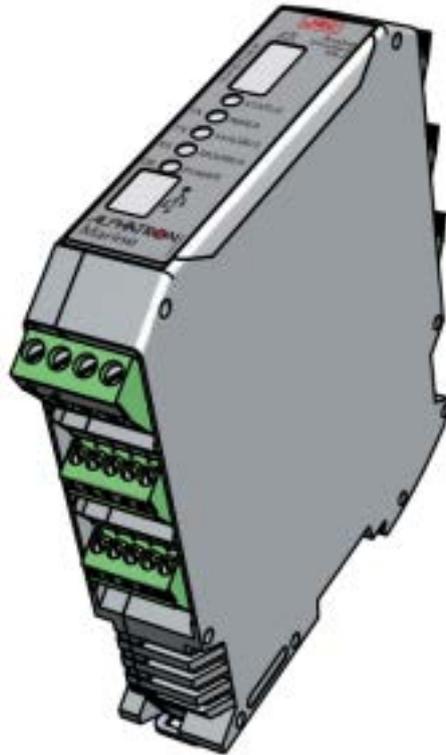




ALPHATRON
Marine



Analog Interface Mk.2

Installation and Operation Manual

www.jrc.am

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I Preface

- Thoroughly read this instruction manual before installation and operation of the equipment.
- We recommend to keep this manual nearby the equipment to ensure ready access to it.

I.1 Revision History

Revision No.	Software Version	Description	Date
V1.0	R1_015	First issue	17 June 2015
V1.0.1	R1_015	Textual changes	23 July 2015
V1.0.2	R1_015	Textual changes	01 September 2015
V1.0.3	R1_029	Textual changes	2 March 2016

I.2 Glossary

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

I.2.1 Definitions

The meaning of standard definitions as used in this manual are explained in *Table 1: Definitions* on page 4.

Redundant	A device that is equipped with multiple part of the same type, for example a double power supply. This equipment will continue to function when one of the redundant part fails.
Heading users	Navigation equipment that uses heading/course information for functioning.
Hardware	The physical parts of the AlphaLine instrument.
LEDs	Light-emitting diodes. These are used for signaling statuses of hardware and software signals to the user.
Central alarm system / Bridge watch monitoring	System that is connected to all vital systems on a ship and that is able to give a centralized indication of the (alarm)status of all connected systems.
NMEA protocol	Protocol standard for transmitting and receiving of asynchronous serial data sentences.
Talker	Device which transmits data. This is usually called transmitter or TX.
Listener	Device which receives data. This is usually called receiver or RX.
ISO GND	Isolated Ground. This is a ground connection to be used for reference signal. It is different from EARTH and should normally not be connected to EARTH.
Grounding point/stud	Point on the chassis of the AlphaLine instrument which should be connected to the ship's mass.
Printed Circuit Board	A printed circuit board, or PCB, is used to mechanically support and electrically connect electronic components using conductive pathways, or traces, etched from copper sheets, laminated onto a non-conductive substrate.
(Galvanic) isolated	Electrical separation of two circuits. There is no current flowing directly from one circuit to another. Electrical energy and/or information can still be exchanged between the sections by other means, such as by induction or by optical means (like transformers or opto couplers).
CAN bus	Controller Area Network. This is a network based serial bus system used for exchanging information. It is the advanced version of RS485/422 serial buses.
Reverse polarity protection	This is a part of the power supply hardware that prevents any damage to the equipment when the power supply is connected to the wrong polarity.

ROT signal	Rate Of Turn (ROT) signal indicates the course change of a ship in degrees per minute. This signal can be analog using voltage or current, or can be an NMEA data signal.
Heading/bearing repeaters	Navigation type of instruments displaying the heading/course of a ship.
Baud rate	This is the transmission speed of serial interfaces in characters per second.
Transmitting interval	The frequency at which complete NMEA sentences are being transmitted in number of times per second.
Factory setting	Instrument setting for backlight color, language, number of connected apparatus, etc. as configured as a new instrument by the factory.
Flash memory	Non-volatile type of memory. This type of memory retains its contents even when the instrument is turned off.
Firmware	(Embedded) software inside the processors of the AlphaLine instrument.
Compass safe distance	The minimum distances to equipment that will not cause an unacceptable deviation of the ship's standard and steering compasses.

Table 1: Definitions

1.2.2 Abbreviations

Abbreviations as used in this manual are explained in *Table 2: Abbreviations* on page 5.

A	Ampere
ARD	AlphaLine Repeater Display
CAN	Controller Area Network
DC	Direct Current
DP	Dynamic Position
ECDIS	Electronic Chart Display Information System
GPS	Global Positioning System
I/O	Inputs and Outputs
I.S.	Inter Switch
LED	Light-Emitting Diode
mA	Milliampere
mm	Millimeter
NC	Normally Closed
NMEA	National Marine Electronics Association
NO	Normally Open
OA	Operational Alarm
TAP	Type Approval Program
PCB	Printed Circuit Board
RCU	Remote Control Unit
ROT	Rate Of Turn
VAC	Volts Alternating Current

VDC	Volts Direct Current
VDR	Voyage Data Recorder
W	Watt

Table 2: Abbreviations

I.3 Norms and Standards

The Analog Interface Mk.2 complies with the applicable standards, norms and regulations:

- IEC 60945 (2002) including IEC 60945 Corrigendum 1 (2008)
- Standard DNV 2.4
- IEC 61162 series

II Warnings and Cautions

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



- WARNING
- A WARNING indicates potential risk of injury or death to users of the product.



- CAUTION
- A CAUTION indicates potential risk of damage to equipment.

To safely install and operate this instrument, so as not to adversely affect the warranty, the following WARNINGS and CAUTIONS must be adhered to.



- WARNING
- Do not disassemble or modify the equipment. Failure to observe this instruction may cause a fire, electric shock, or equipment failure.



- WARNING
- Do not insert or remove the power cord or operate switches with a wet hand. Otherwise, you may suffer an electrical shock.



- WARNING
- Operate the equipment only at the power supply voltage of 24 VDC. Failure to observe this instruction can cause a fire, electric shock, or equipment failure



- WARNING
- Do not scratch, damage, modify, heat, pull, excessively bend, or heavily load the power supply cable. It may cause a fire, or electric shock.



- WARNING
- Immediately turn off the power and disconnect the power supply cable if the equipment is generating any smoke or odor, 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 vessel containing liquid on the equipment. It may cause a fire, electrical shock, or a failure to the equipment if knocked over.



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



- CAUTION
- 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.



- CAUTION
- This product must be installed in accordance with the installation methods described in this manual. Acting otherwise will void the warranty.



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



- CAUTION
- Do not allow the instrument to fall or immerse into water. The equipment can be damaged.



- CAUTION
- 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.



- CAUTION
- If the instruments are not stored as described, it will void the warranty.



- CAUTION
- 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.

II.1 Warranty

Non-compliance with the installation, operation and maintenance requirements may void the warranty. Read *Warnings and Cautions* on page 7.

Contact the Alphasatron dealer regarding the terms of the warranty.

II.2 Storage

The AlphaLine range of instruments are sensitive to humidity, temperature fluctuations and aggressive substances. Store them appropriately.



- CAUTION
- If the instruments are not stored as described, it will void the warranty.



III Introduction

The Analog Interface Mk.2 converts analog to digital signals. Supported signals include 0-20 mA, +/- 5/10/20V and potentiometer signals for use with dimmers or rudder feedback units. The Analog Interface Mk.2 converts the analog signal to a digital MODBUS and IEC 61162-1 signal.

1 Installation Instructions

This chapter describes the installation of the Analog Interface Mk.2.

1.1 Mechanical Installation



- CAUTION
- This product must be installed in accordance with the installation methods described in this manual. Acting otherwise will void the warranty.

1.1.1 Supplied Parts

The Analog Interface Mk.2 is delivered as a fully assembled product. No additional assembly is required.

1.1.2 Dimensions

Carefully check the applicable drawing(s) of the instrument. See *Mechanical Drawings* on page 17.

1.1.3 Mounting Modules

The Analog Interface Mk.2 should be installed on a DIN-rail in a cabinet protected from the environment. Keep at least 5 cm of space between both sides of the interface for thermal emission and cabling space.

When the Analog Interface Mk.2 is removed for service or replacement, pull the DIN-rail clamp to release the interface gently from the DIN-rail.

1.1.4 Module Electric Connections

For electric connections, see *Electric Diagrams* on page 18.

1.1.5 Module Power Supply

The Analog Interface Mk.2 has one 24 VDC (nominal) power input. Power consumption is approx. 200 mA. Connect to a power supply > 1 A.

1.1.6 Connecting Rudder Feedback Unit MD/HD and Analog Interface Mk.2

The Rudder Feedback Unit MD/HD consists of a potentiometer output, combined with limit switches (Rudder Feedback Unit HD only), that can be connected to the display unit via an interface.

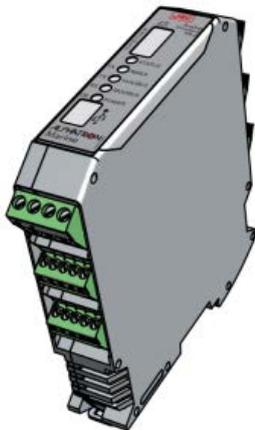


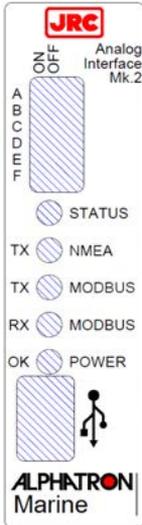
Figure 1: Analog Interface Mk.2



Figure 2: Rudder Feedback Unit MD/HD

Rudder may be connected to the AlphaLine instrument using a serial signal (\$xxRSA sentence, first rudder field), or by using the Rudder Feedback Unit MD/HD.

1. Set the DIP switches on the front as explained below to connect and configure the potentiometer correctly.



Switch Contact	Function
A	Setting analog channel 1
B	Setting analog channel 1
C	Setting analog channel 2
D	Setting analog channel 2
E	Spare
F	Slave address setting

Table 3: DIP Switch Functions

Figure 3: DIP Switch Locations

SW A	SW B	Function
OFF	OFF	+/- 5V and +/- 25mA input
OFF	ON	+/- 10V input
ON	OFF	+/- 20V input
ON	ON	Rudder input potentiometer

Table 4: Functions Switches A and B

SW C	SW D	Function
OFF	OFF	+/- 5V and +/- 25mA input
OFF	ON	+/- 10V input
ON	OFF	+/- 20V input
ON	ON	Rudder input potentiometer

Table 5: Functions Switches C and D



Note Set the switches A and B to the ON position when the Rudder Feedback Unit MD/HD is connected to analog input 1.

2. Connect the Rudder Feedback Unit MD/HD to the Analog Interface Mk.2. See *Electric Diagrams* on page 18.



Note To prevent signal error, the cable with analog signal from the Rudder Feedback Unit MD/HD to the Analog Interface Mk.2 should be as short as possible. Position the Analog Interface Mk.2 as close as possible to the Rudder Feedback Unit MD/HD. The analog signal cable must not exceed 20 meters.

Ensure the analog signal cable is separated from high voltage and high current cables, by placing it in a different trunk.



Note Position the Analog Interface Mk.2 in a cabinet where there can be no interference from electronics such as frequency drives (i.e. use a different/separate cabinet).



- CAUTION
- Failure to observe these guidelines could lead to serious system malfunction or wrong rudder information.



- WARNING
- The analog signal cable must be securely earthed to the Rudder Feedback Unit MD/HD side, using the EMC cable gland. The other side of the cable should remain unearthed.

3. Check functionality by checking the LEDs.

- POWER LED - Steady green
- MODBUS RX LED - Blinking green
- MODBUS TX LED - Blinking red
- NMEA LED - Blinking red
- STATUS LED - Shows Functionality: OK - Steady green, ERROR - Steady red

4. Use the IEC 61162-2 interface COM 0 Modbus to connect the module to the display unit.

1.1.6.1 Inputs and Outputs Analog Interface Mk.2

Inputs and Outputs are as follows:

1. 1 x IEC 61162-1 connection for NMEA signals
2. 1 x IEC 61162-2 connection for Modbus connection to MFx display
3. 2 x Analog input

The Analog Interface Mk.2 has 2 analog signal input channels and each channel can have the following signals defined in the terminals, depending on switch position, see *Table 6: Analog Signal Output Channel 1* on page 12 and *Table 7: Analog Signal Output Channel 2* on page 12

Switch A	Switch B	Terminal 11	Terminal 12	Terminal 13	Terminal 14	Terminal 17	Terminal 18
OFF	OFF	ch1 +/- 5V	X	ch1 0V	X	X	X
OFF	OFF	X	X	X	X	ch1 +/- 20mA	ch1 0V
OFF	ON	ch1 +/- 10V	X	ch1 0V	X	X	X
ON	OFF	ch1 +/- 20V	X	ch1 0V	X	X	X
ON	ON	X	Pot. Wiper Signal	ch1 0V	Rudder Power	X	X

Table 6: Analog Signal Output Channel 1

Switch C	Switch D	Terminal 19	Terminal 20	Terminal 21	Terminal 22	Terminal 15	Terminal 16
OFF	OFF	ch2 +/- 5V	X	ch2 0V	X	X	X
OFF	OFF	X	X	X	X	ch2 0V	ch2 +/- 20mA
OFF	ON	ch2 +/- 10V	X	ch2 0V	X	X	X
ON	OFF	ch2 +/- 20V	X	ch2 0V	X	X	X



Switch C	Switch D	Terminal 19	Terminal 20	Terminal 21	Terminal 22	Terminal 15	Terminal 16
ON	ON	X	Pot. Wiper Signal	ch2 0V	Rudder Power	X	X

Table 7: Analog Signal Output Channel 2



Note Inputs of channel 1 and 2 are electrically isolated. Connect the inputs separately per channel and do not combine wiring, such as ground.

1.2 Software Installation

1.2.1 Software Update for Modules

The Analog Interface Mk.2 is not field serviceable.

1. Contact the Alpatron Service Desk at www.jrc.am/support if there is an issue with the software.



2 Operation

This module cannot be operated without an AlphaLine instrument. For operation, please refer to the original manual with your AlphaLine instrument.

3 Maintenance



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

Maintenance and repair of the Rudder Feedback Unit should only be performed by personnel that is familiar with the Alpatron Rudder Feedback Unit.



- CAUTION
- 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.

4 Appendix A

Appendix A contains:

1. *Specifications* on page 16
2. *Mechanical Drawings* on page 17
3. *Electric Diagrams* on page 18
4. *Thales Certificates* on page 20

4.1 Specifications

4.1.1 Specifications Analog Interface Mk.2

Box Contents upon Delivery		Environmental according to DNV 2.4 table 2.1	
Analog Interface Mk.2 3109.0192 (Seagoing)		Temperature	Class D
Analog Interface Mk.2 3109.0252 (River)		Humidity	Class B
		Vibration	Class A
		EMC compatibility	Class B
		Enclosure	Class C
Physical Dimensions		Input/Output Signals	
Dimensions (WxHxD)	22.6x114x144 mm (0.89x4.49x5.67")	MODBUS port (IEC 61162-2)	Modbus RTU Rx/Tx baud rate 19.200
Weight	0.14 kg (0.31 lbs)	NMEA port (IEC 61162-1)	NMEA Rx/Tx baud rate 4.800
		Analog rudder input ch.1	+/-5 V +/-10 V +/-20 V
		Analog rudder input ch.2	+/-5 V +/-10 V +/-20 V
		Analog input ch.1	4-20 mA
		Analog input ch.2	4-20 mA
		USB port (Mini)	Used for software update/maintenance
Power Specifications		Norms/Standards	
Power supply	24 VDC input +/- 20% (Single source)	IEC 60945 (2002)	Incl. IEC 60945 Corrigendum 1 (2008)
Power consumption	2.4 W (24V DC @ 100 mA)	Standard DNV 2.4	Det Norske Veritas
Protection	Reverse polarity protection by serial diode	IEC 61162 series	NMEA Definitions
Start-up time	Direct	IEC 62288 (2014)	Testing methods
Operating Conditions			
Operating temperature	-5° C to +55° C		
Operating humidity	Up to 95% (at 40° C)		
Storage temperature	-25° C to +70° C		
Storage humidity	Up to 95% (at 40° C)		
IP rating	IP22		
Compass safe distance	Std: 10 cm / Steering: 10 cm		

4.2 Mechanical Drawings

4.2.1 Mechanical Drawing Analog Interface Mk.2

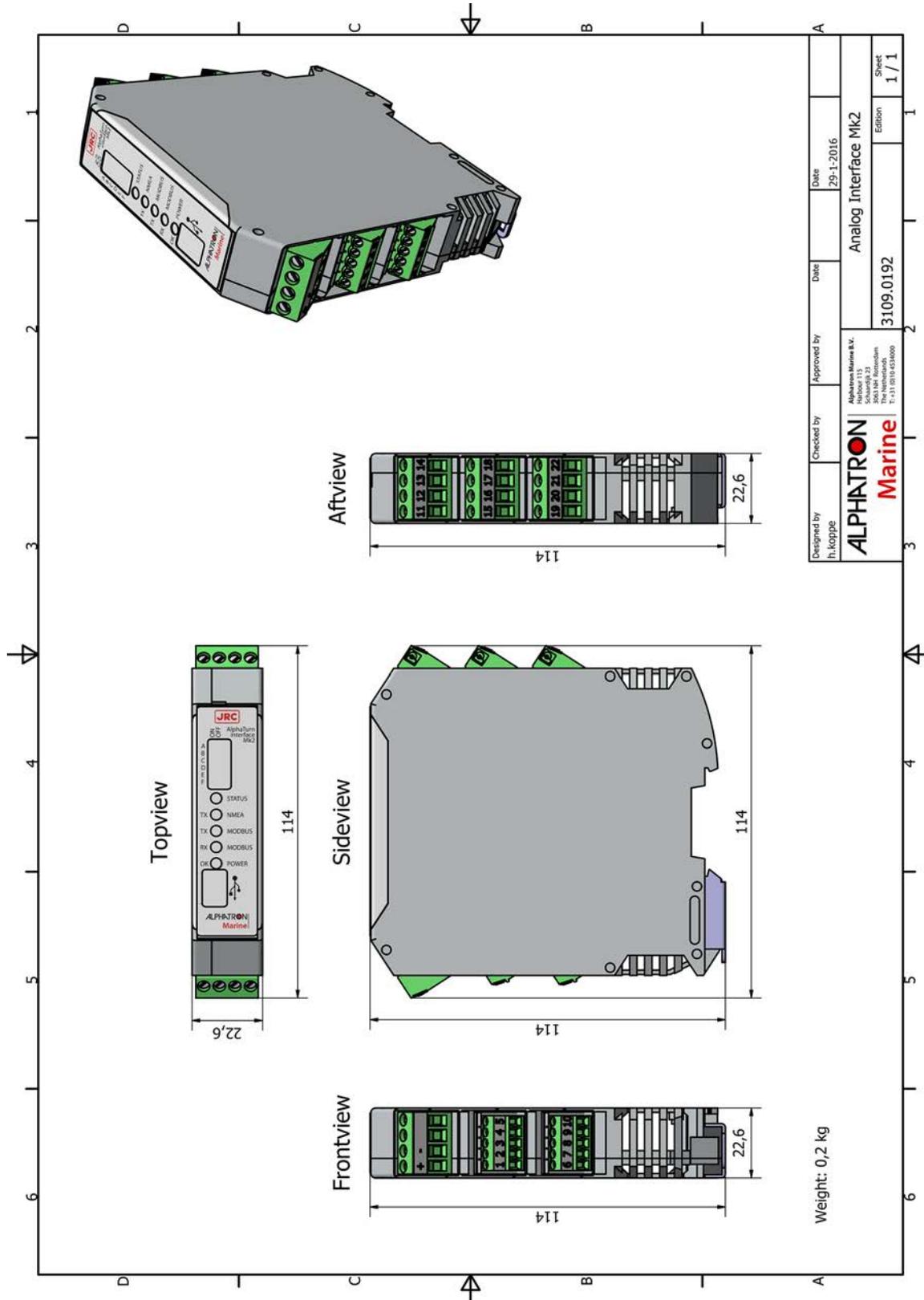


Figure 4: Mechanical Drawing Analog Interface Mk.2



4.3 Electric Diagrams

The cable diagrams and connection diagrams illustrate the connections to hardware, power and other equipment.

4.3.1 Connection Diagram Analog Interface Mk.2

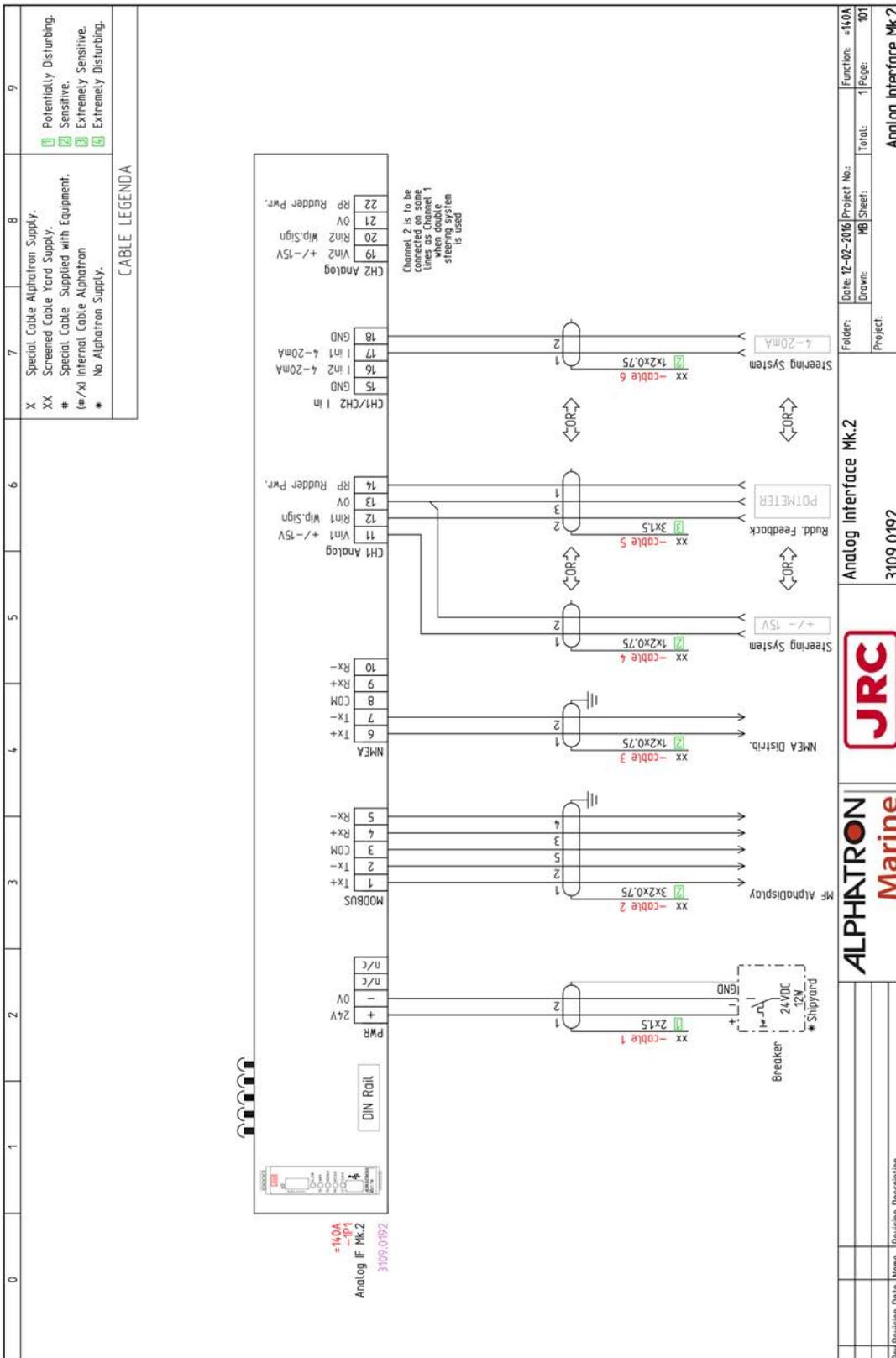


Figure 5: Connection Diagram Analog Interface Mk.2

4.4 Thales Certificates

4.4.1 Thales Certificate Analog Interface Mk.2

Certificate

THALES

Page 1 of 1

Number **S000230**

The ECC of THALES Nederland B.V. hereby declares that the:

Analog Interface Mk.2
distributed by
Alphatron Marine B.V.
Schaardijk 23
3063NH, Rotterdam
Netherlands



was tested, and found to be compliant to:

IEC 60945, 4th ed. 2002-08 with Corrigendum 1, April 2008.

start of test:	09-12-2014
test completed:	11-02-2015
test report numbers:	9505 333 664 EQR 001

This certificate refers to the tested sample only, since product reproducibility is not within the scope of the Environmental Competence Centre.

Hengelo, **13-05-2015**
Ing. G.J.M. Grote Beverborg
Manager ECC



Environmental Competence Centre
Thales Nederland B.V.
P.O. Box 42 NL-7550 GD Hengelo
The Netherlands

This certificate is issued under the restriction that neither the Environmental Competence Centre of Thales Nederland B.V. nor the Accreditation Board assumes any liability.

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Thales Nederland B.V.

Figure 6: Thales Certificate Analog Interface Mk.2

5 Appendix B

5.1 ISO 9001 Certificate Alpatron Marine R&D



CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

Alpatron Marine B.V.
Schaardijk 23
3063 NH Rotterdam
The Netherlands

has been approved by Lloyd's Register Quality Assurance
to the following Quality Management System Standard:

ISO 9001 : 2008

The Quality Management System is applicable to:

**Sales, design, engineering, installation, surveying and
servicing of ships navigation and communication solutions
and VDR equipment. Operational and technical training for
navigation and communication equipment for shipping.**

Approval Certificate No: RQA666472	Original Approval	:	21 March 2013
	Current Certificate	:	21 March 2016
	Certificate Expiry	:	14 September 2018

Issued by: Lloyd's Register Nederland B.V.



K.P. van der Mandelelaan 41a, 3062 MB Rotterdam, Nederland
This approval is carried out in accordance with the LRQA assessment and certification procedures and monitored by LRQA.

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Figure 7: ISO 9001 Certificate Alpatron Marine R&D

6 Appendix C

6.1 EC Declaration of Conformity



DECLARATION OF CONFORMITY

We: Alpatron Marine BV
Schaardijk 23
3063NH Rotterdam
Harbour number 115
The Netherlands
Tel +31(0)10-4534000
Fax +31(0)10-4529214

declare under our sole responsibility that the product line:

Analog Interface Mk.2

to which this declaration relates is in conformity with the following standard(s) or other normative document(s)

- IEC60945 (2002), including corrigendum 1 (2008) – Maritime navigation and radiocommunication equipment and systems- Methods of testing and required results
- IEC61162 series - Maritime navigation and radiocommunication equipment and systems - Digital interfaces
- DNV 2.4 (2006) - ENVIRONMENTAL TEST SPECIFICATION FOR INSTRUMENTATION AND AUTOMATION EQUIPMENT

On behalf of Alpatron Marine B.V

Rotterdam, the Netherlands
June 3, 2015



Quality manager
J. de Jong

Alpatron Marine B.V

Figure 8: EC Declaration of Conformity Analog Interface Mk.2

All over the world,
close to the customer

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The information in this document is subject to change without notice and does not represent a commitment on the part of Alphatron Marine B.V.

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Version : V1.0.3
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