



ALPHATRON
Marine



AlphaPilot MFS

Operation Manual

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I. Preface

The Alphatron AlphaPilot MFS is a type approved Heading Control System (i.e. Autopilot), designed to fit vessels of any size, including high speed crafts. It is a modern and technologically advanced digital vessel control unit that is intended to reduce the operator's workload, increase the vessel motion efficiency and improve operational safety.

The AlphaPilot MFS Control Unit is the main control module of the AlphaPilot MFS system. It is used for control and monitoring of autopilot operation, setting vessel heading or rudder angle, selection of autopilot operating modes.

- Thoroughly read this operation manual before operating the equipment.
- We recommend keeping this manual nearby the equipment to ensure ready access to it.

Revision History

Revision No.	Date	Description	Author
1.0	02-12-2020	First issue	J. Kreeft
1.1	18-02-2021	Completely updated Appendix A. Removed MFS model.	J. Kreeft
1.2	19-02-2021	Additional updates on Appendix A. Minor textual updates.	J. Kreeft
1.3	11-03-2021	Removed alarm test. Change C into T symbol.	J. Kreeft
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Glossary

The glossary contains a list of abbreviations and a list of definitions.

Abbreviations

Abbreviations as used in this manual are explained in the table below.

Abbreviation	Description
AUTO	Automatic ('Heading Control mode')
APH	Automatic Permanent Helm
CCA	Course Comparator Alarm
COG	Course over ground
DNC	Digital Nautical Charts
ECDIS	Electronic Chart Display and Information System
ENC	Electronic Navigational Charts
FU	Follow-Up
GPS	Global Positioning System
HCS	Heading Control System
HSC	High Speed Craft
HMS	Heading Monitor System
IMO	International Maritime Organization
NFU	Non-Follow-Up
OHA	Off Heading Alarm
PID	Proportional, Integral, Derivative
PS	Port Side
RAD	Radius
RFU	Rudder Feedback Unit
ROT	Rate Of Turn
SB	Starboard Side
SOG	Speed over ground
SOLAS	Safety of Life at Sea
STW	Speed through the Water
TCS	Track Control System

Definitions

The meaning of standard definitions as used in this manual are explained in the table below.

Definition	Description
Alert	<p>Announcement of abnormal situations and conditions requiring attention. Alerts are divided in four priorities: emergency alarms, alarms, warnings, and cautions:</p> <ul style="list-style-type: none"> - Emergency alarm: Highest priority of an alert. Alarms which indicate <u>immediate danger to human life or to the ship</u> and its machinery exists and require immediate action. - Alarm: An alarm is a high-priority alert. Condition <u>requiring immediate attention and action</u> by the bridge team, to maintain the safe navigation of the ship. - Warning: Condition <u>requiring immediate attention, but no immediate action</u> by the bridge team. Warnings are presented for precautionary reasons to make the bridge team aware of changed conditions which are not immediately hazardous, but may become so if no action is taken - Caution: <u>Lowest priority of an alert</u>. Awareness of a condition which does not warrant an alarm or warning condition, but still <u>requires attention</u> out of the ordinary consideration of the situation or of given information. <p>An alert provides information about a defined state change in connection with information about how to announce this event in a defined way to the system and the operator.</p> <p>Alerts are separated for the alert handling into three categories of alerts:</p> <ul style="list-style-type: none"> - Category A alerts: Alerts for which information at the task station directly assigned to the function generating the alert is necessary, as decision support for the evaluation of the alert-related condition. - Category B alerts: Alerts where no additional information for decision support is necessary besides the information which can be presented at the CAM-HMI. - Category C alerts: Alerts that cannot be acknowledged on the bridge but for which information is required about the status and treatment of the alert, e.g., certain alerts from the engine.
AlphaPilot MFS	Alphatron brand name for the heading control system
Assisted turn	Manoeuvre of a vessel from one straight leg to the next automatically controlled by a pre-set radius or rate of turn but not based on the vessel's position.

Definition	Description
Autopilot	A Heading Control System.
COG (Course Over Ground)	COG is the actual direction of progress of a vessel, between two points, with respect to the surface of the earth. The vessel's heading may differ from the COG because of wind, tide and currents.
Course	A vessel's course is the cardinal direction along which the vessel is to be steered. It is to be distinguished from the vessel's heading, which is the compass direction in which the craft's bow is pointed.
Cross track distance	Perpendicular distance of the vessel from the track including direction (negative if the vessel is left of the intended track)
Cross track error	See 'Cross track distance'
Cross-track limit	Maximum cross track distance before an alert is activated.
Curved track	Non-straight track between two straight legs.
ECDIS (Electronic Chart Display and Information System)	A geographic information system used for nautical navigation that complies with IMO regulations as an alternative to paper nautical charts. An ECDIS displays the information from ENC or DNC and integrates position information from position, heading and speed through water reference systems and optionally other navigational sensors. Other sensors which could interface with an ECDIS are radar, Navtex, Automatic Identification Systems (AIS), and depth sounders.
Electronic Navigational Charts	An official database created by a national hydrographic office for use with an ECDIS.
Heading	The horizontal direction in which a vessel points or heads at any instant, expressed in angular units from a reference direction, usually from 000° at the reference direction clockwise through 360°.
Heading control	Control of the vessel's heading.
HCS (Heading Control System)	A system which enables a vessel to keep a pre-set heading with minimum operation of the vessel's steering gear, within limits related to the vessel's manoeuvrability in conjunction with their sources of heading information. The HCS may work together with a TCS. A turn rate control or a turning-radius control for performing turns may be provided. The term HCS differentiates the automatic pilot (autopilot) from a system designed to keep a vessel on a pre-determined track throughout its passage, which is called TCS.
Heading Monitor System	This system monitors the actual heading sensor by an independent second source.
Helm	A wheel or tiller by which a vessel is steered.
IEC	A non-profit, non-governmental international standards organization that prepares and publishes International Standards for all electrical, electronic and related technologies.
Indication	Visual display of any message to the user which may be accompanied by a low intensity acoustic signal to gain attention.
Latitude and Longitude	The units that represent the coordinates at geographic coordinate system.
LOG	Speed data from Water Speed Log

Definition	Description
Leg	Line between two waypoints defining the track.
Main steering gear	The machinery, rudder actuators, steering gear power units, if any, and ancillary equipment and the means of applying torque to the rudder stock (e.g. tiller or quadrant) necessary for effecting movement of the rudder for steering the vessel under normal service conditions.
Magnetic compass	The Earth has a magnetic field which is approximately aligned with its axis of rotation. A magnetic compass is a device that uses this field to determine the cardinal directions.
Manual (steering) mode	Method of controlling steering gear manually is contrast with automatic steering control mode (course control mode). Both Follow-Up and Non-Follow-Up modes may be considered as manual steering mode.
Radius of turn	Radius of a curved track
Rate-Of-Turn	The speed (or rate) at which a vessel is turning at, or can turn at, measured in degrees per minute.
Relative bearing	The direction of a target from own vessel expressed as an angular displacement from own vessel's heading.
Relative course	The direction of motion of a target relative to own vessel's position expressed as an angular displacement from north. It is deduced from several measurements of target range and bearing on own vessel's radar.
Relative speed	The speed of a target relative to own vessel's position. It is deduced from several measurements of target range and bearing on own vessel's radar.
Rudder Feedback Unit	The Rudder Feedback Unit can be used in a rudder angle indicator system and as a part of the control loop in a steering control system.
SOLAS (Safety of Life at Sea)	An international maritime treaty which requires signatory flag states to ensure that vessels flagged by them comply with minimum safety standards in construction, equipment, and operation.
Speed	The absolute value of velocity. May either be the vessel's speed through the water, or the speed made good over the ground.
SOG (Speed over ground)	The speed of the vessel relative to the surface of the earth.
Steering gear	The equipment provided on vessels to turn the vessel.
Autopilot mode switch	An external switch on the navigational bridge provided for the selection of manual steering and automatic steering devices.
Tiller	A device that is used to turn the rudder, which then steers the boat.
Track	Path to be followed over ground.
Track control	Control of the vessel's movement along a track, where corrections made by the controller to compensate for wind, drift and other influences, are based on the cross-track error and not only on the bearing to the destination waypoint.
TCS (Track Control System)	System designed to keep a vessel on a pre-determined track throughout its passage.

Definition	Description
	Track Control systems must be interfaced with an electronic position fixing system. SOLAS Regulation 19, 2.8.2 requires Heading Control or Track Control Systems to be fitted to all vessels of 10000 GT and upward. There is no requirement to fit a Track Control system to any class of vessel. Track Control Systems include the functional capabilities of Heading Control systems.
Waypoint	An intermediate point or place on a route or line of travel, a stopping point or point at which course is changed.

II. Safety Information

The signal words DANGER, WARNING and CAUTION used in this manual indicate the degree of hazard that may be encountered by the user. These words are defined as follows:

**DANGER**

Indicates a hazardous situation which, if not avoided, will result in death or serious injury. This signal word is limited to the most extreme situations.

**WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The signal word NOTICE used in this manual indicates information considered important but not related to injury. It is typically used to prevent damage to equipment or property.

To safely operate this system, the following DANGERS, WARNINGS, and CAUTIONS must be adhered to. Failure to comply with the precautions or with specific dangers, warnings, and cautions elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. ALPHATRON MARINE assumes no liability for the customer's failure to comply with these requirements.

AlphaPilot MFS is a very useful navigational aid but DOES NOT UNDER ANY CIRCUMSTANCES REPLACE A HUMAN NAVIGATOR.

Do not use automatic steering in the following conditions:

- In heavy traffic areas or in narrow waters;
- In poor visibility or extreme sea conditions;
- When in areas where the law prohibits use of autopilot.

**WARNING**

When using AlphaPilot MFS:

- Do not leave the helm unattended;
- Do not place any magnetic material or equipment near the heading sensor used in the AlphaPilot MFS system;
- Verify at regular intervals the course and position of the vessel;
- Always switch to Standby mode in due time to avoid hazardous situations

**WARNING**

Do not disassemble or modify the equipment. Otherwise, it may cause a fire, or you may suffer an electrical shock.

**WARNING**

Immediately turn off the power and disconnect the power supply cable if the equipment is generating any smoke or odour or is overheated.

Immediately inform your local service agent of the symptom to have it repaired. Prolonged equipment operation under such a condition can cause a fire or electric shock.

**WARNING**

Do not place a container containing liquid on the equipment. Otherwise, it may cause a fire, or you may suffer an electrical shock if knocked over.

**WARNING**

When unplugging the instrument, be sure to remove the cord terminal correctly. If the cord is pulled, the cord may get damaged resulting in a fire or an electrical shock.

III. Warranty

To not to adversely affect the warranty, the following notices must be adhered to.

NOTICE Operating personnel must not remove equipment covers. Only personnel trained and certified by ALPHATRON MARINE must make component replacement and internal adjustment.

NOTICE Do not disassemble or modify the equipment. Failure to observe this instruction may cause equipment failure, and it will void the warranty.

NOTICE Any modification to this equipment without prior written permission from ALPHATRON MARINE will void the warranty.

NOTICE Installation of this product shall only be done by a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor. Acting otherwise will void the warranty.

NOTICE This product contains no operator serviceable parts. Service and repair shall only be carried out by personnel trained and certified by ALPHATRON MARINE.

NOTICE Do not place a container containing liquid on the equipment. The equipment can be damaged if knocked over.

NOTICE When cleaning the surface, do not use any organic solvent such as thinner or benzine. Otherwise, the paint and markings on the surface may get damaged. For cleaning the surface, remove the dust and debris and wipe with a clean dry cloth.

IV. About the manual

Intended readers

This manual is an operation manual for the AlphaPilot MFS system and its control unit. The manual is intended for end users.

Manual overview

This manual has the following chapters:

- **Introduction** contains a description of the Alphatron AlphaPilot MFS system.
- **AlphaPilot MFS Control Unit** contains a description of the Control Unit and its interface.
- **Operating modes** contains a description of the autopilot operating modes.
- **Controls and functions** contains a description of the basic functions such as dimming, alert handling.
- **Menus** contains a description of the accessible menus and menu items.
- **Alarms, warnings, and cautions** contains a description of alerts displayed on the AlphaPilot MFS Control Unit.

1 Introduction

The Alphatron AlphaPilot MFS system is a type approved heading control system, designed to fit vessels of any size, including high speed crafts. It is a modern and technologically advanced digital vessel control unit that is intended to reduce the operator's workload, increase the vessel motion efficiency and improve operational safety.

The AlphaPilot MFS Control Unit is the main operator control unit of the AlphaPilot MFS system. It is used for control and monitoring of autopilot operation, setting vessel heading or rudder angle, selection of autopilot operating modes.

The AlphaPilot MFS Control Unit works in conjunction with the AlphaPilot MFS Distribution Unit, which connect to the steering system or to the steering gear. Refer to the Alphatron AlphaPilot MFS Installation manual for more details about the Distribution Unit.



WARNING! AlphaPilot is a very useful navigational aid but DOES NOT UNDER ANY CIRCUMSTANCES REPLACE A HUMAN NAVIGATOR.

Do not use automatic steering in the following conditions:

- In heavy traffic areas or in narrow waters;
- In poor visibility or extreme sea conditions;
- When in areas where the law prohibits use of autopilot.

When using AlphaPilot:

- Do not leave the helm unattended;
- Do not place any magnetic material or equipment near the heading sensor used in the AlphaPilot MFS system;
- Verify at regular intervals the course and position of the vessel;
- Always switch to Standby mode (e.g. switch external steering mode selector to NFU position) in due time to avoid hazardous situation.

Compliance

The Alphatron AlphaPilot MFS system meets the following carriage and performance requirements:

MED/4.16 Heading Control Systems (HCS):

- SOLAS 74 Reg. V/18 & V/19
- IMO Res.A.342(IX)
- IMO Res.A.694(17)
- IMO Res.MSC.191(79)
- IMO Res.MSC.64(67) Annex 3
- IMO Res.MSC.302(87)

MED/4.40 Heading Control System (HCS) for High Speed Craft (HSC):

- SOLAS 74 Reg. X/3
- IMO Res.MSC.36(63)-(1994 HSC Code) 13
- IMO Res.MSC.97(73)-(2000 HSC Code) 13
- IMO Res.A.694(17)
- IMO Res.A.822(19)
- IMO Res.MSC.191(79)
- IMO Res.MSC.302(87)
- IMO MSC.1/Circ.1349

'Fail-to-safety' principle

'Fail-to-safety' principle is implemented in the AlphaPilot MFS system design, i.e. any failure results in the least critical of any possible new conditions.

2 AlphaPilot MFS Control Unit

The AlphaPilot MFS Control Unit has a touch screen display, rotary knob, and a ON/OFF button.

The touch screen display shows information such as heading, current mode and settings, and alerts.

The rotary knob, which is used for various purposes such as, changing heading, and scrolling through alerts. When changing the set heading it can be used instead of the **PS**, **SB**, and **CONFIM/SET** buttons.

The ON/OF button is used to reset the AlphaPilot MFS.



Figure 1: AlphaPilot MFS Control Unit

All information, menus and functions are in English. Information shown on the display depends partly on the operating mode.

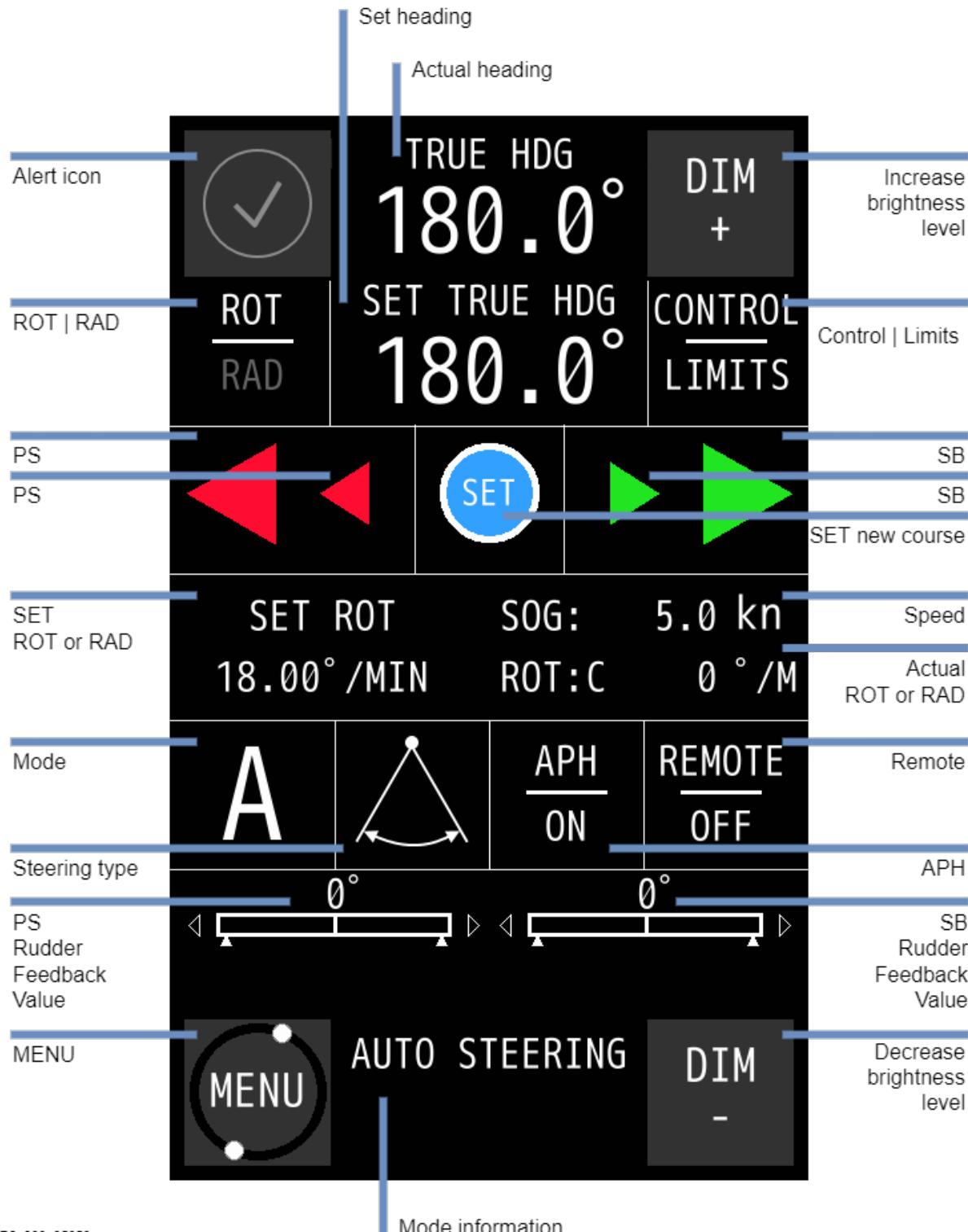


Figure 2: AlphaPilot MFS Control Unit – Operational Screen

Item	Description
Central display	
Actual heading	Actual heading taken from compass source. The following sources may be displayed: HDG SENSOR COIL TRUE HDG MAGNETIC HDG COMPASS HDG STEP HDG
Set heading	Set heading.
Mode information	Shows the actual (steering) mode.
Left side display	
Alert icon	Icon for active alarm or notification. For detailed descriptions of alerts, see section 'Alarms, warnings, and cautions'.
ROT RAD	Set steering method to ROT or RAD mode.
PS	Button to select a new heading value. Big arrow initial 1° steps keep tapping for 2°, 10° steps Small arrow initial 0.1° steps keep tapping for 0.2°, 1° steps
Mode	Shows the active operating mode (for more information, see section 'Operating modes' on page 21) and is used to select the desired control mode.
Steering Type	Shows the steering type. Can be set to: Rudder(s) only Thruster only Rudder(s) and thruster
PS Rudder Feedback Value	Shows the rudder feedback value in degrees. This function can be turned on or off in the DISP CONF menu. Small white arrows below the rudder bar show the pre-set rudder limit. Rudder limit can be set via the CONTROL LIMITS menu. See section 'Change the Rudder Limit' on page 24.
MENU	The MENU button is used to enter the menu, which enables changing of the AlphaPilot MFS operating parameters. For more information, see section 'Menus' on page 35.
Right side display	
Increase brightness level	Increase brightness level of all modules simultaneously.
CONTROL LIMITS	Parameters can be configured via the CONTROL LIMITS button.
SB	Button to select a new heading value. Big arrow initial 1° steps keep tapping for 2°, 10° steps Small arrow initial 0.1° steps keep tapping for 0.2°, 1° steps
SET	Button to confirm/set a new course.
Speed	Actual Speed value in knots. Source from which the speed is taken. The following sources may be displayed: SOG or STW.
Actual ROT or RAD	Actual operating ROT or RAD value. Operating ROT value is shown in degrees per minute. Operating RAD value is shown in

Item	Description
	nautical miles. ROT value can be received from sensor (i.e. ROT:S) or it can be calculated (i.e. ROT:C).
APH	APH (Automatic Permanent Helm) - also referred to as Autotrim - is applied by the Autopilot over a period when underway to offset the rudder and/or thruster level to eliminate heading errors caused by windage or vessel trim etc.
REMOTE	Button to allow or not allow remote control from another Alphatron MFS Control Unit. A request for system control from another Control Unit will be denied when the button on the master Control Unit has not been activated. Other Control Units can only gain system control when the master Control Unit permits (via the REMOTE ON/OFF button).
SB Rudder Feedback Value	Shows the rudder feedback value in degrees. This function can be turned on or off in the DISP CONF menu. Small white arrows below the rudder bar show the pre-set rudder limit. Rudder limit can be set via the CONTROL LIMITS menu. See section 'Change the Rudder Limit' on page 24
Decrease brightness level	Decrease brightness level of all modules simultaneously.

Table 1: Description of AlphaPilot MFS displayed information

3 Operating modes

3.1 Introduction

The operating modes are displayed on the AlphaPilot MFS Control Unit (see Figure 2 on page 18) and explained in this section. Symbols are used to clearly indicate the active autopilot operating mode.

To enable a heading control mode, press the **MODE** button to change the control mode (the identifier of the next available control mode appears on the display). When the desired control mode is shown, confirm it, and the Autopilot goes into selected mode (the respective symbol appears in 'Operating mode' field on the display).

Symbol	Mode	Description
S	Standby	Autopilot is in Standby mode (not in control).
F	FU	Autopilot is in Follow-Up mode (not in control). In FU mode, the vessel can be hand steered by using the FU Tiller or Steering wheel. Hand steering is typically used when the vessel is manoeuvring, and navigating in restricted waters, channels, and areas with traffic density.
A	Auto	Autopilot is (in control) in Automatic heading control mode. The autopilot steers the vessel to the reference course as shown on the display. The reference course will be the course the vessel has when Auto mode is selected.
T	Track	Autopilot is in Track control mode.*
N	NFU	Autopilot is in Non-Follow-Up mode (not in control). In NFU mode, the vessel can be hand steered by using the NFU Tiller.
D	Dodge	Short-term manual FU steering via the Autopilot MFS Control Unit. Autopilot is in control.

* Track control mode combines an ECDIS with the Autopilot. The navigator can program a voyage plan into the ECDIS that contains one or more tracks. The Track Control System (TCS) is used together with the input from the sensors for position, course and speed and is designed to keep the vessel on the plotted route.

3.2 Standby (S) mode

Autopilot is not operating for vessel heading control.

In this mode, the AlphaPilot MFS Control Unit tracks and displays Actual Heading, Rate of Turn (ROT) and Rudder Angle etc. and will continue in a tracking mode until the Autopilot is engaged.

NOTICE The Autopilot can be switched OFF at any time by a continuous two seconds ON/OFF button operation.

Autopilot will go into Standby (S) mode automatically when the external steering mode selector is switched to the 'NFU' position.

3.3 FU (F) mode

Autopilot is not operating for vessel heading control. In FU mode, the vessel can be hand steered by using a FU Tiller or Steering wheel. Hand steering is typically used when the vessel is manoeuvring, and navigating in restricted waters, channels, and areas with traffic density traffic density.

Autopilot will go into FU (F) mode automatically when the external steering mode selector is switched to the 'FU' position.

3.4 Auto (A) control mode

3.4.1 Introduction

Automatic steering by means of heading (course) control. Auto (A) control mode is the main autopilot control mode which automatically steers the vessel to a pre-set heading.

The following information is displayed in Auto (A) control mode: actual heading, pre-set heading, actual speed, actual ROT in degrees per minute or actual RAD in nautical miles, rudder(s) feedback, and steering method.

NOTE: While in Auto (A) control mode, the system continuously checks for the availability and quality of heading and speed information. In case of no heading data, the audible and visual alert is generated.

NOTE: A warning message appears on the display if operating parameters 'SET ROT' or 'SET RAD' are not corresponding with the actual 'Rudder Limit' value. Decrease the value for 'SET ROT' or increase the value for 'SET RAD'.

NOTE: An alert is generated when the difference between the vessel's actual heading and pre-set heading exceeds the 'Heading Alarm'.

3.4.2 Enable Auto (A) control mode

Press the **MODE|AUTO** button to change the control mode (the identifier of the next available control mode appears on the display). When the Auto (A) control mode is shown, press the **CONFIRM/SET** button, and the Autopilot goes into selected mode (the 'A' symbol appears in 'Operating mode' field on the display).

3.4.3 Steering in Auto (A) control mode

3.4.3.1 *Change the heading*

To change the heading, press the **LEFT** or **RIGHT** button to select a new heading value, and press the **CONFIRM/SET** button to confirm. The autopilot starts changing the actual heading to the new heading.

In Adaptive Mode, a course change executed by the autopilot system may be controlled by pre-programmed ROT/RAD data.

NOTICE These limiting factors can also apply in the Non-Adaptive (PID) operating mode provided the autopilot has been programmed - for Radius controlled turns - and that Speed (SOG) input data is available.

3.4.3.2 Enable or disable Adaptive control

The Alphatron AlphaPilot MFS is Speed Adaptive and – provided it is used in Adaptive Mode and calibrated for the correct vessel type (DISP or HSC) – will automatically set its own control parameters for optimum steering performance. In most cases, Adaptive Mode will be preferred.

Perform the following procedure to enable or disable Adaptive control:

NOTICE Adaptive (automatic) ‘Weather’ control adjustment is a Type Approval requirement of High Speed Craft (HSC) Autopilots thus the Adaptive mode must be selected for HSC applications.

1. Press the **CONTROL|LIMITS** button once.
2. Use the < or > button to select **ADAPT**.
3. Use the - or + button to select **ON** or **OFF** as required
 - a. **ON** = Adaptive mode
 - b. **OFF** = Non-Adaptive mode (i.e. PID control).

Unless alternative settings have been established from experience during sea passages with the Autopilot in operation, selection of the Non-Adaptive mode will be necessary to enable primary control settings (YAW, RUDDER, COUNTER RUDDER) to be manually adjusted.

3.4.3.3 Change the Rudder Limit

If the existence of safe limiting factors is uncertain, the Rudder Limit function – which otherwise limits the maximum permissible angle of rudder applied by the Autopilot – can be employed to produce small rudder angles/slow turns.

Perform the following procedure to change the Rudder Limit:

1. Press the **CONTROL|LIMITS** button twice.
2. Use the < or > button to select **RUDDER LIMITS**.
3. Use the - or + button to change the value.
4. Press the **ACCEPT** button to confirm the chosen value.

3.4.3.4 Change the steering method

Two steering methods are available for Auto (A) control mode, namely steering by ROT or steering by RAD. The selected steering mode is shown on the top left part of the display (SET ROT or SET RAD).

To change the steering method, press the **ROT|RAD** button.

3.5 Track (T) control mode

3.5.1 Introduction

Track (T) control mode (also referred to as ‘Track steering’) combines an ECDIS with the Autopilot. The navigator can program a voyage plan into the ECDIS that contains one or more tracks.

The TCS (Track Control System) is used together with the input from the sensors for position, course and speed and is designed to keep the vessel on the plotted route.

**WARNING**

This functionality is not compliant to the SOLAS convention unless approved. Otherwise, Track (T) control mode can be only used on non-SOLAS ships and leisure crafts.

NOTE: Autopilot receives commanded Heading-To-Steer (HTS), commanded radius or commanded ROT from TCS.

NOTE: While in Track (T) control mode, the system continuously checks for the validity (age), format and check sum of ‘HTC’ / ‘HSC’ messages. If one of these messages are missing, an alarm is generated.

NOTE: ‘Rudder Limit’, ‘SET ROT’ and ‘SET RAD’ parameters are not used during operation in Track (T) control mode. AlphaPilot uses incoming HTC sentences (commanded HTS, ROT or RAD) from an external TCS.

3.5.2 Enable Track (T) control mode

Press the **MODE|AUTO** button to change the control mode (the identifier of the next available control mode appears on the display). When Track (T) control mode is shown, press the **CONFIRM/SET** button, and the Autopilot goes into selected mode (the ‘T’ symbol appears in ‘Operating mode’ field on the display).

3.5.3 Steering in Track (T) control mode

Commanded heading to steer and rate of turn (HTC, HSC or proprietary messages) is set by an external TCS.

3.6 Dodge (D) control mode

3.6.1 Introduction

Short-term manual FU steering (set angle of rudder(s)) via external Dodge controller. Dodge control mode operation is available when the Autopilot is in Auto (A) control mode or in Track (T) control mode.

NOTE: Dodge (D) control mode may not be available, as it can be enabled or disabled (see AlphaPilot MFS Installation Manual).

The following information is displayed in Dodge (D) control mode: actual heading, actual speed, actual ROT in degrees per minute, rudder(s) order, rudder(s) feedback.

NOTE: ‘Rudder Limit’, ‘SET ROT’ and ‘SET RAD’ parameters are not used during operation in Dodge (D) control mode.

3.6.2 Enable Dodge (D) control mode

Enable the external Dodge controller. The Autopilot goes into Dodge (D) control mode (the ‘D’ symbol appears in ‘Operating mode’ field on the display).

NOTE: External Dodge controller demands will result in Follow Up or fixed rudder angle application to produce **TEMPORARY** course change since, when the external Dodge controller is switched ‘OFF’, the vessel head will automatically be returned to the original Autopilot course.

3.6.3 Steering in Dodge (D) control mode

Use the External Dodge controller to change the rudder angle.

NOTE: For vessels with two independent rudders; In Dodge (D) control mode; control operations for both rudders are implemented synchronously.

4 Controls and functions

This section describes other controls and functions (not related to operating modes as described in the previous section).

4.1 Turn on

To turn on the AlphaPilot MFS Control Unit, push the ON/OFF button.

The AlphaPilot MFS system will start-up (and performs system testing). After start-up, the AlphaPilot MFS system will go into Standby (S) mode (the AlphaPilot is not operating for vessel heading control).

The AlphaPilot MFS system is ready for operation.

4.2 Turn off

First put the AlphaPilot MFS Control Unit in Standby (S) mode; switch the external steering mode selector in the appropriate position (e.g. NFU position).

To turn off the device, push and hold the ON/OFF button.

4.3 Enabling control

When not in control, the AlphaPilot MFS Control Unit is in Standby mode.

Control is enabled automatically when the external steering mode selector is switched to the AUTO position.

4.4 Autotrim

Autotrim – also referred to as APH (Automatic Permanent Helm) - is applied by the Autopilot over a period when underway to offset the rudder and/or thruster level to eliminate heading errors caused by windage or vessel trim etc.

This feature is always operational when the Autopilot is switched from STANDBY to ON and permits the Autopilot to copy the angle of offset rudder and/or direction and level of thruster compensation manually applied to steer the vessel dead ahead on the desired heading (i.e. Trim compensated) at the instant of Autopilot engagement.

In the ON mode, the Autotrim feature continuously monitors any long-term differences between the Autopilot Heading Set and the mean course actually steered. Any apparent long-term difference is corrected by automatic trim reassessment over a period of time to ensure the correct mean direction of the vessel through the water.

The Autotrim feature can be permanently switched off if required or can be used to instantaneously assess the required rudder ‘offset’ angle (not thruster level) when **APH ON/OFF** button is used.

NOTE: Most of the Autotrim set-up parameters are determined during Sea Trials and include the APH Time Constant and Autotrim Trip Angle. By default, the **APH ON/OFF** button is used as follows: (i)

Factory default setting is AUTOTRIM active (ON) when the Autopilot is switched from STANDBY to ON. (ii) To switch the Autotrim feature OFF, use the **APH ON/OFF** button (Autotrim will automatically revert to the active state when the Autopilot is switched OFF and ON again). (iii) Single press the APH ON/OFF button to switch Autotrim ON again. (iv) Single press the **APH ON/OFF** button to automatically assess and instantaneously apply the correct angle of rudder (APH).

4.5 Rudder-Thruster modes

Use the Rudder-Thruster modes button to select the desired mode. The Autopilot can be engaged in the following modes (see Figure 3):

- Rudder only mode
- Thruster only mode
- Combined rudder and thruster mode

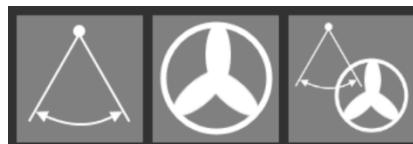


Figure 3: Screen ‘Rudder-Thruster modes’

4.6 Remote control

The **REMOTE ON/OFF** button can be used to allow control from another “slave” Control Unit. In case of a system which consists of a single control unit there are no slave units, this single unit must always be set as master unit. The Remote function is not used for single control unit systems. In case of two or more control units the addresses must be configured correctly in order to use the remote functionality.

A request for system control from a slave Control Unit will be denied when the **REMOTE** button on the master Control Unit is set to **OFF**. Slave Control Units can only gain control when the master Control Unit permits (via the **REMOTE ON/OFF** button).

It must be noted that only the designated Master Control Unit is capable of independent operation since it does not require “permission” from any other Autopilot system component to become active.



The Master station is also the only station that can grant “permission” to any slave Control Unit(s) – (2nd stations or up) – which are only enabled when the Master station sets **“REMOTE” ON**. The **REMOTE** button can be found on the right side of the display as illustrated.

The Master Control Unit will immediately disable any slave Control Unit(s) if the Master station **REMOTE** key is deactivated, **REMOTE** indicates **OFF**.

In this way, the Master station has unconditional control of the Autopilot system.

NOTE: When the **“REMOTE”** mode is **OFF** all slave control units will still display active alerts however audible signals will be silent. Disabled slave control units are not able to silence or acknowledge alerts and the appropriate icon (see below) will be shown for information. All alerts can still be viewed on disabled slave control units using the alert list function.



Additional

“Acknowledge not allowed”



Additional

“Acknowledge not allowed”

4.7 Dimming

The **DIM -** and **DIM +** buttons are dimmed to a pre-set brightness level. Control is always allowed.

4.8 Alert handling

When an alert becomes active, this will be showed to the operator by the corresponding alert icon. The alert icon will be showed in the upper left corner of the display. At the bottom right corner of the alert icon the number of active alerts is shown.

A maximum of 5 alerts can be shown. In case of multiple active alerts, the alert icon only shows the highest priority alert.



R2_000_85950

A single press on the alert icon will temporarily silence all active alerts and open the alert list, a second press will close the list. From the alert list the operator is able to:

Silence alerts

A single press on the **alert icon** will temporarily silence all active categories A and B alerts for 30 seconds, MSC 302(87) 7.3.5.

Acknowledge alerts

Acknowledge an alert by opening the alert list and single press on the **Alert Information Box** or by a single press on the **rotary knob**.

Scroll through the alert list

Scroll through the alert list by using the **arrow buttons** or the **rotary knob**.

View highest priority alert

A single press on **ALERT LIST** will immediately show the highest priority alert, lowest number (1) indicates the topmost priority. MSC302(87) 9.14, show the highest by a single operator action,

View Alert Information Box

The Alert Information Box shows the alert title and description of the shown alert.



4.9 Silencing & acknowledging an audible alert

A Warning or Alarm, category A and B alerts, will be accompanied by an audible signal. All audible alert signals are temporarily silenced for 30 seconds by a single press of the alert icon.



Silence
Alarm

Single press to silence all audible alert signals for 30 seconds.
MSC 302(87) 7.3.5



Silence
Warning

Single press to silence all audible alert signals for 30 seconds.
MSC 302(87) 7.3.5

The icon accompanying the alert will change as follows:-



Silenced
Alarm

“Active – Silenced”



Silenced
Warning

“Active – Silenced”

For more information, please have a look to the example on the next page.



Single press on the **alert icon** to temporarily silence all active categories A and B alerts for 30 seconds, MSC 302(87) 7.3.5.



The alert icon will change to “active – silenced” and the alert list will open showing the alert title and description. Press again on the icon to close the alert list.



After 30 seconds the silence period will end, and the audible signal will be active again.

4.10 Acknowledging a single alert

A single alert of type Alarm or Warning is acknowledged by a single press on the alert message box or a single press on the rotary knob.

Low speed: Ship's speed
too low for HDG control

Single press on the Alert Information Box to acknowledge the active alert.

Or

Single press on the Rotary Knob to acknowledge the active alert.

Note: the alert information box can have different colors depending the shown alert type.

The icon accompanying the alert will change as follows:-



Alarm

"Active – Acknowledged"



Warning

"Active – Acknowledged"

For more information, please have a look to the example on the next page.



Single press on the **alert icon** to open the alert list.



Single press on the alert information box to acknowledge the alert.

Doubtful heading: Heading monitor function is impossible

Or

Single press on the rotary knob to acknowledge the alert.



After acknowledgment, the alert icon will change from "Active – Unacknowledged" to "Active – Acknowledged".



If the alert rectifies after acknowledgement, it will automatically be removed from the alert list. If no other alerts are remaining the alert icon will change to "normal" state.

Note:

After acknowledgement the **alert list** instance changes from 1/2 to 2/2. Because the alert state changes from "Active – Unacknowledged" to "Active – Acknowledged", the priority will decrease and so will the list position decrease.

4.11 Alert list operation

The alert list can be accessed by a single press on the alert icon. Please refer to following example.



Single press on the **alert icon** to open the alert list.



Scroll through the alert list by using the **arrow buttons** or **rotary knob**¹.

arrow buttons

Use < for scrolling to the next alert.



Use > for scrolling to the previous alert.



rotary knob

Turn clockwise for scrolling to the next alert.



Turn counter clockwise for scrolling to the previous alert.



Note:

¹Rotary knob is only available on MFS-VR control unit!

²If there is no user activity the alert list will exit automatically after 30 seconds.



The ALERT LIST will now indicate alert 2/2. The list can be closed at any moment by a single press on the alert icon. In case of no user interaction for 30 seconds, the alert list will close automatically.

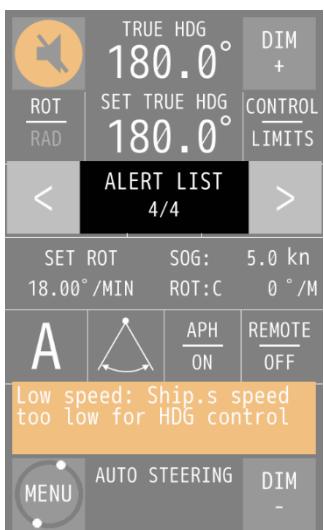
When multiple alerts are active the user can scroll through the list to inspect these alerts. If needed the operator can immediately jump back to the alert with highest priority. This will be explained in following example.



Single press on the **alert icon** to open the alert list.



Scroll through the alert list by using the **arrow buttons** or **rotary**.



The current presented alert is Low speed, alert number 4/4. This alert has the lowest priority now. Single press on **ALERT LIST** to jump to the highest priority alert.

The alert with the highest priority will be showed.



5 Menus

The AlphaPilot MFS has generic and advanced settings. All users are authorized to use the generic settings. Only a commissioning engineer has access to the advanced settings (**ADV SET** and **ALPHAPILOT** button), which are only needed during commissioning or troubleshooting.

All menu items are explained in the following subsections.

Press the **←** button to go back to the previous screen. Press the **ACCEPT** button to save a change. Press the **DISCARD** button to discard changes. Parameters can be adjusted with the + and - buttons.

5.1 Menu 'Main Menu'

This menu is primarily used to quickly change settings during operation.

To enter the main menu, single press the **MENU** button.

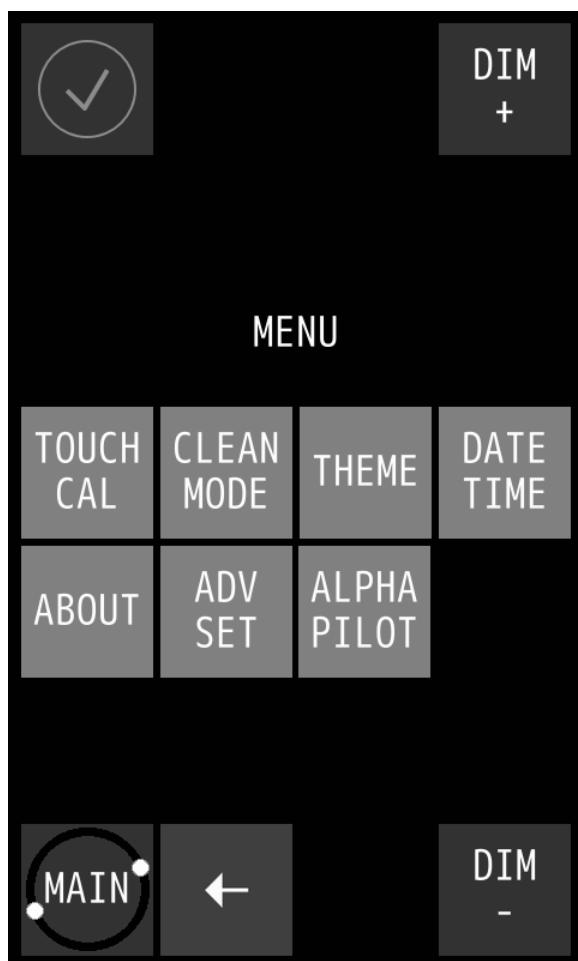


Figure 4: Menu 'Main Menu'

Menu item	Description
TOUCH CAL	To calibrate the touch screen.
CLEAN MODE	To clean the surface of the touch screen without accidentally activating a function.

Menu item	Description
THEME	To change contrast brightness (i.e. illumination) and to set the language.
DATE TIME	To change the date and/or time.
ABOUT	To show the name and version of the software and when it was built.
ADV SET	To change Advanced settings of the AlphaPilot MFS Control Unit. Only a commissioning engineer has access to the Advanced settings, which are only needed during commissioning or troubleshooting.
ALPHAPILOT	To change Advanced settings of the AlphaPilot MFS Distribution Unit. Only a commissioning engineer has access to the Advanced settings, which are only needed during commissioning or troubleshooting. NOTE: If Autopilot is engaged, then this menu is not accessible.

Select a menu item or press the **←** button to return to exit the menu.

5.1.1 Touch screen calibration

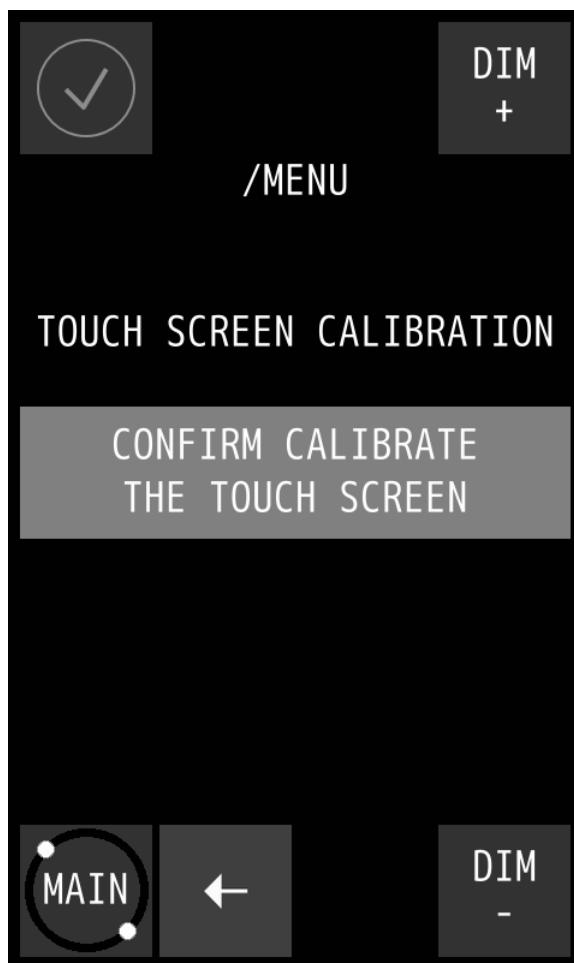


Figure 5: Menu item 'Touch screen calibration'

Calibrate the screen by performing the following procedure:

1. Press the **CONFIRM CALIBRATE THE TOUCH SCREEN** button.
The calibration screen appears with text requesting to touch the four numbered reference points that appear on the screen.
2. Touch the four reference points in sequence 1 to 4, as they light up.
The application will determine whether the sequence is carried out correctly. If the text **VALID CALIBRATION** appears, then the calibration is performed accurately.
3. Test calibration for accuracy by dragging a finger across the screen.
The line that appears on the screen should follow the finger.
4. Press the **ACCEPT** button if calibration is correct or touch the **AGAIN** button to repeat the calibration procedure.
If the text **INVALID CALIBRATION...PLEASE RETRY** appears, touch the **AGAIN** button to repeat the calibration procedure.

5.1.2 Display cleaning

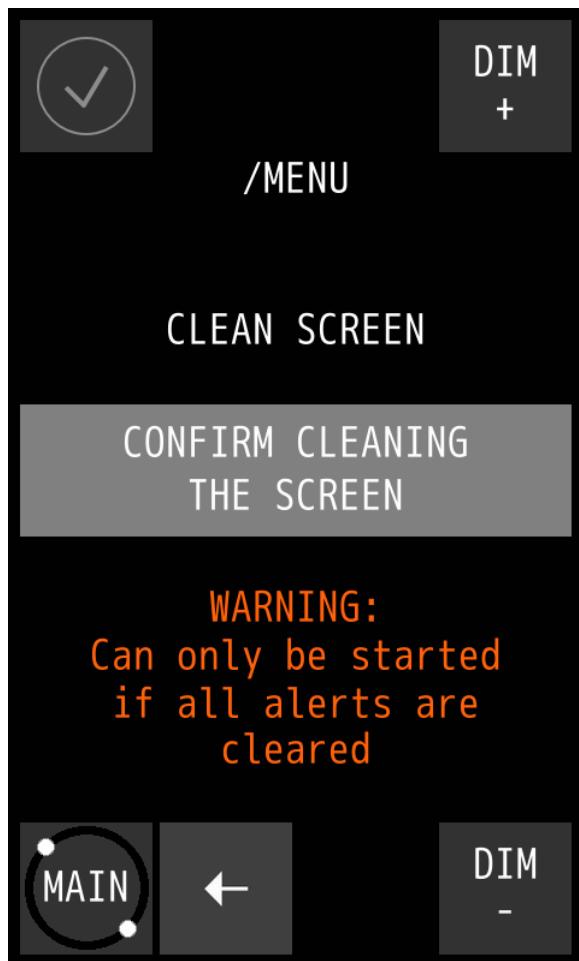


Figure 6: Menu item 'Display cleaning'

The purpose of the Clean Mode feature is to clean the surface of the touch screen without accidentally activating a function. When the Clean mode is started, the touch screen will be deactivated for 60 seconds. Within this period the instrument will remain functional, but it is not operable. Except when an indication is activated, then the touch screen will be activated immediately, and the instrument will be operable again.

To start Clean Mode, perform the following procedure:

1. Press the **CONFIRM CLEANING THE SCREEN** button to start the Clean Mode.
2. The AlphaPilot MFS Control Unit starts the countdown sequence. The touch screen is now deactivated, and the surface can be cleaned. After 60 seconds, or at an active alert, the instrument will become operable again.

NOTICE For safety reason, if an alert is active and needs attention of the operator, Clean Mode can not be started.

5.1.3 Theme



Figure 7: Menu item 'Theme'

5.1.3.1 *Contrast brightness*

Contrast brightness can be easily adjusted to Day, Dusk and Night settings.

To change the contrast brightness, perform the following procedure:

1. Press the + or – button to select the desired **ILLUMINATION** value.
Three different illumination pre-sets can be selected, in accordance with ambient light: DAY, DUSK and NIGHT.
2. Press the **ACCEPT** button to confirm the chosen setting.

5.1.4 Date and time



Figure 8: Menu item 'Date and time'

To change the date and/or time, perform the following procedure:

1. Press the + and/or – button to set the correct **DATE** values.
2. Press the > button to select the **TIME** screen.
3. Press the + and/or – button to set the correct **TIME** values.
4. Press the **ACCEPT** button to confirm the chosen values and return to the Main Menu.
5. To abort, press the **<** button to return to the Main Menu.

5.1.5 About



Figure 9 Menu item 'About'

The About screen contains the name and version of the software and when it was built.

NOTICE When asking for support, this information will be useful.

6 Alarms, warnings, and cautions

The AlphaPilot MFS system is comprehensively equipped with alarm mechanisms that continuously monitor the operational integrity of a wide range of functions from heading input data to steering gear response.

Alarms, warnings, and cautions are displayed on the AlphaPilot MFS Control Unit. An Alert symbol will be shown, accompanied with or without an audible signal.

The alert messages listed Appendix A: Alphatron MFS Alerts will be displayed (if appropriate) and will be accompanied by the appropriate Alert symbol.

Warnings and alarms are accompanied by an audible signal unless the audible alarm has been silenced.

The alert messages are also transmitted to BAM (Bridge Alert Management) system if applicable.

Alerts are acknowledged by pressing the Alert indicator or via the BAM system.

NOTE: The Off-heading alert is defined by DNV/GL as a category A alert and therefore it is not possible to acknowledge this alert remotely from the BAM system.

Alarm

The situation requires an immediate response, or the Autopilot system will go out-of-order.

Warning

The system has degraded, but it still functions. It is possible to reduce the quality of control. A response to this message is required.

Caution

The system does not require an immediate reaction and informs about the degradation of the system without deterioration of the quality of management.

An Alert is indicated via the Alert symbol and an audible signal. The Alert message is displayed when by pressing on the Alert symbol. The audible signal is silenced and flashing of the Alert symbol stops by pressing on the Alert message. An alert message is maintained until the issue is resolved.

For more information such as recommended actions, refer to Appendix A: Alphatron MFS Alerts.



Appendices

Appendix A: Alphatron MFS Alerts

Alert display messages and BAM alert types

The alert messages listed in the table below will be displayed (if appropriate and opened) in the alarm information box at bottom of the display and will be accompanied by the appropriate alert management icon listed in table on the next page.

Warnings and alarms are accompanied by an audible signal unless the audible alarm has been silenced (**Section 4.9 refers**).

The alert messages are also transmitted to Bridge Alert Management (BAM) system if applicable.

Alerts are acknowledged by pressing the alert information box (**Section 4.10 refers**) or via the BAM system.

NOTE: The Off-heading alert is defined by DNV as a category A alert and therefore it is not possible to acknowledge this alert remotely from the BAM system.

Ident- ifier	Inst- ance	Alert Title	Alert Description	Prio- rity	Cate- gory	Esca- lation
		No alert	None			
3007	1	Lost HDG control	HCS Failed. Switch to Manual steering	A	B	BNC
3012	1	Doubtful heading	Deviation between heading sources exceeded limit	W	B	W
	2	Doubtful heading	Heading monitor function is impossible	W	B	W
3023	1	HCS power fail	HCS working normally on Backup Power only	C	B	-
	2	HCS power fail	HCS working normally on Main Power only	C	B	-
3024	1	Off-heading	Yawing is too big: take helm to keep steady	A	A	-
3025	1	Off-heading	Yawing is too big: take helm to keep steady	W	A	A
3059	1	HCS unavailable	Internal Distribution Box Failure	C	B	-
	2	HCS unavailable	Internal Distribution Box +7V Error	C	B	-
	3	HCS unavailable	Internal Distribution Box +3.5V Error	C	B	-
	4	HCS unavailable	Internal Distribution Box +2.5V Error	C	B	-
	5	HCS unavailable	No HDG source available, Step HDG failed	C	B	-
	6	HCS unavailable	No HDG source available, Step HDG not aligned	C	B	-
	7	HCS unavailable	No HDG source available	C	B	-
3062	1	HCS fault	Track steering failed. No input data	W	B	W
	2	HCS fault	HCS fault. Switch to manual steering	W	B	W
3063	1	HCS fault	No Setup data	C	B	-
	2	HCS fault	Control unit interface error	C	B	-
	3	HCS fault	Rudder feedback A failed	C	B	-
	4	HCS fault	Rudder feedback B failed	C	B	-
	5	HCS fault	Draft adaptive control unavailable, no data	C	B	-
3065	1	Low speed	Ship's speed too low for HDG control	W	B	W
3113	1	HDG in fallback	<source 1> lost, normal HC using <source 2>	C	B	-
3156	1	No radius control	Control unavailable, no SOG data			
3156	2	No SPD adaptive	Control unavailable, no STW data	C	B	-

Where possible values of <source 1> & <source 2> are:- Gyro 1, Gyro 2, Mag Compass or Step HDG. Escalation from warning to warning takes 30 seconds.

Icon	Type	State	
	Normal	"No Active alerts" Steady No audible signal	50% size for icons
	Alarm	"Active – Unacknowledged" Flashing 3 short audible signals repeated every 7 to 10 seconds.	
	Alarm	"Active – Silenced" Flashing No audible signal	
	Alarm	"Active – Acknowledged" Steady No audible signal	
	Alarm	"Rectified – Unacknowledged" Flashing No audible signal	
	Alarm	"Acknowledge not allowed"	
	Warning	"Active – Unacknowledged" Flashing 2 short audible signals	
	Warning	"Active – Silenced" Flashing No audible signal	
	Warning	"Active – Acknowledged" Steady No audible signal	
	Warning	"Rectified – Unacknowledged" Flashing No audible signal	
	Warning	"Acknowledge not allowed"	
	Caution	"Active" Steady No audible signal	

Information according IEC 62923-1 2018 Ed 1

Priority	Icon(s)	Type	State
Highest	 	Alarm	"Active – Unacknowledged", "Active – Silenced"
	 	Warning	"Active – Unacknowledged", "Active – Silenced"
		Alarm	"Rectified – Unacknowledged"
		Warning	"Rectified – Unacknowledged"
		Alarm	"Active – Acknowledged"
		Warning	"Active – Acknowledged"
Lowest		Caution	"Active"

Within each display priority, the alerts shall be displayed in the order of "time of last state change" (sequence with, on top, the alert that changed state most recently).

Information according IEC 62923-1 2018 Ed 1

Lost HDG control (3007,1 alarm / BNC)

The BAM alarm “Lost HDG control: HCS Failed. Switch to Manual steering” will be shown if one or more of the following failure conditions occur when the Autopilot is engaged:-

- i) Internal Distribution unit failure*.
- ii) Internal DB +7V failure*.
- iii) Internal DB +3.5V failure*.
- iv) Internal DB +2.5V failure*.
- v) No heading source available*.
- vi) Rudder reference A failure (if it is being actively used for rudder positioning)**.
- vii) Rudder reference B failure (if it is being actively used for rudder positioning)**.
- viii) Steering A failure**.
- ix) Steering B failure**.

This alert informs the operator that the Autopilot is no longer able to control the ship's heading. Manual Steering must be engaged immediately by pressing the “STBY” key on the Control unit.

If the “Lost HDG control” alarm is not acknowledged within 30 seconds and the alarm has not been terminated then a Backup Navigator Call (BNC) is generated.

* When the Autopilot is set to standby mode (disengaged) these failure conditions will generate a new BAM alert message containing details of the specific error condition.

** When the Autopilot is set to standby mode (disengaged) these failure conditions will be cleared.

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

Doubtful Heading (3012,1 & 3012,2 warning / warning)

- i) The Autopilot is equipped with an integral Course Comparator which compares data received from 2 inputs (1 x HSC and 1 x NMEA or 2 x NMEA). In the event that one input is absent or disagrees with the other by more than the preset limit (set in the LIMITS Menu) the BAM warning “Doubtful Heading: Deviation between heading sources exceeded limit” will be activated.
- ii) The BAM warning “Doubtful Heading: Heading monitor function is impossible” will be shown if only one heading source (no second heading data input) is available for comparison purposes. The CCA will function with 2 heading inputs and will compare the 2 highest priority sources nominated via the Autopilot Set Up Menu. Check proprietary source(s).

Both Doubtful Heading warnings will escalate if not acknowledged within 30 seconds.

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

HCS Power Fail (3023,1 & 3023,2 caution)

- i) In the event of Main Power supply failure (18-40Vdc) to Terminals 56 (+ve) and 57 (-ve) of the Distribution Unit, the BAM caution “HCS Power fail: HCS working normally on Backup Power only” message will be displayed on the Control Unit.

ii) In the event of Back Up power supply failure (18-40Vdc) to terminals 58 (+ve) and 59 (-ve) of the Distribution Unit, the BAM caution “HCS Power fail: HCS working normally on Main Power only” message will be displayed on the Control Unit.

NOTE: A Power Monitor relay is also provided within the DB to offer voltfree single pole changeover contacts to activate an external (auxiliary) alarm (if required) in the event of complete (Main & Back Up) power supply failure. (Terminal Nos. 80, 81, 82).

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

Off-Heading (3025,1 warning & 3024,1 alarm)

The Autopilot LIMITS Menu allows the integral Off Heading Alarm (OHA) trip level to be set such that if the vessel alters course or yaws in excess of the level specified (+/-3°, +/-5° etc.) the BAM warning “Off-Heading: Yawing is too big: take helm to keep steady” will be activated.

The Off-Heading warning will escalate to an alarm if not acknowledged within 30 seconds.

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

HCS Unavailable (3059,1 to 3059,7 cautions)

There are a number of failure conditions that will result in a “HCS Unavailable” caution alert, see below for details.

- i) HCS Unavailable: Internal Distribution Box Failure (3059,1).
Indicates internal Distribution Unit failure associated with communication break down between processors. It is likely that factory advice/assistance will be required.
- ii) HCS Unavailable: Internal Distribution Box +7V Error (3059,2).
If the +7V regulated line fails or is outside of design tolerance, the +7V Fail alert will be activated.
- iii) HCS Unavailable: Internal Distribution Box +3.5V Error (3059,3).
If the +3.5V regulated line fails or is outside of design tolerance, the +3.5V Fail alert will be activated.
- iv) HCS Unavailable: Internal Distribution Box +2.5V Error (3059,4).
If the +2.5V regulated line fails or is outside of design tolerance, the +2.5V Fail alert will be activated.
- v) HCS Unavailable: No HDG source available, Step HDG failed (3059,5).
This alarm condition confirms that no valid step by step data is available to the Autopilot System.
- vi) HCS Unavailable: No HDG source available, Step HDG not aligned (3059,6).
This alarm condition occurs if step by step heading input data is interrupted requiring that the Autopilot heading indication be realigned when the step data is restored.

- vii) HCS Unavailable: No HDG source available (3059,7).

This alarm condition confirms that no heading source of any type is being received by the Autopilot system. For IEC 61162-1 or -2 type heading data sources check proprietary source(s).

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

HCS Fault (3062,1 & 3062,2 and 3063,1 to 3063,5)

There are a number of failure conditions that will result in an “HCS Fault” alert, see below for details.

- i) HCS Fault: Track steering failed. No input data. (3062,1 warning / warning)

NOTE: The “HCS fault: Track steering failed. No input data” warning will escalate if not acknowledged within 30 seconds.

This alert message will result when the Autopilot is operating in the TRACK mode and no valid (HTC, HSC or APB) track data is being received.

NOTE: When used with \$XXAPB or \$XXHSC data, the Autopilot will alarm and request cancel / confirm when a waypoint is reached and a turn in excess of 10° is required to next waypoint.

- ii) HCS fault: HCS Fault. Switch to manual steering (3062,2 warning / warning).

The “HCS fault: HCS Fault. Switch to manual steering” warning will escalate if not acknowledged within 30 seconds.

This condition is only applicable to systems that employ the Ethernet interface and indicates there is no connection to other devices. Heading control will continue if already engaged. Select manual steering whilst the fault is investigated.

- iii) HCS fault: No Setup data. (3063,1 caution)

The Autopilot Set Up Data is stored in the Distribution Unit non-volatile memory and read at power up. The integrity of this data is verified when read and will only be used if no errors are detected. A checksum is included to guard against corrupted data being used.

If the current Set Up Data is unable to be loaded at power up for any reason, the “HCS fault: No Setup data” message will be displayed. The Autopilot will continue to function but all setup parameters will be set to their factory default values.

If the “HCS fault: No Setup data.” message appears, switch the Autopilot “OFF”. Wait a few seconds then set the Autopilot to STANDBY. If the “HCS fault: No Setup data.” message is again shown when the Autopilot is re-powered, it is likely that the Set Up Menu data is corrupted thus the integrity of the stored setup data must be considered suspect and should be cleared down.

- iv) HCS fault: Control unit interface error. (3063,2 caution).

This condition indicates no data received by the Control Unit.

- v) HCS fault: Rudder feedback A failed (3063,3 caution) or
HCS fault: Rudder feedback B failed (3063,4 caution).

This condition is only applicable to systems that use rudder feedback for indication only (i.e. Analogue demanded position systems).

This caution warns that an abnormally high rate of change or step change in rudder position has been detected from the rudder reference unit potentiometer, which is used to signal rudder position.

- vi) HCS fault: Draft adaptive control unavailable, no data. (3063,5 caution).
The Draft failure alarm will only be activated if the Autopilot has previously been installed using such data (4 – 20 mA draft input signal) which is later absent.

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

Low Speed: Ship's speed too low for HDG control (3065,1 warning / warning)

This alert relates to Speed over the Ground and warns that SOG is too low for the Autopilot system to undertake the programmed/required radius of turn due to prevailing conditions (SOG too low vs drift etc.). Speed increase required.

NOTE: The “Low Speed: Ship’s speed too low for HDG control” warning will escalate if not acknowledged within 30 seconds.

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

HDG in Fallback: <source 1> lost, normal HC using <source 2> (3113,1 caution)

This caution message will be activated if the Autopilot is engaged and an alternative heading source is used (<source 2>) due to the failure of the heading source in use.

Possible messages are:-

HDG in Fallback: Step HDG lost, normal HC using Gyro 1
HDG in Fallback: Step HDG lost, normal HC using Gyro 2
HDG in Fallback: Step HDG lost, normal HC using Mag compass
HDG in Fallback: Gyro 1 lost, normal HC using Gyro 2
HDG in Fallback: Gyro 1 lost, normal HC using Mag compass
HDG in Fallback: Gyro 1 lost, normal HC using Step HDG
HDG in Fallback: Gyro 2 lost, normal HC using Gyro 1
HDG in Fallback: Gyro 2 lost, normal HC using Mag compass
HDG in Fallback: Gyro 2 lost, normal HC using Step HDG
HDG in Fallback: Mag compass lost, normal HC using Gyro 1
HDG in Fallback: Mag compass lost, normal HC using Gyro 2
HDG in Fallback: Mag compass lost, normal HC using Step HDG

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

No radius control: Radius control unavailable, no SOG data (3156,1 caution)

Speed over the Ground (SOG) data is essential to Autopilot constant radius turn performance for which IEC61162-1 or -2 sentence types \$XXVTG or \$XXVBW must be available.

In the event that these sentence types are absent, the “No radius control: Radius control unavailable, no SOG data” caution message will be activated. (Check SOG Speed Data Source).

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

No SPD Adaptive: SPD adaptive control unavailable, no STW data (3156,2 caution)

Speed though the Water (STW) data is essential to Autopilot Speed Adaptive performance for which IEC 61162-1 or -2 sentence types \$XXVHW or \$XXVBW must be available.

Pulse log input (200 or 400ppNm) is also acceptable but in the event that none of these input types are present (No IEC61162 or Pulse) the “No SPD Adaptive: SPD adaptive control unavailable, no STW data” caution message will be activated. (Check STW Speed/Pulse Data Source).

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

Operational Alarms

REM STR ON

This alarm occurs if a AlphaPilot MFS Control Unit **REMOTE ON/OFF** button is operated to enable Remote Controls when a proprietary Remote Power Steer Control is already in an ON condition (**REMOTE ON/OFF** button action is suspended in this case and prevents inadvertent rudder application due to remotely located Power Steer Unit demands).

Switch 'off' Remote Power steer Station.

MASTER REM. OFF/REMOTE REQUEST

This condition advises that another AlphaPilot MFS Control Unit request for system control has been denied because a Master Control Unit has been nominated and the **REMOTE ON/OFF** button of the master Control Unit has not been set to ON.

Another Control Unit will only gain entry when the master Control Unit has set the **REMOTE ON/OFF** button to ON.

NO ORIDE CAL

No override cal – HSC requirement.

This alarm confirms that no cal data has been entered during initial High Speed vessel (HSC) installation and sea trials to provide safe angles of rudder - based on vessel speeds and associated safe rate of turns – when single or dual override controls are operated.

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

REMOTE FAIL

This condition indicates no data received by the AlphaPilot MFS Distribution Unit from the selected Control Unit.

NOTE: Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

RUDDER LIMIT

The rudder limit setting is the maximum angle of rudder that the AlphaPilot MFS system is normally permitted to apply and is set – in degrees – via the **LIMITS** menu (accessible via the **CONTROL|LIMITS** button). If the maximum (limit) angle is attained, the alarm is activated.

Diagnostic failure messages: Heading Sensors

CPS HI FAIL

Signal from HSC is too large.¹

CPS LO FAIL

Signal from HSC too low.¹

CPS PHS FAIL

Signals from the 3 sense lines not consistent.¹

COMPASS FAIL

High ROT/Rate of change.¹

HDT 1 FAIL

Channel 1 input. An unreasonable rate of change of heading has been detected in the HDT (NMEA 0183) heading data. The HDT sentence has been inhibited and will not be re-enabled until the Autopilot Mode Switch set to **STANDBY**.¹

It is also noteworthy that should the HDT data still be suspect when the AlphaPilot MFS system is switched ON, the next (lower) priority NMEA sentence will be read, and if the higher priority sentence is restored, this will automatically be accepted provided the heading value is within 15° of the current heading.

HDG 1 FAIL

Channel 1 input. An unreasonable rate of change of heading has been detected in the HDG (NMEA 0183) heading data. The HDG sentence has been inhibited and will not be re-enabled until the Autopilot Mode Switch set to **STANDBY**.¹

NOTE: The comments made in ‘HDT 1 FAIL’ reference filtering and 15° restoration provided within 15° of current heading are applicable to the HDG sentence.

HDM 1 FAIL

Channel 1 input. An unreasonable rate of change of heading has been detected in the HDM (NMEA 0183) heading data. The HDM sentence has been inhibited and will not be re-enabled until the Autopilot Mode Switch set to **STANDBY**.¹

NOTE: The comments made in ‘HDT 1 FAIL’ reference filtering and 15° restoration provided within 15° of current heading are applicable to the HDM sentence.

HCC 1 FAIL

Channel 1 input. An unreasonable rate of change of heading has been detected in the HCC (NMEA 0183) heading data. The HCC sentence has been inhibited and will not be re-enabled until the Autopilot Mode Switch set to **STANDBY**.¹

NOTE: The comments made in ‘HDT 1 FAIL’ reference filtering and 15° restoration provided within 15° of current heading are applicable to the HCC sentence.

¹ Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

HDT 2 FAIL

Channel 2 Input. Ditto HDT 1 FAIL.

HDG 2 FAIL

Channel 2 Input. Ditto HDG 1 FAIL.

HDM 2 FAIL

Channel 2 Input. Ditto HDM 1 FAIL.

HCC 2 FAIL

Channel 2 Input. Ditto HCC 1 FAIL.

NO NMEA H`DG IN

This alarm condition confirms that no NMEA heading data of any type is being received by the AlphaPilot MFS system.²

CCA DAT FAIL

This alarm condition occurs if only one heading data input (no second heading data input) is available for comparison purposes. The CCA will function with two heading inputs and will compare the two highest priority sources nominated via the AlphaPilot MFS system Set Up Menu.²

STEP FAIL

This alarm condition confirms that no valid step-by-step data is available to the AlphaPilot MFS system.²

STEP ALIGN

This alarm condition occurs if step-by-step heading input data is interrupted requiring that the Autopilot heading indication be realigned when the step data is restored.²

Diagnostic failure messages: Miscellaneous

L/SW OPEN

This is an operational status alarm applicable to both Port and Starboard limit switches and is displayed on the AlphaPilot MFS Control Unit if either limit switch is rendered open circuit.²

STEER`G FAIL

Steering System Fail.²

Solenoid Steering System

This alarm is activated if the AlphaPilot MFS system has issued a rudder movement demand, but the steering system has failed to respond within a period of two seconds.

The alarm is automatically cancelled when the rudder starts to move and likely causes of this type of failure are as follows:

- i) Steering pump(s) not running.
- ii) Air in hydraulic system causing delayed rudder response.

² Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.

- iii) Rudder at maximum limit as defined by limit switch settings.

NOTE: An open circuit limit switch (whether due to adjustment or defect) is signalled by the **L/SW OPEN** alarm.

- iv) No rudder demand outputs from AlphaPilot MFS Control Unit or defective solenoid(s):

ASI Analogue Steering Systems

Provided continuous rudder position feedback is available and the ASI Steering Fail monitor is turned ON, the AlphaPilot MFS system will monitor the Rudder position (as indicated by the Rudder Feedback signal) and compare it to the demanded position.

When the Rudder approaches the demanded position, if the final position when the rudder has stopped remains greater than the set limit value for more than two seconds, and the rudder is not moving towards the correct position, then the steering fail alarm is activated. The alarm is automatically cancelled if the rudder moves towards the correct position or the error is within the set limit.

Likely causes are:

- i) Analogue steering machine not operating or not set for AlphaPilot MFS system control.
- ii) Rudder at maximum physical limit.
- iii) Rudder not at demanded angle due to incorrect calibration of AlphaPilot MFS Distribution Unit Output Gain.

RRU FAIL

This error message warns that an abnormally high rate of change or step voltage – 40 change has been detected from the RRU potentiometer, which is used to signal rudder position.³

This might be caused by a ‘noisy’ or open circuit potentiometer track, damaged wiring, or intermittent feedback connections. Loose joints or ‘backlash’ in the mechanical linkage between RRU and rudder stock may also be a contributory factor.

The AlphaPilot MFS Control Unit display provides two-digit rudder angle data and can be used to provide an accurate indication of the RRU potentiometer integrity as follows:

Set the AlphaPilot MFS system to standby and use manual steering control to move the rudder from hard over Port to hard over Starboard observing the two-digit display in the process. If the indicated rudder angle fails to follow the rudder smoothly and accurately, a potentiometer fault is indicated.

Ethernet Alarms

ETHERNET FAIL

No Data received on Ethernet.³

³ Contact a certified installation company approved by either ALPHATRON MARINE or by an official ALPHATRON MARINE distributor for support.