

## BE1-IO/BE1-A Refit with AHD-BE1-IO and Color Displays



## Manual

Read this manual before beginning any work!



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**Change History**

For Manual "Refit of BE1-IO/BE1-A with AHD-BE1-IO and Color Displays".

<b>Date</b>	<b>Version</b>	<b>Reason for Change</b>	<b>Page</b>	<b>Author</b>
09/29/2016	Refit_BE1-IO_BE1-A_Instructions_EN_V1_20160929	Newly created	n.a.	Patzke, Jens (PaJ)

## General Information

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# 1 General Information

## 1.1 About this Manual

**Read this manual carefully before beginning any work! It is part of the product and must be kept in the product's immediate vicinity, so that it is always available to the personnel.**

**Include this manual when handing the product over to third parties.**

This manual includes important product handling instructions. On the following pages, this manual describes

how to replace BE1-A and BE1-IO with AHD-BE1-IO and a color display. Currently, only color displays AHD 570 are supported.

This manual must be used in conjunction with the manuals of the respective devices.

This manual includes specific instructions, in case further and more detailed documentation is available for individual components.

Adhering to all product safety and handling instructions for the product and all connected components is a prerequisite for safe operation.

In addition, the local accident prevention and general safety rules for the device's area of operation must be observed.

The illustrations in this manual are intended to demonstrate the contents more clearly. They are not necessarily drawn to scale and can vary from the actual product in minor details.

This manual has to be regarded as a complete unit. Using of excerpts from this manual as stand-alone documentation without considering the complete manual is not allowed.

## 1.2 Explanation of Symbols

### Warnings

In this manual, warnings are marked by symbols. The warnings are introduced by signal words indicating the degree of danger. It is important to heed these warnings and act with caution to avoid accidents, personal injury and property damage.



#### **DANGER!**

... indicates an imminently hazardous situation that can result in death or severe injury, if not avoided.



#### **WARNING!**

... indicates a potentially hazardous situation which can result in death or severe injury, if not avoided.



**CAUTION!**

... indicates a potentially hazardous situation that can result in minor or light injury, if not avoided.



**CAUTION!**

... indicates a potentially hazardous situation that can result in equipment damage, if not avoided.

**Tips and Recommendations**



**NOTICE!**

... indicates useful tips and recommendations and information for efficient and error-free operation.

## 1.3 Limitation of Liability

All information and instructions in this manual have been compiled in consideration of current norms and regulations, the state of technology, and our knowledge and experience of many years.

The manufacturer is not responsible for damages due to:

- Noncompliance with the instructions in this manual
- Unintended use
- Employment of untrained personnel
- Unauthorized modifications
- Technical modifications
- Use of unauthorized spare parts
- Faulty device and system configurations created by the user

The actual scope of delivery can vary from the explanations and illustrations in this manual in case of customized models, special ordering options or the latest technical improvements.

In addition, the agreed upon obligations in the delivery contract, the general terms and conditions, the manufacturer's delivery terms and the legal regulations current at the contract signing are in force.

We reserve the right to make changes to improve the device's service properties and to further develop the product.

## 1.4 Copyright

This operation manual is a confidential document. It is intended solely for those persons working with the product. It is not permitted to hand this manual over to third parties without the manufacturer's prior written permission.

## General Information

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### **NOTICE!**

*The information, texts, drawings, illustrations, and other representations in this manual are protected by copyright laws and are subject to industrial property rights. Any misuse is subject to prosecution.*

It is not permitted to duplicate this manual in any type or form – even in excerpts – or use and/or communicate its contents without the manufacturer’s written permission. Contraventions are liable to compensation. We reserve other rights.

## 1.5 Spare Parts



### **WARNING!**

#### **Risk of injury from incorrect spare parts!**

Incorrect or defective spare parts can cause damages, malfunctions or complete failure and jeopardize the vessel’s safety.

Therefore:

- Only use the manufacturer’s original spare parts.

Please order spare parts from a contracted reseller or directly from the manufacturer. Refer to page 2 for the address.

## 1.6 Warranty Terms

The warranty terms can be found in the General Terms and Conditions (GTC) of the manufacturer’s sales documents.

## 1.7 Customer Care

Our customer service department is available to assist you with technical information.

Information about the corresponding customer contact is always accessible via telephone, fax, e-mail, or the Internet. Please refer to page 2 for the manufacturer’s address.

In addition, our staff is always interested in new information and experiences resulting from the use of the product which can be used to further improve our products.



## 2 Safety

This chapter provides an overview of all important safety aspects for optimal protection of the personnel as well as safe and error-free operation.

Noncompliance with the handling and safety instructions listed in this manual can cause significant hazards.

### 2.1 Personnel Requirements

#### 2.1.1 Qualifications



**WARNING!**

**Risk of injury from insufficient qualification!**

Insufficient qualification can lead to significant personal injury and equipment damage.

Therefore:

- Only allow qualified personnel to do any work.

This manual lists the following qualifications for various areas of activity.

■ **Trained Person**

has been trained by the operator through an orientation for the assigned tasks and has been informed about possible hazards from improper execution.

■ **Specialist**

is able to execute the assigned tasks and recognize and avoid potential hazards independently due to formal training, knowledge and experience, as well as knowledge of the situational norms and regulations.

■ **Electrician**

is able to work on electrical systems and recognize and avoid potential hazards independently due to formal training, knowledge and experience, as well as knowledge of the situational norms and regulations.

The electrician is trained for the specific work site in which he is active and knows the relevant norms and regulations.

Only those persons who can be expected to do their work reliably are permitted as personnel. Persons, whose responsiveness is diminished by e.g. drugs, alcohol, or medication, are not permitted.

- Observe the local age and profession specific regulations when selecting the personnel.

## General

### 3 General

In 1996, Böning Automationstechnologie developed an alarm and safety system for maritime Diesel engines. This system consisted of the Input and Output Unit BE1-IO and the Display Unit BE1-A.

This manual describes how to replace these units with the Input and Output Unit AHD-BE1-IO and one or more color displays. Currently, only color displays of the type AHD 570 are supported.

It is assumed that all necessary device settings have been implemented by the manufacturer and that the configuration files for the visualization of the data on the color displays have been uploaded to the displays. Furthermore, it is assumed that AHD-BE1-IO and the color display will be installed at or close to the installation sites of BE1-IO and BE1-A.

In addition to the inputs and outputs of BE1-IO, AHD-BE1-IO provides four additional inputs:

- 2 x 4—20 mA for example for monitoring tanks
- 2 x NiCrNi for example for monitoring exhaust gas temperatures

If these inputs are used, observe additional project specific documentation for the connection of these inputs.

AHD-BE1-IO's CAN interface is used for data transfer to one or more displays.

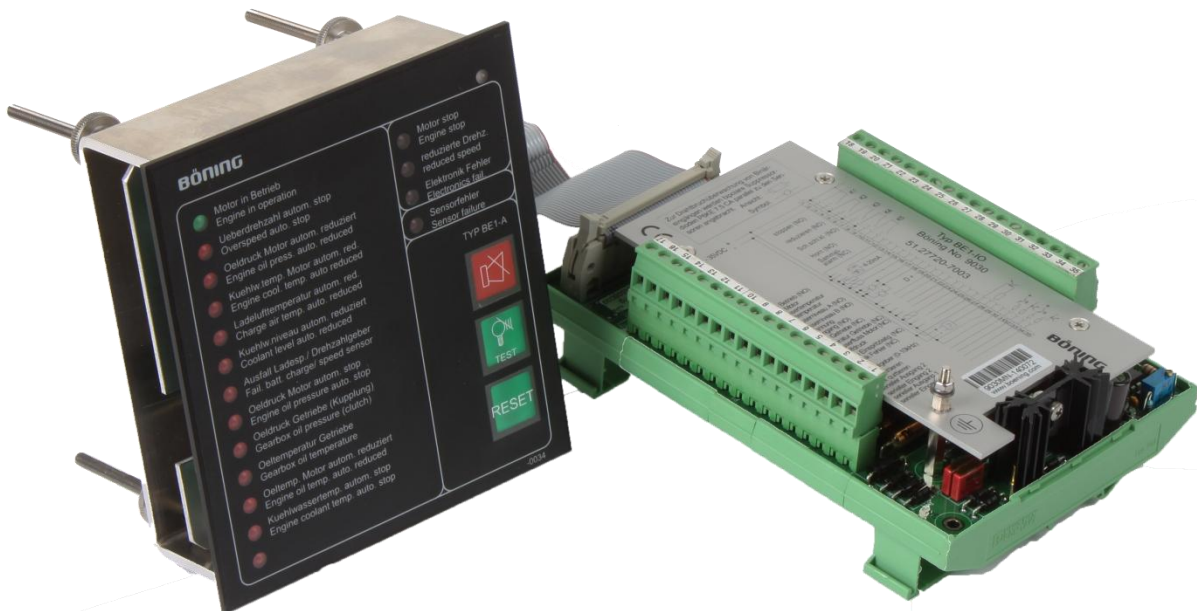


Illustration 1: BE1-A and BE1-IO



Illustration 2: AHD 570 and AHD-BE1-IO

## General

### 3.1 Installation Example

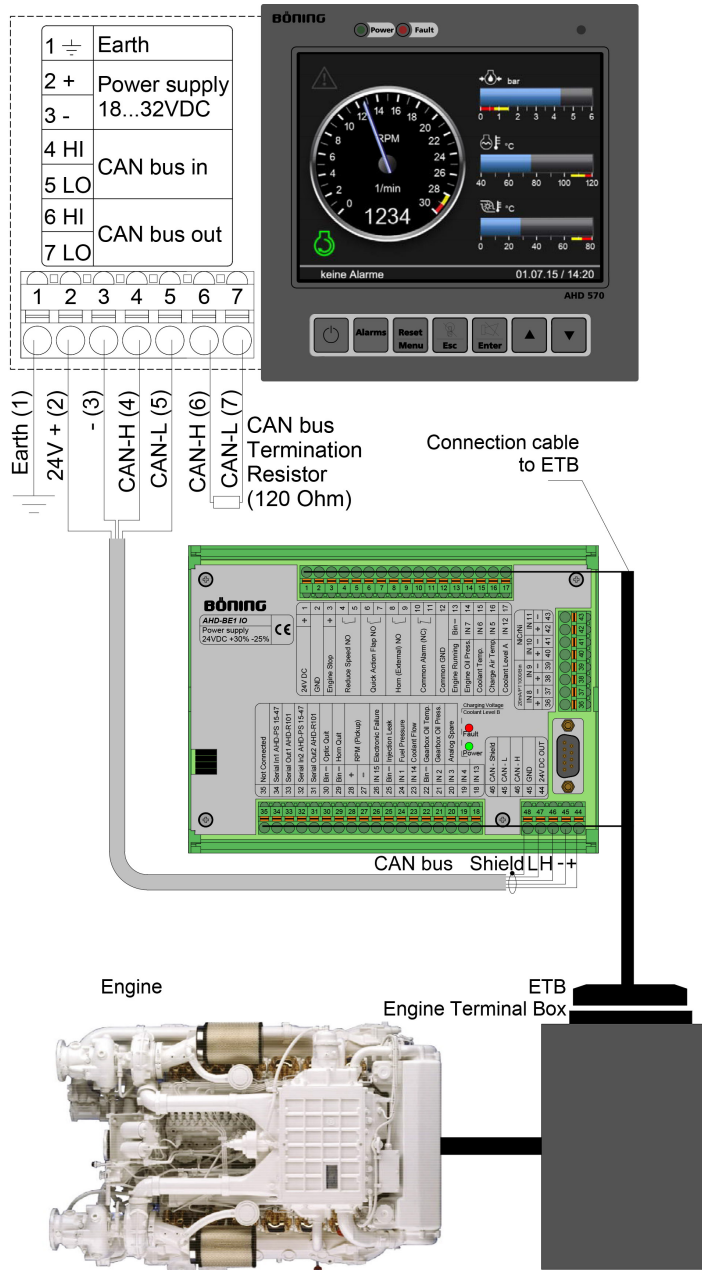


Illustration 3: AHD-BE1-IO with a display AHD 570

NOTICE: The cables for the LH CAN connection and the power supply are not included in the scope of delivery. They must be provided by the customer on-site according to the local requirements.

## 4 Technical Information

### 4.1 AHD-BE1-IO

#### 4.1.1 Technical Data

Description	Value/Unit/Type
<b>General Data</b>	
Dimensions, W x H x D	167 x 125x 57 mm Can be mounted on rail TS32 / TS35
Weight	Ca. 0.5 kg
<b>Environmental Data</b>	
Operating Temperature	-25°C...~+70°C
Protection class	IP 20 (rear side)
<b>Electrical Data</b>	
Power Supply	24 V DC (+30% / - 25%)
Current Consumption	Ca. 300 mA
<b>Interfaces</b>	
Interfaces	1 x CAN Bus
Inputs/Outputs	Matches BE1-IO In addition: 2 x NiCrNi 2 x 4—21 mA
<b>Approvals</b>	
Classification Societies	DNV GL (in preparation)

## Technical Information

### 4.1.2 Name Plate

**BÖNING**

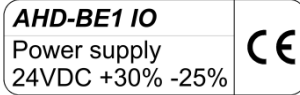


Illustration 4: Name plate of AHD-BE1-IO

The name plate of AHD-BE1-IO is located on the device's cover hood and contains the following information:

- The unit's model designation
- Power supply
- Serial number (separate label) (\*)
- Manufacturer/supplier and CE-marking

(\*) → the first two digits of the serial number designate the year of manufacture.

The exact date of manufacture can be requested from the manufacturer via the serial number.

### 4.1.3 Device Dimensions

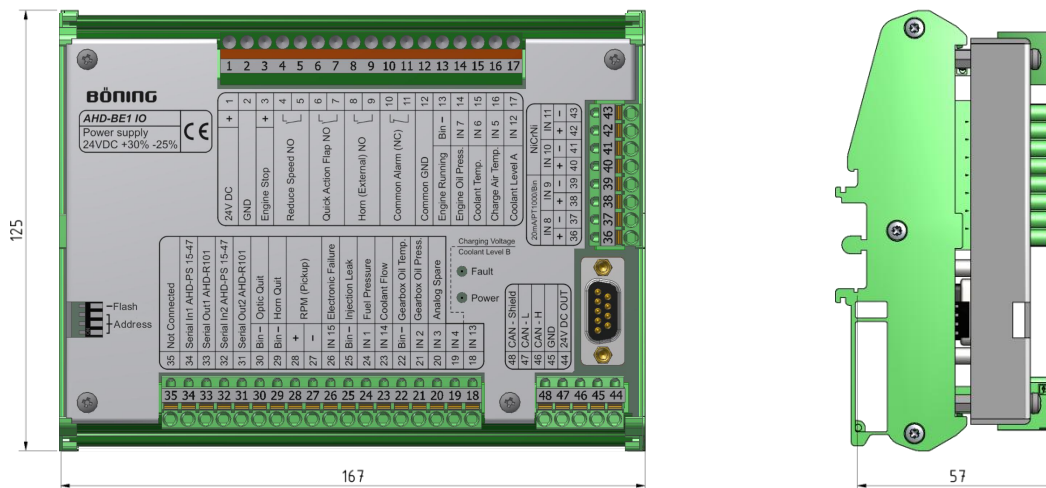


Illustration 5: Dimensions of AHD-BE1-IO



### 4.1.4 Connection and Terminal Assignments

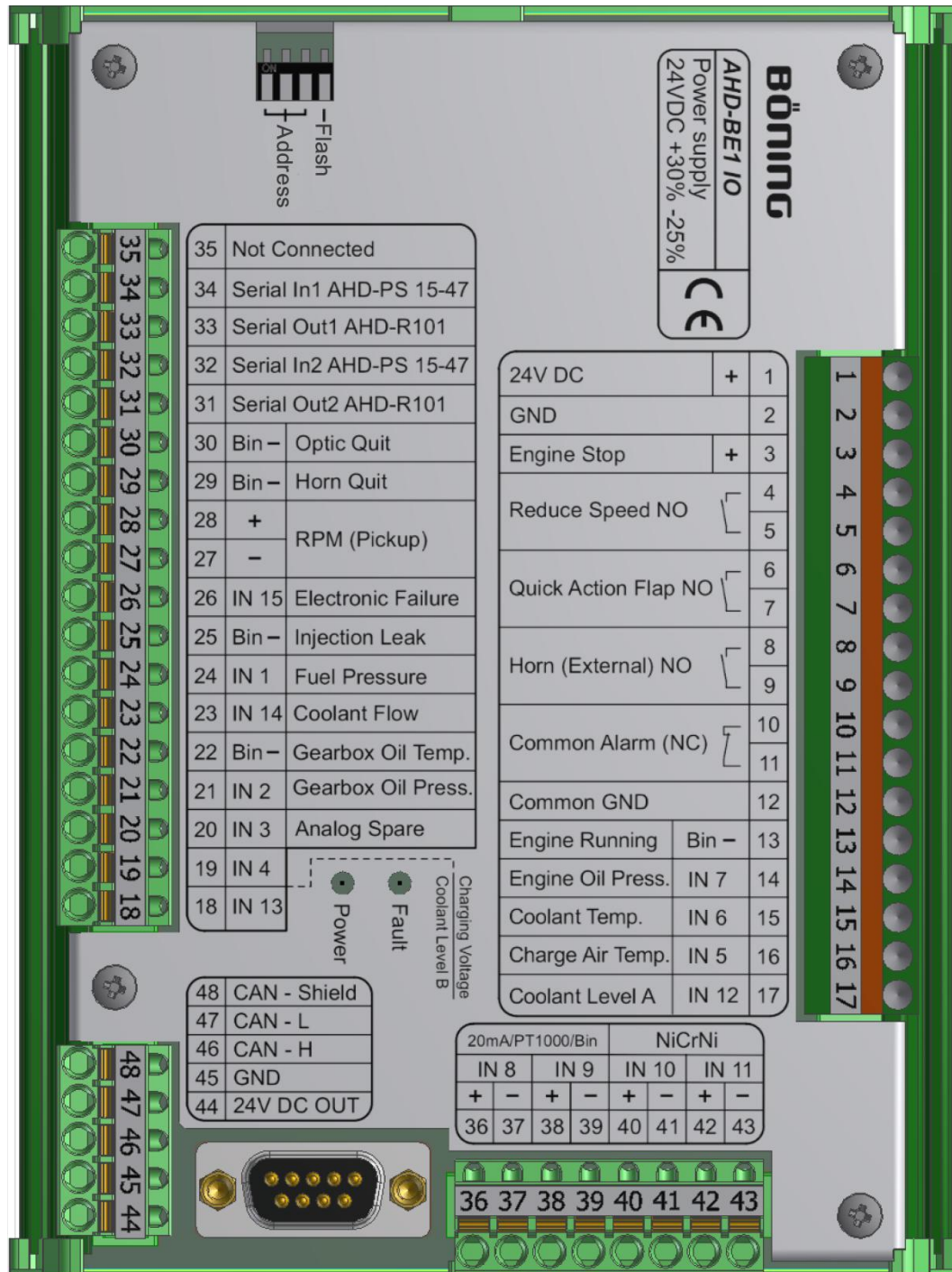


Illustration 6: Connection and terminal assignments of AHD-BE1-IO

The assignment of the terminals is indicated on the device's front plate.

Deviating from the markings on the front plate, terminals 31 and 32 are used as an additional CAN interface:

## Technical Information

- Terminal 31: CAN-H
- Terminal 32: CAN-L

BE1-IO used these terminals for a serial connection to another BE1-IO, e.g. on the fly bridge. AHD-BE1-IO's usage of these terminals for CAN makes it possible to supply a second color display with data without having to lay new cables to the installation site of the previous second BE1-IO/BE1A installation.

### 4.1.5 Device Address



#### NOTICE!

The device address is set by the manufacturer.  
If the device address is changed to another value, AHD-BE1-IO and the color display will not function correctly.

AHD-BE1-IO's device address in the CAN bus is set with the DIP switches on its left side.



Illustration 7: DIP switches of AHD-BE1-IO

Only the three lower DIP switches shown in Illustration 7 are used for setting the device address.

On delivery, the device address is set to 1 by moving the lowest DIP switch to ON as shown in Illustration 7. It must remain in that position.

## 4.2 AHD 570

### 4.2.1 Technical Data

Description	Value/Unit/Type
<b>General Data</b>	
Dimensions, W x H x D	144 x 144 x 43 mm
Panel Cutout, W x H	131 x 131 mm
Weight	Appr. 0.5 kg
<b>Environmental Data</b>	



## Technical Information

Description	Value/Unit/Type
Operating Temperature	-30 °C...~+70 °C
Storage Temperature	-50 °C...~+85 °C
Protection Class	IP 56 (front side) IP 20 (rear)
Req. Minimum Distance to Compass	Steering compass: 55 cm Standard compass: 80 cm
<b>Electrical Data</b>	
Power Supply	24 V DC (+30%/-25%)
Current Consumption	Up to 700 mA (24 V DC)
<b>Display</b>	
Display Type	5.7" LCD color display
Visible Area	116 mm x 87 mm
Luminosity	500 cd/m <sup>2</sup>
Resolution	640 (H) x 480 (V) Pixels
Color Depth	15 bit
<b>Ports</b>	
	1 x CAN bus (communication, configuration)
<b>Installation type</b>	Built-in housing
<b>Approvals</b>	DNV GL LR RS

## Technical Information

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### 4.2.2 Name Plate

# BÖNING

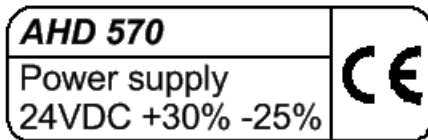


Illustration 8: Name plate of AHD 570

The name plate of the Display AHD-570 is located on the device's rear side and contains the following information:

- The unit's model designation
- Power supply
- Serial number (separate label) (\*)
- Manufacturer/supplier and CE-marking

(\*) → the first two digits of the serial number designate the year of manufacture.

The exact date of manufacture can be requested from the manufacturer via the serial number.

**4.2.3 Device Dimensions**

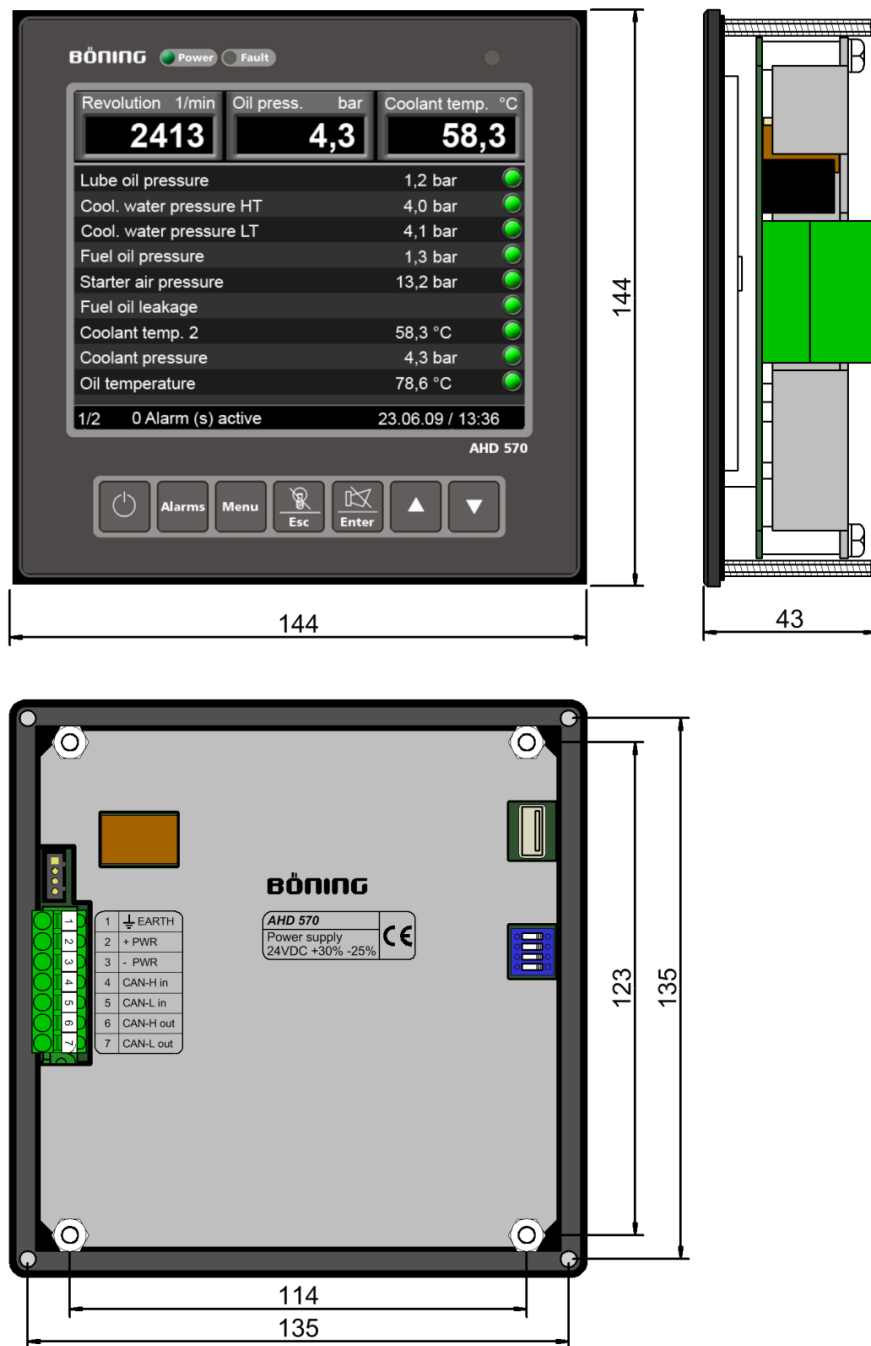


Illustration 9: Dimensions of AHD 570

## Technical Information

### 4.2.4 Connection and Terminal Assignment

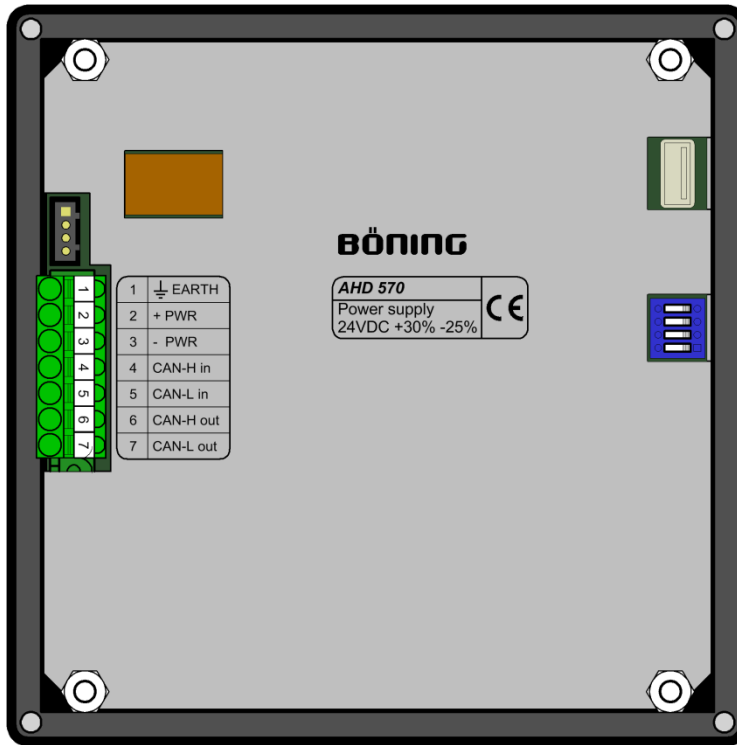


Illustration 10: Connections of AHD 570

A terminal strip for the power supply, grounding and connection to the CAN bus is on the device's rear side.

The assignment of the terminals is indicated on the terminal strip's right side.

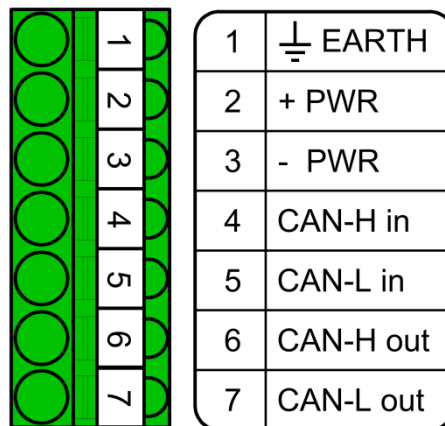


Illustration 11: Terminal assignment of AHD 570

## 5 Procedure



**NOTICE!**

*The cables for the CAN connections and the power supply are not included in the scope of delivery.*

*They must be provided by the customer on-site according to the local requirements.*



**CAUTION!**

Installation and initial startup may only be performed by specially trained personnel.

Only electricians may work on the electrical system.

### 5.1 Dismantling the Old System

- Disconnect BE1-A and BE1-IO from their power supply.
- Disconnect BE1-A from BE1-IO and remove it from its installation site.  
Remove the flat ribbon cable connecting the devices.
- Unplug the terminal strips labeled 1—17 and 18—35 from BE1-IO.



**NOTICE!**

*In general, it is not necessary to disconnect the cables from BE1-IO's terminal strips.*

*The terminal strips may be plugged into AHD-BE1-IO without reconnecting their cables.*

- Remove BE1-IO from its installation site.

### 5.2 Installing the New System

- The dimensions of AHD 570 are different from those of BE1-A, see Section 4.2.1.  
Adjust the cutout for BE1-A to accommodate AHD 570.
- Place AHD-BE1-A and the color displays at their installation sites
- Establish the CAN connection between AHD-BE1-IO and the color displays.  
The procedure depends on the type of the color displays and their number as described in the following section.

## Procedure

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### 5.2.1 CAN Connection to AHD 570

#### One AHD 570

For this connection, two cables are required.

- Connect AHD-BE1-IO's terminal 46 (CAN-H) with AHD 570's terminal 4 (CAN-H in)
- Connect AHD-BE1-IO's terminal 47 (CAN-L) with AHD 570's terminal 5 (CAN-L in)

#### Two AHD 570s

If a second system BE1-IO/BE1-A was installed, e.g. on the fly bridge, the CAN connection can be established with terminals 31 and 32 of AHD-BE1-IO. It is not necessary to renew the cabling, the respective cables inserted into the existing terminal strip can be reused for the new connection. AHD-BE1-IO uses these terminals for CAN.

- Connect the cable for terminal 31 (CAN-H) of AHD-BE1-IO with terminal 4 (CAN-H in) of the AHD 570 and the cable for terminal 32 (CAN-L) of AHD-BE1-IO with terminal 5 (CAN-L) of AHD 570.

#### Termination

- To terminate the CAN bus, connect terminals 6 and 7 of AHD 570 with a terminating resistor (120 Ohm, 1%, 0.25 W or above).

### 5.2.2 Connecting the Inputs and Outputs of AHD-BE1-IO

The terminal strips of BE1-IO used in the old system can be used for the new system without having to reassign the cables.

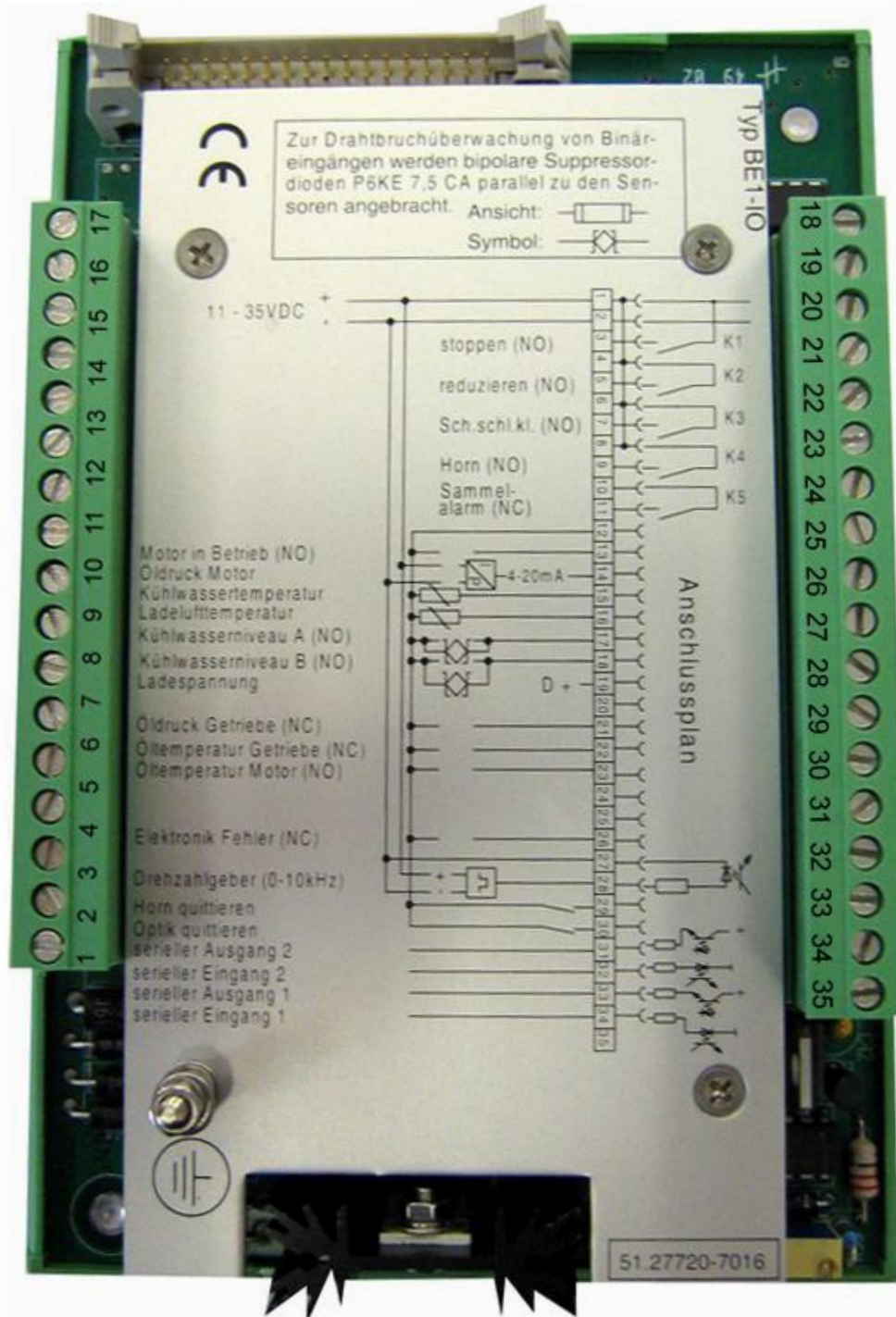


Illustration 12: Terminal strips on BE1-IO

- Plug BE1-IO's terminal strip labeled 1—17 in Illustration 12 into the terminals labeled 1—17 on AHD-BE1-IO
- Plug BE1-IO's terminal strip labeled 18—35 in Illustration 12 into the terminals labeled 18—35 on AHD-BE1-IO

## Procedure

### 5.2.3 Grounding



#### CAUTION!

Ground first, and then switch on!

Before powering on AHD 570, ground it with the provided ground terminal:

→ Terminal 1

### 5.2.4 Power Supply and Initial Startup

#### Power Supply

- Connect AHD-BE1-IO to the ship's 24 V DC power supply with its terminals 1 (+) and 2 (GND).



#### NOTICE!

*Terminals 44 and 45 of AHD-BE1-IO may be used to supply a color display:*

- Terminal 44: +
- Terminal 45: GND

*Terminals 44 and 45 of AHD-BE1-IO cannot supply a second color display with power. The power supply of the previous installation of BE1-IO/BE1-A can be used for this.*

- Connect AHD 570 to the power supply with its terminals 2 (+) and 3 (-).
- Switch the ship's power supply on.

#### Initial Startup of AHD-BE1-IO

If its power supply has been established successfully, AHD-BE1-IO's "Power" LED is on.

If AHD-BE1-IO's "Fault" LED is on, proceed as described in Section 6.

#### Initial Startup of AHD 570

If its power supply has been established successfully, AHD 570 will briefly display an image.

If no errors were found during the initialization and function test, AHD 570's "Power" LED is on. The first page with current data is displayed on the screen. If no data is displayed, check the CAN connection.

If AHD570's "Fault" LED is on, proceed as described in Section 6.



## Final Installation

If the devices function properly, install them firmly in their installation sites.

## Errors

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# 6 Errors

The following section describes possible errors during operation of the device with information about cause, error recognition, and error correction.

## 6.1 Safety

### Personnel

- Some work may only be performed by specially trained personnel or the manufacturer. This is indicated in the description of the individual errors.
- As a rule, only electricians may work on the electrical system.

### Basic Information



#### **CAUTION!**

#### **Risk of injury from dangerous voltages or other hazards**

Opening the covers can expose you to dangerous voltages or other hazards.

Therefore:

- Never perform device repairs yourself.
- Do not remove the covers for maintenance.



#### **WARNING!!**

#### **Risk of injury from improper error correction!**

Improper error correction can cause severe personal injury or equipment damage.

Therefore:

- Only the manufacturer or authorized personnel may repair the device.
- Ensure sufficient installation space before beginning any work.
- Observe orderliness and cleanliness in the work area! Parts and tools that are loosely stacked or lying about are accident sources.
- Observe correct installation procedures when parts have been uninstalled. Reinstall all mounting elements and observe torque limits.
- Observe correct installation procedures when parts have been uninstalled. Reinstall all mounting elements and observe torque limits.

**In Case of Error:**


As a rule:

1. Determine the cause of the error.
2. Immediately inform a responsible party on-site.
3. Depending on the error type, have an authorized specialist correct it, or correct it on your own.
4. Correct the error by replacing or repairing the defective parts (e.g. cables, plugs, etc.).
5. If the error cannot be determined through the error table, a device defect cannot be excluded. For repairs, send the device to the manufacturer's address or to an authorized specialist company.

## 6.2 Fault LED

Status	Possible Cause	Diagnosis / Error Correction
Permanently ON	Device defective	Power off the system and consult with the manufacturer or an authorized representative.
Flashing	No CAN bus communication	Check the CAN connection If the fault continues, consult with the manufacturer or an authorized representative.

## 6.3 Error Correction

Status	Possible Cause	Diagnosis / Error Correction
AHD-BE1-IO's or AHD 570's "Power" LED not lit	Power supply failure	Check the power supply
AHD 570 is ON but does not display the current data	CAN connection faulty	Check connections
	AHD-BE1-IO receives no data	Check the terminal strips in AHD-BE1-IO
AHD 570 is powered off "Power" LED is lit	Display is in standby mode (no device defect)	Power on display with key 
Display too dark	Incorrect brightness offset (no device defect)	Increase brightness offset on the configuration page (min. brightness)

## Errors

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Status	Possible Cause	Diagnosis / Error Correction
No function	Device defect	Should the device not function properly in spite of all measures, it must be returned to the manufacturer for diagnosis.

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## **9 List of Abbreviations**

### **C**

CAN – Controller Area Network

### **L**

LED – Light Emitting Diode



Devices, System Installation, Monitoring and  
Control Technology, Ship Automation

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Texts and illustrations not binding.

We reserve the right to make changes due to technical improvements.