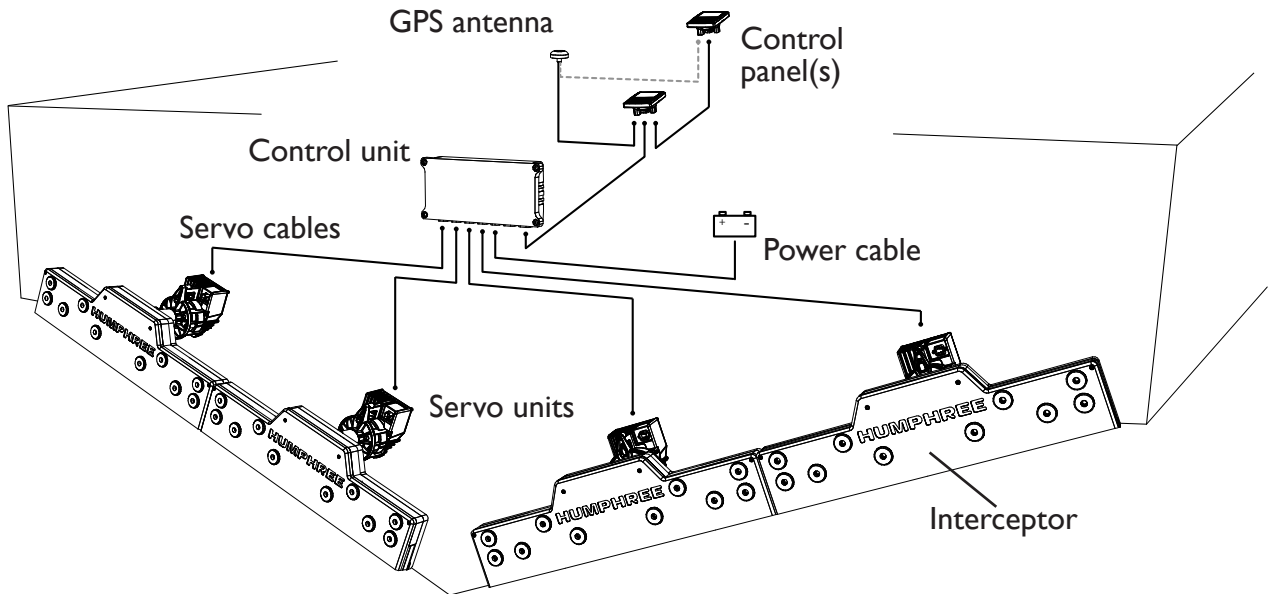
As the vessel makes speed through the water, the water moves along the fin body. If the fin is given an angle of attack the fin creates a lifting force acting on the vessel to reduce vessel motions.



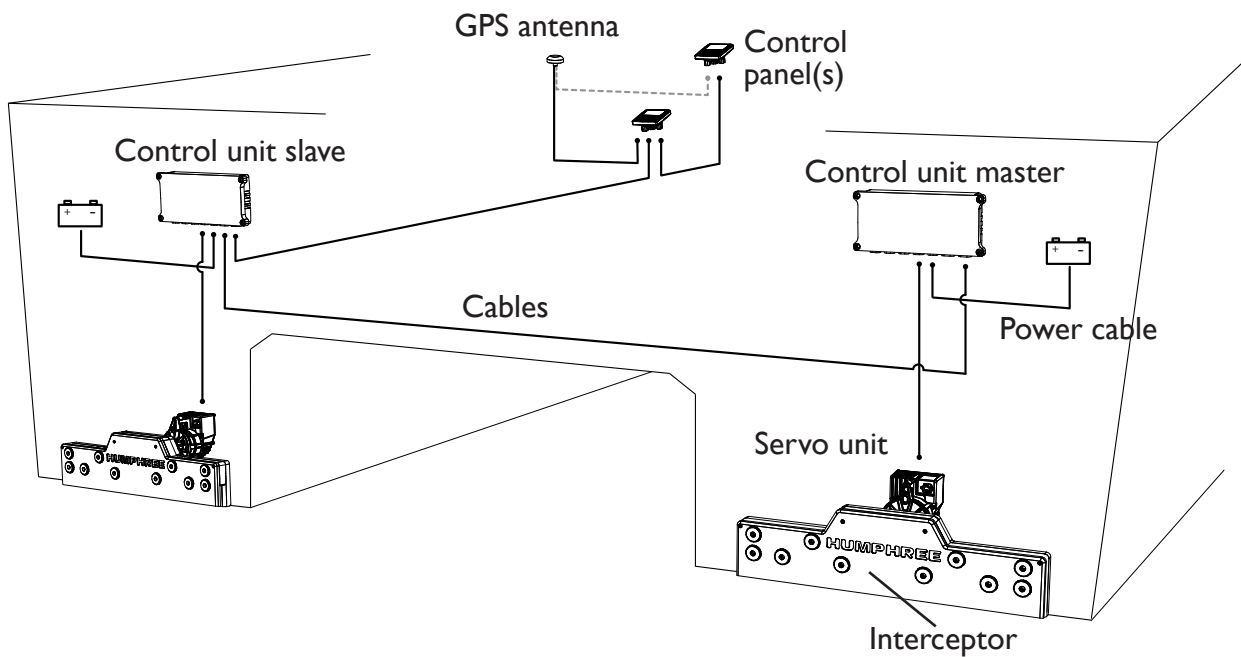
To reduce roll motion when the vessel is stationary or moving at speeds below 4 knots, fins do a strong paddle to counteract each wave induced roll motion and this will result in reduced roll motions onboard the vessel.

GENERAL SYSTEM OVERVIEW

General system overview: monohull



General system overview: catamaran



ON/OFF

MAIN SCREEN

KEYS

DIMMER

USING AUTO

ALARMS

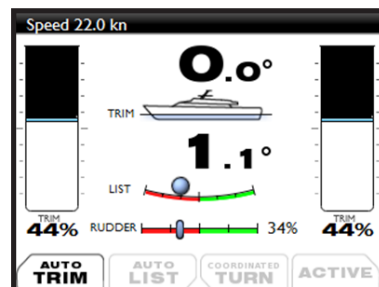
CONTROL FUNCTIONS OVERVIEW

Depending on the system in your vessel, different control functions are available on the control panel main screen and menu options. Each selected function is shown in the bottom of the main screen.

MANUAL TRIM

With the automatic functions turned off, manual trim will let the operator manually change the trim and list of the vessel by deploying or retracting the interceptors. The large and intuitive trim and list indicators will present the angles in real time.

A GPS antenna is connected to the system, and the vessel speed is shown top left in the status bar.



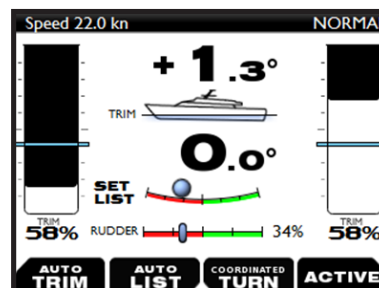
AUTOMATIC TRIM CONTROL (AUTO TRIM)

Automatic trim control adds automatic adjustment of the vessel trim to provide optimum running trim for highest speed and lowest fuel consumption. The operator can manually adjust the trim and list of the vessel by deploying or retracting the interceptors and/or fins.

AUTOMATIC LIST CONTROL (AUTO LIST)

Automatic list control provides automatic correction of vessel list, normally caused by wind or uneven loading. "Set list" shall normally be even keel (0°).

Auto list will automatically adjust the vessel to run at the set list angle. The function automatically activates at 10 knots and above and will keep the vessel at the set list angle when running straight forward.



COORDINATED TURN CONTROL (COORDINATED TURN)

Coordinated turn control automatically adjusts the heeling angle of the vessel during turns to reduce the side forces for people on board.

The vessel's turning ability is significantly improved as a result of the interceptor steering force.

A rudder input bar is additionally shown on the main screen.

ACTIVE RIDE CONTROL (ACTIVE)

With the Humphree active ride control the interceptors and/or stabilising fins are instantly actuated to provide lift which counteracts vessel motions and at the same time optimises the running trim and list angle - all in one system. The system includes a ride control unit (RCU) which consists of an advanced digital controller with unique control algorithms and an advanced sensor package which uses a combination of GPS, gyros and accelerometers to evaluate the motions of the vessel.

ZERO SPEED CONTROL

Zero speed control reduces roll motion when the vessel is not moving. The function can be used when the boat is at anchor as well as unanchored.

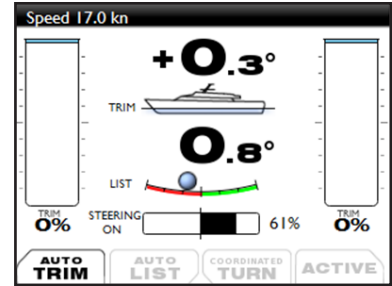
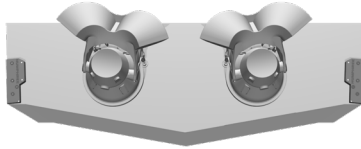
When the vessel speed is below 3 knots, zero speed control is available if the vessel has stabiliser fins installed.



INTERCEPTOR STEERING ASSISTANCE (INTERCEPTOR STEERING)

The interceptor steering assistance, enhance the water jet steering by deploying interceptors and keeping the water jet thrust undeflected for small steering commands. For larger steering commands a combination of interceptors and water jet deflection will result in increased steering force and reduced turning radius.

The steering interceptor position bar is seen in the main screen when installed.



STARTING UP THE SYSTEM - FIRST TIME

Once the system is installed, perform the following steps to get the system up and running:

- 1) Turn on the power to the Humphree system (main switch and fuses).

If the **calibration needed** screen is shown in the control panel then see chapter “servo calibration” in this manual.

The system can not be operated until all servos have been successfully calibrated.

When the servo units have been calibrated the system will start up normally.

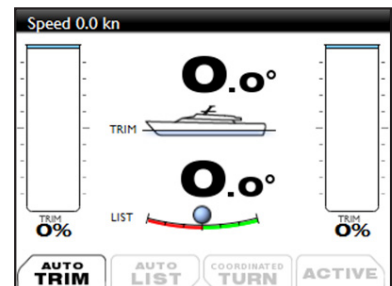


- 2) Check GPS signal.

Verify that the GPS signal is received properly. Either a Humphree GPS antenna or a connection to an NMEA2000® network can be used.

On the control panel, check that the speed indication top left on the main screen shows a speed value. A value near 0,0 knots should be seen when at dock

If the text “Waiting for GPS Fix” is shown instead of a speed, the connection is OK but the GPS is still searching for satellites.



If no information is shown top left, see chapter “troubleshooting” in this manual.

- 3) Check trim and list angle indication.

The trim and list angle should be set when the vessel is on even keel. After calibration the indicators in the control panel will show the vessels true trim and list value.

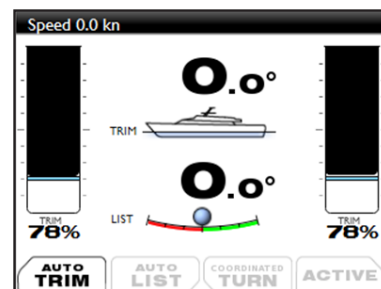
If the displayed angles do not appear to be accurate see chapter “trim and list angle calibration” .

(Angles should be close to 0.0° when the vessel is floating at even keel and no heel, at zero speed)

- 4) If interceptors are installed, press the trim forward key to deploy the interceptors.

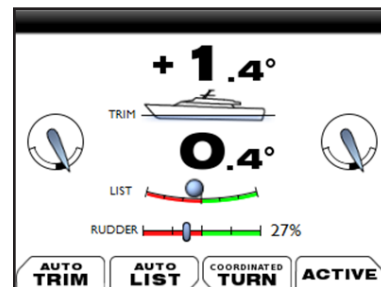
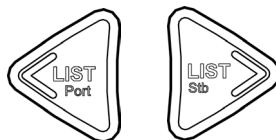


The black bars will move down indicating how much the interceptors are deploying.



If fins are installed, press the list port or starboard key to angle out the fin. The fin angle will be indicated in the display.

Now press both List keys for one second. Interceptors will fully retract, and fins will return to neutral. This feature is called force retract. See chapter “control panel keys” in this manual.

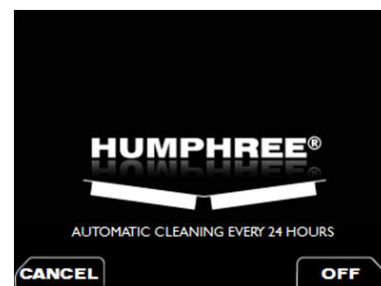


- 6) Now the System is up and running. Please read more about the keys, main screen, features of the control functions and the cleaning function.

TURNING SYSTEM OFF

When the system is turned off all interceptors will fully retract, and all units enter a standby mode with lowest electrical power consumption. A cleaning function will be activated every 24 hours. This will avoid marine growth when the vessel is not operated for a while.

The Humphree system is turned off when the engines are turned off, if the system is connected to a remote key switch. See remote key switch cable installation in the Installation Manual.



If a key switch is not installed, the system is turned off by pressing and holding down the “exit” key for more than 1 second. In the turn off menu, press function key “off” to turn off the system. Interceptors will retract, fins will go to neutral positions, and the system will go into standby mode.

IMPORTANT!



When the system is turned off from the control panel or by remote key switch the system enters into standby mode until the next cleaning cycle is activated. The cleaning cycle is important to keep the mechanical parts free from marine growth and avoid getting jammed. However the standby mode consumes 120mA per control panel it adds up to 21A in a week. So it is important to charge the batteries continuously to avoid draining the batteries.

If the system is turned off by main switches it has no power and the cleaning function cannot be performed!

In case the boat has no continuous battery charging and is not able to keep the battery capacity with the system consumption of 120mA per control panel or 21A in a week. It is our recommendation to install a circuit breaker to the humphree system and disconnect the system from the batteries when the boat is moored for a longer period. This will disable the cleaning function so it is important that the interceptor blades are completely retracted into the interceptor housing.

NOTE!

The cleaning function is by default on. To deactivate the cleaning function, see chapter “cleaning” in this manual.

Finlock Mode

The finlock mode assures that the fins hold their neutral position when the control system is in standby mode.

NOTE!

If finlock is not selected in standby mode the power supply to the fin servo electronics with the servo position controller is disabled. The fins move freely with the water flow.

Entering standby mode with finlock mode

On the control panel, press and hold the “exit” key until the “Enter standby mode” page appears.

Press “Fins lock” for finlock mode.

Press “OK” to save power if finlock mode is not requested.

A predicted power consumption in mAh per day is displayed on the confirmation page.

Press “Yes” to activate finlock mode

**IMPORTANT!**

Do not activate finlock mode without battery charging!

The system now enters standby mode with finlock.

Finlock mode is displayed and the fins hold their neutral position until the system is switched back on.

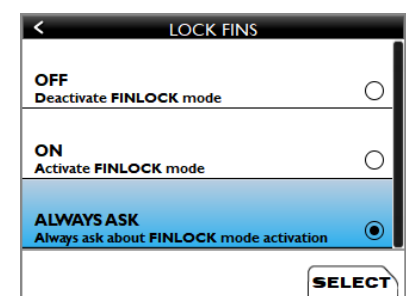
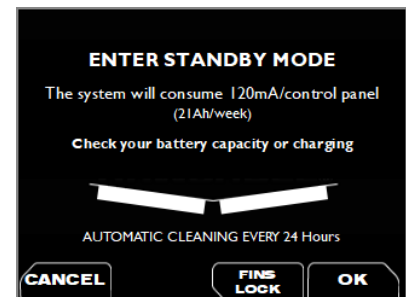
Finlock mode setup

Navigate to Menu / Settings / Fins Lock to change the activation procedure of finlock mode.

Upon delivery, the system is set to “always ask” for activation of finlock mode as described above.

It can be selected to always enter Finlock without questions by selecting “On”. If “On” is selected, finlock will be activated every time the control system is switched to standby.

Finlock mode can be disabled by selecting “Off”. This requires access code.



TURNING SYSTEM ON

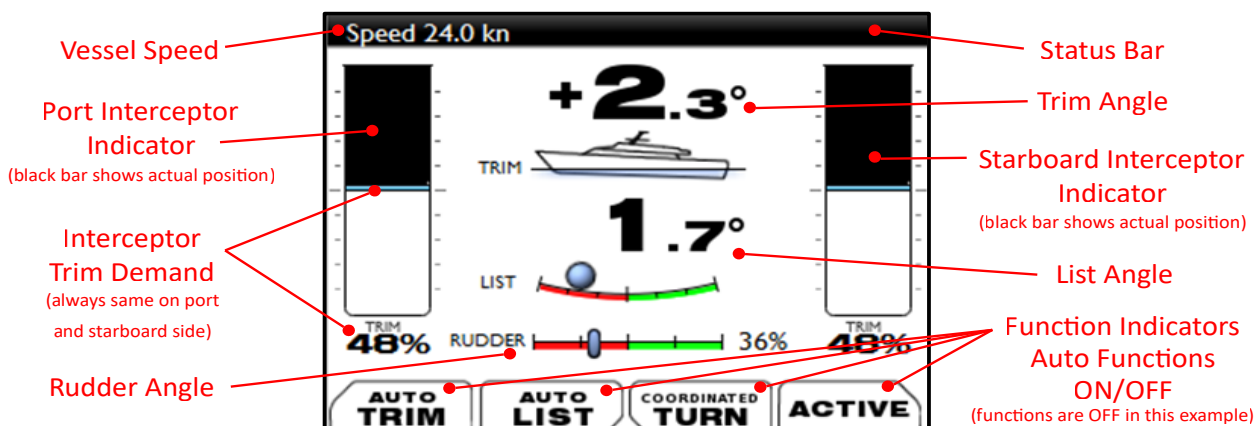
The system is turned on when the remote key switch is switched on.

If the Humphree system is not connected to a remote key switch, press the EXIT/Power key until the system is turned on.



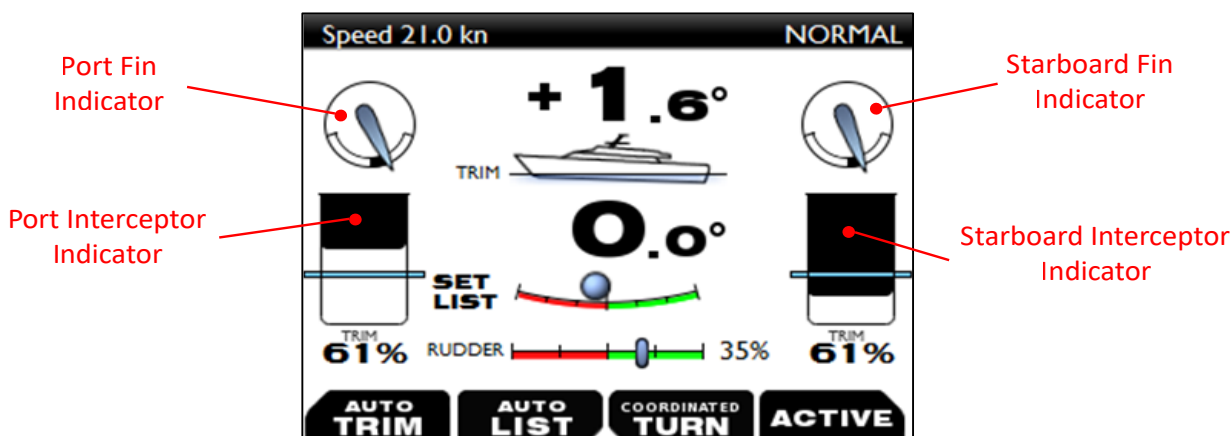
MAIN SCREEN FOR INTERCEPTOR SYSTEM

The following example of the main screen shows a configuration with interceptors and the control functions “auto trim”, “auto list”, “coordinated turn” and “active ride control”.



MAIN SCREEN FOR FIN AND INTERCEPTOR SYSTEM

The following example of the main screen shows a configuration with roll stabilising fins and interceptors, and the control functions “auto trim”, “auto list”, “coordinated turn” and “active ride control”.



CONTROL PANEL KEYS

This chapter acquaints you with the basic key functions of the control panel.



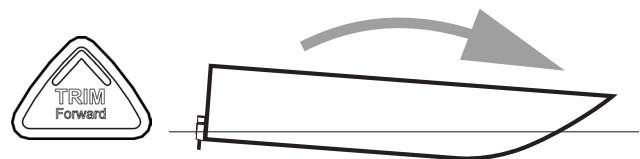
How to trim the vessel

Manual trim and list using the following keys can only be done when the main screen is shown.

Trim forward (bow down)

Both port and starboard interceptors deploy simultaneously and the bow of the vessel will trim down.

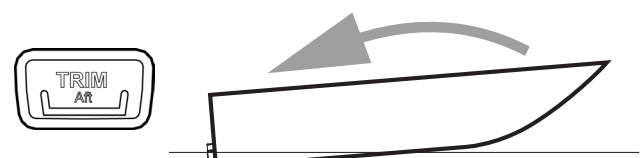
This key also navigates up in menus.



Trim aft (bow up)

Both port and starboard interceptors retract simultaneously and the bow of the vessel will trim up.

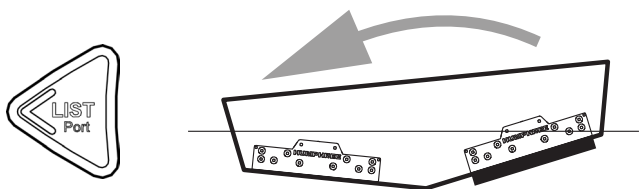
This key also navigates down in menus.



List to port

Port side interceptors retract, starboard interceptors deploy, and fins rotate counter clockwise to make the vessel list to port.

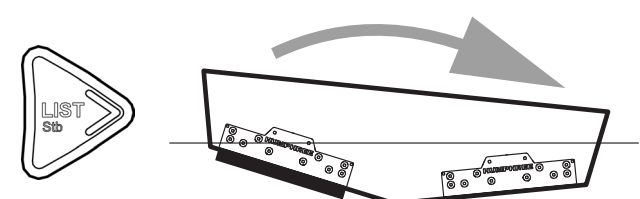
This key also navigates back to previous menu.



List to starboard

Starboard side interceptors retract, port side interceptors deploy, and the fins rotate clockwise to make the vessel list to starboard.

This key also navigates into menus.

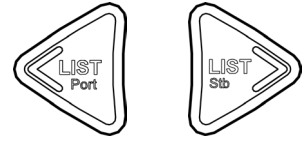


Force Retract

Available only when main screen is displayed.

Press the port and starboard list keys for one second to turn all automatic functions off, rapidly retract the interceptors and rotate the fins to neutral.

The function can for example be used when meeting a large wave of an approaching vessel.



Function keys (soft keys)

The function soft keys changes depending on which menu is active. In the main screen the function keys turn on and off each function individually.



ENTER key (Menu)

The enter key opens the menu screen, enters sub menu screens and turns on and off specific functions.



EXIT/Power key (On/Off/Dimmer)

On main screen a short press enters dimmer popup screen. See chapter “dimmer” in this manual for more information. When in menus, a short press exits to the main screen.

Two seconds press enters turn off menu.



Center key

In specific Humphree systems there are more than one view available on the main screen, displaying different information.

If more than one view is available, a page indicator is displayed above the function soft keys.

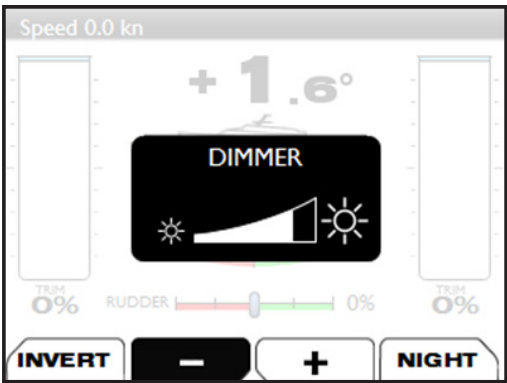


The center key is used to change the main screen view.



DIMMER

In the main screen press and release the exit button. A dimmer popup menu will appear and the four function buttons will change.

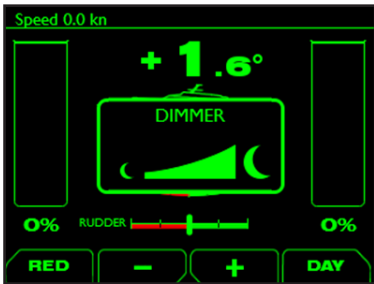
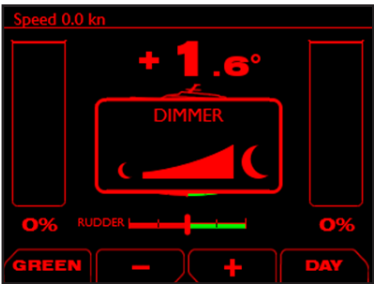
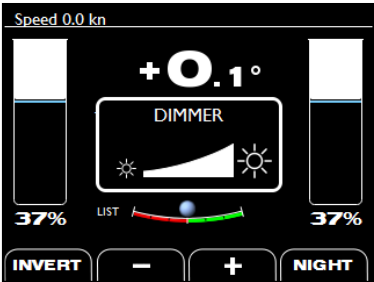
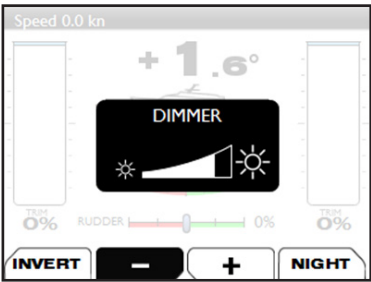


INVERT / RED or GREEN: Changes the background between white and black in day mode or between red and green in night mode.

- : lowers the dimmer light.

+ : increases the dimmer light.

NIGHT / DAY: switches between night and day screens.



ON/OFF

MAIN SCREEN

KEYS

DIMMER

USING AUTO

ALARMS

MANUAL TRIM

The manual trim will let the operator manually change the trim and list of the vessel.

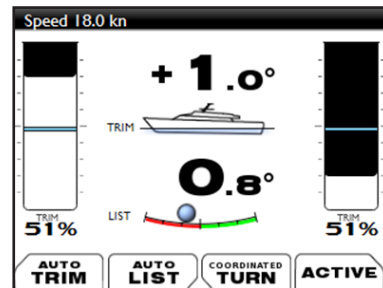
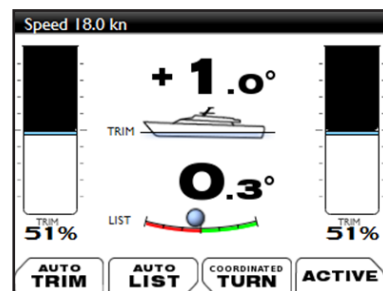
With the trim keys the operator adjusts the trim angle of the vessel by deploying or retracting all interceptors.

The total amount of trim is indicated by a blue line inside the interceptor indicator, and in percent below the indicator.

The black bars indicate actual interceptor positions on port and starboard side.

Using the list keys the operator adjusts the list angle by deploying the interceptors on one side, and retracting on the opposite side.

The total amount of trim will be kept unchanged, but the black interceptor bars will separate from the blue trim lines.



USING AUTO FUNCTIONS

Automatic Trim Control (AUTO TRIM)

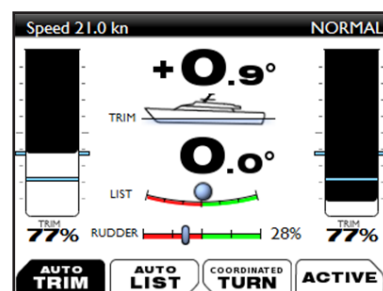
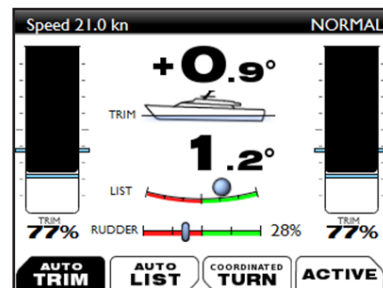
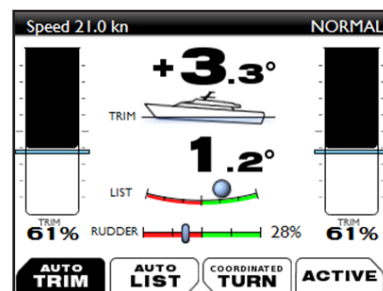
Auto trim control continuously adjusts the interceptors for optimum vessel trim (interceptor deployment) depending on the vessel speed. There are four different user curves that can be used for different load conditions of the vessel.

Recommended use:

Normally auto trim should be switched on.

To turn automatic trim control on/off press the “auto trim” function key in the main screen.

The blue trim lines are extended to indicate the interceptor deployment applied by the auto trim function. The black bars indicate actual interceptor position.



When auto trim is on, the captain can adjust a manual trim offset using the trim forward or trim aft key to compensate for different load conditions.

The inner blue line will separate from the outer blue lines, to indicate the total amount of trim.

When auto trim is on, the captain can adjust a manual list offset using the list port or list starboard key to compensate for different load and/or side wind conditions.

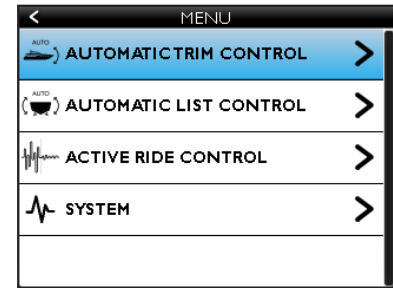
The inner blue lines will retain its position and still indicates total trim. The black bars will separate from the blue lines.

NOTE!

If speed (GPS) signal is lost, automatic trim control is automatically switched off. The interceptors will keep their positions according to the last known speed, and can be manually adjusted while the speed signal is absent.

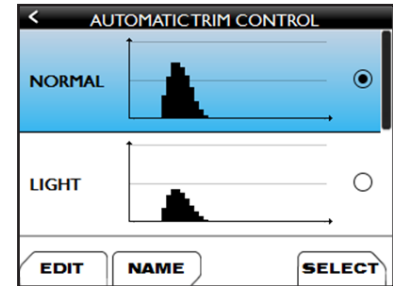
AUTO TRIM SETTINGS

In the main menu, scroll to “automatic trim control” and press “enter” to open the menu.



There are four auto trim curves that can be setup depending on load conditions.

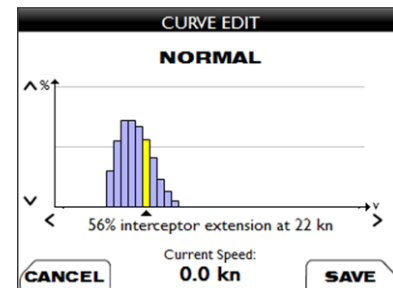
Navigate to the desired curve with the trim forward and trim aft keys, then press “select” to activate that curve.



The curves can be manually edited. Press “edit” to enter the “curve edit” menu.

Auto trim calibration is normally done during initial sea trials.

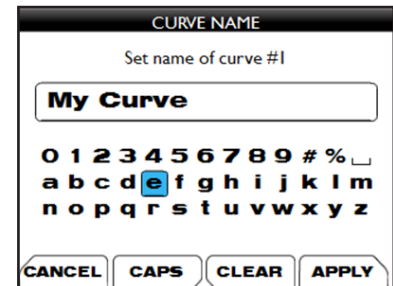
Use the list keys to move the cursor to the desired speed and then use the trim keys to change the interceptor deployment at this speed.



Save the curve by pressing “save”.

The name of the curve can be changed by pressing “name” to enter the “curve name” menu.

Use “clear” to delete the old name, then enter the desired name and press “apply”.



Automatic List Control (AUTO LIST)

May not be available in your system. Contact HUMPHREE for information of purchase.

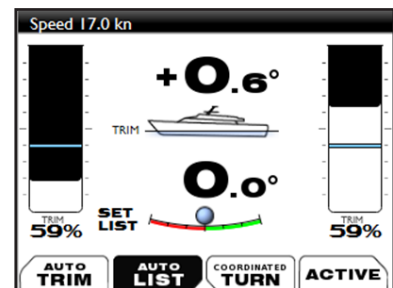
Automatic list control will automatically adjust the vessel's running list angle to compensate for cross winds or asymmetric load conditions.

Recommended use:

- Normally auto list should be switched on.

To turn automatic list control on/off press the “auto list” function key in the main screen.

Auto list starts working when the speed of the vessel is above 10 knots. The actual list angle will then be replaced by the “set list”.

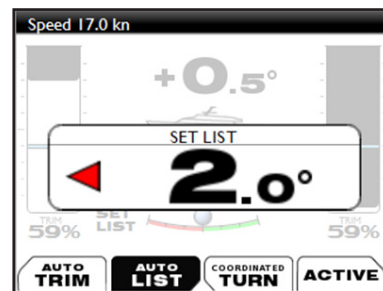


Set list is the desired heel angle of the vessel. Normally set list shall be 0.0° for running at even keel.

It is possible to manually use the list keys to change the desired set list from port 4° to starboard 4°.

Recommended use:

- To reduce slamming in quartering head sea, use set list to make the bow cut the waves.



Auto list settings

SENSITIVITY

The sensitivity setting can be increased for faster list control if the compensation is considered slow when the boat enters a new load condition or wind angle.

If the vessel starts to roll back and forth when running in calm waters, the sensitivity value is set too high. Then lower the value.

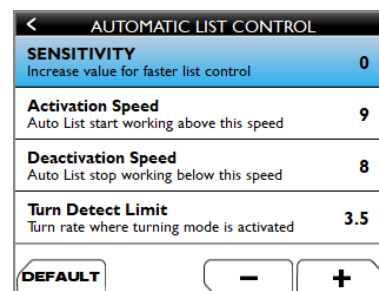
The range of Automatic List Sensitivity is from -20 to 10. Default value: 0.

NOTE!

If speed (GPS) signal is lost, automatic list control is automatically switched off. The list offset will slowly adjust to 0.

NOTE!

The list angle calibration will effect the performance of auto list. See chapter "trim and list angle calibration" in this manual.



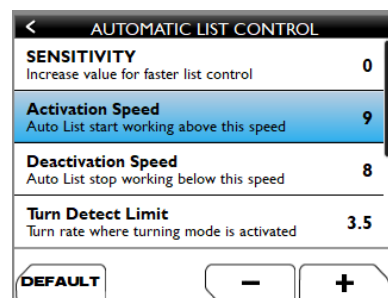
ACTIVATION/DEACTIVATION SPEEDS

The speed when Auto List starts compensating can be increased or decreased.

The deactivation speed should always be set 1-2 knots below the activation speed.

NOTE!

If the boat is fast accelerating it is not recommended to decrease the speeds lower than the default settings.



The range of Activation Speed starts at 6 knots and can be increased without limit. Default value: 9 knots

The range of Deactivation speed starts at 5 knots and can be increased without limit. Default value: 8 knots.

Access code is required to change Activation / Deactivation Speeds.

TURN DETECT / TURN EXIT LIMITS

The interceptor system enters a turning mode when the turn rate of the boat exceeds the turn detect limit [degrees/s]. The Turning mode allows the boat to heel inwards at tighter turns.

If it feels like the boat is heeling outwards in the beginning of turns, try lowering Turn Detect Limit.

Turn Exit Limit should always be set to a value 1-2 below Turn Detect Limit.

The range of Turn Detect Limit is 1-25 degrees/s. Default value: 3.5.
(values above 10 available only to disable turning mode.)

The range of Turn Detect Limit is 0.5-24.5 degrees/s. Default value: 2.5.
(values above 10 available only to disable turning mode.)

Access Code is required to change Turn Detect / Turn Exit Limits.

< AUTOMATIC LIST CONTROL	
Deactivation Speed Auto List stop working below this speed	8
Turn Detect Limit Turn rate where turning mode is activated	3.5
Turn Exit Limit Turn rate where turning mode is deactivated	2.5
True Turn Compensation Increase value to heel boat inwards in a weak turn	2
<div> <div>DEFAULT</div> <div>-</div> <div>+</div> </div>	

TRUE TURN COMPENSATION

If it feels like the boat is leaning outwards throughout weak turns, try increasing True Turn Compensation.

At setting 0 the boat strives to go flat throughout the turn.

NOTE!

True Turn Compensation has no impact in sharper turns, i.e. when the turn rate has exceeded Turn Detect Limit.

The range of True Turn Compensation is 0 to 10. Default value: 2.

Access Code is required to change True Turn Compensation.

< AUTOMATIC LIST CONTROL	
Turn Detect Limit Turn rate where turning mode is activated	3.5
Turn Exit Limit Turn rate where turning mode is deactivated	2.5
True Turn Compensation Increase value to heel boat inwards in a weak turn	2
Deactivation Ramp Speed Increase for faster activation of turning mode	15
<div> <div>DEFAULT</div> <div>-</div> <div>+</div> </div>	

DEACTIVATION RAMP SPEED

The activation of Turning Mode is controlled by this ramp time. The ramp time defines how fast the interceptors may move in percent per second when entering Turning Mode.

Most boats work very well with the default setting.

For boats with tight turning radius the value can be increased to enter turning mode faster.

The range of Deactivation Ramp Speed is 5 to 25. Default value: 15 %/s.

Access Code is required to change Deactivation Ramp Speed.

< AUTOMATIC LIST CONTROL	
Turn Detect Limit Turn rate where turning mode is activated	3.5
Turn Exit Limit Turn rate where turning mode is deactivated	2.5
True Turn Compensation Increase value to heel boat inwards in a weak turn	2
Deactivation Ramp Speed Increase for faster activation of turning mode	15
<div> <div>DEFAULT</div> <div>-</div> <div>+</div> </div>	

ON/OFF

MAIN SCREEN

KEYS

DIMMER

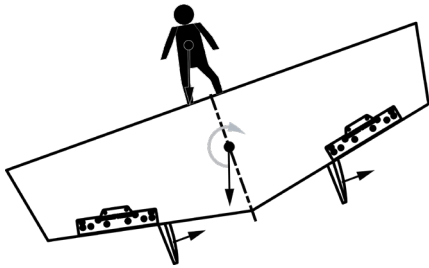
USING AUTO

ALARMS

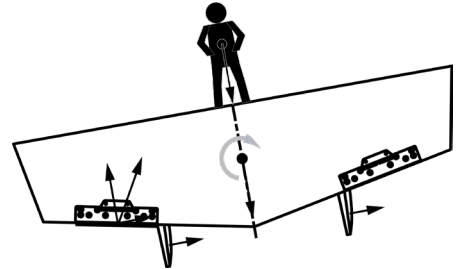
Coordinated Turn Control (COORDINATED TURN)

May not be available in your system. Contact HUMPHREE for information of purchase.

Without Coordinated Turn



With Coordinated Turn



Recommended use:

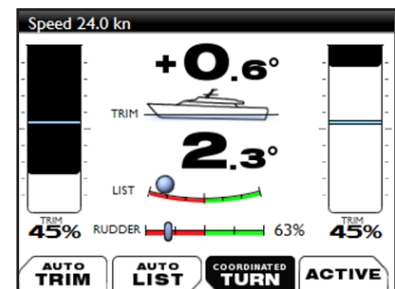
- Normally coordinated turn control should be switched on.

To turn coordinated turn control on/off press the “coordinated turn” function key in the main screen.

Coordinated turn calibration is normally done during initial sea trials.

NOTE!

If speed (GPS) signal or the rudder input signal is lost, coordinated turn control is automatically switched off.



Active Ride Control (ACTIVE)

May not be available in your system. Contact HUMPHREE for information of purchase.

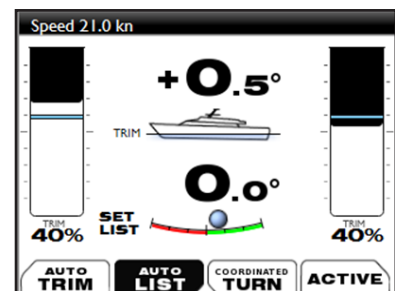
Active ride control will automatically dampen pitch and roll motions to compensate for induced wave motions.

To turn active on/off press the “active” function key in the main screen. When active is on, the interceptors and/or fins will dampen the vessel motions.

Recommended use:

- Calm seas:**
Auto list turned on
Active turned off

Read also chapter “automatic list control”.

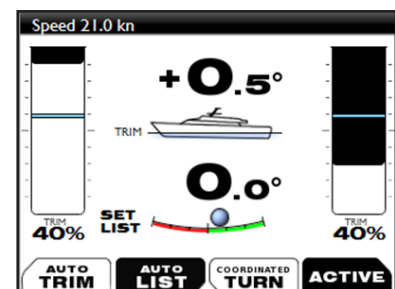


- Medium and rough seas:**

Auto list turned on
Active turned on

With auto list and active on the system will strive to keep the vessel on even keel. This may result in less roll damping because part of the force is used to keep the vessel even keel.

For catamaran hulls it is recommended to switch auto list off when active is on. Read also chapter “automatic list control”.



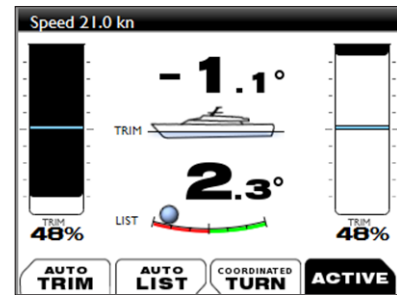
- Maximum damping:**

Auto list turned off

Active turned on

For maximum damping force, turn auto list off. The system will use full force to dampen roll & pitch motions.

The system will then not strive to keep vessel at even heel, but instead use all force for damping.

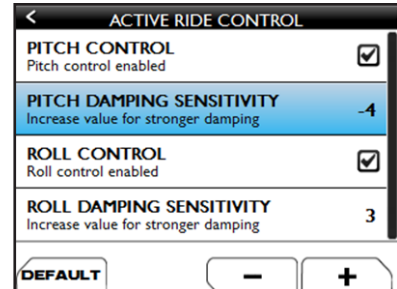


ACTIVE SETTINGS

Normally “pitch control” and “roll control” should be on.

- If strongest possible pitch damping is preferred, turn roll control off or increase “pitch damping sensitivity”.
- If strongest possible roll damping is preferred, turn pitch control off or increase “roll damping sensitivity”.

The pitch or roll sensitivity can be adjusted from -20 to +20. A low sensitivity will make the system use less interceptor or fin force to reduce vessel movements. A high sensitivity applies more force and creates the most effective damping, but not necessarily the most comfortable ride. Too high sensitivity might even create a tendency of the vessel rolling back and forth, in which case the sensitivity should be reduced.



NOTE!

The list angle calibration will effect the performance of auto list. See chapter “trim and list angle calibration” in this manual.

Zero Speed Stabilisation (ZERO SPEED)

May not be available in your system. Contact HUMPHREE for information of purchase.

The zero speed function can be activated when the speed is below 3 knots. The captain must confirm the activation of the function on the control panel.

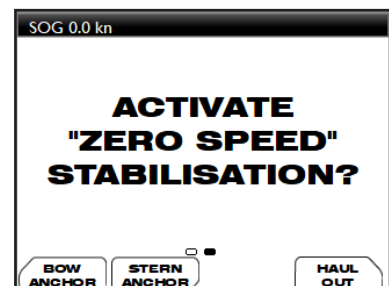
When the vessel speed has decreased below 3 knots the zero speed activation page is shown on the control panel.

To activate the function

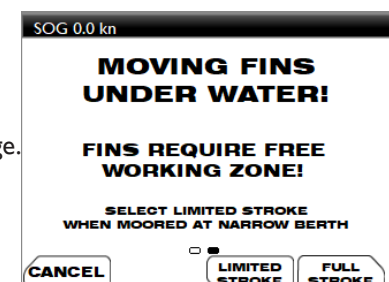
To prevent anchor walking the correct anchor mode should be selected, in order to keel the anchor line tightened:

- Press “stern anchor” if the vessel is anchored at stern.
- Press “bow anchor” if the vessel is anchored at bow. The fins will rotate 180° towards the keel and operate from there.

If the vessel is not at anchor, either button can be pressed to activate the function.



At the Stroke Selection Page “Limited Stroke” or “Full Stroke” can be selected. Select the requested stroke. The control panel will switch to the confirmation page.



Using full stroke

The captain must be sure that it is safe to engage the function before confirming activation with **"YES"**.



WARNING!

- At any uncertainty about safety around the vessel, the captain must abort the activation with **"NO"**.
- If the vessel is moored close to a dock or other vessels, the captain must abort the activation with **"NO"**.



Using limited fin stroke

Limited Fin Stroke can be used with Zero Speed Control, if it is important that the fins never swing beyond the hull side.

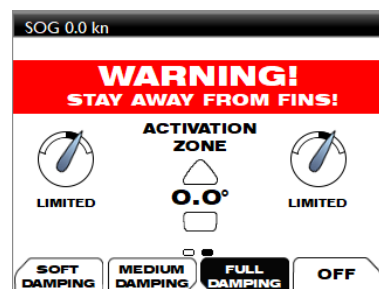
The maximum fin angle can be adjusted in a separate menu. The default stroke is 30 degrees. Please refer to Setup Manual for instructions.

It is recommended to use limited stroke when the boat is moored at a narrow berth.

Confirm the activation of selected stroke with **"YES"** or abort with **"NO"**.



If limited stroke has been selected "Limited" is indicated below the graphical presentation of the fin.



Using full, medium and soft damping

When the activation is confirmed, zero speed control will start damping the vessel motion.

The zero speed function has three operation modes: "soft", "medium" and "full damping." At full damping the fins are operated at maximum speed to create the most effective damping. In medium and soft mode the fins will react slower to vessel motions.

The desired operation mode is selected with the function keys.

The activation zone of the zero speed function can be adjusted by pressing the trim keys. When the activation zone is increased, the vessel roll must be above the selected angle before the motion is dampened.

Recommended use:

- Select "full damping" for the most effective damping with fastest response
- Select "medium damping" in calmer conditions
- Select "soft damping" and increased activation zone at night



To deactivate the function: Press “off” and the fins will return to neutral and stop moving.
When the speed exceeds 4 knots, the system will automatically switch zero speed control off and return to the previously selected control functions.

Haul out fin park mode

The Haul Out Fin Park mode can be used to park the fins perpendicular to the hull while the boat speed is below 2.2 knots and the control system is in running mode.

The fins can be parked pointing towards the keel or pointing outwards from the hull.



IMPORTANT!

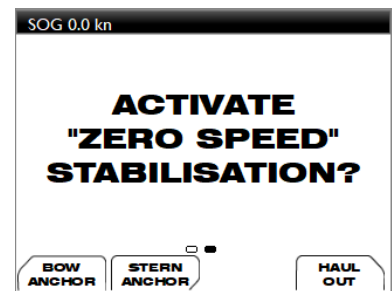
The Haul Out Fin Park mode will not hold the selected fin position if the control system is in standby mode or if the power supply is turned off, or if the boat speed increases above 2.8 knots.

USING HAUL OUT FIN PARK MODE

The activation button for Haul Out Fin Park mode is located bottom right at the Zero Speed Activation Page.

This page is shown when the boat speed is below 2.2 knots.

Press the “Haul Out” button to access the Haul Out Fin Park options.



Press “Hull Side” to park the fins pointing outwards from the hull.

Press “Keel” to park the fins pointing towards the keel.



After the button is pressed the control panel switches to the confirmation page.

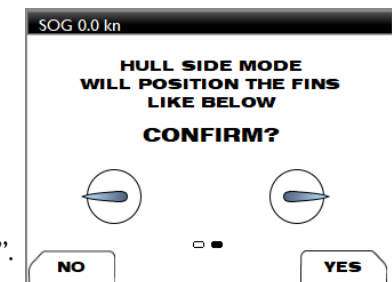
At the confirmation page it is indicated what position the fins will take with the selected park position.



IMPORTANT!

The fins will not move until the selection is confirmed. Make sure that it is safe for the fins to move before confirming!

Confirm the selected park position by pressing “YES” or abort by pressing “NO”.



If the park position is aborted the fins will not move.

After confirmation the fins will move to the selected park position.



RESETTING THE FINS

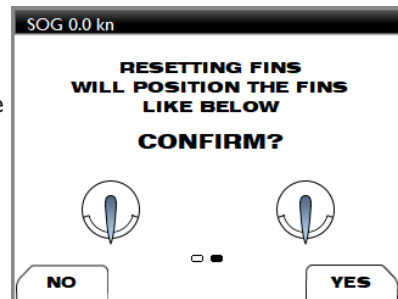
Press "Reset Fins" to deactivate Haul Out Fin Park Mode

At the confirmation page it is indicated what position the fins will take when the fins are reset.



IMPORTANT!

The fins will not move until the selection is confirmed. Make sure that it is safe for the fins to move before confirming!



Confirm the reset by pressing "Yes" or abort by pressing "No".

If the park position is aborted the fins will not move.

After the reset if confirmed the fins will move to neutral position.

The control panel switches back to the Zero Speed Activation Page.

NOTE!

The fins are automatically reset if the boat speed increases above 2.8 knots.



Interceptor Steering Assistance (INTERCEPTOR STEERING)

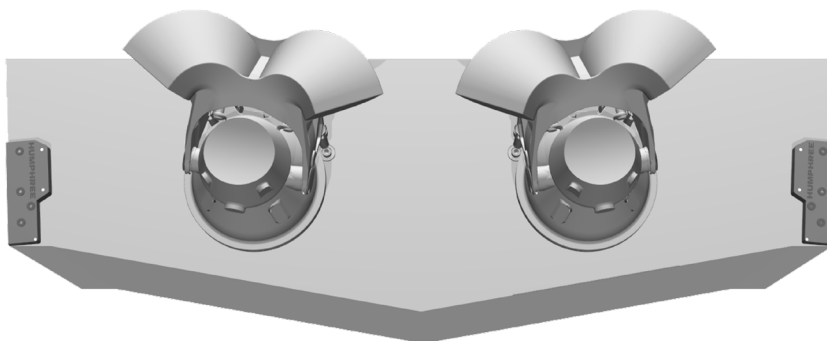
May not be available in your system. Contact HUMPHREE for information of purchase.

Water jet powered vessels experience significant power losses when deflecting the complete thrust force to steer the vessel. These power losses result in higher fuel consumption and speed loss during course corrections, but with Humphree "interceptor steering assistance" this can be avoided. An interceptor can generate a steering force with significantly less power loss than by deflecting the jet thrust flow.

A system with transom interceptors and the steering assistance function in combination with water jet propulsion, enables more efficient steering during navigation and autopilot operation. For larger steering commands a combination of interceptors and water jet deflection will result in increased steering force and reduced tactical turning diameter.

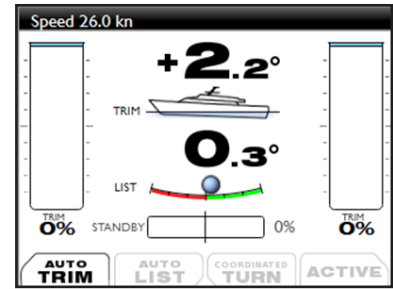
Interceptor steering results in a faster response to a steering command, giving a straighter course, improved fuel economy, better control, increased comfort and less wear of the water jet steering gear. The system can easily be integrated with autopilots and water jet system, and can also be used as in an emergency steering backup mode for increased safety.

The steering force from the Humphree steering interceptor typically corresponds to a bucket deflection of between 5 and 15 degrees. For larger steering commands the water jet buckets will start to deflect and the interceptors will contribute with increased steering force at speed high speeds.



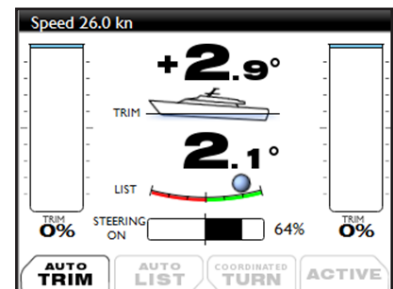
The interceptor steering assistance is usually setup to be controlled by an external system.

When interceptor steering is not requested by the external system, “standby” is indicated next to the steering bar on the control panel.



When interceptor steering is requested by the external system, “steering on” is indicated.

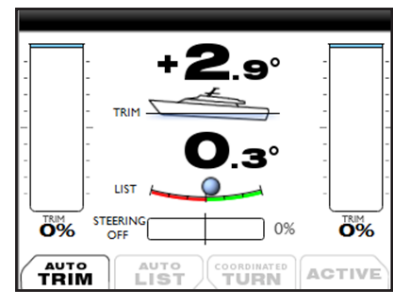
The steering bar in the control panel will show the position of the steering interceptors.



NOTE!

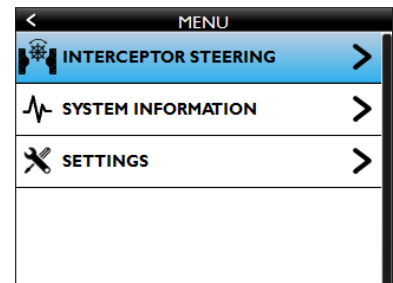
If speed (GPS) signal or the rudder input signal drops out interceptor steering is automatically switched off.

“Steering off” is indicated on the control panel.

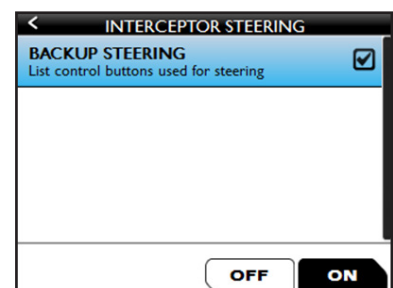
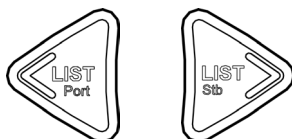


Backup Steering

If the main steering control system has failed, the interceptors can be separately operated from the Humphree control panel at speeds where the interceptors provide some steering force. This will give the vessel an option to manoeuvre.



When backup steering is enabled, use the list port and starboard keys steer with the interceptors.



ON/OFF

MAIN SCREEN

KEYS

DIMMER

USING AUTO

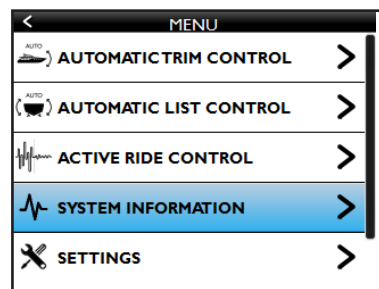
ALARMS

GENERAL MENUS

Main Menu

In the main screen, press the “enter/menu” key.

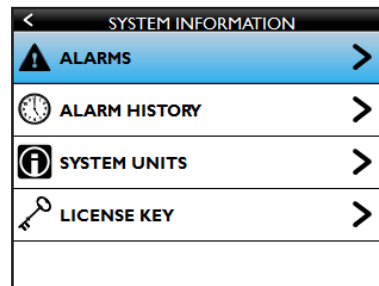
Press “list port” to get back to the previous page or “exit” to go back to main screen.



System Information

Navigate to “system information” and press “enter” or “list starboard” key.

To return to the main screen, press the “exit” key at any time.



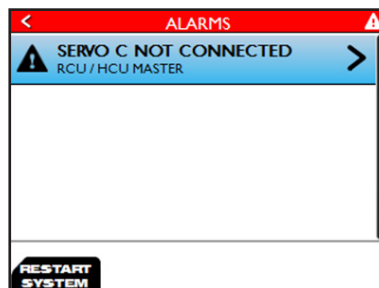
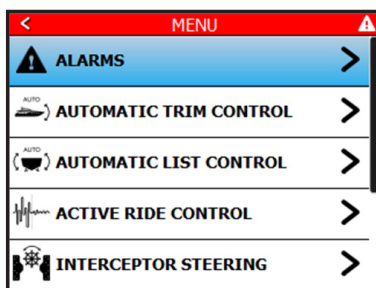
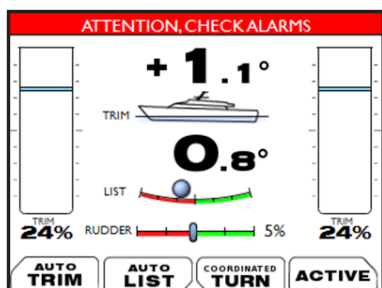
Alarms

If an alarm is present, the information bar in the main screen will turn red.

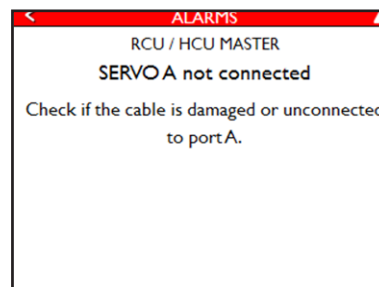
The alarm menu will be shown at the top of the main menu page. Press “enter” or “list starboard” to enter the alarm menu.

In the alarm menu, error information of the present alarm will be shown.

An error is indicated by a heading and description.



Navigate to any alarm and press the enter key to open the error description page where further instructions are given. See Trouble Shooting for more information.

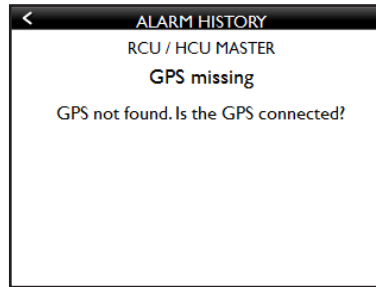
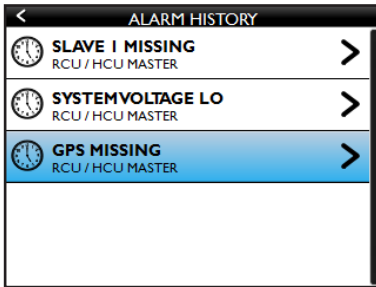


When an alarm has been checked and solved press “restart system”. If the alarm is still present see chapter “trouble shooting” in this manual.

When an alarm is cleared it is moved to the “alarm history” menu.

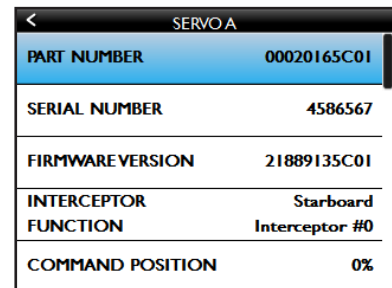
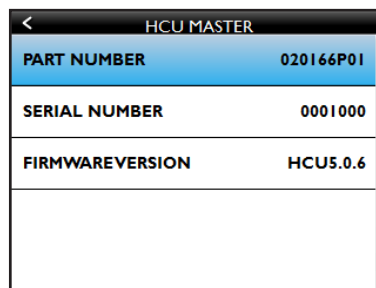
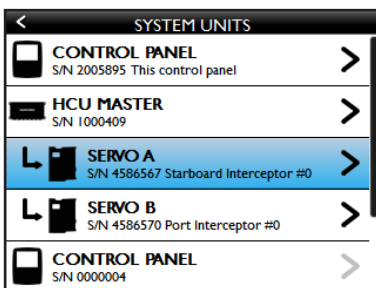
Alarm History

Alarms that are not active are stored in the alarm history.



System Units

The system units menu will list all the units found in the system. Each unit will list specific information.



All serial numbers should be written down in the warranty form that is sent to Humphree.

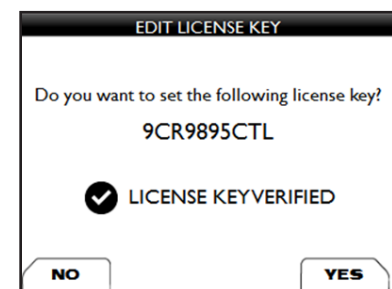
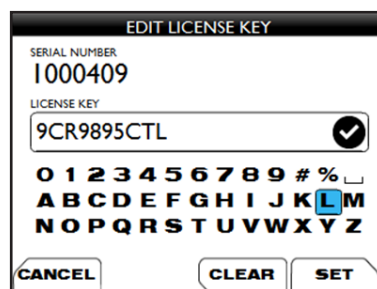
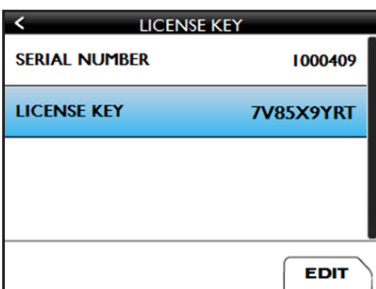
License key - upgrading the system

When an upgrade with additional control functions is purchased a new license key will be provided. The license key is installed with the control panel.

Navigate to “system information / license key” and press “edit”.

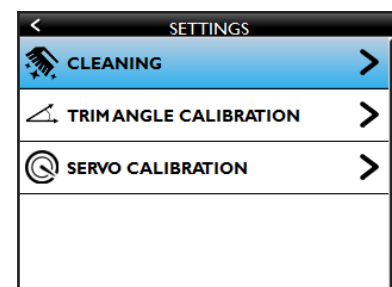
Before starting the procedure, write the old license key down in case the system needs to be restored.

Erase the old key with “clear”. Enter your new license and press “set”, then confirm with “yes”.



Settings

Under the “settings” menu, changes can be made to the system.



Cleaning

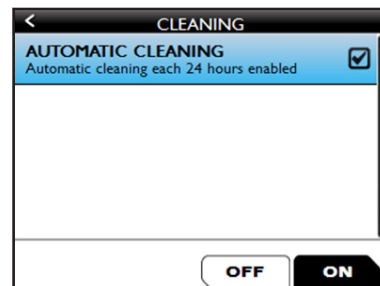
Cleaning is used to remove any initial marine growth from the interceptors when the vessel is not in use. The function is by default enabled, and is activated when the system is turned off, see chapter "turning system off" in this manual.

In the "cleaning" menu cleaning can be enabled and disabled.



WARNING!

If the cleaning function is on the interceptors will make a full stroke every 24 hours. Make sure people are clear from the interceptors.



The interceptor system's cleaning function should always be used when the vessel is not used for longer periods of time. When the system is turned off, the system will start to clean after 24 hours. The cleaning function will exercise the interceptors every 24 hours, removing any initial marine growth from the interceptor blades. The screen will indicate that cleaning is being performed.

To disable the cleaning function go to menu "settings / cleaning" and press "off". This is recommended if the vessel is taken out of the water.

NOTE!

Power supply (breaker or main switch) to the system must be switched on for the cleaning to function.

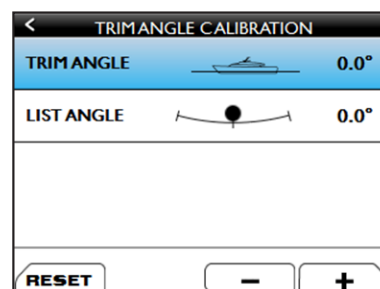
Trim and List Angle Calibration

The trim and list angles should correspond to the true angles of the vessel.

If possible ballast the vessel so the vessel is at even keel.

Navigate to the "settings / trim angle calibration" menu to set zero angles for the trim and list indication.

Press "reset" for the trim / list angle to be set to zero.



If it is not possible to ballast the vessel and the vessel is leaning to one side or to the bow then the trim and list angles can be fine tuned by pressing the plus (+) or minus (-) function keys.

For the trim angle, the angle will increase if the bow is raised. If the vessel floats lower in the aft press the plus (+) key to change the indicator so it represents the true angle. If uncertain of how many degrees the vessel is leaning start with one degree and watch the angle when the vessel is running to see if it is accurate.

For the list angle, the angle will increase when the vessel is leaning to the starboard side. If the vessel is floating with a static port list, then press the minus (-) key to change the indicator so it represents the true angle. If uncertain of how many degrees the vessel is leaning, start with one degree and watch the angle when the vessel is running.

NOTE!

This calibration will effect the functionality of automatic list control and active ride control.

Servo Calibration

The servo units will deploy and retract the interceptors to find their end positions.



WARNING!

The vessel must be at zero speed when performing a calibration. The interceptor deployment can cause undesired vessel movements.

Open the menu and navigate to “settings /servo calibration”

Enable servo calibration by pressing “on” and then navigate to “calibrate servos”.

Press “run” and the servos will calibrate.

NOTE!

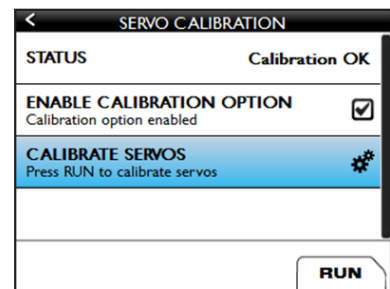
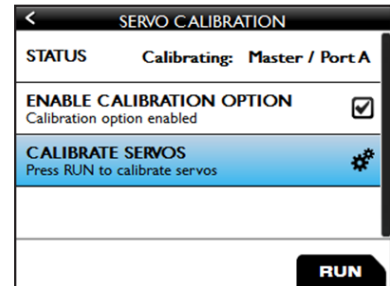
If the servos have been dismounted for any reason a new calibration must be performed.

When all servos have been calibrated the STATUS will read OK.

Press EXIT to go to the main screen.

NOTE!

The servo units for stabilising fins are not automatically calibrated. See instruction in the setup manual.



ON/OFF

MAIN SCREEN

KEYS

DIMMER

USING AUTO

ALARMS

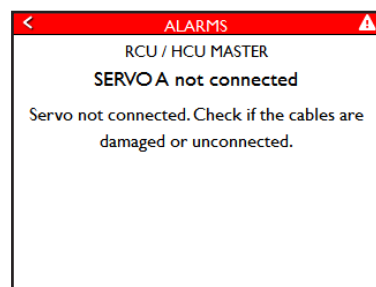
TROUBLE SHOOTING

Alarms

An alarm is presented by a header and an instruction in the alarm page.

Ex: *GPS not found. Is the GPS connected?*

Follow the instructions to clear the alarm.



Error Correcting Actions

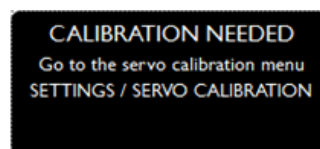
If the error correcting action does not help, please contact Humphree Service, see www.humphree.com for service network.

For mounting/dismounting the servo unit and checking the interceptor shaft torque, see chapter Removing the Servo Unit and Checking the Shaft Torque.

POPUP SCREENS

If the control panel shows a popup menu CALIBRATION NEEDED:

1. See chapter STARTING UP THE SYSTEM.



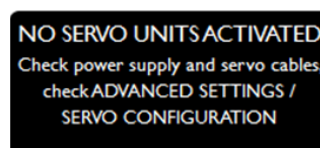
If the control panel shows a popup menu COMMUNICATION ERROR:

1. The panel starts up but there is no communication to HCU/RCU.
2. Check all connectors and cables.
3. Connect the termination plugs in the last control panel and the last control unit on both ends of the control bus. See cable installation and connection diagram in the Installation Manual.



If the control panel shows a popup menu NO SERVO UNITS ACTIVATED:

1. The servo units are disconnected or not properly configured.
2. Check that all servo units are electrically connected. Check the power supply of servo units with separate power supply.
3. See chapter SERVO CONFIGURATION in the Setup Manual.



ALARMS

If the system indicates **Servo # stuck**:

1. Remove the servo unit which is connected to port #. Do not remove the servo cable.
2. Perform a servo calibration (see chapter Servo Calibration) and check that the servo unit shaft is rotating. (Ignore alarm **SERVO # no end stop detected**)
3. Check the rotation of the interceptor shaft. The shaft should be able to be rotated 100°. If less than 100° something is blocking the stroke. If the shaft can be rotated more, then the interceptor parts must be checked.
4. See chapter Checking the shaft torque. If higher than 12 Nm, the interceptor unit must be checked, cleaned or re-installed. Do not proceed until the interceptor shaft torque is below 12 Nm.
5. Mount the servo unit to the interceptor.
6. On the control panel, navigate to the calibration menu and start calibration of the servo units.
7. Restart the system.



If the system indicates **Servo # calibration error** or the **Servo # calibration torque high**:

1. Turn off the interceptor System power.
2. Remove the cable from servo unit connected to port #.
3. Dismount the servo unit from the interceptor.
4. Check the rotation of the interceptor shaft. The shaft should be able to be rotated 100°. If less than 100° something is blocking the stroke. If the shaft can be rotated more, then the interceptor parts must be checked.



5. See chapter Checking the shaft torque. If higher than 12 Nm, the interceptor unit must be checked, cleaned or re-installed. Do not proceed until the interceptor shaft torque is below 12 Nm.
6. Mount the servo unit to the interceptor.
7. Connect the cable to the servo unit.
8. Turn on the interceptor System power.
9. On the control panel, navigate to the calibration menu and start calibration of the servo units.

Servo # no end stop detected:

1. Check that the servo is connected to the interceptor.
2. If servo is connected, remove the servo and check the shaft rotation. It should be able to rotate 100° and have end positions.
3. Check interceptor moving parts.
4. Remount the servo unit.
5. On the control panel, navigate to the calibration menu and start calibration of the servo units.
6. Restart the system.

Port # unknown servo unit:

1. The HCU/RCU port does not recognize the serial number of the connected servo unit. Check that the servo cable is connected to the correct servo unit and port.
2. If a servo unit has been replaced, continue with following steps to assign the new servo unit to the port.
3. Go to the menu ADVANCED SETTINGS / SERVO CONFIGURATION.
4. Navigate to the port where the servo unit has been replaced. Enter the menu of the port.
5. Press the "assign servo" button.
6. Repeat for each port where the servo unit has been replaced.

Servo # not connected:

1. Check that the servo # is connected to the HCU/RCU # port.
2. Check if the cable is damaged or unconnected to port #.

GPS missing:

1. Check GPS or NMEA2000 connection to Control Panel.

Rudder signal missing:

1. Check rudder signal connections. See connection diagram for more information.
2. See Setup Manual - Rudder Input Signal.

Slave # missing:

1. Slave HCU not responding. Check power supply.
2. Check Control Bus cables.
3. Check and install termination plugs.

OTHER ERRORS

Text "**Waiting for GPS fix**" in the information bar of the main screen.

1. Make sure the GPS is not covered by any metallic structures or metallic parts.
2. Make sure the GPS is not mounted on structures with vibrations.
3. Check that the wind screen does not have a metallic coating which can disturb the signal.
4. Move the GPS so that it has good GPS satellite reception.
5. Check GPS source signal if not using a Humphree GPS antenna.

GPS speed is not shown in main screen.

1. Check GPS NMEA2000 connection to Control Panel.
2. Check GPS source signal if not using a Humphree GPS antenna.

Missing unit under System Units (Servo unit or control unit):

1. Check all system connectors and cables.
2. Make sure all the units are connected correctly.

A unit is connected but it is still **not shown** in the System Units:

1. Connect the termination plugs in the last control panel and the last control unit on both ends of the Control Bus. See cable installation and connection diagram in the Installation Manual.

If the control panel does not start when the **system power** is on then:

1. Check all the connectors and cables.
2. Check the power supplies of all HCU units. The control panel needs minimum 6 volts to start up and display information. Use connection diagram to establish power supply to all the units in the system.

If the batteries has been drained:

1. Charge the batteries.
2. Check the capacity of the batteries to hold 120mA per control panel equals to 21A per week for the time the system will be in standby mode.
3. Add a charging device or increase the battery capacity.
4. An alternative that disable the cleaning function, is to disconnect the system with a circuit breaker to the batteries in that protects the batteries from being drained over time. In this case it is important to have the interceptor blades completely retracted minimising the marine growth on the blades.

The Humphree system does not turn on when the engine **ignition switch** is turned on (Only if remote key switch is installed):

1. Press the power key on the Humphree control panel, if the system starts then the problem is in the remote key switch cable.
2. If the Humphree system does not start check the system power and cables.
3. Check connection and wiring diagram for details.

The **Trim or List angle** can not be reset to 0°.

1. Check the orientation of HCU/RCU. See Installation Manual and Setup Manual - HCU/RCU control unit orientation.
2. Match the software orientation of the HCU/RCU so it corresponds to the specific HCU/RCU installation in the vessel.

Vessel BEHAVIOUR PROBLEMSWhen cruising, the **vessel leans to starboard** when the LIST Port key is pressed:

1. The servo cables are connected to the wrong port of the HCU/RCU or the HCU/RCU is oriented incorrectly. See the Setup Manual - HCU/RCU control unit orientation.
2. Position the cables according to the figures in the Servo Unit cable installation in the Installation Manual.
3. Check the orientation of HCU/RCU so it corresponds to the orientation in the Installation Manual.

When cruising, the **vessel leans to port** when the LIST Starboard key is pressed:

1. The servo cables are connected to the wrong port of the HCU/RCU or the HCU/RCU is oriented incorrectly. See the Setup Manual - HCU/RCU control unit orientation.
2. Position the cables according to the figures in the Servo Unit cable installation in the Installation Manual.
3. Check the orientation of HCU/RCU so it corresponds to the orientation in the Installation Manual.

Interceptor is moving in and out rapidly when the vessel speed is changing back and forth. For example in head sea.

1. Check the AUTO TRIM curve so the gain does not differ more than 30% between each speed interval.
2. Check the COORDINATED TURN CONTROL curve so the gain does not differ more than 30% between each speed interval.
3. Check the GPS signal. Make sure the GPS has good satellite view.
4. Check the signal quality from the rudder sensors.

MAINTENANCE

Regular maintenance

Cleaning:

**IMPORTANT!**

Power supply (breaker or main switch) to the system must be on for the self cleaning to function.

Regular cleaning is done by the system automatically when the system is turned off. For this to function properly, make sure that the cleaning function is kept on. Read more about the cleaning function in chapter Cleaning.

Control panel:

When cleaning the control panel, use lightly soaped water and a clean paper towel. Use the protective cover, when the vessel is not in use.

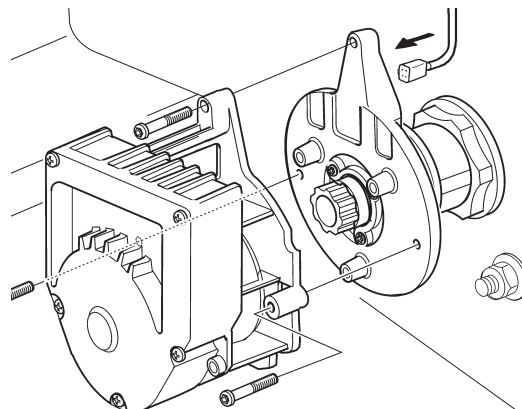
Annual maintenance

See appendix Service and Maintenance document for annual maintenance for your specific vessel type and use.

Removing the interceptor servo unit

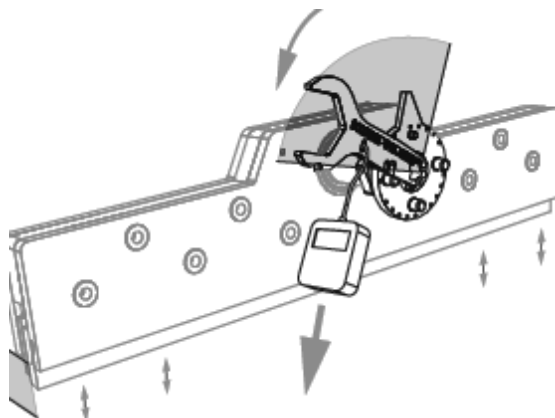
Remove the connector and secure the cable so it does not drop into the bilge resulting in water contamination. Place the connector in the connector slot on the back of the servo flange.

To remove the servo unit unscrew the three M5 bolts. Move the servo unit back and forth to release it from the studs and shaft.



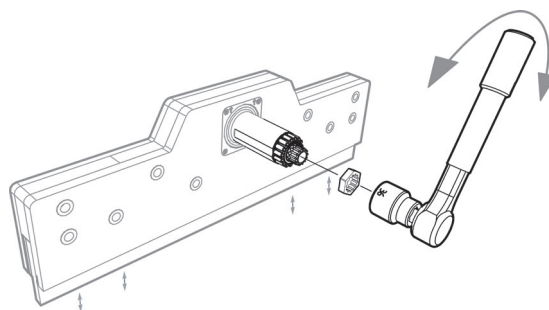
Checking the interceptor shaft torque

By rotating the shaft $\sim 100^\circ$ the interceptor blade will make a full stroke. Connect the Humphree key to the shaft and place a spring scale in the hole as shown in the figure. Pull the spring scale 90° to the key so the shaft rotates. While doing this read the scale value during a $\sim 100^\circ$ rotation. The value will correspond to the shafts torque value. Ex. 8 kg = 8 Nm. Check in both directions.



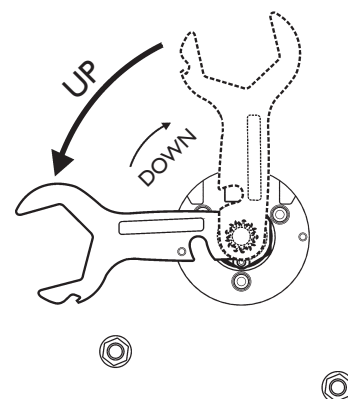
Alternatively push the Humphree torque adapter onto the shaft and use a torque wrench with a socket size 36 mm, to check the torque of the shaft.

If the torque is higher than 12 Nm, check moving parts for damage or see the Installation manual - chapter interceptor Installation.



Moving the interceptor blade up

Place the Humphree key on the shaft. Rotate the key counter clockwise until it stops to retract the blade.



Locking the interceptor blade

By rotating the shaft $\sim 100^\circ$ the interceptor blade will make a full stroke. Turning the shaft counterclockwise will retract the blade. Rotate the shaft with the Humphree key clockwise to deploy the interceptor blade to a desired position. Replace the key to a position where the M5 nut is in line with the hole on the key. Lock the key with one of the bolts from fastening the servo unit.

SERVICE NETWORK

While installing or using a HUMPHREE interceptor System, questions might occur or spare parts might be needed.

Contact Humphree Service at:

<http://www.humphree.com/contact-us/>

APPENDIX

Service and Maintenance document

HUMPHREE®

This chapter describes service and maintenance for Humphree interceptor and fin systems. For the warranty to be valid, carefully follow the instructions and service plan. Please note that some service instructions are described in the Workshop manual. The Workshop manual can be downloaded from www.humphree.com

VESSEL NAME: _____

VESSEL MODEL: _____

Humphree Service and Maintenance

Note that this is a document of value and belongs to the vessel.
Lost or non-completed warranty form / fulfilled service maintenance
will void the Humphree extended warranty.

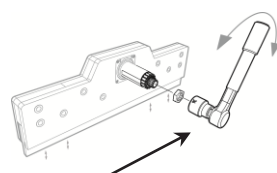
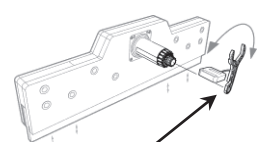
- **Concerns Interceptor systems X, H, HA, HE, HAE and fin stabilisers and rudder systems using SU553**
- **For the extended warranty to apply, the warranty form must be completed and a copy sent to Humphree; warranty@humphree.com**
- **Service has to be performed by an authorized Humphree dealer for the warranty to be valid.**

WARRANTY FORMFAX: +46 31 744 3573 Email: humphree@humphree.com

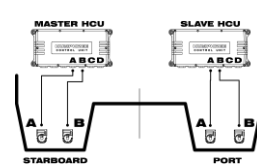
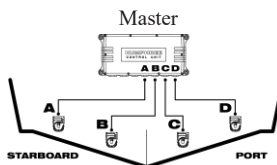
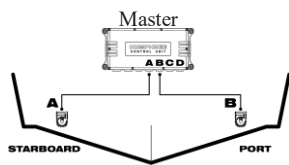
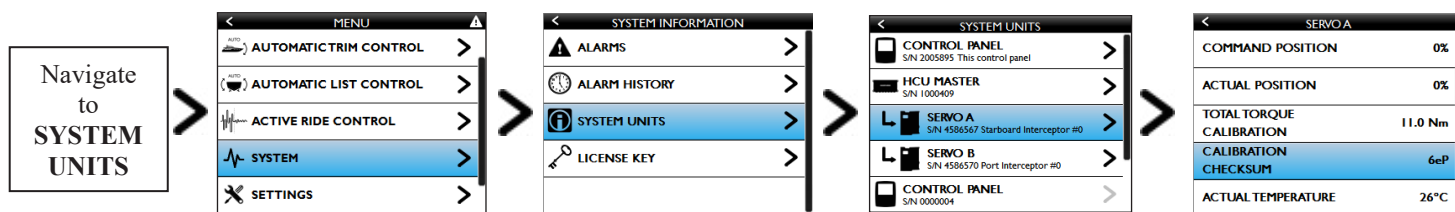
Installed by	
Boat model	
Hull number	
Boat delivery date (warranty start date)	

Step 1) Interceptor torque + servo internal torque measurement

- Measure the shaft torque of each installed interceptor with a manual torque wrench.

Tool
P/N. 020601Standard tool
(included) P/N.020182

	MASTER or SLAVE				SLAVE				
	Servo Pos	Servo Pos	Servo Pos	Servo Pos	Servo Pos	Servo Pos	Servo Pos	Servo Pos	
	A	B	C	D	A	B	C	D	
Interceptor size									mm
Manual measured interceptor torque									Nm
Control panel total torque calibration									Nm
Calibration checksum									

In the control panel, navigate to **SYSTEM UNITS** and fill in the table above for each servo

NOTE: The total calibration torque includes the servo internal torque of approximately 6 Nm.

Step 2) Serial numbers (Ex: 0000003 7-digit) Serial numbers are found in the SYTEM UNITS menu.

Unit:	Serial Number:
Control Panel Main Bridge	
Control Panel Secondary	
HCU Master	
RCU Master	
Servo A	
Servo B	
Servo C	
Servo D	
Landing Sensor Unit	
Motion Sensor Unit	

Unit:	Serial Number:
HCU Slave 1	
Servo A	
Servo B	
Servo C	
Servo D	
HCU Slave 2	
Servo A	
Servo B	
Servo C	
Servo D	

Failure to complete and return this document to Humphree will void the Extended Limited Warranty (24 months). See Humphree Conditions.

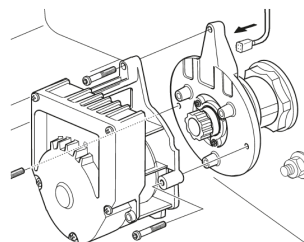
Copy Sent to Humphree, warranty@humphree.com Date _____ Sign _____

Service Description Interceptors

Attention: Never use acids or oxidizing agents on Humphree components!

Visual inspection of the system and cleaning of Servo units

Make a visual inspection of the complete system (Interceptors, Mounting plates, Servo units, Control unit and Control panel) to verify the status of the Humphree system.
Inspect cables and connectors for possible wear.
Use soap-freshwater to clean the servo units if needed.

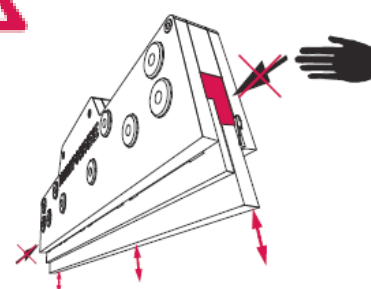


Cleaning of Interceptor blade

Fully deploy the blades and inspect for any damage or marine growth.
Gently remove any growth.



WARNING!
Movable parts and sharp edges.
Watch your fingers!



Polishing of interceptor blade

After cleaning the blade, apply lithium based marine grease on a piece of cloth and manually rub a thin layer into the blade surface making it shiny.
Wipe away any visible grease.

Replacement of shaft & shaft seals

See Workshop Manual

Service kit: Shaft kit Short Composite for X, H and HA interceptors
 Shaft kit Short Metal for HE and HAE interceptors
 Shaft kit Long Metal for HE and HAE interceptors
 Part numbers to be found in sparepart pricelist

Replacement of crank assembly

See Workshop Manual

Service kit: Crank kit for X, H and HA interceptors
 Crank kit for HE and HAE interceptors
 Part numbers to be found in sparepart pricelist

Replacement of interceptor blade

See Workshop Manual

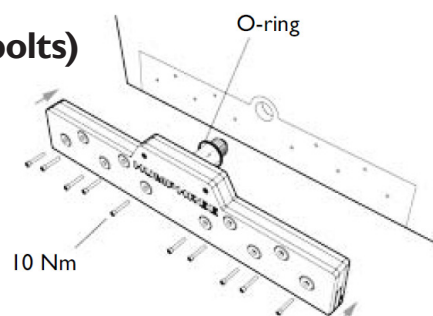
Replacement of Interceptor fastening bolts (M8 bolts)

For more information - see Workshop Manual

X, H, HA: M8 - 75 mm bolts, MC6S A4-80
HE, HAE: M8 - 90 mm bolts, MC6S A4-80

Re-tighten interceptor bolts

The M8 bolts shall be tightened to 10 Nm.
Do not over tighten.



Service Schedule Interceptors

Interceptors: _____ (size) Commercial vessel: ☐

Estimated annual operating hours: _____ (h) Leisure boat / yacht ☐

The below service schedules are based on type of use, choose 1 (of 4) of the below service schedules.

☐ **Service schedule A: LEISURE USE**
Manual, AutoTrim, AutoList, Coordinated Turn

A

Year / Service	1	2	3	4	5	6	7	8	9	10
Visual Inspection & Cleaning of Servo Units	X	X	X	X	X	X	X	X	X	X
Cleaning of Interceptor blade		X		X		X		X		X
Polishing of Interceptor blade		X		X		X		X		X
Replace shaft & shaft seals						X				
Replace crank assembly										X
Replace interceptor blade										X
Replace Interceptor fastening bolts										X
Re-tightening of interceptor bolts to 10Nm		X		X		X		X		X
Calibration of system (Below 20Nm in the display)	X	X	X	X	X	X	X	X	X	X

☐ **Service schedule B: LEISURE USE**
Interceptor systems with Active stabilisation and/ or Steering Interceptors

B

Year / Service	1	2	3	4	5	6	7	8	9	10
Visual Inspection & Cleaning of Servo Units	X	X	X	X	X	X	X	X	X	X
Cleaning of Interceptor blade		X		X		X		X		X
Polishing of Interceptor blade		X		X		X		X		X
Replace shaft & shaft seals				X				X		
Replace crank assembly								X		
Replace interceptor blade										X
Replace Interceptor fastening bolts								X		
Re-tightening of interceptor bolts to 10Nm		X		X		X		X		X
Calibration of system (Below 20Nm in the display)	X	X	X	X	X	X	X	X	X	X

☐ **Service schedule C: COMMERCIAL USE**
Interceptor systems with Manual, Auto Trim, AutoList, Coordinated Turn

C

Year / Service	1	2	3	4	5	6	7	8	9	10
Visual Inspection & Cleaning of Servo Units	X	X	X	X	X	X	X	X	X	X
Cleaning of Interceptor blade		X		X		X		X		X
Polishing of Interceptor blade		X		X		X		X		X
Replace shaft & shaft seals				X				X		
Replace crank assembly								X		
Replace interceptor blade										X
Replace Interceptor fastening bolts				X				X		
Re-tightening of interceptor bolts to 10Nm		X		X		X		X		X
Calibration of system (Below 20Nm in the display)	X	X	X	X	X	X	X	X	X	X

☐ **Service schedule B: COMMERCIAL USE**
Interceptor systems with Active stabilisation and/ or Interceptor Steering

D

Year / Service	1	2	3	4	5	6	7	8	9	10
Visual Inspection & Cleaning of Servo Units	X	X	X	X	X	X	X	X	X	X
Cleaning of Interceptor blade		X		X		X		X		X
Polishing of Interceptor blade		X		X		X		X		X
Replace shaft & shaft seals		X		X		X		X		X
Replace crank assembly*				X				X		
Replace interceptor blade										X
Replace Interceptor fastening bolts				X				X		
Re-tightening of interceptor bolts to 10Nm		X		X		X		X		X
Calibration of system (Below 20Nm in the disp	X	X	X	X	X	X	X	X	X	X

* If operating in waters with high levels of sand, mud or silt, replace the crank assembly more often

SERVICE 1

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

SERVICE 2

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

SERVICE 3

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

SERVICE 4

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

SERVICE 5

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

SERVICE 6

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

SERVICE 7

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

SERVICE 8

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

SERVICE 9

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

SERVICE 10

Service date: _____

Performed by: _____

Service Schedule: A ☐ B ☐ C ☐ D ☐

Comments:

Visual Inspection & Cleaning of Servo Units	
Cleaning of Interceptor blade	
Polishing of Interceptor blade	
Replace of shaft & shaft seals	
Replace of crank assembly	
Replace of interceptor blade	
Replace of Interceptor fastening bolts	
Re-tightening of interceptor bolts to 10Nm	
Calibration of system (Below 20Nm in the display)	

STAMPED AUTHORIZED DEALER

MASTER OR SLAVE

Servo position

Servo information	A	B	C	D
Total calibration torque				
Calibration checksum				

SLAVE

Servo position

A	B	C	D	
				Nm

Service Description

Fin Stabilisers and Rudders using SU553

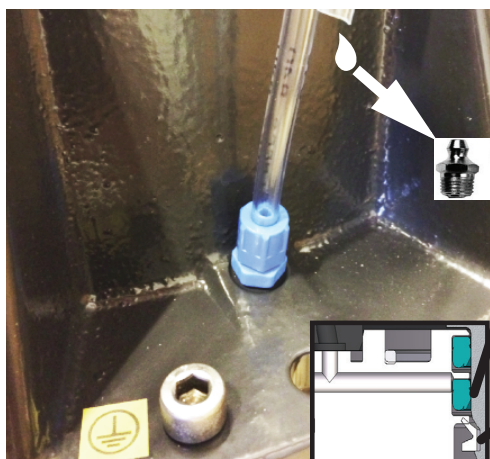


WARNING!

Rotating fins. Take the necessary precautions for your safety

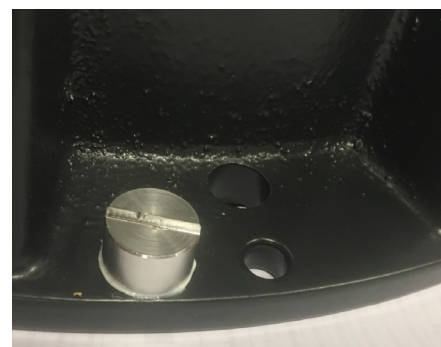
Inspect indication hose for sign of water

Check Indication hose for water Regularly. Water in the Inspection hose may be a result of worn outer main seal. In case of water in the inspection hose. Pump marine grease until it comes out of the inspection hose to prolong inner seal life until seals can be replaced. See Workshop manual for replacing seals.



OUTER MAIN SEAL
PART NO. 021432
NOTE! TWO ARE REQUIRED
FOR EACH SERVO

LIP SEAL
PART NO. 020830



SERVO ANODE Part no: 021419

Visual inspection of the system and cleaning of Servo units

Make a visual inspection of the complete system (Fins, Servo units, Control unit and Control panel)

to verify the status of the Humphree system.

Inspect cables and connectors for possible wear.

Use soaped-freshwater to clean the servo units if needed.

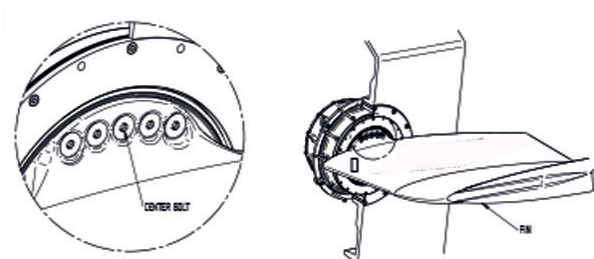
Check inside zinc anode on the servo unit. (anode part nr: 021419)

Replacement of fin bolts and outside zinc anodes

The fin bolts must be removed to access the zinc anode.

The bolt kit also includes one zinc anode. Kit part no: 021550

Replacement: See Workshop manual.



Replacement of shaft seal kit

See Workshop manual.

Service Schedule Zero speed Fin Stabilisers

Below is based on normal use of product for leisure and commercial use

Perform	Leisure use	Commercial use
Check shaft seal indication hose	Regularly	Regularly
Visual Inspection	Annually	Annually
Replacement of fin bolts and zinc anode	Every 2 years	Every 2 years or 3000 operating hours (propulsion engine operating hours) whatever comes first
Replacement of shaft seal kit	Every 4 years	Every 4 years or 3000 operating hours (propulsion engine operating hours) whatever comes first

SERVICE 1

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

SERVICE 2

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

SERVICE 3

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

SERVICE 4

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

SERVICE 5

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

SERVICE 6

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

SERVICE 7

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

SERVICE 8

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

SERVICE 9

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

SERVICE 10

Zero speed Fin Stabilisers

Visual Inspection☐**Replace fin bolts and zinc anodes**☐**Replace Shaft seal kit**☐**Service Date** _____**Propulsion engine running hours** _____**Performed by:** _____**Comments:**

STAMPED AUTHORIZED DEALER

Ship ID

Your Local Agent/Dealer

HUMPHREE®

Göteborg Sweden

Tel. +46 31 744 3577 Fax. +46 31 744 3573 humphree@humphree.com
www.humphree.com