

Alarm, Start/Stop and Safety System for Diesel Engines, Grid and Generator Monitoring

AHD 504 / AHD 514

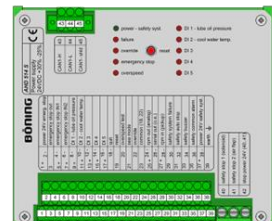
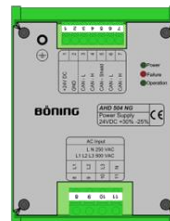
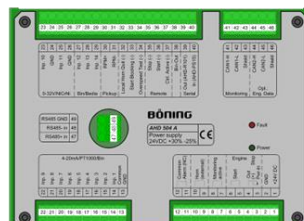
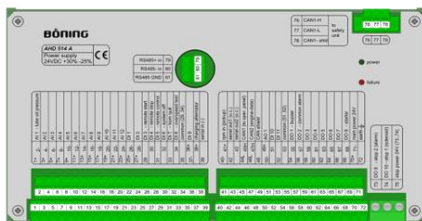


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Operation Manual

Read this manual before beginning any work!



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1	General Information	11
1.1	About this Manual.....	11
1.2	Explanation of Symbols.....	12
1.2.1	Warnings	12
1.2.2	Tips and Recommendations.....	12
1.3	Illustrations	12
1.4	Limitation of Liability	13
1.5	Copyright and Nondisclosure	13
1.6	Spare Parts.....	14
1.7	Warranty Terms.....	14
1.8	Customer Service	14
2	Safety	15
2.1	Operator's Responsibilities.....	15
2.2	Personnel Requirements.....	16
2.2.1	Qualifications	16
2.2.2	Unauthorized Persons.....	17
2.3	Intended Use	17
3	Structure and Function	19
3.1	General Information.....	19
3.2	AHD 514 A.....	20
3.2.1	Functions	20
	Starting the Engine	20
	Stopping the Engine	21
	Alerting ..	21
	Acknowledgement/Horn Test.....	22
	Reset	22
3.2.2	Mechanical Structure.....	22
3.2.3	Device Electronics	23
3.2.4	Inputs and Outputs	23
	Inputs.....	23
	Outputs..	24
3.2.5	Installation of a Flyback Diode for Relays	25
3.2.6	Setting of DIP Switches for Analog Output Terminal 49/50	26
3.2.7	Ports	27
	CAN Bus Port	27
	RS232 Port	27
	Serial IN Port	27
	Serial OUT Ports	27
	Option: Extension Module	28
3.2.8	Alarm and Event Memory	28

Contents

3.2.9	Configuration	28
3.2.10	Option: AHD 514 A COM.....	29
3.3	AHD 504 A.....	30
3.3.1	Functions	30
	Starting the Engine	30
	Stopping the Engine	31
	Alerting	31
	Acknowledgement/Horn Test	31
	Reset	32
3.3.2	Mechanical Structure	32
3.3.3	Device Electronics	32
3.3.4	Inputs and Outputs	33
	Inputs	33
	Outputs	33
3.3.5	Installation of a Flyback Diode for Relays	34
3.3.6	Ports	35
	CAN Bus Port	35
	RS232 Port	35
	Serial IN Port	35
	Serial OUT Port	35
	Option: Extension Module	35
3.3.7	Alarm and Event Memory	36
3.3.8	Configuration	36
	System Configuration	36
3.3.9	Input Configuration with Jumpers	37
3.3.10	Option: AHD 504 A COM.....	39
3.4	AHD 514 S.....	40
3.4.1	Functions	41
	Emergency Stop	41
	Safety Stop	41
	Wire Break Monitoring	42
	Alerting	42
	Acknowledgement/Lamp Test	42
	Reset	43
3.4.2	Mechanical Structure	43
3.4.3	Device Electronics	43
3.4.4	Inputs and Outputs	44
	Inputs	44
	Outputs	44
3.4.5	Installation of a Flyback Diode.....	45
3.4.6	Setting of DIP Switches for Output Terminal 24 / 25 ..	46
3.4.7	Ports	47

CAN Bus Port	47
Serial OUT Port	47
3.4.8 Configuration	47
3.5 AHD 504 NG.....	48
3.5.1 Functions	48
3.5.2 Ports	48
CAN Bus Port	48
3.5.3 Configuration	49
3.6 AHD 514 OP.....	49
3.6.1 Functions	50
3.6.2 Ports	51
CAN Bus Port	51
3.6.3 Configuration	52
3.7 AHD 514 OP B	53
3.7.1 Functions	53
3.7.2 Ports	54
CAN Bus Port	54
3.7.3 Configuration	55
3.8 Configuration Example AHD 514	56
3.9 Configuration Example AHD 504	57
3.10 Requirements for 24 V DC Main and Emergency Power Supply	58
4 Technical Information	59
4.1 AHD 514 A.....	59
4.1.1 Technical Data	59
4.1.2 Name Plate and Other Information	60
4.1.3 Dimensions.....	61
4.1.4 Connection	62
4.2 AHD 514 A COM	64
4.2.1 Connection AHD 514 A COM.....	64
Terminals RS485+ and RS485-	64
Terminal RS485 GND	64
4.3 AHD 504 A.....	65
4.3.1 Technical Data	65
4.3.2 Name Plate and Other Information	66
4.3.3 Dimensions.....	67
4.3.4 Connection	67
4.4 AHD 504 A COM	69
4.4.1 Connection	69
Terminals RS485+ and RS485-	69
Terminal RS485 GND	69
4.5 AHD 514 S.....	70

Contents

4.5.1	Technical Data.....	70
4.5.2	Name Plate and Other Information.....	72
4.5.3	Dimensions	72
4.5.4	Connection.....	73
4.6	AHD 504 NG.....	74
4.6.1	Technical Data.....	74
4.6.2	Name Plate and Other Information.....	75
4.6.3	Dimensions	75
4.6.4	Connection.....	76
4.7	AHD 514 OP/AHD 514 OP B.....	77
4.7.1	Technical Data.....	77
4.7.2	Name Plate and Other Information.....	78
4.7.3	Dimensions	79
4.7.4	Connection AHD 514 OP.....	80
4.7.5	Connection AHD 514 OP B	81
4.7.6	DIP Switch Functions	82
4.7.7	AHD 514 OP Transferring the Configuration to the Device	83
4.7.8	AHD 514 OP: Upload of Firmware and Graphic Configuration.....	83
5	Transport, Packaging and Storage.....	85
5.1	Transport Safety Instructions.....	85
5.1.1	Improper Transport.....	85
5.2	Transport Inspection.....	85
5.3	Packaging	85
5.3.1	About the Packaging	85
	Handling the Packaging Materials.....	86
5.3.2	Storage	87
6	Installation and Initial Startup	88
6.1	Safety.....	88
6.1.1	Personnel.....	88
6.1.2	Basic Information	88
6.2	Installation.....	88
6.2.1	General Information	88
6.2.2	Installation Requirements	89
6.2.3	Earthing	90
6.2.4	Installation.....	90
6.3	Setting the Device Address	91
6.3.1	AHD 514 A.....	92
6.3.2	AHD 504 A.....	92
6.3.3	AHD 514 S.....	92
6.3.4	AHD 504 NG.....	93

6.3.5	AHD 514 OP/AHD 514 OP B	93
6.4	Initial Startup.....	93
6.4.1	Startup Requirements	93
6.5	Startup Procedure	95
7	Operation	98
7.1	AHD 514 OP: Display and Operation Elements.....	98
7.1.1	Function Operation Buttons.....	99
7.2	Power On.....	100
7.3	Functions Executable on AHD 504 A / AHD 514 A.....	102
7.3.1	Selecting the Operating Mode.....	102
	“Local control” Mode	102
	Remote control” Mode	102
7.3.2	Starting the Engine	103
7.3.3	Start Blocking	104
7.3.4	Manual Engine Stop	105
7.3.5	Alarm and Warning Visualization	107
7.4	Functions Executed on AHD 514 S.....	108
7.4.1	Automatic Alarm Stop of the Engine	108
7.4.2	Emergency Engine Stop.....	110
7.4.3	Overspeed Test.....	110
7.5	Other Functions of the Display	111
7.5.1	Settings.....	111
7.5.2	Advanced Configuration	112
7.5.3	Displaying the Events List	115
7.6	Power Off.....	118
8	Alarm Suppression AHD 504 A/AHD 514 A	119
8.1	Definitions.....	119
8.2	Settings in DeviceConfig	120
8.3	Setting the Suppression Channel States	120
8.3.1	Explanations.....	121
9	Regular Checks and Cleaning	122
10	Errors	123
10.1	Safety	123
10.1.1	Personnel	123
10.1.2	Basic Information.....	123
10.1.3	In Case of Errors	124
10.2	Error Correction	125
10.2.1	AHD 514 A.....	125
10.2.2	AHD 504 A.....	126
10.2.3	AHD 514 S.....	126

Contents

10.2.4	AHD 504 NG	127
10.2.5	AHD 514 OP/AHD 514 OP B.....	127
11	Disassembly	128
11.1	Safety.....	128
11.1.1	Personnel.....	128
11.1.2	Basic Information	128
11.2	Disassembly	128
11.3	Disposal	129
12	Index	130
13	List of Illustrations	134

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for Operation Manual “System AHD 514 and AHD 504”

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07/11/2013	AHD_504_514_DOK_de_V2_20130711	Amendments and minor corrections in entire document	n.a.	Pasuki, Bahram (PaB)
09/18/2013	AHD_504_514_DOK_en_V3_20130918	Rework of documentation based on requirements by classification societies	n.a.	Pasuki, Bahram (PaB)
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05/19/2014	AHD_504_514_Dok_EN_V5_20140519	Minor corrections for AHD 504 devices (A, NG, OP)	66 75 87	Pasuki, Bahram (PaB)
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		Minor corrections of text and language	n.a.	
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2022-12-07	AHD_504_514_DOK_EN_V14_20221207	Approvals updated Minor corrections of text and language General information updated	n.a.	Patzke, Jens (PaJ)
2023-11-16	AHD_504_514_DOK_EN_V15_20231116	Corrected Dip switch settings	82	Hof, André (HoA)

1 General Information

1.1 About this Manual

Read this manual carefully before beginning any work! It is a part of the product and must be kept in the product's immediate vicinity, so that the personnel can access it at any time.

When handing the product over to third parties, also include this manual.

This manual provides important product handling instructions. On the following pages, the manual describes the Alarm, Start/Stop and Safety System for Diesel Engines, consisting of:

- AHD 514 A Start/Stop System with Combined Alarm System for Propulsion Diesel Engines (Item number 12972) alternatively
- AHD 504 A Start/Stop System with Combined Alarm System for Propulsion Diesel Engines (Item number 14639)
- AHD 514 S Safety System with Combined Emergency Stop System for Propulsion Diesel Engines (Item number 12973) and AHD 514 S1 (Item number 15431)
- AHD 504 NG Power Grid and Generator Monitoring Device (optional) (Item number 14377)
- AHD 514 OP Display and Operation Unit for AHD 514 Propulsion Diesel Monitoring System (Item number 12974)
- AHD 514 OP B Display and Operation Unit for the bridge (optional) (Item number 14503)
- AHD 514 A COM, optional: AHD 514 A with Modbus module (Item number 14527) alternatively
- AHD 504 A COM, optional: AHD 504 A with Modbus module (Item number 14744)

This manual provides specific information, if additional, more detailed documentation is available for individual components.

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

Furthermore, the local accident prevention and general safety regulations for the device's field of use must be obeyed.

The illustrations in this manual are intended to explain its contents more clearly. They are not necessarily drawn to scale and may deviate from the actual product in minor details.

This operation manual must be viewed exclusively as a single unit. It is not permitted to use excerpts from this manual as

General Information

standalone documentation without referring to the entire document.

1.2 Explanation of Symbols

1.2.1 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.

1.2.2 Tips and Recommendations



NOTICE!

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

1.3 Illustrations

Illustrations in this document may deviate slightly from actual devices, without this being pointed out separately.

In particular, illustrations of conformity markings may deviate from the current status.

1.4 Limitation of Liability

All information and instructions in this manual were compiled under consideration of the legal norms and regulations, the state of technology, as well as our knowledge and experience of many years.

The manufacturer assumes no liability 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
- Device and system configurations created by the user or third parties

The actual scope of delivery can vary from the explanations and representations in this manual due to special versions, the use of additional ordering options, or the latest technical improvements.

Furthermore, the obligations agreed upon in the delivery contract, the General Terms and Conditions as well as the manufacturer's delivery terms, and the legal regulations at the time of the contract closing are in force.

We reserve the right to make technical improvements to improve the product's performance characteristics and to further develop the product.

1.5 Copyright and Nondisclosure

This manual must be treated confidentially. It is intended only for those persons handling the product. It is not permitted to hand this operation manual over to third parties without the manufacturer's prior written permission.



NOTICE!

The information, texts, drawings, illustrations, and other descriptions 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.

General Information

1.6 Spare Parts



WARNING!

Risk of injury due to improper spare parts!

Improper or defective spare parts can lead to damages, malfunctions, or total failure as well as jeopardize the vessel's safety.

Therefore:

- Only use the manufacturer's original spare parts.

Spare parts can be obtained from contracted resellers or directly from the manufacturer. See page 2 for the address.

1.7 Warranty Terms

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

1.8 Customer Service

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

Information about the responsible contact person 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 Operator's Responsibilities

This product is intended for commercial use. Therefore, its operation is subject to legal workplace safety regulations.

In addition to the workplace safety instructions in this manual, the current safety, accident prevention, and environmental protection regulations for the product's place of use must be observed. Especially:

- The operator must stay abreast of the current workplace safety regulations and determine through a risk assessment any additional hazards resulting from the special working conditions of the product's place of use. He must implement these in the form of operating instructions for the product's use.
- During the product's entire period of operation, the operator must verify that his operating instructions comply with current regulations and revise them, if necessary.
- The operator must clearly regulate and define areas of responsibility for installation, operation, maintenance, and cleaning.
- The operator must ensure that all employees handling the product have read and understood this manual.
- In addition, he must train the personnel in regular intervals and inform them about any dangers.

Furthermore, the operator is responsible for always keeping the product in perfect working condition.

Safety

2.2 Personnel Requirements

2.2.1 Qualifications

**WARNING!****Risk of injury due to insufficient qualification!**

Improper use can lead to significant personal injury and equipment damage.

Therefore:

- Only allow qualified personnel to perform 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 due to 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 for example drugs, alcohol, or medication, are not permitted.

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

2.2.2 Unauthorized Persons



WARNING!

Danger to unauthorized persons!

Unauthorized persons who do not meet the requirements described in this manual do not know the occupational hazards.

Therefore:

- Keep unauthorized persons out of the work area.
- When in doubt, approach persons and remove them from the work area.
- Interrupt all work while unauthorized persons remain in the work area.

2.3 Intended Use

The Alarm, Start/Stop and Safety System for Diesel Engines has been designed and constructed exclusively for the use described in this manual.

The Alarm, Start/Stop and Safety System for Diesel Engines consists of the following components: Display and Operation Unit AHD 514 OP, Safety System AHD 514 S, Start/Stop and Alarm System AHD 514 A or AHD 504 A, as well as possibly the Power Grid and Generator Monitoring Device AHD 504 NG. The system is designed as a compact system for starting, stopping, and monitoring (including emergency stop activation) of diesel engines on board ships or in onshore installations. All necessary inputs, outputs, and monitoring and control functions for propulsion engine and generator aggregate applications are integrated.



WARNING!

Danger due to unintended use!

Any use of the product beyond and/or other its intended use can cause hazardous situations.

Therefore:

- Only use the product as intended.
- Strictly adhere to all instructions in this manual.
- In particular, avoid the following product applications. They are considered unintended:
 - Using a supply voltage other than the one indicated in this manual

Safety

Any claims for damages resulting from unintended use are void.

The operator is solely responsible for any damages resulting from unintended use.



WARNING!

Danger due to improper operation of the product!

Product failure or malfunctions can lead to personal injury or equipment damage in the overall system.

Therefore:

- Although the product itself is not especially dangerous, the effects of failures or malfunctions on the overall system must be considered.
- Always discontinue using the products when they develop smoke or abnormal heat.

3 Structure and Function

3.1 General Information

The Alarm, Start/Stop and Safety System for Diesel Engines has been designed and constructed as a compact system for starting, stopping, and monitoring (including emergency stop activation) diesel engines on board vessels or in onshore installations.

All required inputs, outputs, and corresponding monitoring and control functions for propulsion engine and generator aggregate applications are integrated in the system's components.

The components' design emphasizes ease of connectivity and servicing. To a large extent, the system can be connected with the system components' terminal strips, thus leading to a significant reduction in the material and installation effort and consequently resulting in cost savings.

The overall system includes the following components:

- AHD 514 A Start/Stop System with Combined Alarm System
or alternatively
- AHD 504 A Start/Stop-System with Combined Alarm System
- AHD 514 S Safety System with Combined Emergency Stop System
- Optional: AHD 504 NG for monitoring voltages and frequencies of the monitored power grid
- AHD 514 OP Display and Operation Unit with Color Display as built-in device with start/stop operating buttons (installation on site and/or optionally in bridge console)
- Optional: AHD 514 OP B Display and Operation Unit with Color Display as built-in device with operating buttons (installation on bridge)
- Optional: AHD 514 A COM (Start/Stop System with Combined Alarm System AHD 514 A with integrated COM module for Modbus communication)
- Optional: AHD 504 A COM (Start/Stop System with Combined Alarm System AHD 504 A with integrated COM module for Modbus communication)

The overall system is configured with the configuration software DeviceConfig (by manufacturer or shipyard).

Structure and Function

3.2 AHD 514 A

The AHD 514 A Start/Stop and Alarm System controls the starting and stopping of the diesel engine, performing all required monitoring functions, including automatic stop at overspeed. For non-classified systems further stop conditions can be configured.

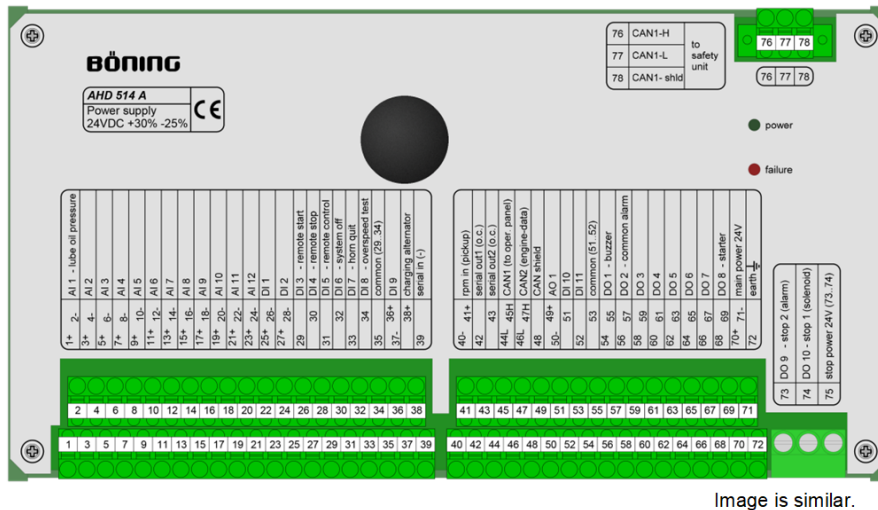


Illustration 1: AHD 514 A Start/Stop Alarm System (version without COM module)

3.2.1 Functions

Starting the Engine

The engine can be started from an external remote start input or the Display and Control Units AHD 514 OP/AHD 514 OP B. For this, the following requirements must be met:

- Start blocking not active
- No current stop alarm
- No significant engine speed
- Lube oil pressure low (threshold value set in the configuration)
- Cooling water pressure low (can be deactivated in the configuration)

Whether the engine must preheat first or starts immediately can be set in the configuration (by the manufacturer or the shipyard). In the former case, the preheating duration is freely selectable.

The starting procedure is ended once the engine has reached a speed which it is certain to maintain on its own. The time allowed for a starting procedure and the number of start attempts in case of unsuccessful starts can be configured.

Immediately before a new activation of the starter, the system checks, if the lube oil pressure is low or an engine speed is detected. If at least one of the stated criteria is fulfilled, the starter is

not activated, and the automatic system switches to monitoring mode. Alternatively, the cooling water pressure can be used as an additional run criterion. This can achieve improved starter protection. The stated parameters do not result in aborting an active starting procedure, but they prevent initiating the starting sequence.

Stopping the Engine

The engine can be switched off manually with the Operation Units AHD 514 OP or AHD 514 OP B, and externally via remote stop, via the “system off” input, or via a stop alarm (configurable). A solenoid or operation solenoid (configurable) can be used as a possible switch-off element. During an engine stop, the selector switch “Remote control” is irrelevant, i.e., the engine can always be stopped locally.

By default, the engine speed monitoring function is configured as a stop alarm. In this case, the start/stop system also fulfills a safety function, because it automatically stops the engine at overspeed. An overspeed test function is also provided. It is activated via a separate input. In this process, the permissible engine speed threshold is reduced with a button press (default value = overspeed threshold minus 15%).

Alerting

Normally, alarms are signaled with the operation units AHD 514 OP / AHD 514 OP B. In addition to the alerting on the display(s) the alarms can be signaled to a higher-level ship alarm system over a collective alarm output. This output is closed during normal operation (no alarm; fail safe). The contact opens when an alarm occurs and remains open until the alarm has been acknowledged optically and acoustically (on the display) and the physical cause of the alarm has been removed. Only then the contact closes again. If another alarm is triggered in this state, the output generates a short pulse, i.e., the relay contact closes for approximately 2 seconds and then reopens. A failure of the supply power is also alerted by opening the contact.

In addition to the collective alarm output, the output “buzzer” is also activated.

If further information related to the alarms shall be transmitted over the collective alarm output (for example exact causes for the alarm etc.) a relay station AHD-R101 can be connected to the serial output for the forwarding of single alarms. Optionally, forwarding of alarms over the Modbus interface is also possible.

Structure and Function

Acknowledgement/Horn Test

The alarms are acknowledged by activating the external acknowledgement output “horn quit” twice or with the acknowledgement function of the Operation Units AHD 514 OP/AHD 514 OP B.

Acoustic alarms are acknowledged first, and then the alarms are acknowledged optically.

A horn test is performed on AHD 514 OP/AHD 514 OP B by activating the input “horn quit” for more than 5 seconds.

The CAN bus interface provides a further acknowledgement option. It forwards the acoustic and optical acknowledgement data from AHD 514 OP/AHD 514 OP B to the Safety System AHD 514 S.

When in “Local control” operating mode, acoustic alarms can be acknowledged only locally on AHD 514 OP B.

Reset

A “Reset” with AHD 514 OP resets acknowledged, no longer current alarms to their original state. Furthermore, a current stop signal can be cancelled early (**see “Safety Stop” on page 41 for an exception**).

The reset function is not available on AHD 514 OP B. Alarms can only be reset in the engine room, from AHD 514 OP installed there (can be set in the configuration).

3.2.2 Mechanical Structure

AHD 514 A has been designed as a microprocessor-controlled device for flush mounting, panel installation, or control box installation. The device electronics are integrated in a module carrier housing with which the device can be directly installed on DIN rails TS 32 or TS 35. The electronics are protected with a device front plate mounted on spacer bolts. The front plate is imprinted with the device's name plate and the terminal terminals' designations.

The green operation (LED “power”) and red error indication (LED “failure”) status LEDs are also integrated into the front plate.

The device provides 75 spring terminals and 3 screw terminals.

3.2.3 Device Electronics

The circuit board's central unit is a controller with microprocessor by which all device functions are controlled and monitored. Among the most important functions are:

- Capture and processing of the analog and binary inputs' measured data
- Relay control
- Data communication management
- Real-time clock (RTC) for precise control and capture of alarm and event times
- Watchdog
- Voltage monitoring
- Reset logic
- Operating hours counter
- LED control

The analog signals are captured galvanically isolated from the power supply. This prevents problems arising from potential shifts. The analog signals are converted with a 12-bit A/D converter.

The AHD 514 A Start/Stop Alarm System includes an internal voltage control, providing the required internal supply voltages. Therefore, the device's supply voltage provided by the external distribution may vary in the 18 V DC to 32 V DC range.

3.2.4 Inputs and Outputs

Inputs



CAUTION!

To avoid damaging the current inputs (mA), they may only be wired as follows:

AI 01 – AI 06 → only 4-20 mA sensors with 2-wire technology

AI 10 – AI 12 → only 4-20 mA sensors with 2-wire technology

To avoid damaging the binary inputs, they may only be wired as follows:

AI 01 – AI 12 → potential free contacts

- 6 analog inputs for 4-20 mA sensors, contact
- 3 analog inputs for PT100/PT1000/Ni1000 sensors, contact
- 3 universal inputs (configurable)
- 1 engine speed input for speed sensor/pickup, galvanically isolated (see notice below)

Structure and Function

- 2 additional binary inputs (for example for cooling water level sensor or fuel leakage)
- 6 binary inputs for control (for example remote control) and acknowledgement functions. Can be set as break or make contact input (NC or NO) in the configuration (by the manufacturer or the shipyard).
- 1 voltage input (optocoupler), circuit breaker monitoring
- 1 input (optocoupler), generator function input
- 2 optocoupler inputs speed up/down for engine speed control (GAC controller)



NOTICE!

The speed sensor / pickup must meet the following specifications:

- *Frequency: 0 Hz to 8 kHz*
- *Duty Cycle: 50%*
- *AC Signal: $-32 \text{ to } -4 \leq U_x \leq +4 \text{ to } +32 \text{ V peak}$*
- *DC Signal:
high voltage level $+4 \leq U_x \leq +32 \text{ V}$
low voltage level $0 \leq U_x \leq 0.5 \text{ V}$.*

Outputs

- 8 relay outputs, 6 A, potential free (for example starter relay, horn, collective alarm)
- 2 transistor outputs, 8 A, wire break monitored, short circuit proof, for engine stop via solenoid/operation solenoid or controller
- 1 voltage output, 0...5 V/0...10 V/ 0...20 mA (configurable with DIP switches, see the section "Setting of DIP Switches for Analog Output Terminal 49/50" on page 26)
- 2 status LEDs ("power," "failure")

3.2.5 Installation of a Flyback Diode for Relays



NOTICE!

To ensure secure operation a flyback diode must be installed in parallel to the connected relay as close as possible.

The flyback diode must be dimensioned according to the installed relay.

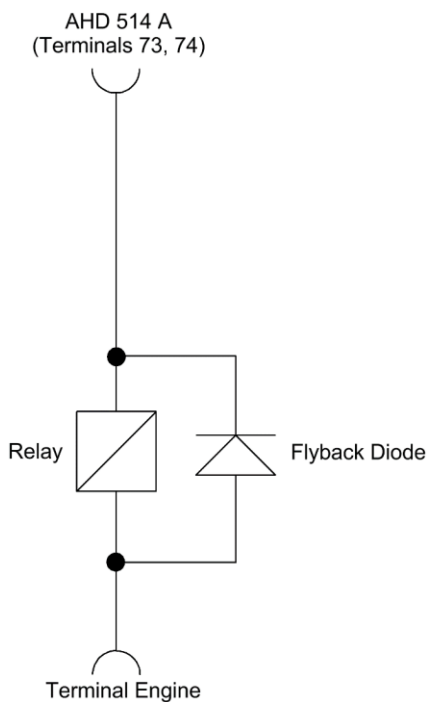


Illustration 2: Installation of a flyback diode for AHD 514 A

Structure and Function

3.2.6 Setting of DIP Switches for Analog Output Terminal 49/50

The analog output at the terminals 49/50 of AHD 514 A can be configured according to requirements with two DIP switches.

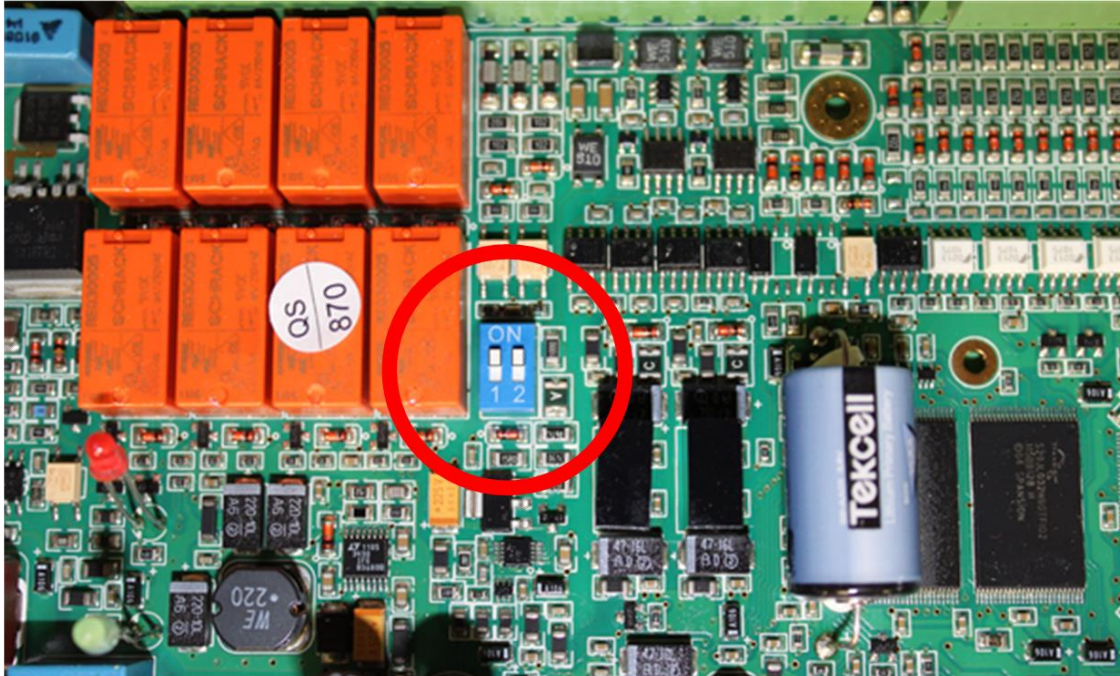


Illustration 3: Position of the DIP switches on AHD 514 A

The DIP switches have the following functions:

DIP1	DIP2	Output
OFF (0)	OFF (0)	0 – 20mA
OFF (0)	ON (1)	Not defined
ON (1)	OFF (0)	0 – 10V
ON (1)	ON (1)	0 – 5V



NOTICE!

For setting the DIP switches the cover plate fixed with 4 screws must be removed.



CAUTION!

Before removing the cover plate, disconnect the device from its power supply!

3.2.7 Ports

CAN Bus Port

CAN bus 1 for connecting AHD 514 S and AHD 514 OP (local device) and AHD 514 OP B (external device on the bridge). Operating data and alarms are received by AHD 514 S and forwarded to AHD 514 OP and AHD 514 OP B. Furthermore, the system can be configured via this port, by the manufacturer or the shipyard. Communication failure triggers an alarm.

CAN bus 2 is provided for connecting an engine CAN bus, for example ADEC or J1939.

All system data are available as a defined standard protocol on the CAN bus lines. Individual adjustments are possible. The CAN bus is operated with a transfer rate of 250 Kbit/s and can be run to a length of up to 150 m.

The device's CAN address is set with a 4-pin DIP switch on the circuit board.

RS232 Port

The integrated RS232 port is used for connecting a service PC/notebook for configuration, error diagnostics (memory scan), and firmware updates by the manufacturer or the shipyard. For connection a 9-pin SUB-D plug connector is provided.



NOTICE!

The 4-pin DIP switch for setting the device's CAN address and the RS232 port's 9-pin plug connector can be accessed by removing the device's front plate.

Serial IN Port

Serial optocoupler input as a port for connecting an additional Binary Data Station AHD-PS 15. With this device, up to 15 additional binary inputs can be captured and processed. It is configured project-specifically by the manufacturer or the shipyard.

Serial OUT Ports

Two serial optocoupler outputs are used for connecting for example a Relay Station AHD-R 101, an Alarm and Indication System EDA 47, or other serially controlled devices.

The Relay Station AHD-R 101 provides up to 15 additional relay outputs (3 A, 230 V AC/DC potential free).

The Alarm and Indication System EDA 47 is used for displaying up to 47 binary alarm or display measuring points. The ports are configured according to project specifications by the manufacturer or the shipyard.

Structure and Function

Option: Extension Module

A Modbus extension module, which is plugged directly into the base module, is available as an option (AHD 514 A COM).

3.2.8 Alarm and Event Memory

For logging, the most recent approximately 4500 events, indications, alarms, and operation commands are saved in a ring buffer. The stored data can be retrieved with the configuration software DeviceConfig.

Since firmware version 1.30.999.0, AHD 514 OP can display the last 56 most important events, see the section “Displaying the Events List” on page 115. The power on and power down of devices and alarms are shown. The reading of acknowledgements was deliberately omitted here. They can be read with DeviceConfig.

The diesel engine’s operating hours are captured and monitored with freely configurable operating hours counters. Up to 4 individual operating states can be differentiated and counted separately. Taking into account external data, such as the aggregates’ workload and/or engine speed, one can distinguish various load ranges.

3.2.9 Configuration

The device can be configured by the manufacturer or the shipyard in several ways:

- A PC/laptop with the configuration software DeviceConfig connected to the CAN bus.
- Changing the system parameters on the operation units.

In all cases, password protected authorization levels are provided for setting various parameters.



NOTICE!

The configuration of the system AHD 504 / AHD 514 is described in detail in its configuration manual.

Information about this documentation is available from the manufacturer.

3.2.10 Option: AHD 514 A COM

The Modbus interface available on AHD 514 A COM (COM module) allows the integration of the Alarm, Start/Stop, and Safety System for Diesel Engines into a ship wide alarm and monitoring system.

Modbus communication is based on a master/slave protocol by which up to 247 slaves can be controlled by one master.

The master queries, slave replies, and respective delay times between a query and the corresponding reply are predefined (following Modicon PI-MBUS300, Rev. 1.1).

By default, the Alarm, Start/Stop, and Safety System for Diesel Engines AHD 514 operates in slave mode and is queried by the master, the higher-level ship alarm system.

All essential data captured and processed in the AHD 514 system's CAN network are available via Modbus.

The Modbus interface features the following characteristics:

- RS485
- half-duplex data transfer with 2 wires
- communication mode Modbus RTU/ASCII, default RTU
- settable slave address, permissible range 1 – 247, default 1
- settable transfer rate 9600 and 19200 baud, default 9600 baud
- serial transmission parameters: 8N1

All settings can be made with DeviceConfig only on the AHD 514 A COM.

Tables with the address ranges for measured values and status or alarm information are summarized in the supplement to this operation manual "Modbus Specifications for AHD 514"

(Doc-ID PaB-1055)

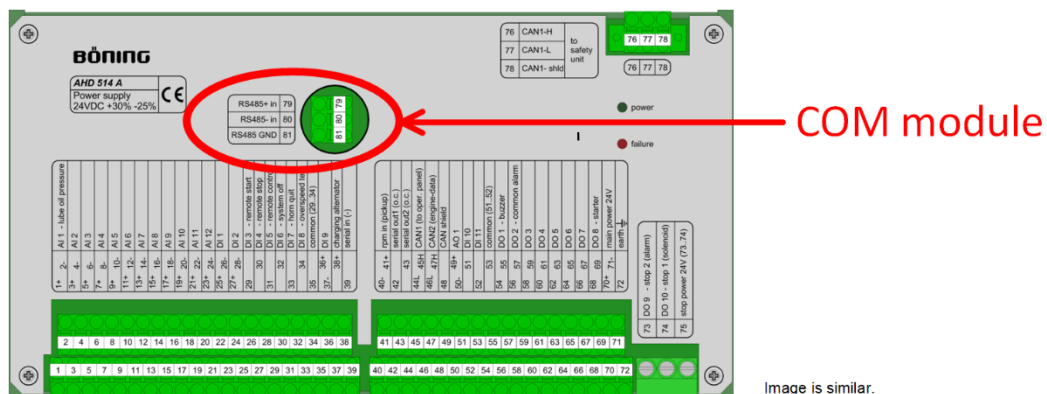


Illustration 4: AHD 514 A COM

Structure and Function

3.3 AHD 504 A

The AHD 504 A Start/Stop Alarm System controls the diesel engine's start and stop, performing all required monitoring functions, including automatic stop at overspeed.

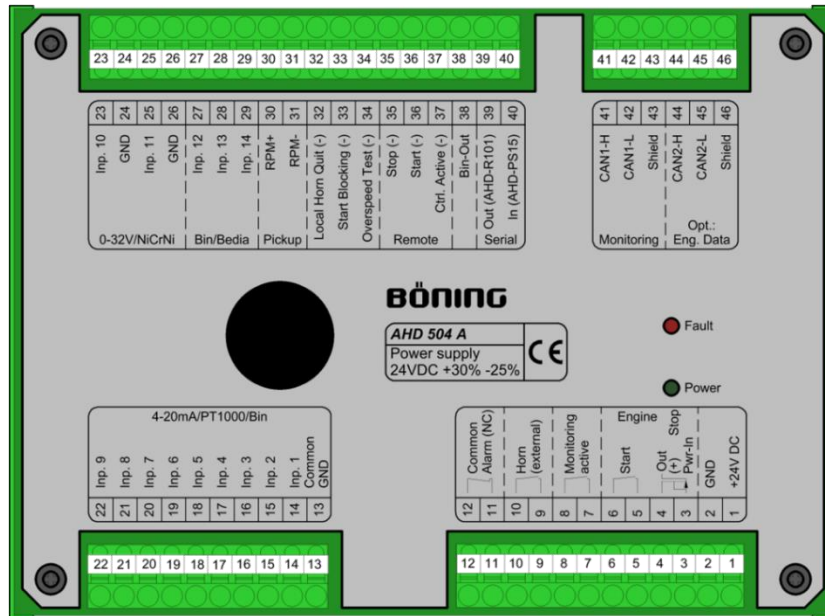


Image is similar.

Illustration 5: AHD 504 A Start/Stop Alarm System

3.3.1 Functions

Starting the Engine

The engine can be started via an external remote start input or the Display and Operation Units AHD 514 OP/AHD 514 OP B. For this, the following requirements must be met:

- Start blocking not active
- No current stop alarm
- No significant engine speed present
- Lube oil pressure low
- Cooling water pressure low (can be deactivated in the configuration)

Whether the engine must preheat first or starts immediately can be set in the configuration (by the manufacturer or the shipyard). In the first case, the preheating duration is freely selectable.

The start procedure is ended when the engine has reached a speed that it is certain to maintain on its own. The time allowed for a starting procedure and the number of start attempts in case of unsuccessful starts can be configured.

Immediately prior to a new activation of the starter, the system checks, if the lube oil pressure is low or an engine speed is captured. If at least one of the stated criteria is found, the starter is not activated, and the automatic system switches to monitoring mode. Alternatively, the cooling water pressure can be used as an additional run criterion. This can achieve improved starter protection. The stated parameters do not result in aborting an active starting procedure, but they prevent initiating the starting sequence.

Stopping the Engine

The engine can be switched off manually with the Operation Units AHD 514 OP or AHD 514 OP B and externally, via remote stop, with the “System Off” input, or by a stop alarm. A solenoid or operation solenoid (configurable) can be used as a switch-off element. During an engine stop, the selector switch “Remote control” is irrelevant, that means that the engine can always be stopped locally.

By default, the engine speed monitoring function is configured as a stop alarm. In this case, the start/stop system also fulfills a safety function, because it automatically stops the engine at overspeed.

Alerting

Alarms are signaled at a collective alarm output with alarm repetition pulse. This output is closed during normal operation (no alarm). The contact opens when an alarm occurs.

If another alarm is triggered in this state, the output generates a short pulse, this means that the relay contact closes for approximately 2 seconds and then reopens. Supply power failure is also alerted by opening the contact.

In addition to the collective alarm output, the output “buzzer” is also activated.

Acknowledgement/Horn Test

Alarms are acknowledged by activating the external acknowledgement output “horn quit” twice or with the acknowledgement functions of AHD 514 OP/AHD 514 OP B.

First, the acoustic alarm is acknowledged; then the alarm is acknowledged optically.

A horn test is conducted by activating the input “horn quit” for more than 5 seconds.

The CAN bus port provides an additional acknowledgement option. This port forwards the acknowledgement information for acoustic and optical acknowledgements from AHD 514 OP/AHD 514 OP B to AHD 514 S.

When in “Local control” operating mode, acoustic alarms can be acknowledged only locally on AHD 514 OP B.

Structure and Function

Reset

A “Reset” with AHD 514 OP returns acknowledged, no longer current alarms to their original state. Furthermore, a current stop signal can be cancelled early (**see “Safety Stop” on page 41 for exception**).

The reset function is not available with AHD 514 OP B. Alarms can only be reset in the engine room, from the AHD 514 OP installed there.

3.3.2 Mechanical Structure

AHD 504 A has been designed as a compact device for flush mounting, panel installation, or control box installation. The device electronics are integrated in a module carrier housing with which the device can be directly installed on DIN rails TS 32 or TS 35. A front plate mounted with spacer bolts protects the electronics. The front plate is imprinted with the device’s name plate and the terminal designations.

Status LEDs displaying the operational state (“power”) and device errors (“failure”) are also integrated into the front plate.

The device provides 46 spring terminals.

3.3.3 Device Electronics

The circuit board’s central unit is a controller with microprocessor by which all device functions are controlled and monitored. Among the most important functions are:

- Capture and processing of the analog and binary inputs’ measured data
- Relay control
- Data communication management
- Real-time clock (RTC) for exact control and capture of alarm and event times
- Watchdog
- Voltage monitoring
- Reset logic
- Operating hours counter
- LED control

The capture of analog signals is decoupled from the power supply with filters. To achieve a high degree of precision, the separation of the sensor ground and supply ground should be maintained on the side of the connection too. An integrated voltage regulation allows safe operation in a supply voltage range of 18 V DC to 32 V DC.

3.3.4 Inputs and Outputs

Inputs



CAUTION!

To avoid damaging the analog inputs (AI), all inputs should only be wired according to their default settings (see also "Input Configuration with Jumpers" on page 37).

- 9 analog inputs for 4-20 mA sensors/PT100/PT1000 or binary contact (shared analog GND)
- 2 analog inputs for thermocouples NiCrNi or voltage capture 0-32 V
- 3 binary inputs for sensors
- 1 engine speed input for speed sensor/pickup, galvanically isolated, see notice below
- 6 binary inputs for control (for example remote control) and acknowledgement functions. In the configuration by the manufacturer or the shipyard, they can be set as normally closed or normally open contacts (NC or NO).



NOTICE!

The speed sensor / pickup must meet the following specifications:

- *Frequency: 0 Hz to 8 kHz*
- *Duty cycle: 50%*
- *AC signal: $-32 \text{ to } -4 \leq U_x \leq +4 \text{ to } +32 \text{ V}$ peak*
- *DC signal:
high voltage level $+4 \leq U_x \leq +32 \text{ V}$
low voltage level $0 \leq U_x \leq 0.5 \text{ V}$.*

Outputs

- 4 relay outputs, 6 A, potential free (for example for starter relay, horn, collective alarm)
- 1 transistor output, 8 A, wire break monitored, short circuit proof for engine stop via solenoid/operation solenoid or controller
- 1 binary output transistor (up to 40 mA, polyfuse) *
- 2 status LEDs ("power" and "failure")

Structure and Function



* NOTICE!

If the binary output (pin 38) is used for connecting relays, the following tested relays are recommended:

- FINDER relay series 34
- FINDER relay series 54.

3.3.5 Installation of a Flyback Diode for Relays



NOTICE!

To ensure secure operation a flyback diode must be installed in parallel to the connected relay as close as possible.

The flyback diode must be dimensioned according to the installed relay.

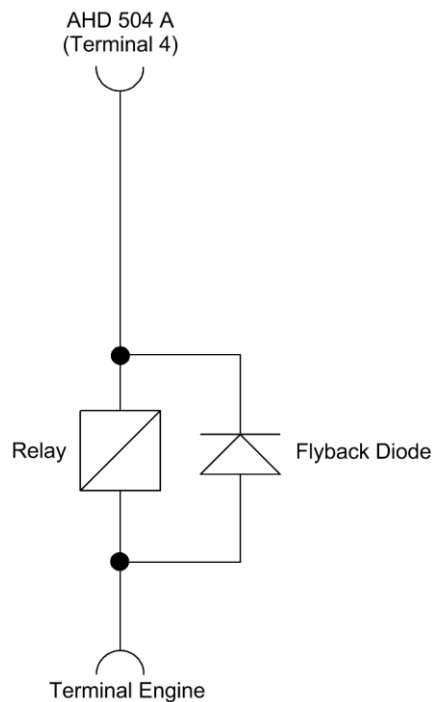


Illustration 6: Installation of a flyback diode for AHD 504 A

3.3.6 Ports

CAN Bus Port

CAN bus 1 for connecting AHD 514 S and AHD 514 OP.

Operating data and alarms are received by AHD 514 S and forwarded to AHD 514 OP. Furthermore, the system can be configured, by the manufacturer or the shipyard, via this port. Communication failure triggers an alarm.

CAN bus 2 is intended for connecting an engine CAN bus (for example ADEC or J1939).

All system data are available as a predefined standard protocol in the CAN bus lines. The CAN bus is operated with a transfer rate of 250 Kbit/s and can be run to up to 150 m.

The device's CAN address is set with a 4-pin DIP switch on the circuit board.

RS232 Port

The integrated RS232 port is used for connecting a service PC/notebook for configuration, error diagnostics (memory recall), and firmware updates by the manufacturer or the shipyard. It is connected with a 9-pin SUB-D plug connector.



NOTICE!

The 4-pin DIP switch for setting the device's CAN address and the RS232 port's plug connector can be accessed by removing the device's front plate.

Serial IN Port

Serial optocoupler input for connecting an additional Binary Data Station AHD-PS 15. With this device, up to 15 additional binary inputs can be captured and processed. It is configured by the shipyard or the manufacturer on request.

Serial OUT Port

A serial optocoupler output is used as a port for connecting for example the optionally available Relay Station AHD-R 101. This device provides 15 additional relay outputs (3 A, 230 V AC/DC, potential free). It is configured project specific by the manufacturer or the shipyard.

Option: Extension Module

An extension module for Modbus which can be plugged into the base module is optionally available (AHD 504 A COM).

Structure and Function

3.3.7 Alarm and Event Memory

For logging purposes, the most recent approximately 4000 events, indications, alarms, and operation commands are stored in a ring buffer. The saved data can be retrieved with the configuration software DeviceConfig.

When alarms are triggered, the system's overall status during a predefined time frame is saved. All available measured values, status information, and environmental variables are saved as a data field, and are available for error analysis at a later point. The saved data packet encompasses a selection of 9 measuring channels with 180 scan points. The system remembers the 64 most recently entered events.

The diesel engine's operating hours are captured and monitored with freely configurable operating hours counters. Up to 4 individual operating states can be distinguished and counted separately. When taking into account external data, such as the aggregates' workload and/or engine speed, one can distinguish different load ranges.

3.3.8 Configuration

AHD 504 A is configured system-dependently on two levels: depending on the sensor configuration, the analog capture must be adjusted with jumpers. Measuring ranges, threshold values, or delay times, as well as the settings for many additional parameters are configured with suitable tools via the existing ports.

System Configuration

The device can be configured by the manufacturer or the shipyard with various methods:

- A PC/laptop with the configuration software DeviceConfig connected to the CAN bus.
- Changing of system parameters via the operation units.

In all cases, password protected authorization levels are provided for setting various parameters.



NOTICE!

The configuration of the system AHD 504 / AHD 514 is described in detail in its configuration manual.

Information about this documentation is available from the manufacturer.

3.3.9 Input Configuration with Jumpers

The input type for analog inputs 1...11 is set with jumpers as follows:

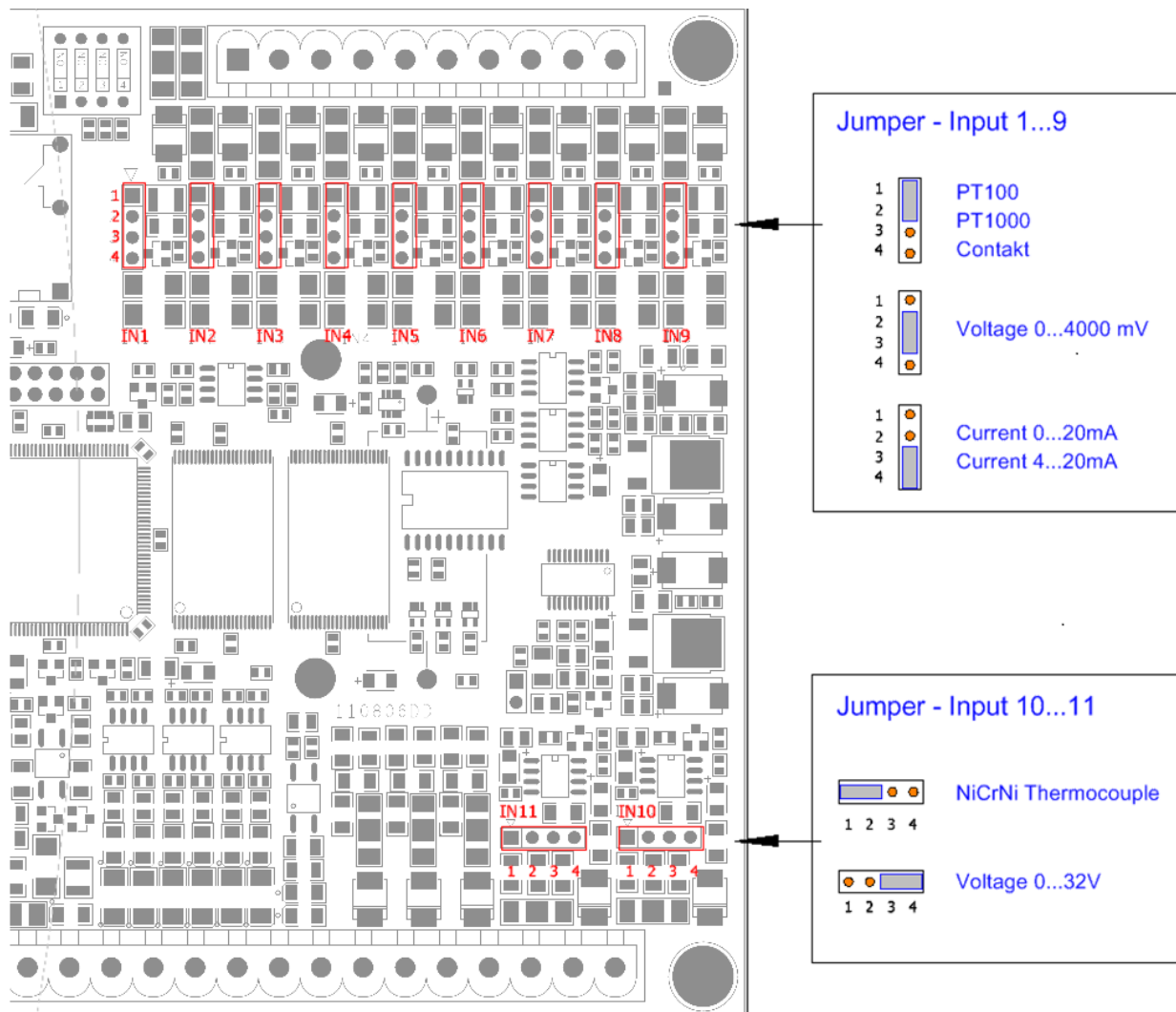


Illustration 7: Jumpers for the input configuration of AHD 504 A

Structure and Function

Configuration with DIP Switches

A DIP switch for setting the device address (CAN ID) as well as for activating the device for a firmware update is located on the AHD 504 A. It can be accessed after the cover plate has been removed. The following settings are possible:

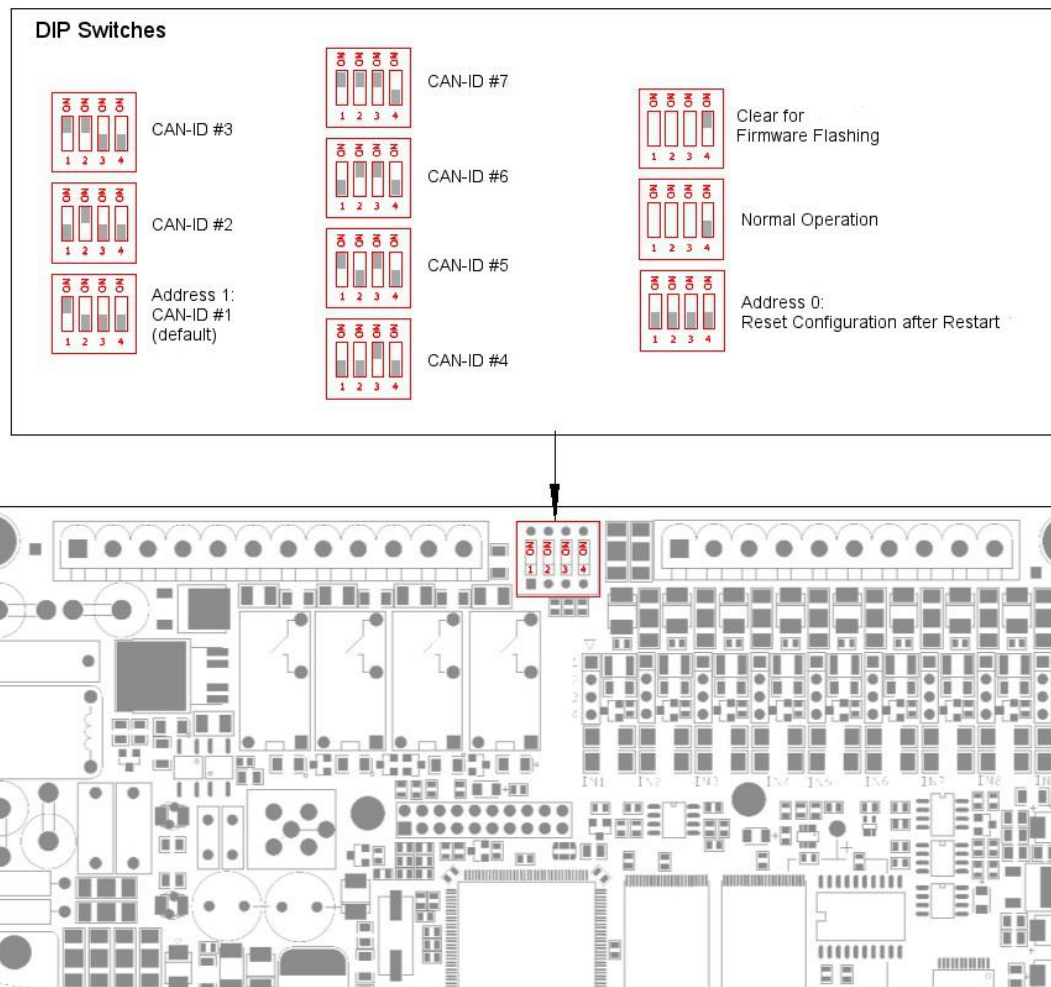


Illustration 8: DIP switch settings of AHD 504 A



CAUTION!

Possible system failure due to incorrect settings!

- Only trained personnel may adjust settings.



NOTICE!

The DIP switch 4 is by default set to OFF (normal operation mode).

For flashing the device, the DIP switch 4 must be set to position ON (1).

3.3.10 Option: AHD 504 A COM

The Modbus interface (COM module) available on the AHD 504 A allows the integration of the Alarm, Start/Stop, and Safety System for Diesel Engines into a ship wide alarm and monitoring system.

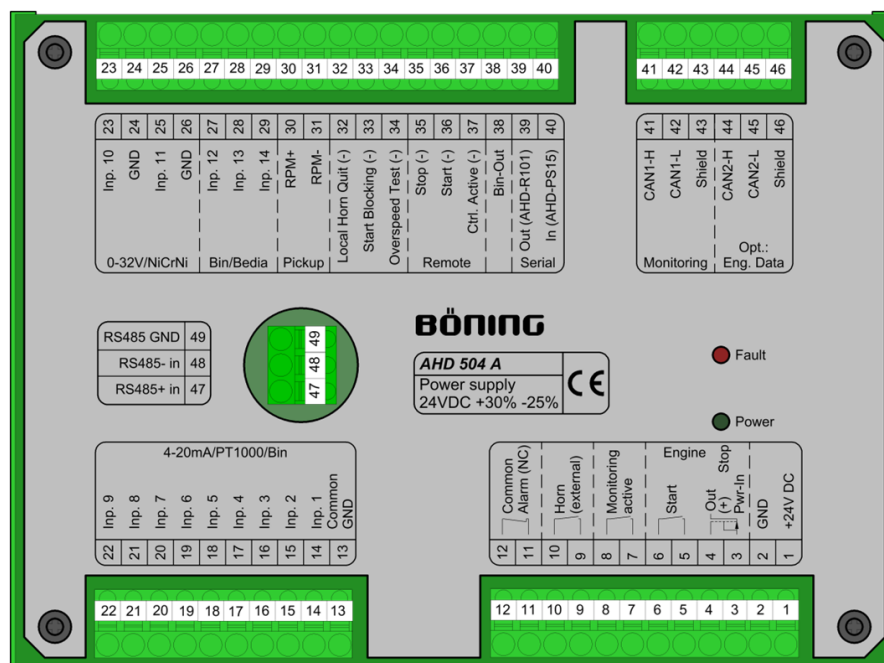


Image is similar.

Illustration 9: AHD 504 A Start/Stop Alarm System, version with COM Module

Modbus communication is based on a master/slave protocol by which up to 247 slaves can be controlled by one master.

The master queries, slave replies, and respective delay times between a query and the corresponding reply are predefined (following Modicon PI-MBUS300, Rev. 1.1).

By default, the Alarm, Start/Stop, and Safety System for Diesel Engines AHD 514 operates in slave mode and is queried by the master, the higher-level ship alarm system.

All essential data captured and processed in the AHD 504 system's CAN network are available via Modbus.

The Modbus interface features the following characteristics:

- RS485
- Half-duplex via 2 wires
- Communication type Modbus RTU/ASCII, default RTU
- Adjustable slave address, permissible range 1 – 247, default 1
- Adjustable transfer speed 9600 and 19200 baud, default 9600 baud
- Serial transmission parameter: 8N1

Structure and Function

All settings can be configured with DeviceConfig only on AHD 504 A COM.

Tables with the address ranges for measured values and status or alarm information are summarized in the supplement to this manual, titled “Modbus Specifications for AHD 514” (Doc-ID PaB-1055).

3.4 AHD 514 S

AHD 514 S works in combination with AHD 504 A or AHD 514 A, providing all safety functions for diesel engine monitoring systems required by the classification societies.

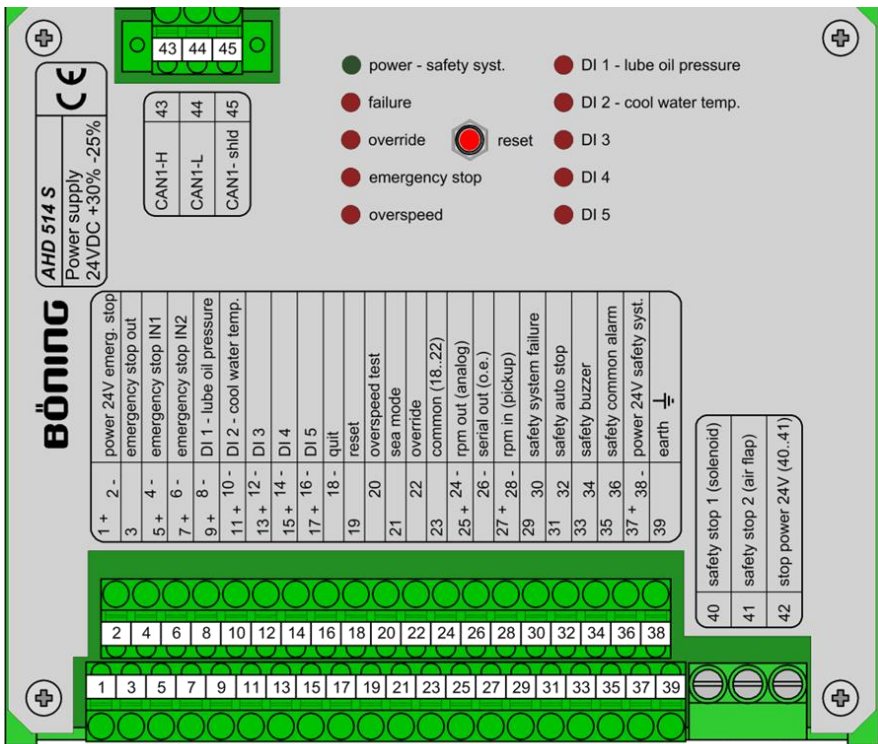


Image is similar.

Illustration 10: Safety System AHD 514 S

AHD 514 S monitors the safety relevant (redundant) sensors independently from the alarm system and activates the safety stop in case of error.

The emergency stop system includes 2 separate input circuits, monitored for wire break. Processing is independent of the safety system. The internal circuitry routes an activated emergency stop directly to the emergency stop output.

A separate supply feed for the emergency stop system provides additional safety. Thus, the emergency stop function is still ensured, even if the remaining safety system or its feed fail.

All relevant data of AHD 514 S are forwarded via the CAN bus port and AHD 504 A or AHD 514 A to AHD 514 OP / AHD 514 OP B, where they are displayed.

Integrated safety functions maintain the overall system's essential basic functions, even in case of fault.

Thus, all stop alarms and most important statuses can be read directly on AHD 514 S with alarm LEDs, even during for example failure of the alarm system or the operation units.

3.4.1 Functions

Emergency Stop

2 separate emergency stop inputs directly affect the emergency stop output. The function is ensured even during failure of the microcontroller or its feed.

The microcontroller-controlled part of the safety system performs the wire break monitoring function for the emergency stop inputs and the emergency stop output as well as the monitoring function for the emergency stop power supply. In case of error, an alarm is triggered locally and indicated by the integrated alarm LEDs. At the same time, the alarms are sent to the alarm system and visualized on AHD 514 OP/AHD 514 OP B.

Safety Stop

By default, the first two binary inputs and the engine speed input are configured as stop alarms, causing an automatic engine stop. 3 additional inputs are available for monitoring other criteria, which also can be configured as stop alarms.

The "override" input allows the suppression of the stop output during an alarm. However, for safety reasons, this does not apply to the overspeed alarm.



NOTICE!

The following applies to systems classified according to DNV guidelines:

- *An overspeed stop procedure cannot be canceled for emergency power generators with a power output of less than 2250 kW or a cylinder diameter of less than 300 mm.*
- *An overspeed or lube oil pressure stop procedure cannot be canceled for diesel auxiliary or propulsion engines with a power output of less than 2250 kW or a cylinder diameter of less than 300 mm.*

The operation mode "Seamode" or "Harbor" can be selected with another input. If the aggregate functions as an emergency diesel, the stop suppression occurs in Sea Mode. Overspeed is also an

Structure and Function

exception to this rule. The “override” and “seamode” (sea/harbor mode) can also be deactivated in the configuration by the manufacturer or the shipyard, if necessary.

The overspeed test function is implemented as a separate input. Here, the permissible engine speed threshold is reduced with a button press (default: overspeed threshold 15%).

Wire Break Monitoring

All inputs capable of causing an automatic stop are monitored for wire break. The safety system's and the emergency stop system's emergency stop circuits are also monitored. The activation of the individual inputs' wire break monitoring function is freely configurable by the manufacturer or the shipyard.

Alerting

All necessary data, including the current alarm states, are continuously sent to AHD 504 A or AHD 514 A via the CAN bus port, and visualized on AHD 514 OP/AHD 514 OP B.

To ensure alerting even during alarm system failure, alarm LEDs for local indication and a collective alarm output are integrated into AHD 514 S. The most important alarm states are indicated by flashing. This output is closed during normal operation (no alarm; fail safe). The contact opens when an alarm occurs and remains open until the alarm has been acknowledged optically and acoustically (on the display) and the physical cause of the alarm has been removed. Only then the contact closes again.

If another alarm is triggered in this state, the output generates a brief repeat pulse, i.e., the contact closes for approximately 2 seconds and then reopens. A power failure is also alerted by the contact being opened continuously.

Acknowledgement/Lamp Test

All triggered stop alarms are indicated by a corresponding alarm-LED and the activation of the acoustic alarm output “safety buzzer.”

Classified Systems:

The alarms are acknowledged by activating the external acknowledgement input “horn quit” (input 33 – alarm system). The acoustic alarm is acknowledged by the first activation of the acknowledgement input. Optical alarms are not allowed to be acknowledged with this acknowledgement input.

Non-Classified Systems:

Alarms are acknowledged by activating the acknowledgement input “horn quit” (input 33 – alarm system) twice. The acoustic alarm is acknowledged by the first activation of the acknowledgement input. The optical alarm (flashing LED) is acknowledged by the subsequent, second activation.

The alarms can be reset by activating the external reset input. This requires that the alarms are fully acknowledged (acoustically and optically, alarm LED continuously lit), and the alarm cause no longer exists.

If there is no current alarm, the input “horn quit” (input 33 – alarm system) can be used for an LED/lamp test.

The CAN bus port provides another acknowledgement option. It forwards acoustic and optical acknowledgement information from AHD 514 OP/AHD 514 OP B to AHD 514 S.

Reset

The “Reset” input returns acknowledged, no longer current alarms to their original state. Furthermore, a current stop signal cannot be canceled (**see “Safety Stop” on page 41 for exception**). Here too, alarms can be reset on AHD 514 OP and forwarded to AHD 514 S via the CAN bus.

3.4.2 Mechanical Structure

AHD 514 S has been designed as a compact microcontroller-controlled device for flush mounting, panel installation, or control box installation. The device electronics are integrated into a module carrier housing with which the device can be installed directly on DIN rails TS 32 or TS 35.

The electronics are protected by a front plate mounted on spacer bolts. The front plate is imprinted with the device name plate and the terminal designations.

The green operation (LED “power – safety syst.”) and the red error indication (LED “failure”) status LEDs and the red alarm LEDs for “override,” “emergency stop,” “overspeed,” and the five safety relevant alarm inputs are also integrated into the front plate.

For connection pluggable terminal strips with a total of 42 spring terminals and 3 screw terminals are provided.

3.4.3 Device Electronics

The circuit board’s central unit is a controller with a microprocessor by which all device functions are controlled and monitored. Among the most important functions are:

- Monitoring the emergency stop inputs and the emergency stop output
- Capturing and processing the binary alarm and control inputs
- Relay control
- Data communication management
- Watchdog
- Voltage monitoring

Structure and Function

- Reset logic
- LED control

AHD 514 S includes an internal voltage control, ensuring the required internal supply voltage. Therefore, the voltage supply by the external distribution may vary in the 18 V DC to 32 V DC range.

An additional 18 V DC to 32 V DC feed supplies the emergency stop circuit. Therefore, the emergency stop function is available independently from the safety function.

3.4.4 Inputs and Outputs

Inputs

- 2 binary inputs, wire break monitored (emergency stop)
- 5 binary inputs, wire break monitored (stop criteria)
- 5 binary inputs for control functions (for example “quit (acknowledgement),” “reset,” “override”)
- 1 engine speed input for speed sensor/pickup, galvanically isolated with adjustable voltage range (see notice below)



NOTICE!

The speed sensor / pickup must meet the following specifications:

- *Frequency: 0 Hz to 8 kHz*
- *Duty cycle: 50%*
- *AC signal: $-32 \text{ to } -4 \leq U_x \leq +4 \text{ to } +32 \text{ V peak}$*
- *DC signal:
high voltage level $+4 \leq U_x \leq +32 \text{ V}$
low voltage level $0 \leq U_x \leq 0.5 \text{ V}$.*

Outputs

- 4 relay outputs, 6 A, potential free (for example for horn, collective alarm)
- 2 transistor outputs, 8 A, wire break monitored, short circuit proof, for solenoid/operation solenoid and flapper valves (stop from safety system)
- 1 transistor output, 8 A, wire break monitored, short circuit proof (stop from emergency stop system)
- 1 output, 0-20 mA / 0-5 V / 0-10 V (configurable with DIP switches, see “Configuration with DIP Switches” on page 38). The measured engine speed for example is available at this output as a 4-20 mA signal for direct display on a round instrument.
- 2 status LEDs (“power – safety syst.,” “failure”)

- 8 alarm LEDs (“override,” “emergency stop,” “overspeed,” and the 5 safety relevant alarm inputs)

3.4.5 Installation of a Flyback Diode



NOTICE!

To ensure secure operation a flyback diode must be installed in parallel to the connected load as close to the load as possible.

The flyback diode (provided by the customer) must be dimensioned according to the connected load.

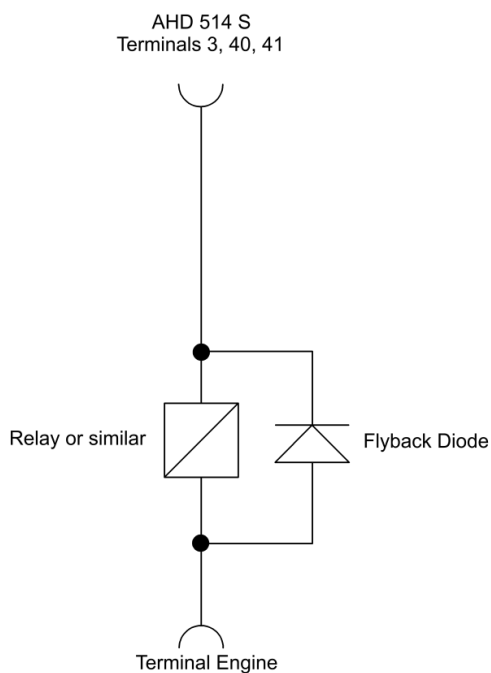


Illustration 11: Installation of a flyback diode for AHD 514 S

Structure and Function

3.4.6 Setting of DIP Switches for Output Terminal 24 / 25

The output on the terminals 24 and 25 of the AHD 514 S can be configured according to requirements with two DIP switches as voltage or current output.

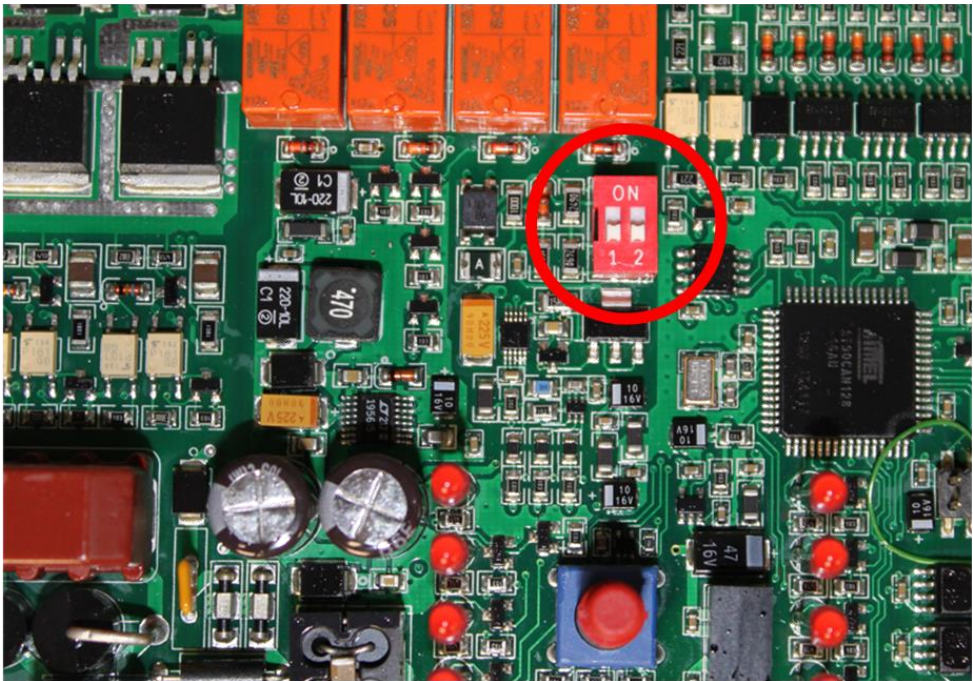


Illustration 12: DIP switches for output terminals 24/25 of AHD 514 S

The settings of the DIP switches have the following functions:

DIP 1	DIP 2	Output
OFF (0)	OFF (0)	0 – 20 mA
OFF (0)	ON (1)	Not defined
ON (1)	OFF (0)	0 – 10 V
ON (1)	ON (1)	0 – 5 V



NOTICE!
For setting the DIP switches the cover plate (fixed with 4 screws) must be removed.



CAUTION!
Before removing the cover plate disconnect the device from its power supply!

3.4.7 Ports

CAN Bus Port

CAN bus for communication with AHD 504 A or AHD 514 A and AHD 514 OP (local device), AHD 514 OP B (external device on the bridge).

Operation and alarm data are received by AHD 514 S and forwarded to AHD 514 OP/AHD 514 OP B. The system can also be configured (by the manufacturer or the shipyard) via this port. Communication failure triggers an alarm ("safety common alarm").

All system data are available as a predefined standard protocol on the CAN bus. Individual adjustments are possible. The CAN bus is operated with a transfer rate of 250 Kbit/s and can be run to up to 150 m.

The device's CAN address is set (by the manufacturer or the shipyard) with a 4-pin DIP switch on the circuit board.

Serial OUT Port

The serial optocoupler output is used for connecting for example a Relay Station AHD-R 101, an Alarm and Indication System EDA 47, or other serially controllable devices.

The Relay Station AHD-R 101 provides up to 15 additional relay outputs (16 A, 3000 V AC, potential free).

The Alarm and Indication System EDA 47 is used for displaying up to 47 binary alarms or measuring points.

The configuration is project specific.

3.4.8 Configuration

The device can be configured (by the manufacturer or the shipyard) by various methods:

- A connected PC/laptop with configuration software.
- Changing of system parameters on the operation units.

In all cases, password protected authorization levels are provided for setting various parameters.



NOTICE!

The configuration of the system AHD 504 / AHD 514 is described in detail in its configuration manual.

Information about this documentation is available from the manufacturer.

Structure and Function

3.5 AHD 504 NG

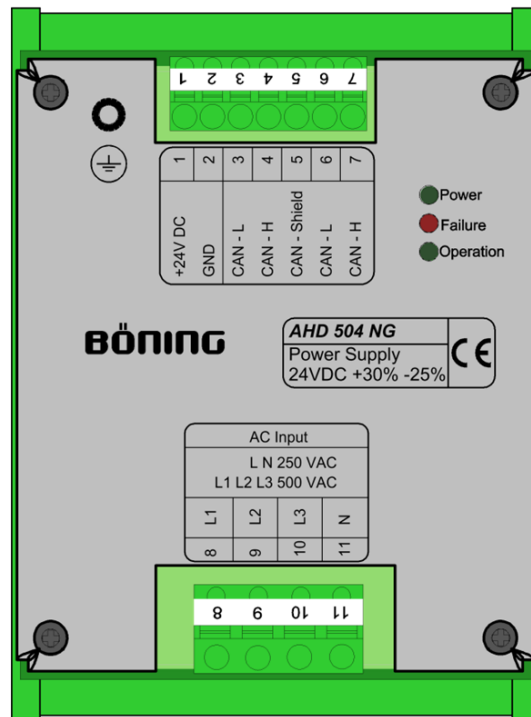


Image is similar.

Illustration 13: Power Grid and Generator Monitoring Device AHD 504 NG

3.5.1 Functions

AHD 504 NG is used for the measuring of voltages and frequencies of the monitored power grid.

All 3 phases are captured independently from one another. If configured limit values are exceeded, alarms are signaled directly by the display devices. The device is installed in a module carrier housing; it is intended for flush mounting or cabinet installation on DIN rail TS 32/TS 35.

3.5.2 Ports

CAN Bus Port

CAN bus for communication with AHD 504 A for visualizing the measured operating data and alarms.

All system data are available as a predefined standard protocol on the CAN bus. Individual adjustments are possible. The CAN bus is operated with a transfer rate of 250 Kbit/s and can be run to up to 150 m.

The CAN bus address is set in the factory to **#04**.

3.5.3 Configuration

The device can be configured (by the manufacturer or the ship-yard) by the following method.

- A connected PC/laptop with configuration software for the system software.

3.6 AHD 514 OP

AHD 514 OP is available for displaying operation and alarm states. It features a 5.7" color display and buttons for operation.

This device is primarily intended as a local built-in device in the diesel engine's control cabinet and is part of the system's basic scope. This ensures all required functionalities. For communication with AHD 514 A and AHD 514 S the CAN bus is used.

Optionally, an additional display can be installed in another location and connected to the other components via the CAN bus, for example as a remote device in the bridge console (AHD 514 OP B).



Illustration 14: Display and Operation Unit AHD 514 OP



NOTICE!

Depending on the configuration, the visualization on displays shown in this operation manual can deviate in detail from the actual display.

Structure and Function

3.6.1 Functions

The large viewing area allows the presentation of all important operating data on two display pages. Current alarm messages are displayed on separate alarm pages. System-internal parameter settings (for example date/time, language, unit system, etc.) are possible on an additional screen page with configuration menu. On this page, you can also launch a separate service/diagnostics page, displaying all operating data as tables with their current measured values and states. Multilingual displays with various character sets can be configured.

Current alarm messages are displayed on a separate alarm page. Internal system parameter settings (such as date/time, language, unit system, etc.) can be set on another page, the configuration menu page. From this page, you can also access a separate service/diagnosis page, which displays all available parameters with their current values in tabular format. Various languages and character sets can be selected.

The following applies for the AHD 514 OP in the engine room:

- Operation mode “Local control” (Operation Unit AHD 514 OP in the engine room active):
The diesel engine can be started with integrated operation buttons.
Alarms can be acknowledged optically and acoustically; safety alarms can be reset.
- Operation mode “Remote control” (Operation Unit AHD 514 OP B on the bridge active):
The diesel engine can be stopped with the integrated operating buttons, but it cannot be started. Alarms can be acknowledged acoustically and optically; safety alarms can be reset.

System control and system parameter settings can be changed with menus.

The configuration software DeviceConfig which allows the setting of all desired parameters on several, password protected authorization levels is available for configuring the system by the manufacturer or the shipyard.

The following features should be noted:

- Compact built-in device with 5.7” color display and operating buttons
- Automatically dimmed background lighting
- Power supply 18 to 32 V DC
- Data communication with AHD 514 A and AHD 514 S via CAN bus.
- Engine start/stop button highlighted in color



NOTICE!

To start the engine, the start button must be held down for approximately 1 second.

- Operating buttons for the following standard functions:
 - - Horn acknowledgement
 - - Optical acknowledgement
 - - Reset
 - - Navigation buttons (Up/Down) for page/menu/settings
- Three display elements for the most important operating data on all display pages
- Tabular parameter display on several display pages, configurable selection, and assignment of parameters
- Display of the acknowledged and unacknowledged alarms on a separate page
- Integrated buzzer
- Integrated menu navigation for parameterizing important basic setting (depending on the authorization level)

3.6.2 Ports

CAN Bus Port

CAN bus for communication with AHD 514 A and AHD 514 S for visualizing operating data and alarms, system parameterizing and configuration.

All system data are available as a predefined standard protocol on the CAN bus. Individual adjustments are possible. The CAN bus is operated with a transfer rate of 250 Kbit/s and can be run to up to 150 m.

The CAN bus address of AHD 514 OP is set in the system configuration or the device menu on the device's configuration page (by the manufacturer or the shipyard).



NOTICE!

The CAN bus of AHD 514 OP must be terminated with a terminating resistor at the device. If an additional display (for example a Bridge Display AHD 514 OP B) is installed, the bus is terminated at the bridge display.

Structure and Function

3.6.3 Configuration

The device can be configured by several methods (by the shipyard or the factory):

- A PC/laptop connected to the CAN bus with configuration software for the system software.
- Firmware and graphics software with a PC/laptop with configuration software connected to the internal serial port (4-pin AMP plug connector) or USB port (remove cover plate).
- Changing of system parameters from the operation units (currently, only GAC control possible).

In all cases, password protected authorization levels are provided for setting various parameters.



NOTICE!

The configuration of the system AHD 504 / AHD 514 is described in detail in its configuration manual.

Information about this documentation is available from the manufacturer.

3.7 AHD 514 OP B

The optional Display and Operation Unit AHD 514 OP B is available for displaying operation and alarm states. It features a 5.7" color display and buttons for operation.

Communication with AHD 514 A and AHD 514 S takes place over the CAN bus, like AHD 514 OP.

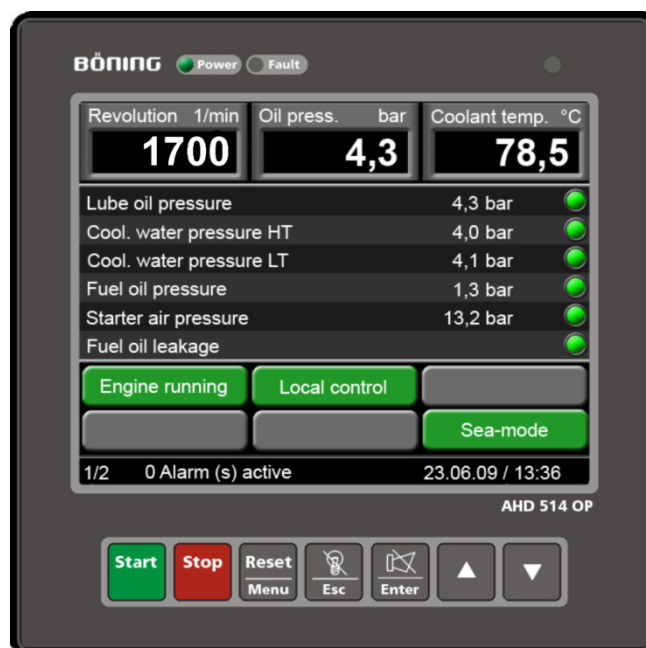


Illustration 15: Display and Operation Unit AHD 514 OP B



NOTICE!

Depending on the configuration, the visualization on displays shown in this operation manual can deviate in detail from the actual display.

3.7.1 Functions

The large viewing area allows the presentation of all important operating data on two display pages. Current alarm messages are displayed on separate alarm pages. System-internal parameter settings (for example date/time, language, unit system, etc.) can be set on an additional screen page with configuration menu. From this page, you can also launch a separate service/diagnostics page that displays all operating data in tabular format with their current measured values and states. Multilingual presentations with several character sets can be defined in the configuration.

Current alarm messages are displayed on a separate alarm page. Internal system parameter settings (such as date/time, language, unit system, etc.) can be set on another page, the configuration menu page. From this page, you can also access a separate service/diagnostics page, which displays all available parameters with

Structure and Function

their current values in tabular format. Several languages and character sets can be set.

The following applies to AHD 514 OP B:

- Operating mode “Remote control” (AHD 514 OP B on the bridge active):
The diesel engine can be started and stopped with integrated operating buttons.
The waiting time between stop and restart can be shortened with the RESET button.
Alarms can be acknowledged acoustically and optically, but safety alarms cannot be reset.
- Operating mode “Local control” (AHD 514 OP in the engine room active):
Current alarms can only be acknowledged acoustically (the internal buzzer of AHD 514 OP B is muted). Alarms can be optically acknowledged and reset only on AHD 514 OP.
The diesel engine can be stopped with the integrated operating button, but a start is not possible.

The system is also configured with PC software (by the manufacturer or the shipyard).

Apart from this, AHD 514 OP B is identical to AHD 514 OP, i.e., it features the same technical characteristics and functions.

3.7.2 Ports

CAN Bus Port

CAN bus for communication with AHD 514 A and AHD 514 S for visualizing operating data and alarms, and system configuration.

All system data are available as a predefined standard protocol on the CAN bus. Individual adjustments are possible. The CAN bus is operated with a transfer rate of 250 Kbit/s and can be run to up to 150 m.

The CAN bus address of AHD 514 OP B is set in the system configuration or the device menu on the device's configuration page (by the manufacturer or the shipyard).



NOTICE!

The CAN bus of AHD 514 OP B must be terminated at the device with a terminating resistor, if the device is the last participant in the CAN bus.

3.7.3 Configuration

The device can be configured by several methods (by the manufacturer or the shipyard):

- A PC/laptop with configuration software for the system software connected to the CAN bus.
- Firmware and graphics software via a PC/laptop with configuration software connected to the internal serial port (4-pin AMP plug connector) or USB port (remove cover plate).
- Changing of system parameters from the operation units (currently, only GAC control possible).

In all cases, password protected authorization levels are provided for setting various parameters.

Depending on the requirements, AHD 514 OP B can be configured to the customer's specifications. The functions described above are standard factory configurations.



NOTICE!

The configuration of the system AHD 504 / AHD 514 is described in detail in its configuration manual.

Information about this documentation is available from the manufacturer.

3.9 Configuration Example AHD 504

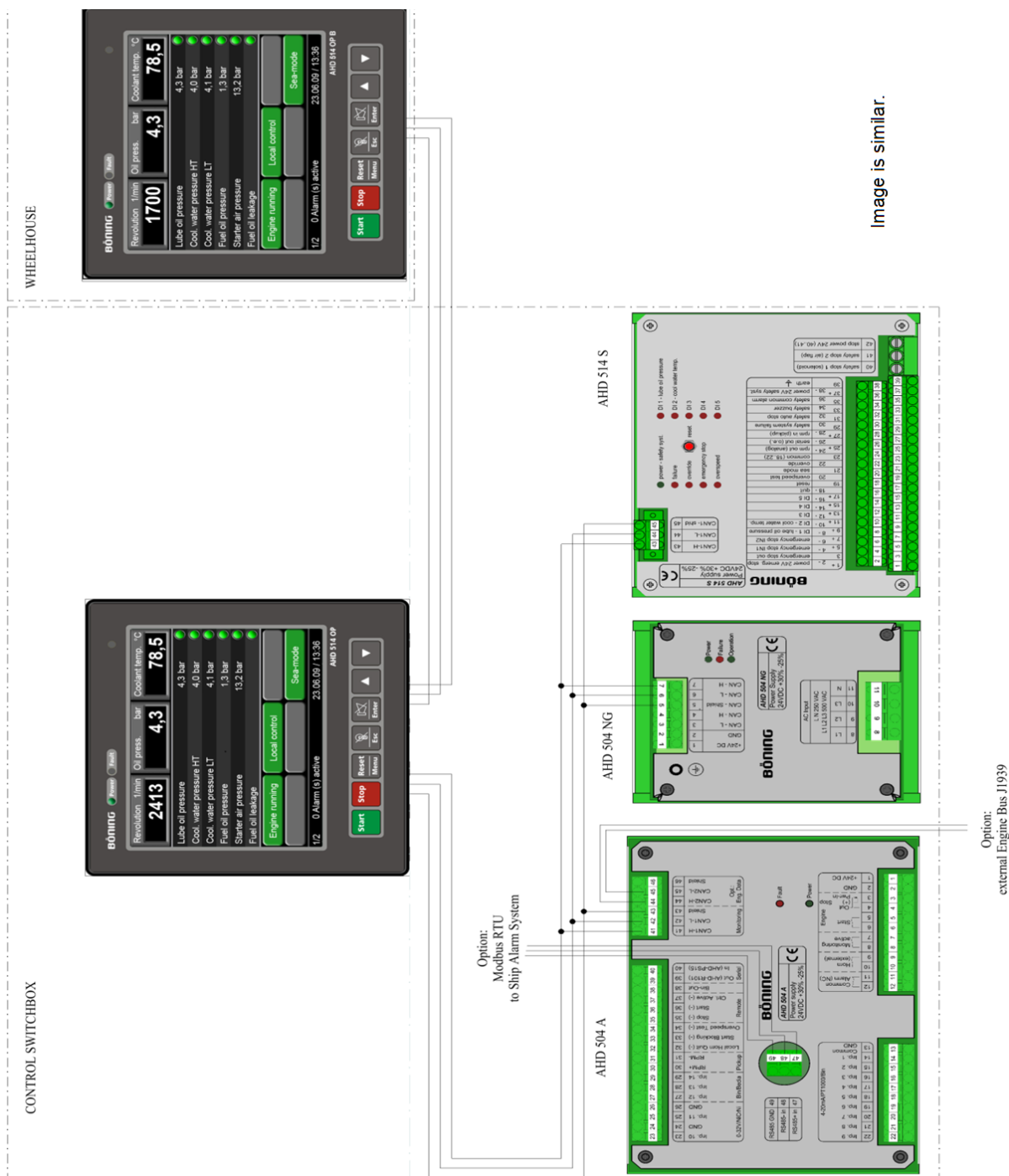


Illustration 17: Configuration example AHD 504

Structure and Function

3.10 Requirements for 24 V DC Main and Emergency Power Supply

The system components of the Alarm/Start/Stop and Safety System for Diesel Engines AHD 504/514 are equipped with 24 V DC connectors for connection to a single power supply.

The 24 V DC power supply is part of the customer provided power grid. Classifiable systems must be configured as follows to meet the requirements for alarm and safety systems:



NOTICE for classified systems!

The 24 V DC power supply for the Alarm/Start/Stop and Safety System for Diesel Engines AHD 504/514, which is provided by the customer, must be equipped with an automatic changeover to the emergency supply, in case of main supply failure.

The changeover to the emergency feed must be interruption-free to prevent any functional impairment of the system during a power failure.

Main and emergency power failure signaling outputs for alarm messages must be provided.

The 24 V DC power supply with automatic changeover provided by the customer must be installed in the immediate vicinity of the system components of the Alarm/Start/Stop and Safety System for Diesel Engines AHD 504 / AHD 514.

4 Technical Information

4.1 AHD 514 A

4.1.1 Technical Data

Description	Value/Unit/Type
General Data	
Dimensions, W x H x D	238 x 128 x 77 mm
Weight	Approximately 0.7 kg
Environmental Data	
Operating temperature	-30°C...+70°C
Storage Temperature	-50°C...+85°C
Protection class	IP 20
Required minimum distance to compass	Steering compass: 0.40 m Standard compass: 0.50 m
Electrical Data	
Power supply	24 V DC (+30% / -25%)
Current consumption	Max. 225 mA (24 V DC)
Inputs	
	6 x analog (4 – 20 mA)/binary, 6 x analog (PT100/PT1000)/bi- nary Analog inputs can be parameter- ized 1 x speed input, galvanically iso- lated 2 x binary, wire break monitored 8 x binary (control inputs) 2 x binary (generator and safety monitoring)
Outputs	

Technical Information

Description	Value/Unit/Type
	8 x relay, 6 A (32 V DC) potential free (control outputs, starter relay) 2 x transistor, 8 A (32 V DC), wire break monitored, short circuit proof for engine stop 1 x analog output (4 – 20 mA/ 1 – 5 V/2 – 10 V) 2 x LED indicator
Ports	
	2 x CAN bus (internal communication, configuration) 1 x RS232 (9-pin SUB-D, configuration, error diagnostics/log readout, firmware update) 1 x serial input (optocoupler) 2 x serial output (optocoupler)
Installation Type	
	Module carrier housing for installation directly on DIN rail TS32 or TS35
Approvals	
Classification societies	ABS BV CRS DNV LR RS

4.1.2 Name Plate and Other Information

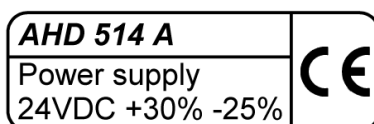



Illustration 18: Name plate AHD 514 A

The name plate of AHD 514 A (Illustration is similar) and other information are on the device's cover hood and contain the following:

- Model designation of the device
- Power supply
- Manufacturer
- Conformity markings
- Serial number

The two first digits of the serial number indicate the year of production.

To obtain the exact date of production contact the manufacturer stating the complete serial number.

4.1.3 Dimensions

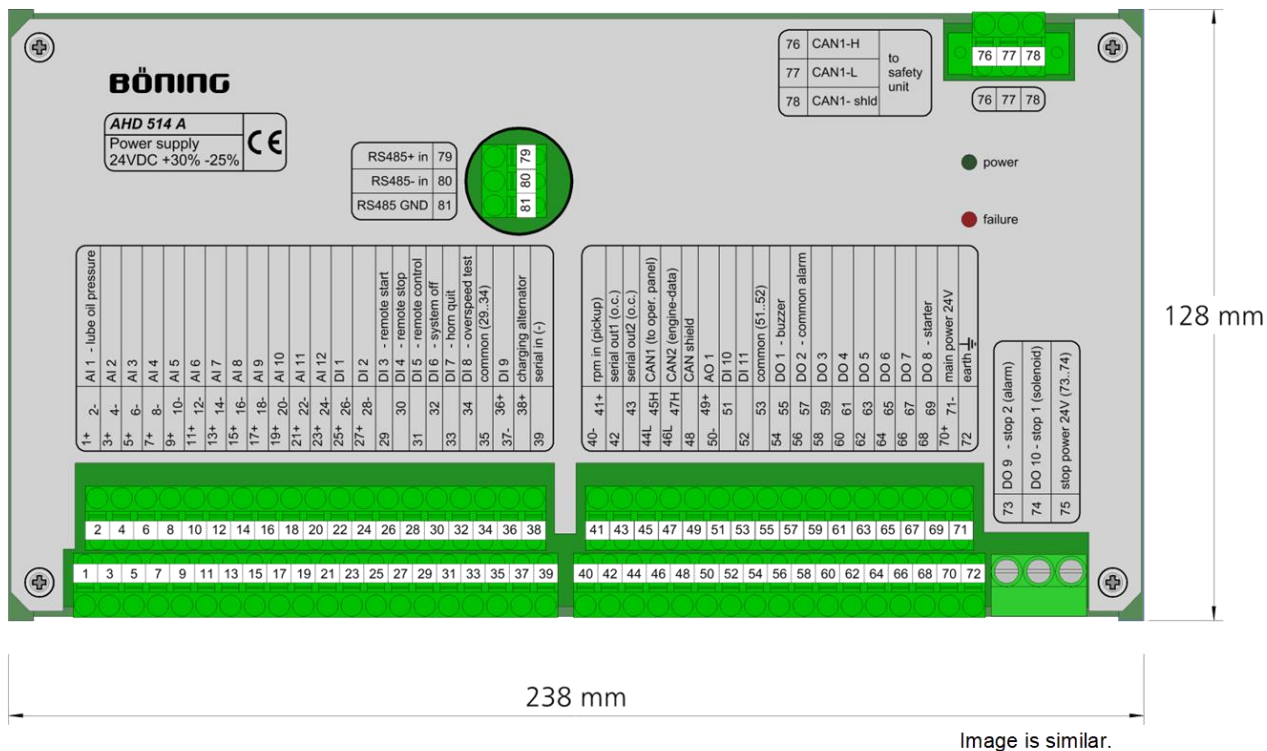


Image is similar.

Illustration 19: Dimensions of AHD 514 A in millimeters

Technical Information

4.1.4 Connection

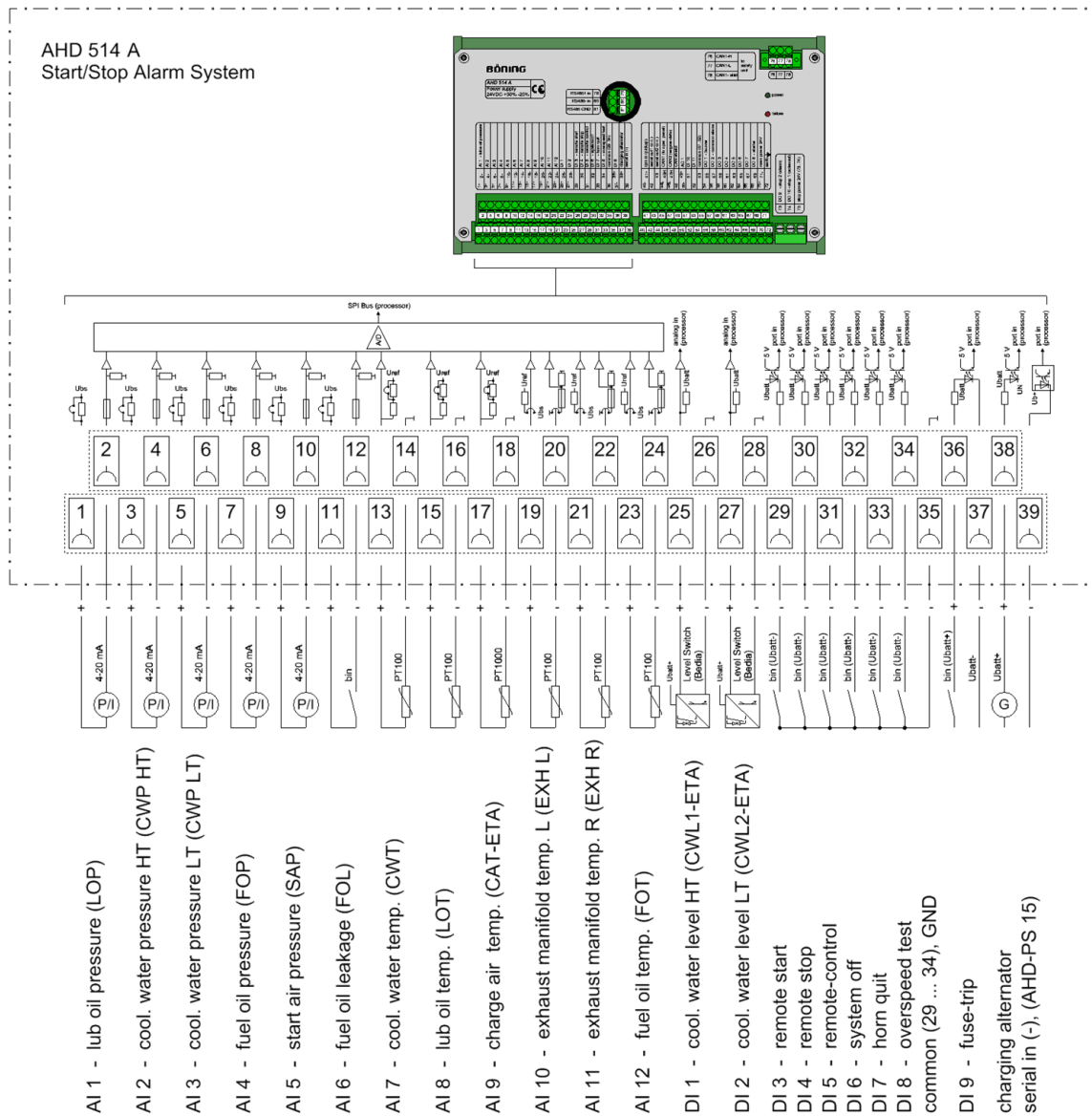


Image is similar.

Illustration 20: Connection schematic AHD 514 A, terminals 1 – 39



NOTICE!

The requirements for the customer provided 24 V DC main and emergency feed for the Alarm, Start/Stop and Safety System for Diesel Engines must be fulfilled, see the section "Requirements for 24 V DC Main and Emergency Power Supply" on page 58.



CAUTION!

To avoid damaging the current inputs (mA), they may only be wired as follows:

AI 01 – AI 06 → only 4-20 mA sensors with 2-wire technology

AI 10 – AI 12 → only 4-20 mA sensors with 2-wire technology

To avoid damaging the binary inputs, they may only be wired as follows:

AI 01 – AI 12 → potential free contacts

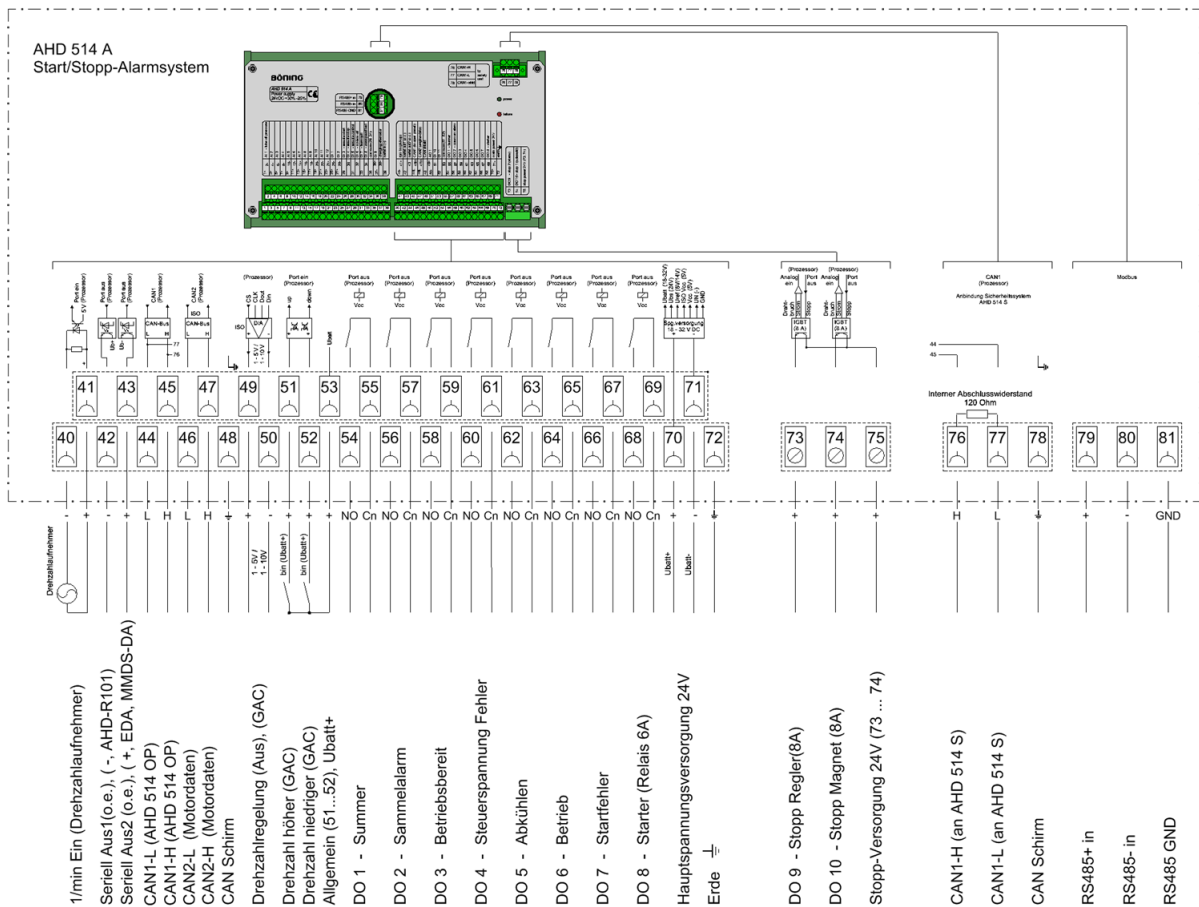


Image is similar.

Illustration 21: Connection schematic AHD 514 A, terminals 40 – 81



NOTICE!

The device contains an internal termination resistor for the CAN bus at the terminals 76 and 77.

This termination resistor cannot be switched off.

No additional termination resistor may be connected here.

Technical Information



NOTICE!

The requirements for the customer provided 24 V DC main and emergency feed for the Alarm, Start/Stop and Safety System for Diesel Engines must be fulfilled, see the section "Requirements for 24 V DC Main and Emergency Power Supply" on page 58.

4.2 AHD 514 A COM

Compared to the standard version AHD 514 A, version AHD 514 A COM is equipped with an additional Modbus port, allowing the system's connection to external systems. AHD 504 A COM provides the protocol Modbus RTU V1.1a and operates in slave mode.

4.2.1 Connection AHD 514 A COM

Terminals RS485+ and RS485-

The Modbus system should preferably be terminated with appropriate terminating resistors at both bus ends. The system must be terminated at the master on one end and at the last bus participant on the other end.

If AHD 514 A COM is the last bus participant, a 120 Ω resistor must be wired by the shipyard between the RS485+ (terminal 79) and RS485- (terminal 80) terminals.

Terminal RS485 GND

To comply with the Modbus specifications, the RS485 GND terminal (terminal 81) must be connected to the Modbus master's GND by the shipyard.



NOTICE!

If the master does not include a GND connection, this rule can generally be omitted. In most cases, the systems will operate problem-free even without a GND connection.



CAUTION!

Under no circumstances may terminal 81 (GND) be connected to the Modbus line's shielding.

When in doubt, this pin may remain unassigned because the COM module is galvanically isolated from the automatic start/stop's motherboard.

If the shielding is connected, excessive equalizing currents can run across the module, depending on the installation, and damage or destroy the module.

4.3 AHD 504 A

4.3.1 Technical Data

Description	Value/Unit/Type
General Data	
Dimensions, W x H x D	173 x 128 x 55 mm
Weight	Approximately 0.5 kg
Environmental Data	
Operating temperature	-25°C...+70°C
Storage temperature	-50°C...+85°C
Protection class	IP 20
Electrical Data	
Power supply	24 V DC (+30% / -25%)
Current consumption	Max. 100 mA (24 V DC)
Inputs	
	9 x analog 4–20 mA, PT100, PT1000, binary (can be set with jumpers), 2 x analog 0-32 V, thermocouple NiCrNi (can be set with jumpers) 9 x binary (contact, control input) 1 x engine speed input (pickup)
Outputs	

Technical Information

Description	Value/Unit/Type
	4 x relay, 3 A (32 V DC), potential free (control outputs, starter relay) 1 x transistor, 8 A (32 V DC), wire break monitored, short circuit proof for solenoid or operation solenoid 1 x transistor (32 V/25 mA) 2 x LED indicator
Ports	
	2 x CAN bus (monitoring bus, opt. ext. engine bus) 1 x RS232 (9-pin SUB-D, diagnostics, firmware update) 1 x serial input (optocoupler) 1 x serial output (optocoupler)
Installation Type	
	Module carrier housing for direct installation on DIN rail TS32 or TS35
Approvals	
Classifications societies	DNV, LR, RS

4.3.2 Name Plate and Other Information

AHD 504-A Start-Stop Alarm System

Power supply	24V DC +30% -25%
--------------	------------------

Illustration 22: Name plate AHD 504 A

The name plate of AHD 504 A (Illustration is similar) and other information are on the device's cover hood and contain the following:

- Model designation of the device
- Power supply
- Manufacturer
- Conformity markings
- Serial number (on separate label)

The two first digits of the serial number indicate the year of production.

To obtain the exact date of production contact the manufacturer stating the complete serial number.

4.3.3 Dimensions

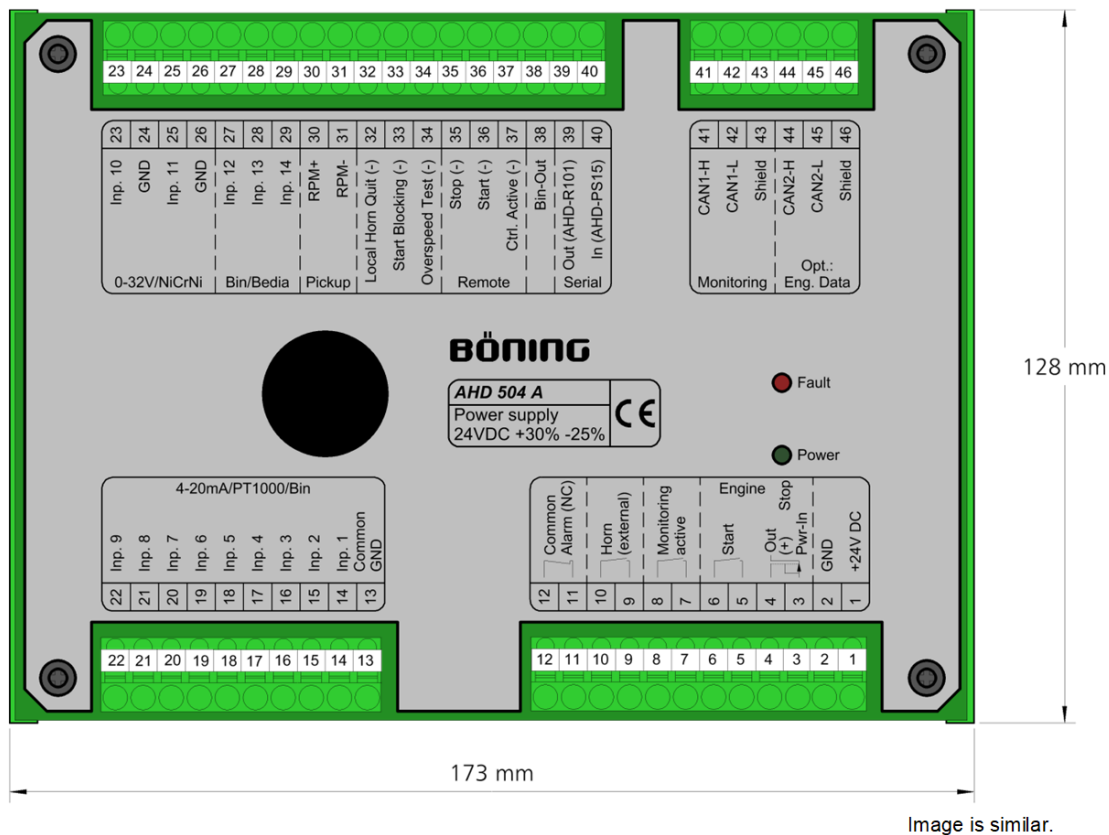


Illustration 23: Dimensions of AHD 504 A in millimeters

4.3.4 Connection



NOTICE!

The requirements for the customer provided 24 V DC main and emergency feed for the Alarm, Start/Stop and Safety System for Diesel Engines must be fulfilled, see the section "Requirements for 24 V DC Main and Emergency Power Supply" on page 58.



CAUTION!

To avoid damaging the analog inputs, they may only be wired according to the specifications or the current jumper settings.

Technical Information

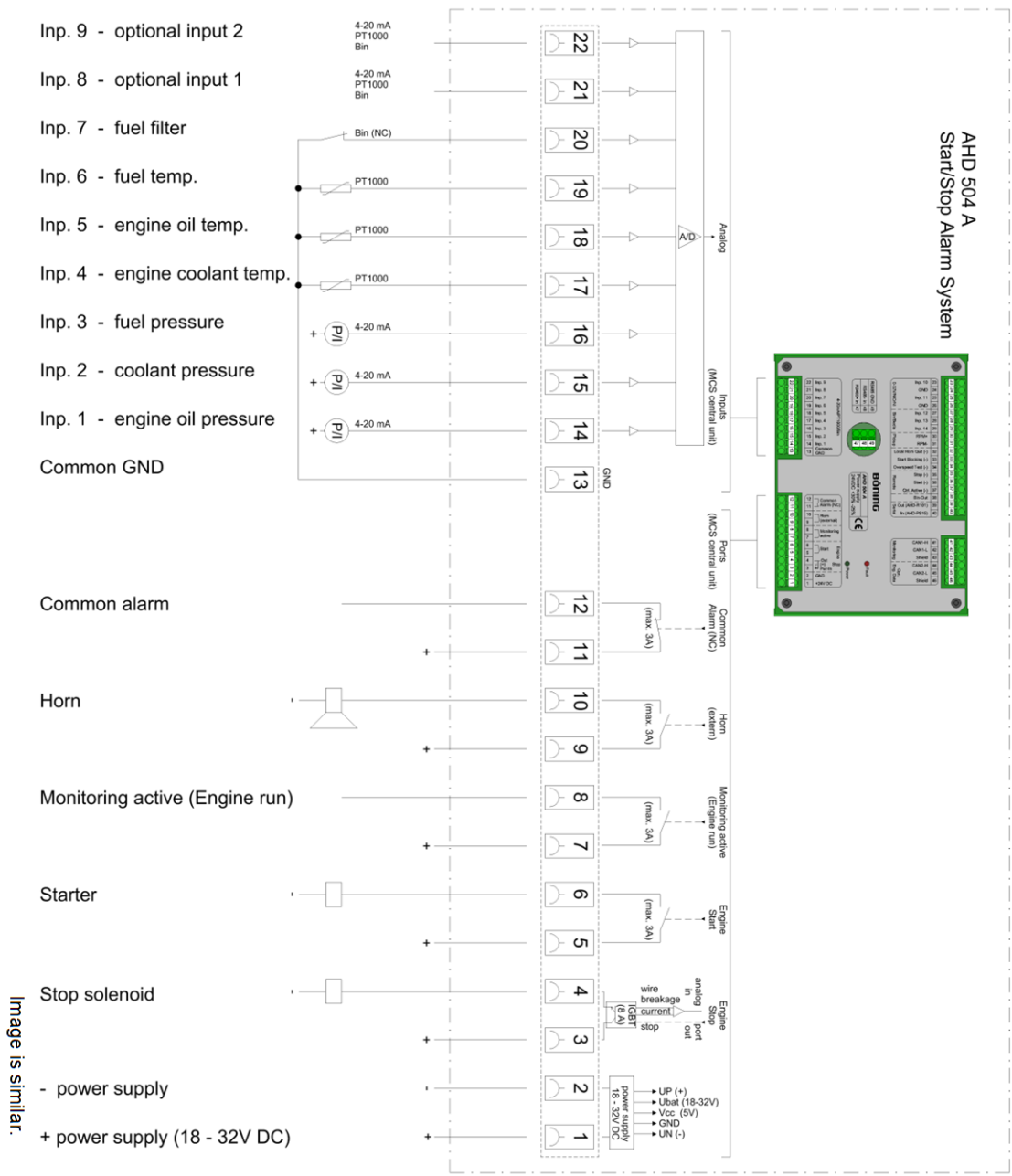


Illustration 24: Connections AHD 504 A (terminals 1 – 22)

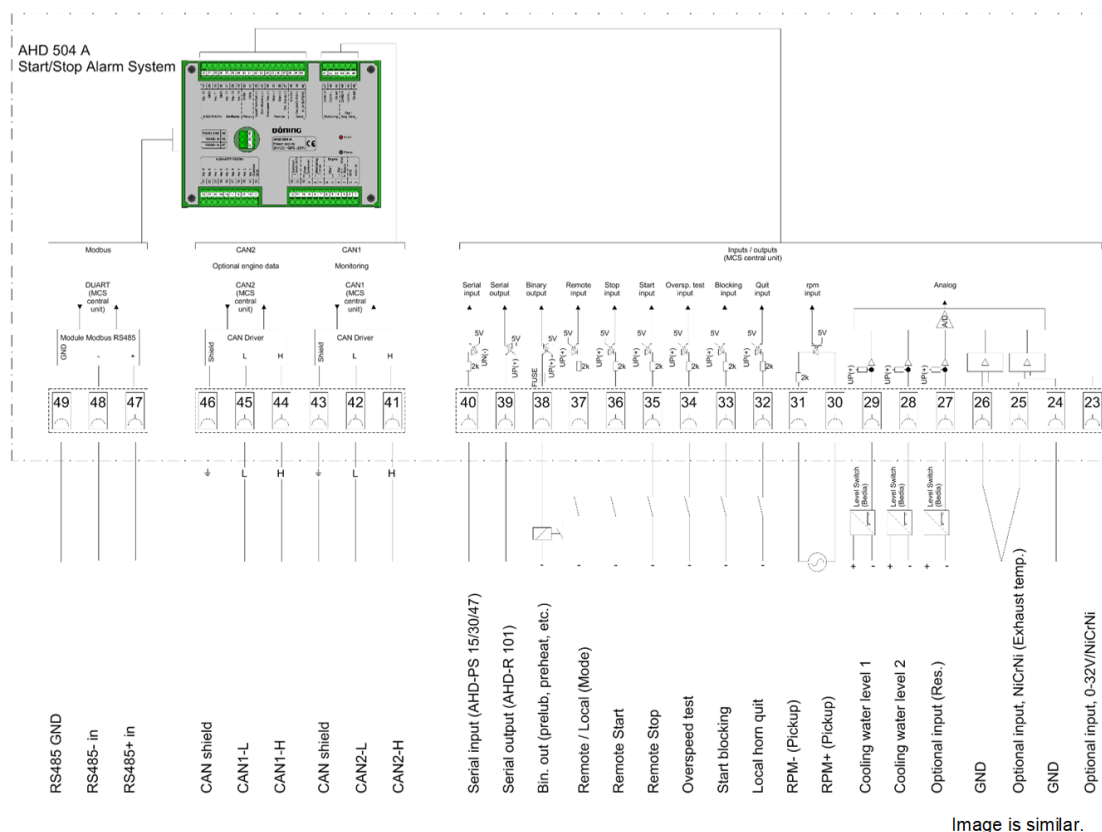


Illustration 25: Connections AHD 504 A (terminals 23 – 49)

4.4 AHD 504 A COM

Compared to the standard version AHD 504 A, version AHD 504 A COM is equipped with an additional Modbus port, allowing the system's connection to external systems. AHD 504 A COM provides the protocol Modbus RTU V1.1a and operates in slave mode.

4.4.1 Connection

Terminals RS485+ and RS485-

The Modbus system should preferably be terminated with corresponding terminating resistors at both bus ends. The bus is terminated at the master on one end and at the last bus participant at the other end.

If AHD 514 A COM is the last bus participant, a 120 Ω resistor must be wired by the shipyard between the two data lines (RS485+ and RS485-).

Terminal RS485 GND

According to the Modbus specifications, the RS485 GND terminal must be connected to the Modbus master's GND by the shipyard.

Technical Information



NOTICE!

If the master does not include a GND connection, this rule can generally be omitted. Experience has shown that in most cases, the systems will operate problem-free even without a GND connection.



CAUTION!

Under no circumstances may terminal RS485 GND be connected to the Modbus line's shielding!

When in doubt, this terminal must remain unsigned because the COM module is galvanically isolated from the start/stop automatic's motherboard.

If the shielding is connected, excessive equalizing currents can run across the module, depending on the installation, and damage or destroy the module.

4.5 AHD 514 S

4.5.1 Technical Data

Description	Wert/Einheit/Art
General Data	
Dimensions, W x H x D	148 x 128 x 77 mm
Weight	Approximately 0.5 kg
Environmental Data	
Operating temperature	-30°C...+70°C
Storage temperature	-50°C...+85°C
Protection class	IP 20
Required minimum distance to compass	Steering compass: 0.40 m Standard compass: 0.45 m
Electrical Data	
Power supply	24 V DC (+30% / -25%) (safety system) 24 V DC (+30% / -25%) (emergency stop system)
Current consumption	Max. 100 mA (24 V DC)

Description	Wert/Einheit/Art
Inputs	
	2 x binary, wire break monitored (emergency stop) 5 x binary, wire break monitored (stop criteria) 5 x binary (control inputs) 1 x engine speed inputs galvanically isolated
Outputs	
	4 x relay, 6 A (32 V DC), potential free (for horn, collective alarm, etc.) 2 x transistor, 8 A (32 V DC), wire break monitored, short circuit proof (solenoid/operation solenoid), flapper valves; stop from safety system) 1 x transistor, 8 A (32 V DC), wire break monitored, short circuit proof (stop from safety system) 1 x current output 4-20 mA (for external engine speed display) 10 x LED indicator
Ports	
	1 x CAN bus (internal communication, configuration) 1 x serial output (Optocoupler)
Installation Type	
	Module carrier housing for direct installation on DIN rail TS 32 or TS 35
Approvals	
Classification societies	ABS BV CRS DNV LR RS

Technical Information

4.5.2 Name Plate and Other Information

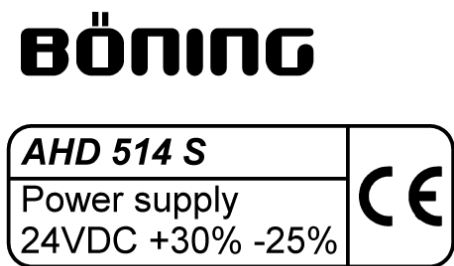


Illustration 26: Name plate AHD 514 S

The name plate of AHD 514 S (Illustration is similar) and other information are on the device's cover hood and contain the following:

- Model designation of the device
- Power supply
- Manufacturer
- Conformity markings
- Serial number (on separate label)

The two first digits of the serial number indicate the year of production.

To obtain the exact date of production contact the manufacturer stating the complete serial number.

4.5.3 Dimensions

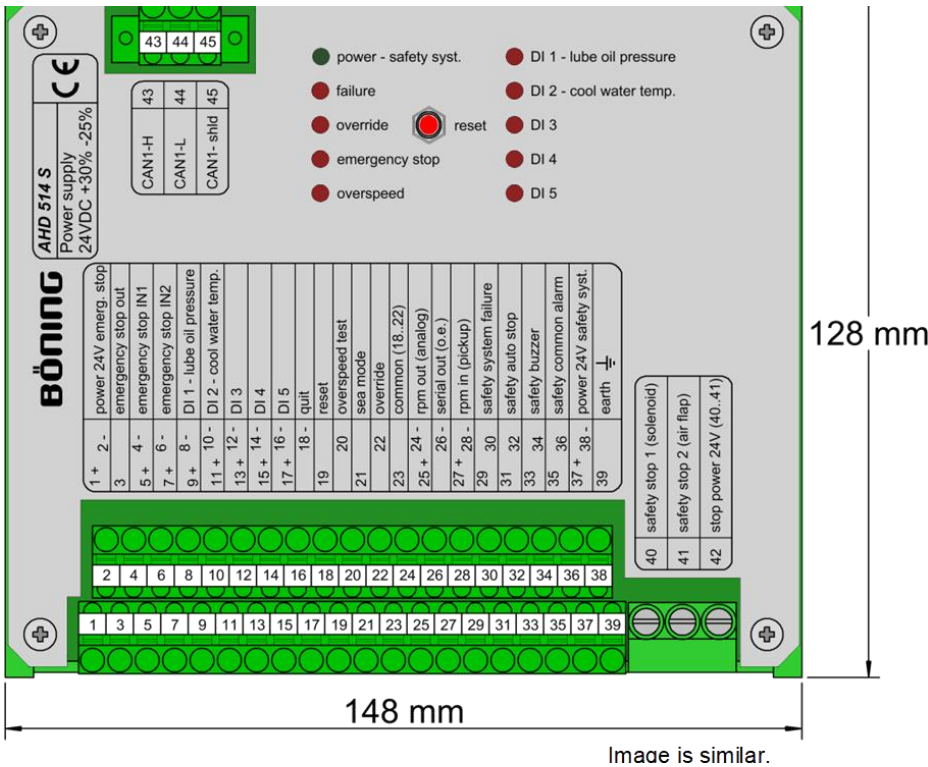


Illustration 27: Dimensions AHD 514 S in millimeters

4.5.4 Connection

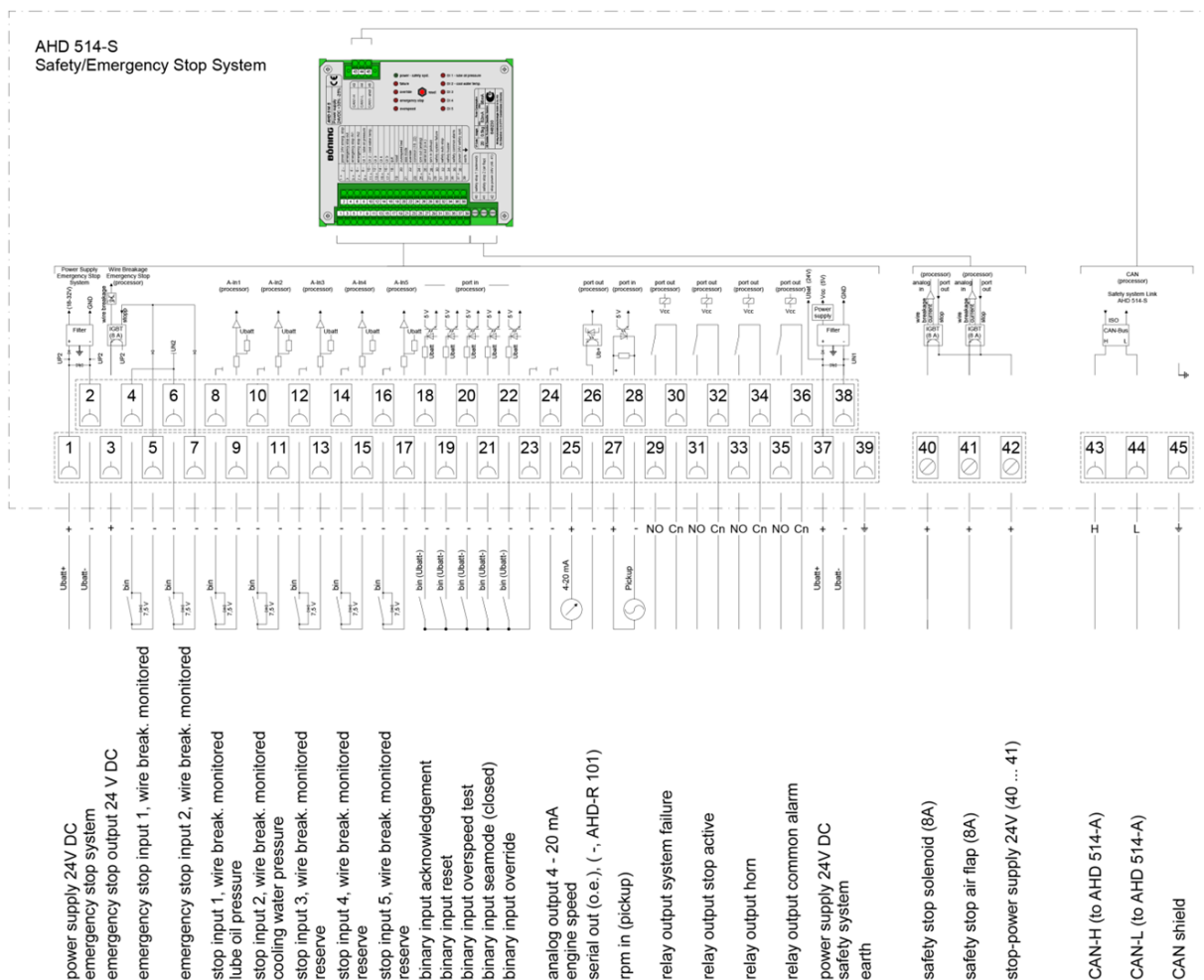


Image is similar.

Illustration 28: Connections AHD 514 S, terminals 1 - 45



NOTICE!

The requirements for the 24 V DC main and emergency feed for the Alarm, Start/Stop and Safety System for Diesel Engines provided by the customer must be fulfilled, see the section "Requirements for 24 V DC Main and Emergency Power Supply" on page 58..

Technical Information

4.6 AHD 504 NG

4.6.1 Technical Data

Description	Value/Unit/Type
General Data	
Dimensions, W x H x D	95 x 128 x 55 mm
Weight	Approximately 0.25 kg
Environmental Data	
Operating temperature	-25°C...+70°C
Storage temperature	-50°C...+85°C
Protection class	IP 20
Electrical Data	
Power supply	24 V DC (+30% / -25%)
Current consumption	Max. 37 mA (24 V DC)
Inputs	
	3 x Phase alternating current 0...500 V AC, 40...60 Hz L1, L2, L3, and N
Ports	
	1 x CAN bus (internal communication, configuration)
Installation Type	
	Module carrier housing for direct installation on DIN rail TS 32 or TS 35
Approvals	
	DNV, LR, RS

4.6.2 Name Plate and Other Information

AHD 504-NG Generator Measuring device	
Power supply	24V DC +30% -25%

*Illustration 29: Name plate
AHD 504 NG*

The name plate of AHD 504 NG (Illustration is similar) and other information are on the device's cover hood and contain the following:

- Model designation of the device
- Power supply
- Manufacturer
- Conformity markings
- Serial number (on separate label)

The two first digits of the serial number indicate the year of production.

To obtain the exact date of production contact the manufacturer stating the complete serial number.

4.6.3 Dimensions

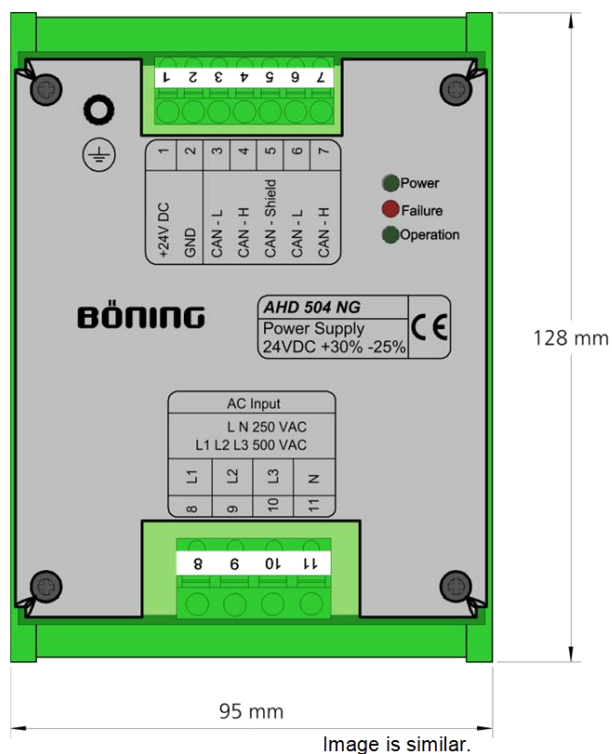


Illustration 30: Dimensions AHD 504 NG in millimeters

Technical Information

4.6.4 Connection

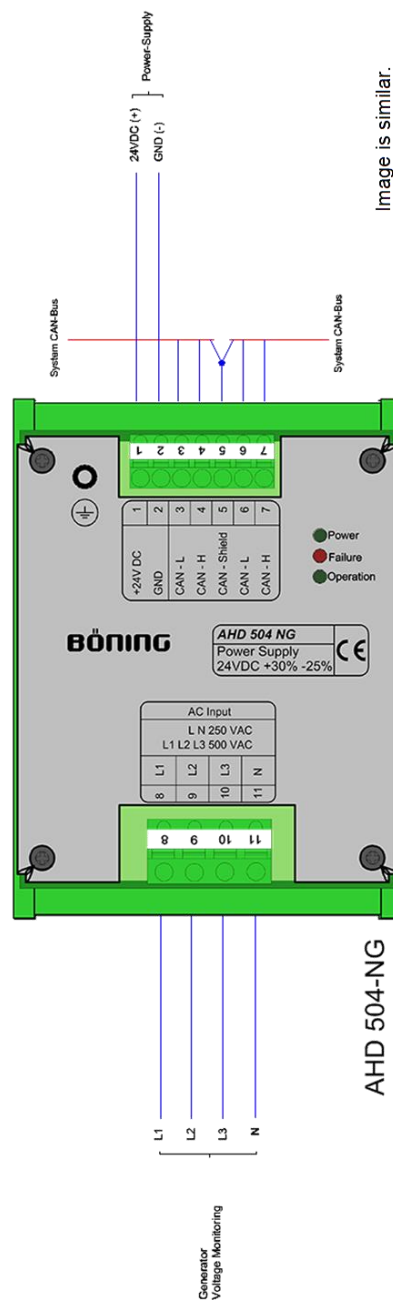


Illustration 31: Connections AHD 504 NG



NOTICE!

The requirements for the 24 V DC main and emergency feed for the Alarm, Start/Stop and Safety System for Diesel Engines provided by the customer must be fulfilled, see the section "Requirements for 24 V DC Main and Emergency Power Supply" on page 58.

4.7 AHD 514 OP/AHD 514 OP B

4.7.1 Technical Data



NOTICE!

The Display and Operation Unit AHD 514 OP is described below. All data provided here also fully apply to AHD 514 OP B.

Description	Value/Unit/Type
General Data	
Dimensions, W x H x D	144 x 144 x 43 mm
Panel cutout, W x H	131 x 131 mm
Weight	Approximately 0.5 kg
Environmental Data	
Operating temperature	-30°C...~+70°C
Storage temperature	-50°C...~+80°C
Protection class	IP 56 (frontside) IP 20 (rear)
Required minimum distance to Compass	Steering compass: 0.55 m Standard compass: 0.80 m
Electrical Data	
Power supply	24 V DC (+30% / -25%)
Current consumption	Max. 200 mA (24 V DC)
Display	
Display type	5.7" LCD color display
Viewing area	116 mm x 87 mm
Luminosity	500 cd/m ²
Resolution	640 (h) x 480 (v) pixels
Color depth	15 bits
Ports	

Technical Information

Description	Value/Unit/Type
	1 x CAN bus (internal communication, configuration)
Installation Type	
	Installation housing for direct installation into consoles, panels, and control boxes
Approvals	
Classification societies	ABS BV CRS DNV LR RS

4.7.2 Name Plate and Other Information

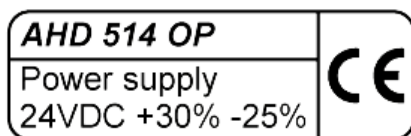



Illustration 32: Name plate AHD 514 OP

The name plate of AHD 514 OP (Illustration is similar) and other information are on the device's cover hood and contain the following:

- Model designation of the device
 - Power supply
 - Manufacturer
 - Conformity markings
 - Serial number (on separate label)
- The two first digits of the serial number indicate the year of production.
- To obtain the exact date of production contact the manufacturer stating the complete serial number.

4.7.3 Dimensions

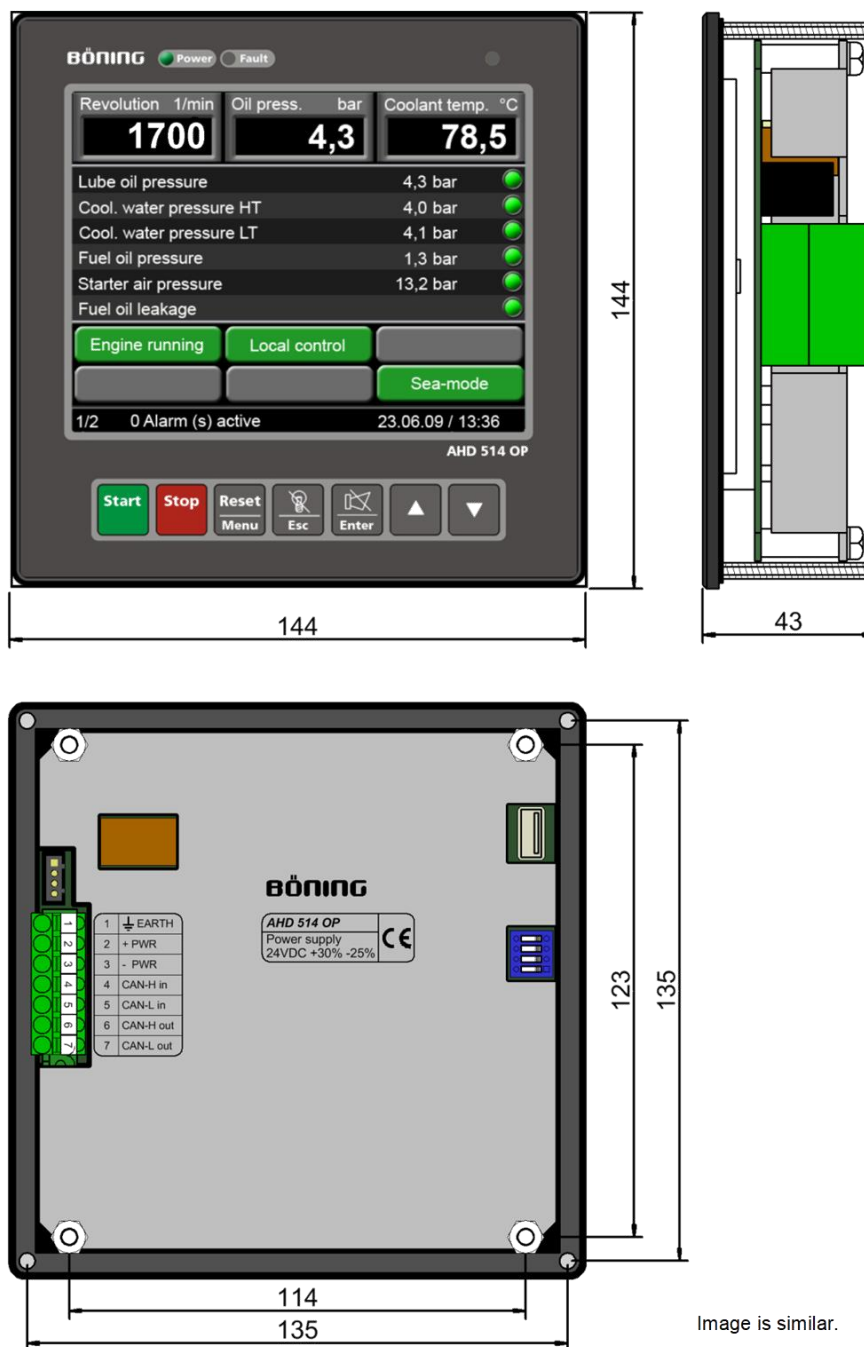


Image is similar.

Illustration 33: Dimensions AHD 514 OP in millimeters

Technical Information

4.7.4 Connection AHD 514 OP

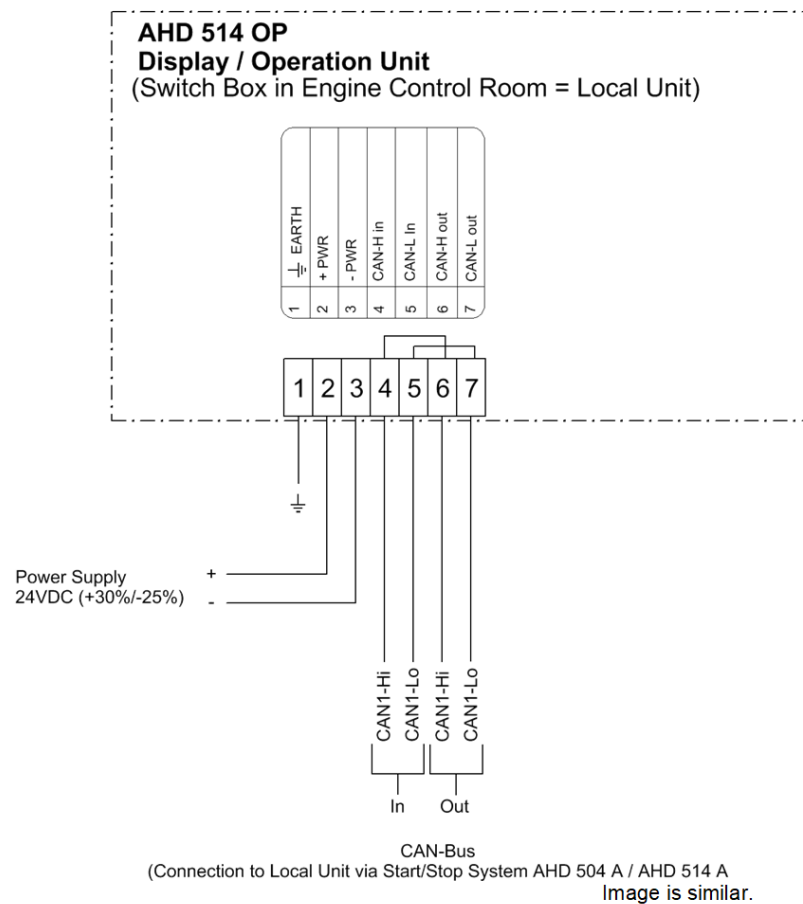
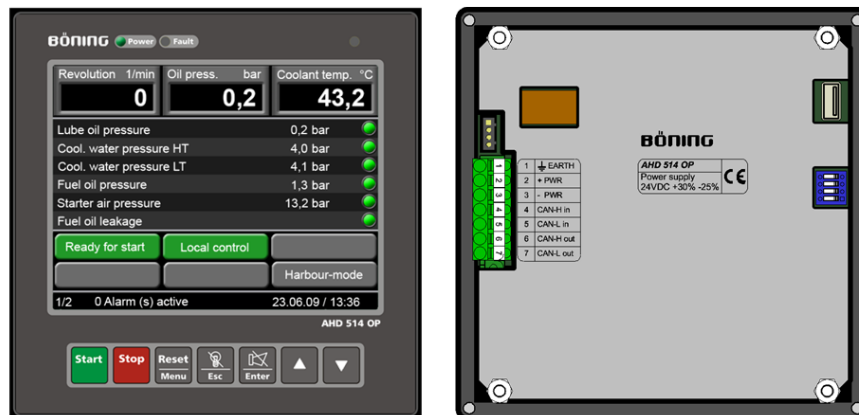


Illustration 34: Connections of AHD 514 OP

4.7.5 Connection AHD 514 OP B

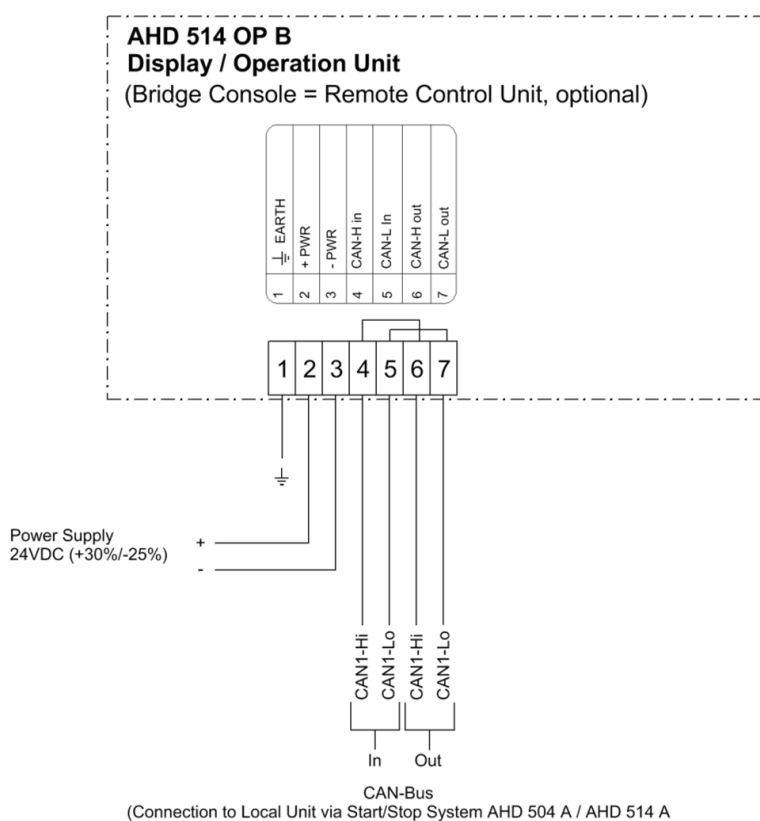
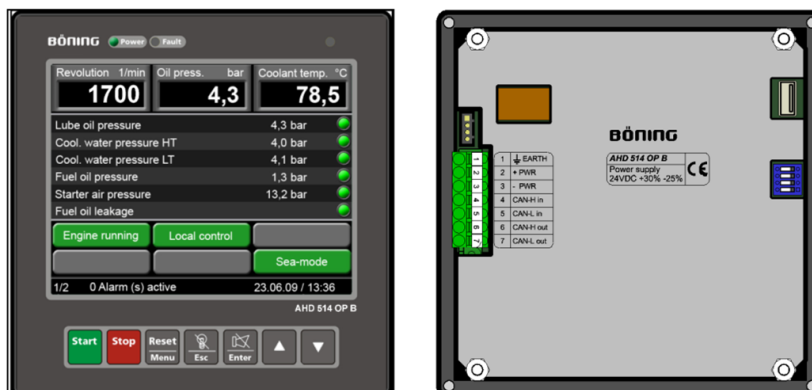


Image is similar.

Illustration 35: Connections of AHD 514 OP B

Technical Information

4.7.6 DIP Switch Functions

A DIP switch group (SW 1/1-4) is located on the rear side of the device. With these DIP switches, certain settings for the display that deviate from the default settings are possible.



CAUTION!

Only authorized technicians should adjust the DIP switch settings because incorrect settings can cause functional errors.

The following table describes the DIP switches and their respective functions.

The switches marked "not relevant" only serve device-internal purposes and must not be changed.

To activate a function shown in the table, the corresponding switch must be set to the ON position.



NOTICE!

If a DIP switch is set to a different position, the change takes effect only after the device has been restarted by disconnecting and reconnecting its power supply.

Exception: Switching the DIP switch SW1-4 is immediately effective; the device does not need to be restarted for this switch.

Switch	Function
SW1-1	no function
SW1-2	ON = Delete current configuration completely (normal setting = OFF) To do this, set SW1-2 to position ON. Restart the device (switch the power supply off and on again). The screen now shows the message <Configuration Incomplete>. The current configuration has been deleted and must now be transferred again. IMPORTANT: Set SW1-2 back to OFF before switching off the device!
SW1-3	ON = Force device into configuration mode (normal setting = OFF) To do this, set SW1-3 to position ON. Restart the device (switch the power supply off and on again). The screen now shows the message <No configuration forced flash mode>. If the configuration is invalid, the device can now be accessed again and a new valid configuration can be transferred to the device. IMPORTANT: Set SW1-3 back to OFF before switching off the device!
SW1-4	ON = activate flash mode (normal setting = OFF) To flash the device with new firmware, set SW1-4 to position ON and restart the device (switch the power supply off and on again). IMPORTANT: After completing the flash process, set SW1-4 back to OFF!

4.7.7 AHD 514 OP Transferring the Configuration to the Device

The transfer of the configuration to the device is discussed in a separate document.

Firmware Update via PC Software, Doc-ID PaB-1254

As a supplement to this operation manual, the document is part of the scope of this delivery.



NOTICE!

Before this device can be configured, DIP switch SW1-4 must be set to the ON position.

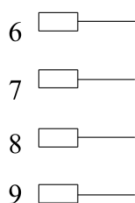
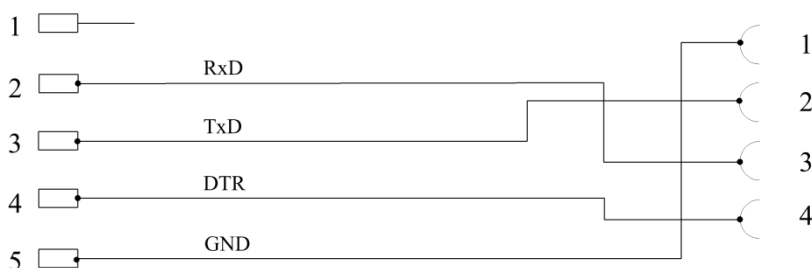
The DIP switches are on the device rear.

After the configuration has been completed, DIP switch SW1-4 must be returned to the OFF position.

4.7.8 AHD 514 OP: Upload of Firmware and Graphic Configuration

A special cable is required for transferring the firmware and the graphic configuration to the Display AHD 514 OP/AHD 514 OP B.

Sub Min D
Stecker, 9-polig / Male, 9 pole
Artikel-Nr: /Art.-No. 13444



Kein Schirm / No Shield

Max Länge / max. length: 3 m

AMP 4-poliges Gehäuse / AMP 4 pole housing AMP MODU
Buchse 4-polig / Female 4 pole

Hersteller / Manufacturer TYCO
Nr.: / No.: 0-0102241-2

Böning- Art.-Nr. / Art. No. 2792

Illustration 36: Cable for firmware update and upload of graphic configuration of AHD 514 OP

The cable is connected to the AMP socket on the device's rear.

To ensure optimal data transfer, the cable length must not exceed 3 meters.

Before the upload, DIP switch SW1-4 must be set to the ON position.

Technical Information

After the upload has been completed, DIP switch SW1-4 must be reset to the OFF position.

5 Transport, Packaging and Storage

5.1 Transport Safety Instructions

5.1.1 Improper Transport



CAUTION!

Equipment damage due to improper transport!

Improper transport can cause significant equipment damage.

Therefore:

- Use caution when unloading the packages during delivery and during on-site transport and observe the symbols and instructions on the packaging.
- Remove the packaging only shortly before installation.

5.2 Transport Inspection

Immediately inspect the delivery for completeness and transport damages.

Proceed as follows when noticing external transport damages:

- Do not accept delivery or accept it only with reservation.
- Note the scope of the damage on the transport documents or the deliverer's bill of lading.
- File a claim.



NOTICE!

Claim any fault as soon as it is noticed. Damage claims can only be filed within their respective reclamation periods.

5.3 Packaging

5.3.1 About the Packaging

The individual parts are packaged according to the expected transport conditions. Only environmentally safe materials have been used for the packaging.

The packaging is intended to protect the individual parts from transport damages, corrosion, and other damages. Therefore, the packaging may not be destroyed, and it may only be removed shortly before installation.

Transport, Packaging and Storage



CAUTION!

Equipment damage due to electrostatic discharge!

When removing the device from its packaging or when packing the device, always observe protective measures against electrostatic discharges (ESD)!

These include the use of antistatic flooring or conductive mats, antistatic clothing made of cotton instead of synthetic fibers or animal hair, control of atmospheric humidity above 50%, and the use of, for example, grounding bracelets.

Handling the Packaging Materials

The packaging materials must be disposed of according to current legal regulations and local ordinances.



CAUTION!

Environmental damages due to improper disposal!

Packaging materials are valuable raw materials and can often be reused or usefully processed and recycled.

Therefore:

- Dispose of packaging materials in an environmentally safe manner.
- Observe the local disposal regulations. When necessary, contract a specialist company.

5.3.2 Storage

Store the packages under the following conditions:

- Do not store them outdoors.
- Store them in a dry, dust free environment.
- Do not expose them to aggressive media.
- Protect them from sunlight.
- Observe the storage temperature, see the section “Technical Information” on page 59.
- Avoid mechanical shock.
- When storing longer than 3 months, regularly inspect the general condition of all parts and the packaging.



NOTICE!

In some cases, the packages contain instructions which extend beyond the requirements listed in this manual. These must be observed accordingly.

Installation and Initial Startup

6 Installation and Initial Startup

6.1 Safety

6.1.1 Personnel

- Installation and initial startup may only be performed by specially trained professionals.
- Only electricians may work on the electrical system.

6.1.2 Basic Information



CAUTION!

Risk of injury due to improper installation and initial startup!

Improper installation and initial startup can cause personal injury and equipment damage.

Therefore:

- Ensure sufficient installation space before beginning any work.
- Handle parts with exposed sharp edges carefully.
- Observe orderliness and cleanliness in the work area!
- Install parts properly.

6.2 Installation

6.2.1 General Information



CAUTION!

Equipment damage due to electrostatic discharge!

During all work observe protective measures against electrostatic discharges (ESD)!

These include the use of antistatic flooring or conductive mats, antistatic clothing made of cotton instead of synthetic fibers or animal hair, control of atmospheric humidity above 50%, and the use of, for example, grounding bracelets.



CAUTION!

Equipment damage due to improper handling and selection of installation locations!

Installing the products in locations that do not meet the requirements of the technical specifications and improper handling can lead to system errors and equipment damage.

Therefore:

- Observe the products' technical specifications when selecting the installation location.
- Only trained personnel may install the devices.
- Never install the devices in areas that are not of the required protection type.
- Never install the devices in extreme high or low temperature areas.
- Never install the devices on ceilings that cannot support their weight.
- Never bump or shake the devices vigorously.
- Install the devices in such a manner that unauthorized persons cannot access the interfaces used for the configuration.
- Install the devices in such a manner that the cooling system can function properly.

6.2.2 Installation Requirements

- All required connecting cables are of the required type, equipped with plug connectors according to technical specifications or project drawings, led to the intended installation location, and are properly installed and stripped. Free cables are of sufficient installation length and are secured against short circuit and earth fault.
- The product is not connected to the supply voltage and switched off-circuit.

Installation and Initial Startup

6.2.3 Earthing



CAUTION!

Earth first, then power the system on!

Before switching the device on, earth it with the provided earthing terminals.

- AHD 514 A/AHD 514 A COM: terminal 72
- AHD 514 S: terminal 39
- AHD 514 OP/AHD 514 OP B: terminal 1
- AHD 504 A/AHD 504 NG: earth bolt

6.2.4 Installation

1. The components of the Alarm, Start/Stop, and Safety System for Diesel Engines AHD 504 / AHD 514 must be installed properly in the intended installation location, according to the technical specifications or project drawings.



NOTICE!

When systems are delivered, the components are already delivered configured according to the project specific specification. This includes the required firmware as well as the settings for the correct device address for CAN bus communication. If the system includes several Display and Operation Units AHD 514 OP, it is imperative to observe the correct selection of the device configured for the installation location.

If the project specific configuration is changed, this configuration may need to be adjusted locally.

2. Wire all inputs and outputs according to the project drawings.

Setting the Device Address



CAUTION!

Equipment damage due to incorrect cable connections!

Improperly connected cables can cause system errors and equipment damage.

Therefore:

- Always verify cable and wire designations before connecting them. Check for secure seating of the connecting wires in the terminals.
- To avoid short circuits, verify that all wires are connected in the terminal.
- To not overtighten the terminals.
- When using pluggable terminal strips or plug connectors, it is imperative to ensure insertion in the correct socket and secure seating.

3. Check the system for earth/ground fault.



CAUTION!

System failure or malfunction!

During earth/ground fault, incorrect data can be transmitted and lead to overall system failure or malfunctions.

Therefore:

- Immediately correct any discovered earth/ground fault.

6.3 Setting the Device Address

In a CAN bus network, it is necessary to assign every bus participant a unique device address (CAN bus address). To avoid bus conflicts, every address may exist only once in the system.

Installation and Initial Startup

6.3.1 AHD 514 A

The CAN bus address of AHD 514 A is set by the manufacturer or the shipyard and does not need to be adjusted during a standard configuration.



NOTICE!

In future versions of the system, connecting several AHD 504 A/AHD 514 A Start/Stop Alarm Systems within the CAN bus communication may be possible.

To configure a unique device address, an offset may be added to the set address with the switches 1 and 2 of the internal 4-pin DIP switch. (Function currently unavailable)

6.3.2 AHD 504 A

The CAN bus address of AHD 504 A is set by the manufacturer or the shipyard and does not need to be adjusted during a standard configuration.



NOTICE!

In future versions of the system, connecting several AHD 504 A Start/Stop Alarm Systems within the CAN bus communication may be possible.

To configure unique device addresses, the preset address #1 can be changed with the device-internal 4-pin DIP switch (see "Configuration with DIP Switches" on page 38)

6.3.3 AHD 514 S

The CAN bus address of AHD 514 S is set by the manufacturer or the shipyard and does not need to be adjusted during a standard configuration.



NOTICE!

In future versions of the system, connecting several AHD 514 A Safety and Emergency Systems within the CAN bus communication may be possible.

To configure a unique device address, an offset may be added to the set address with the via switches 1 and 5 of the internal 2-pin DIP switch. (Function currently unavailable)

6.3.4 AHD 504 NG

The CAN bus address of AHD 504 NG is set with the configuration software DeviceConfig. It is set by the manufacturer or the shipyard and does not need to be adjusted during a standard configuration.

6.3.5 AHD 514 OP/AHD 514 OP B

The CAN bus address of AHD 514 OP/AHD 514 OP B is set on the "Settings" page of the device. It is set by the manufacturer or the shipyard and does not need to be adjusted during a standard configuration.

6.4 Initial Startup

6.4.1 Startup Requirements

- The components of the Alarm, Start/Stop, and Safety System have been properly installed and are equipped with all required connections.
- All external devices connected to AHD 514 A or AHD 504 and AHD 514 S have also been installed according to technical specifications or project drawings and are operational.
- All required power supplies are available and error-free.
- The components of system AHD 504/AHD 514 and all connected external devices are not connected to the power supply or have been wired off-circuit.
- The input "system off" of AHD 514 A or AHD 504 A is activated (contact closed). This blocks the system from operation.
- The input "remote-control" of AHD 514 A or AHD 504 A is deactivated (contact open). By this, the system is operated locally.



CAUTION!

Earth first, then power the system on!

Before switching the device on, earth it with the provided earthing terminals.

- | | |
|----------------------------|-------------|
| - AHD 514 A/AHD 514 A COM: | terminal 72 |
| - AHD 514 S: | terminal 39 |
| - AHD 514 OP/AHD 514 OP B: | terminal 1 |
| - AHD 504 A/AHD 504 NG: | earth bolt |

1. Establish the 18 – 32 V DC power supply for the Alarm, Start/Stop, and Safety System for Diesel Engines according to technical specifications or project drawings.

Installation and Initial Startup

2. Establish the power supplies for all external devices connected to the system AHD 504/514 according to their corresponding operating instructions.
3. Test the power supplies.



CAUTION!

Equipment damage due to incorrect voltage!

Connecting an incorrect supply voltage can lead to equipment damage.

Therefore:

- Review all relevant project documents and operation manuals of the devices used and verify their correct supply voltage and polarity before connecting them.
4. Switch on the power supply of the system AHD 504/514 and all connected external devices from the corresponding circuit breakers in the power distribution and the device internal starting devices according to the corresponding operation manuals.
 5. Check the correct sequence of the startup procedure according to the following section “Operation.”
 6. Log any errors or functional deviations that may occur and correct errors through proper measures, referring to the errors described in the section “Errors” on page 123.
 7. You may need to review the installed configuration and adjust it to the necessary operating conditions. Log the final configuration for the project documentation.

6.5 Startup Procedure



Illustration 37: Startup: Boot screen of AHD 514 OP

After the power supply is switched on, the system components automatically conduct an initialization procedure and a function test. During the system start procedure, the window shown in the illustration is shown briefly on the display AHD 514 OP/AHD 514 OP B.

If no errors were found during the initialization and function test, the correct operational status is shown on the system components as follows:

AHD 514 A:

- LED "power" lit
- LED "failure" not lit

AHD 514 S:

- LED "power-safety syst" lit
- LED "failure" not lit
- Other status LCD indicators according to the read input status

Installation and Initial Startup



Illustration 38: Startup: Message "Start blocking"

AHD 514 OP:

- LED "Power" lit
- LED "Failure" not lit

The first page with the operation data, where the measured data and status messages according to the system read status can be viewed, is shown.

The message "Start - blocking" is shown in the upper left status field. It indicates that the system is not in the "switch off" state; the contact "system off" of AHD 514 A is closed, thus blocking operation.



NOTICE!

If the LEDs "failure" or "fault" are also lit, an internal device defect was detected during the initialization and function test. For more information, see the section "Errors" on page 123.

1. Deactivate input "system off" of AHD 514 A (contact open).



Illustration 39: Startup: Message "Ready for start"

The message "Ready for start" is shown in the upper left status field. It indicates that the system is operational, and that the diesel engine can be started.

The Alarm, Start/Stop and Safety System AHD 504/514 is now fully operational.

2. To complete the initial start procedure, the system should be put into a secure state by reactivating AHD 514 A's input "system off" (contact closed) and the system is thus returned to the "switch off" state.



NOTICE!

In “switch off” state, the device is supplied with power. Operation is not possible in this state. On AHD 514 OP/AHD 514 OP B, the “switch off” state is indicated by the text “system off.”

Operation

7 Operation

The components of the Alarm, Start/Stop and Safety System for Diesel Engines are operational only after correct installation and successful initial startup.

The following chapter explains the overall system's available operation functions in detail.

7.1 AHD 514 OP: Display and Operation Elements

The system AHD 504/514 is operated most of the time on the local AHD 514 OP. Optionally, AHD 514 OP B is available for use on the bridge. The available functions deviate from those of AHD 514 OP in minor details, depending on the operation mode.

The functions of AHD 514 OP are described below. Deviating functionalities of AHD 514 OP B are highlighted in the respective passages.

The device has the following display and operation elements:

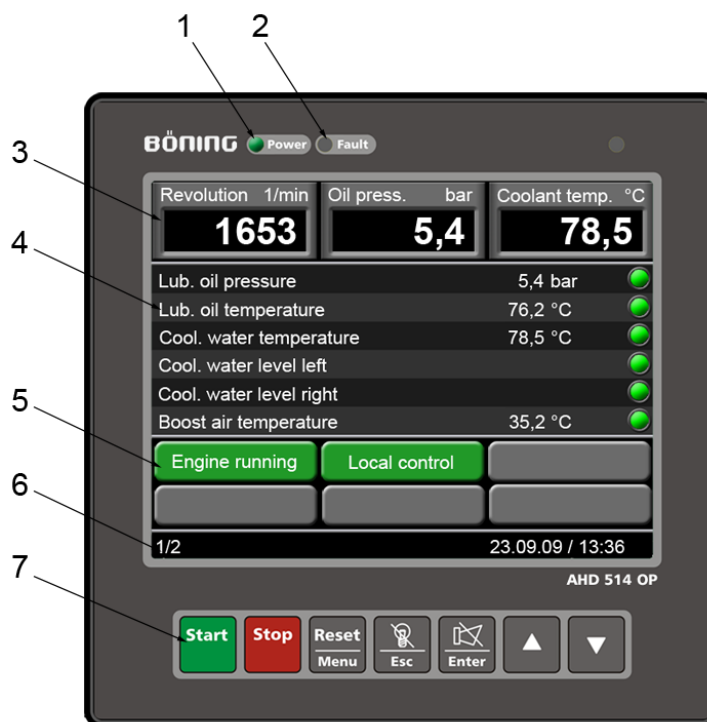


Illustration 40: Display and operation elements of AHD 514 OP

1. LED "Power"
2. LED "Fault"
3. Digital indicators for engine speed, lube oil pressure, and cooling water temperature
4. Data field with measuring point display and status LED
5. Status display fields for system states

AHD 514 OP: Display and Operation Elements

6. Information bar with page number, current number of alarms, date and time
7. Buttons for operation

7.1.1 Function Operation Buttons



“Start” button for starting the diesel engine

AHD 514 OP B:

Function only available in “Remote control” mode.



“Stop” button for stopping the diesel engine



“RESET/MENU” button for resetting current alarm messages, re-setting alarms with cause resolution, and canceling running stop procedures (**see “Safety Stop” on page 41 for exception**). Pressing this button more than 5 seconds opens the configuration menu.

An initiated stop process is not interrupted if the “RESET/MENU” button is pressed longer than 5 seconds.

In the configuration menu, the “RESET/MENU” button can be used for navigating in the individual fields on the page.

AHD 514 OP B:

When in “Local control” mode, the “RESET/MENU” button can only open the configuration menu or shorten the waiting period between stop and restart.



“Optical Acknowledgement/Esc” button for acknowledging a new alarm message and returning from the configuration menu.

AHD 514 OP B:

Function available only in “Remote control” mode.



“Horn Acknowledgement/Enter” button for acoustic acknowledgement of a new alarm message and confirming/saving entries in the configuration menu.

Pressing and holding this button longer than 5 seconds launches a horn test.

AHD 514 OP B:

Function active only in “Remote control” mode.

When in “Local control” mode, an alarm can be acknowledged only locally (internal buzzer of AHD OP B is muted).



Arrow button “UP” for menu control and parameter selection in the configuration menu.

Operation



Arrow button “DOWN” for menu control and parameter selection in the configuration menu.



NOTICE!

Pressing the “RESET/MENU” and “Horn Acknowledgement/Enter” buttons simultaneously when on the configuration page opens a screen page with system information, for example software version, operating hours, etc.

Only a service technician using additional connected tools can change the contents of this page.

7.2 Power On



CAUTION!

Earth first, then power the system on!

Before switching the device on, earth it with the provided earthing terminals.

- | | |
|----------------------------|-------------|
| - AHD 514 A/AHD 514 A COM: | terminal 72 |
| - AHD 514 S: | terminal 39 |
| - AHD 514 OP/AHD 514 OP B: | terminal 1 |
| - AHD 504 A/AHD 504 NG: | earth bolt |

After successful initial startup, the circuit breakers or main switches for the 24 V DC feeds normally remain switched on.

If they have been switched off, they must be switched on again in the respective power supply distribution so that the overall system can be operated.

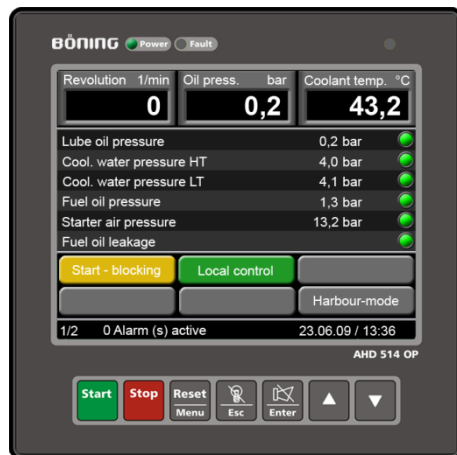


Illustration 41: "Switch off" state on AHD 514 OP

After the power supply is switched on, the system is operational, but still in a secured "switch off" state via the "system off" input of AHD 514 A (contact closed), which prevents start procedures.



Illustration 42: "Ready for start" state on AHD 514 OP

Deactivating AHD 514 A's "system off" input (contact open) returns the system to operational status.

The message "Ready for start" is shown in the upper left status field. It indicates that the system is operational, and the diesel engine can be started.

- The Alarm, Start/Stop and Safety System for Diesel Engines AHD 514 is now fully operational.

Operation

7.3 Functions Executable on AHD 504 A / AHD 514 A

7.3.1 Selecting the Operating Mode

AHD 514 A is equipped with a binary input “remote control” with which the following operating modes can be selected with an external selector switch:

“Local control” Mode

Local control

“Local control” mode is activated, if the contact of the binary input “remote-control” is open.

Available functions in this mode:

Local Display and Operation Unit AHD 514 OP in the engine room:

- Diesel engine start and stop
- Resetting safety alarms
- Menu navigation with display of operational data and alarms and settings on the configuration page

Display and Operation Unit AHD 514 OP B on the bridge:

- Diesel engine stop only (also with remote controlled stop input at the AHD 514 A)
- Menu navigation with display of operational data and alarms and settings on the configuration page
- Acoustic local alarm acknowledgement (AHD 514 OP B's internal buzzer is muted)

Remote control” Mode

Remote control

“Remote control” mode is activated, if the contact of the binary input “remote-control” is closed.

Available functions in this mode:

Local Display and Operation Unit AHD 514 OP in the engine room:

- Diesel engine stop only
- Resetting safety alarms
- Menu navigation with display of operational data and alarms and settings on the configuration page

Display and Operation Unit AHD 514 OP B on the bridge:

- Diesel engine start and stop (also with remote controlled stop input at the AHD 514 A)
- Acoustic and optical alarm acknowledgement
- Menu navigation with display of operational data and alarms as well as settings on the configuration page

7.3.2 Starting the Engine



Illustration 43: Starting the engine on AHD 514 OP

The engine can be started in “local control” mode with the “Start” button at the local AHD 514 OP, or in “Remote-Control” mode (respective input of AHD 514 A activated), on the external operation unit on the bridge.

The start procedure ends when the engine has reached a speed which it is certain to maintain on its own. The start procedure’s duration and the number of start attempts during start failure can be configured (by the manufacturer or the shipyard).

The following conditions are required for the engine start:

- No active start blocks
- No current stop alarm
- No current significant engine speed
- Lube oil pressure low
- Cooling water pressure low (can be deactivated in the configuration)

Whether the engine must be preheated first or starts immediately can be set in the configuration. At this, the preheating time can be freely set.

After pressing the “Start” button, the upper left status display field shows the message “Start-process,” and the upper right field shows the message “Starter” (for the duration of the starter relay activation).



NOTICE!

To start the engine, the start button must be held down for approximately 1 second.

AHD 514 A’ s relay output “starter” is activated to initiate the start procedure.

If the first start attempt was unsuccessful, another start procedure is initiated according to the configured number of start attempts. If all start attempts have been unsuccessful, the relay outputs “start failure” and “common failure” of AHD 514 A are simultaneously activated for fault signaling.

Operation

Immediately before the starter's reactivation, the system first checks whether the lube oil pressure is low, or an engine speed is detected. If at least one of the stated criteria is fulfilled, the system interprets this as a successful start, and the starter is not activated. The automatic system switches to monitoring mode. Alternatively, the cooling water pressure can be used as an additional run criterion thus improving the protection of the starter. The stated parameters do not cancel a running start procedure, but they prevent initiating the start sequence.

After the engine's target speed and the lube oil and cooling water pressures have been reached, the start procedure is finished. This is shown with the message "Engine running" in the upper left status display field.

The relay output "operation" of AHD 514 A is activated.



Illustration 44: AHD 514 OP after successful engine start

7.3.3 Start Blocking



Illustration 45: Message "Start blocking"

If the input "system off" of AHD 514 A is activated, the engine start is blocked. This state is indicated with the message "Start – blocking" in the upper left field of t AHD 514 OP and AHD 514 OP B.

Functions Executable on AHD 504 A / AHD 514 A



NOTICE!

If the input “system off” of AHD 514 A is activated while the engine is running, the engine continues to run.

Start blocking is activated only after execution of a stop, safety stop, or emergency stop procedure.

7.3.4 Manual Engine Stop



The engine can be stopped with the “Stop” button of AHD 514 OP or AHD 514 OP B, regardless of the operation mode.



Illustration 46: “Engine – stop” on AHD 514 OP

The initiated stop procedure is indicated with the message “Engine – stop” in the upper left status field of AHD 514 OP or AHD 514 OP B.

Depending on the shut-off device used for the controlled diesel engine, both stop outputs “stop governor” and “stop solenoid” of AHD 514 A are configured (by the manufacturer or the shipyard) according to the specific output and activation time during the stop procedure.



NOTICE!

An initiated stop procedure can be cancelled by pressing the “RESET/MENU” button on AHD 514 OP/AHD 514 OP B (see “Safety Stop” on page 41 for exception).

However, if the “RESET/MENU” button is pressed longer than 5 seconds, the stop procedure is not interrupted.

The system either returns to the normal operating mode for the running engine, or it grants clearance for an immediate engine start, if the engine is ready for start.

Operation



Illustration 47: "Ready for start" after engine stop

After the engine has been stopped, the relay output of AHD 514 A is deactivated, and the display's upper left status field shows the message "Ready for start" again.



Illustration 48: "Start – blocking" after activating "system off"

The manual stop procedure is also initiated by activating the input "system off" of AHD 514 A. Here, the message "Start - blocking" is shown in the display's upper left status field.

7.3.5 Alarm and Warning Visualization

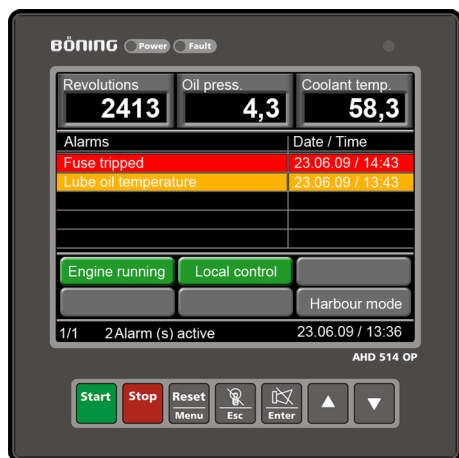


Illustration 49: Visualization of alarms and warnings



If a new alarm (main alarm) or warning (pre-alarm) is detected, the display automatically switches from the current page to the alarm page. All alarms and warnings are shown with their respective alarm or warning texts and the date and time of detection. The most recent alarm or warning is always shown in the list's first line.

If a new alarm or warning is detected, the horn is activated, and the alarm is shown with a flashing background.

Alarms are acknowledged acoustically and optically with the respective button on the AHD 514 OP's front side.

The AHD 514 OP B on the bridge can only acknowledge new alarms acoustically and locally (muting AHD 514 OP B's buzzer) when in "Remote control" mode.

The alarms can also be acknowledged acoustically with AHD 514 A's external input (input DI 7 – terminal 33).

The binary outputs of AHD 514 S can be configured depending on alarms, statuses, or groups (by the manufacturer or the shipyard). Thus, for example the engine power can be reduced in certain circumstances.

If the engine runs at overspeed, both stop outputs of AHD 514 A (DO9 – terminal 73 and DO10 – terminal 74) are activated. The engine is stopped. It can only be started after pressing the "RESET/MENU" button.

Operation

7.4 Functions Executed on AHD 514 S

7.4.1 Automatic Alarm Stop of the Engine

The stop procedure can also be initiated automatically by a stop alarm from AHD 514 S, independently from a manual engine stop.

By default, the device's first two binary inputs and the engine speed input are configured as stop alarms, leading to an automatic engine stop during an alarm. 3 additional inputs are available for monitoring other criteria; they can also be configured as stop alarms (by the manufacturer or the shipyard).

The "override" input allows suppressing the stop output during an alarm. However, for safety reasons, this does not apply to the over-speed alarm.



NOTICE!

The following applies to systems classified according to DNV guidelines:

An overspeed stop procedure cannot be canceled for emergency power generators with a power output of less than 2250 kW or a cylinder diameter of less than 300 mm.

An overspeed or lube oil pressure stop procedure cannot be canceled for diesel auxiliary or propulsion engines with a power output of less than 2250 kW or a cylinder diameter of less than 300 mm.

By default, the engine speed monitoring function is configured as a stop alarm for AHD 514 A, as well. In this case, AHD 514 A also fulfills a safety function, because overspeed causes an automatic stop.

Functions Executed on AHD 514 S



Illustration 50: Automatic alarm stop on AHD 514 OP



On AHD 514 OP, the initiated automatic alarm stop is indicated with the message “Alarm / Stop” in the lower left status field and the message “Safety Stop” in the lower right status field.

Furthermore, the relay output “safety auto stop” and the status LED for the initiated stop alarm at the AHD 514 S are activated.

After the automatic safety stop, the engine can be started only after resetting the alarm with the “Reset” button, which returns the system to its normal state.

A reset is only possible if the initiating binary input has returned to its normal position.



NOTICE!

The reset function is only reactivated, if the corresponding binary input has returned to its normal position.

In monitoring systems designed according to classification society requirements, a reset is only possible on the AHD 514 OP in the engine room.

Operation

7.4.2 Emergency Engine Stop



Illustration 51: Emergency stop on AHD 514 OP



AHD 514 S has two separate, wire break monitored emergency stop inputs that directly affect the emergency stop output, which is also wire break monitored. The function is ensured, even if the microcontroller or its power supply fails.

If the emergency stop is initiated, the emergency stop output is activated directly and the engine is stopped immediately.

The initiated emergency stop is indicated by the message “Emergency Stop” in the lower right status field on the display of AHD 514 OP and AHD 514 OP B.

The status LED “Emergency Stop” of AHD 514 S is also activated.

After an emergency stop, the engine can be started only after resetting the alarm with the “Reset” button, which returns the system to its normal state.



NOTICE!

The reset function is only reactivated, if the corresponding binary input has returned to its normal position.

In monitoring systems designed according to classification society requirements, a reset is only possible on the AHD 514 OP in the engine room.

7.4.3 Overspeed Test

The binary input DI8 – terminal 34 on the AHD 514 A is designed for performing an overspeed test for approval or verification purposes. It is possible to lower the permissible maximum engine speed, so that the function can be tested without risking engine damage.

For normal operation, this function is irrelevant.

7.5 Other Functions of the Display

7.5.1 Settings



NOTICE!

We recommend changing the parameters in this menu only, when the engine is at standstill, because the display switches from the currently active page to the alarm page whenever a new alarm or warning is triggered.



Illustration 52: "Basic Configuration" page of AHD 514 OP

The page "Basic Configuration" (settings) is launched, if the "RESET/MENU" button of AHD 514 OP/AHD 514 OP B is pressed for at least 5 seconds.

The "Basic Configuration" page contains the following user configurable entries:

- **Adjust clock:**
To set the time, press the "MENU/RESET" button to jump from [STD] to [MIN], and from there to [FORMAT] (24h/am-pm).
The values are changed with the arrow buttons. Press the "RESET/MENU" button to navigate to the next line, or press "ESC" to return to the main pages.
- **Date:**
To set the date, press the "RESET/MENU" button to navigate from [DAY] to [MON] and from there to [YEAR].
The values are changed with the arrow buttons. Press the "RESET/MENU" button to navigate to the next line, or press "ESC" to return to the main pages.



NOTICE!

If the time format is changed, the display format for the date changes too:

- 24 h = DD/MM/YYYY
- am/pm = MM/DD/YYYY

Operation



- **Language:**
For setting the language used on the display (currently only English).
The values are changed with the arrow buttons.
Press the “RESET/MENU” button to navigate to the next line, or press “ESC” to return to the main pages.
- **Units:**
For setting the system of units (metric or British system).
The values are changed with the arrow buttons.
Press the “RESET/MENU” button to navigate to the next line, or press “ESC” to return to the main pages.
- **Min. Brightness**
For setting the display’s minimum brightness (the brightness is automatically reduced to the set value).
The values are changed with the arrow buttons: a short press changes the value in single steps, while a long press changes the value in longer steps.
Press the “RESET/MENU” button to navigate to the next line, or press “ESC” to return to the main pages.
- **Max. Brightness:**
For setting the display’s maximum brightness (the brightness is automatically increased to the set value).
The values are changed with the arrow buttons: a short press changes the value in single steps, while a long press changes the value in greater steps.
Press the “RESET/MENU” button to navigate to the line [next configpage], or press “ESC” to return to the main pages.
To navigate to the page “Advanced Configuration,” press the “Enter” button.

7.5.2 Advanced Configuration

This menu displays information about the system, such as the software version and other important parameters.

These parameters are important for the system’s proper operation and therefore, they should not be changed.

Press the “RESET/MENU” button to navigate to the individual entries, then press the “Enter” button to open the respective subpage.

Other Functions of the Display



Illustration 53: "Advanced Configuration" page of AHD 514 OP

- **Device ID:**
Shows the device's internal bus address.
This value cannot be changed by the user.
Press the "RESET/MENU" button to navigate to the next line, or press "ESC" to return to the main pages.



Illustration 54: "Diagnosis" page of AHD 514 OP

- **Diagnosis page:**
Shows all active channels, the channel's unit, and an alarm/warning display for the channel in tabular format.
This table shows the total number of pages available in this sub menu.
The arrow buttons can be used to navigate back and forth between these pages.

The values shown on these pages cannot be changed by the user.

Press the "RESET/MENU" button to navigate to the next line, or press "ESC" to return to the "Advanced Configuration" page.

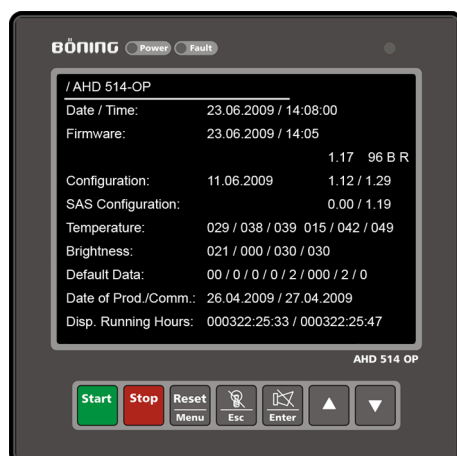


Illustration 55: General system information on AHD 514 OP

- **System Info/System Versions:**
Shows general system information, such as for example firmware and hardware version and other default values.
The arrow buttons can be used to navigate back and forth between the pages.

The values shown on these pages cannot be changed by the user.

Press the "RESET/MENU" button to navigate to the next line, or press "ESC" to return to the "Advanced Configuration" page.

Operation

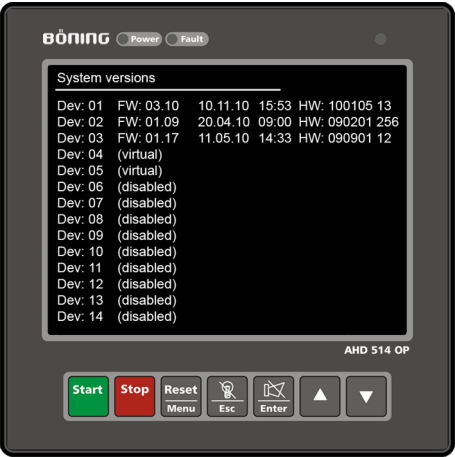


Illustration 56: Device versions on AHD 514 OP

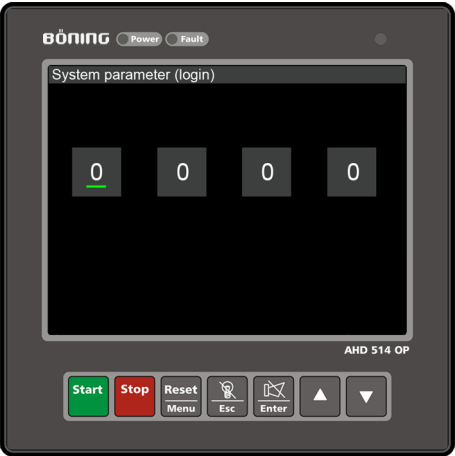


Illustration 57: Login for changing system parameters

- System parameter:
For setting selected system parameters.



NOTICE!

This page is password protected and cannot be accessed by the user, because changes to the values in this menu can cause system damage or malfunctions.

Press "ESC" to return to the "Advanced Configuration" page.
Press "ESC" to return to the main page.

7.5.3 Displaying the Events List

AHD 514 A logs important incidents in the system ("Events").

AHD 514 OP can show the last 56 most important events.

To view the events, open the "Advanced Configuration" page, see the section "Advanced Configuration" on page 112.



Illustration 58: Opening the events list

On the page select "Events" and press "Enter".

When the "Events" page is opened, the events are read from AHD 514 A. While the events are being read from AHD 514 A "Reading" is shown in the center of the title bar.

Transmission errors are signaled with the message "Transmission Error":

Operation



Illustration 59: Transmission error while reading the events

Each events page shows up to 8 events. The events are shown in time descending order.

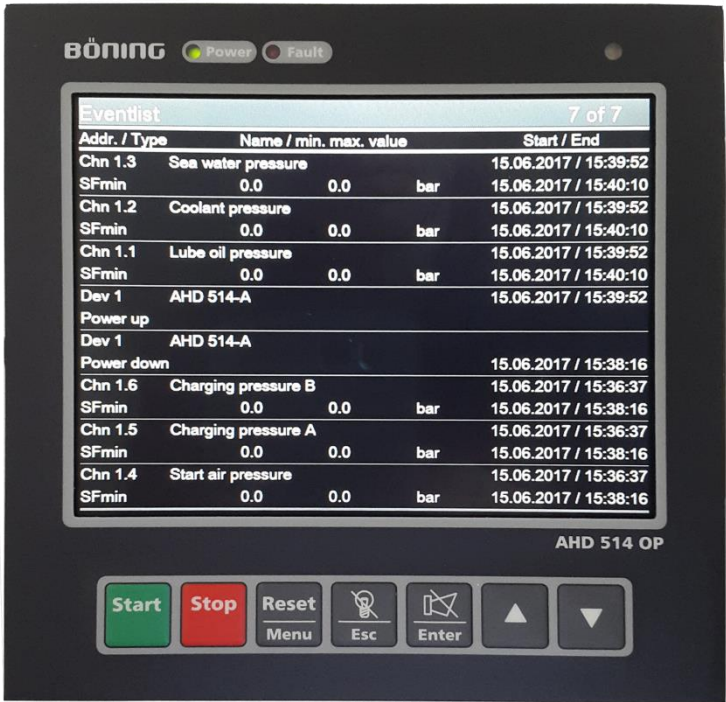


Illustration 60: Events list

Other Functions of the Display

For each event the following details are shown in two rows:

- The channel address in the form device_address.channel_number
- The measuring point's text
- Date and time of the event's start
- The event's type, for example SFmin for a low-level sensor failure

The following events are shown:

- Power up: A device's power up
 - Power down: A device's power down
 - SFmin: Sensor failure triggered by reaching a low limit value
 - SFmax: Sensor failure triggered by reaching an upper limit value
 - PAmin: Warning (pre-alarm) triggered by reaching a low limit value
 - PAmay: Warning (pre-alarm) triggered by reaching an upper limit value
 - MAmin: Alarm (main alarm) triggered by reaching a low limit value
 - MAmay: Alarm (main alarm) triggered by reaching an upper limit value
- Minimum value during the alarm
 - Maximum value during the alarm
 - The value's unit
 - Date and time of the event's end

The displayed events list does not contain acknowledgement requests and status messages. These can be read with DeviceConfig.

The previous and the following events page can be opened with the arrow buttons.

By pressing "ESC" you return to the "Basic Configuration" page.

To update the events list, leave the events pages with "ESC" and reopen it on the "Advanced Configuration" page.



NOTICE!

If a main alarm or pre-alarm is triggered while an "Events" page is open, AHD 514 OP shows the "Alarm" page.

Reopening the "Events" pages updates the list of displayed events.

Operation

7.6 Power Off

The entire Alarm, Start/Stop and Safety System for Diesel Engines AHD 514 is powered off by switching off the respective 24 V DC power supply in the corresponding distribution box.



NOTICE!

The Alarm, Start/Stop and Safety System for Diesel Engines AHD 504/514 is used as a monitoring and control system with additional, connected systems and devices. Switching off individual components within the system can lead to failure messages for the then missing devices. To avoid this, the power supplies for all devices must be switched off.

8 Alarm Suppression AHD 504 A/AHD 514 A

When suppressing the alarms in the system AHD 504/514, one must first define, which channel is used for the suppression and under what conditions an alarm is to be suppressed.

8.1 Definitions

Alarm Suppression:

Is applied to the channel in which an alarm shall not be triggered in certain system conditions, for example an oil pressure alarm when the engine is at standstill.

Suppression Channel:

The channel that contains the value that determines whether the alarm shall be suppressed.

For clarity, the channel type should always be binary, because in a binary channel, both states 0 and 1 can be used for alarm suppression. Here, it is irrelevant, whether a real or virtual channel is used.

The following conditions apply to the alarm suppression:

- The suppression can be configured separately for warnings and alarms or sensor failures min, max, or min/max.
- The set suppression channel is used for warnings and alarms or sensor failures min/max.
- The suppression shall be executed while the alarm conditions have not yet been met.
- A triggered alarm cannot be suppressed.
- If an alarm has been acknowledged acoustically and optically and is suppressed then, it continues to be displayed in the alarm list.
If the suppression is reset, the alarm shall be triggered again.
- The suppression conditions for the channel whose alarms are suppressed are saved in the parameter DeadLock-Mode.

Alarm Suppression AHD 504 A/AHD 514 A

8.2 Settings in DeviceConfig

In DeviceConfig, the alarm suppression is configured in the “System” columns:

Column Designation	Description
Alarm Suppression	In many cases, it is sufficient to use the engine run criterion for alarm suppression. It is also possible to configure a customized suppression condition.
Suppression Device [CAN-ID]	The suppression channel's device address
Suppression Channel	The suppression channel's channel address
PA Suppr. Cond. (Source)	Suppression channel status for suppressing warnings
PA Suppr. (Target)	The warning types to be suppressed (min, max or all)
MA Suppr. Cond. (Source)	Suppression channel status for suppressing alarms
MA Suppr. (Target)	The alarm types to be suppressed (min, max or all)
SF Suppr. Cond. (Source)	Suppression channel status for suppressing sensor failures
SF Suppr. (Target)	The sensor failure types to be suppressed (min, max or all)
Suppr. Source Sensor Type	Specification if the suppressing channel is analog or binary

8.3 Setting the Suppression Channel States

For suppressing alarms, the following settings for the suppressing channel are possible:

1. - No suppression
2. Bin 0 If the suppression channel = 0
3. Bin 1 If the suppression channel = 1
4. Always

Setting the Suppression Channel States

8.3.1 Explanations

1. No suppression

Description	DeadLockMode
No alarm suppression for the respective channel	0x0000

2. Bin 0 suppression channel = 0

Description	DeadLockMode
If the suppression channel = 0, an alarm is suppressed. Example: An engine's lube oil pressure alarm "Main Alarm min" is to be suppressed, if "Engine in Operation" = 0.	0x8120

3. Bin 1 suppression channel = 1

Description	DeadLockMode
If the suppression channel = 1, an alarm is suppressed. Example: A "Main Alarm min" of a monitored tank is to be suppressed, if the tank controls are set to 1 (manual operation).	0x8140

4. Always

Description	DeadLockMode
It does not make much sense to permanently suppress an alarm during operation, and the suppression for "Main Alarm max" is listed here only for the sake of completeness.	0x8260

Regular Checks and Cleaning

9 Regular Checks and Cleaning



NOTICE!

Maintenance of the devices is limited to external cleaning and inspection.

The following tests must be performed at least once a year:

- *firm seating of the cable connection in the terminals*
- *firm seating of the fastening screws*
- *low resistance earth connection*
- *horn test*
- *overspeed test*

Only use solvent-free and nonabrasive detergents for cleaning.



CAUTION!

Risk of injury due to dangerous voltages and other hazards

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

Therefore:

- Never perform device repairs yourself.
- Do not remove the covers for maintenance or inspection.
- In case of product malfunctions, contact the manufacturer or an authorized representative.

10 Errors

During normal operation of the Alarm, Start/Stop and Safety System for Diesel Engines AHD 504/514, an error message is generated, if the communication with other devices fails. If measured values outside the preset value limit are detected, a sensor failure message for the respective input is triggered.

The table below describes errors that can occur when operating the Alarm, Start/Stop and Safety System for Diesel Engines AHD 504/514, including information about causes, error diagnostics, and error correction.

10.1 Safety

10.1.1 Personnel

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

10.1.2 Basic Information



CAUTION!

Risk of injury due to 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.

Errors



WARNING!

Risk of injury due to 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.

10.1.3 In Case of Errors

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 (for example 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.



NOTICE!

Do not disassemble the device when sending it to the manufacturer!

Pack the device safely when sending it to the manufacturer!

10.2 Error Correction

10.2.1 AHD 514 A

Error	Possible Cause	Error Diagnosis/Correction
No function "Power" LED not lit	Wire break Power supply not present or switched on	Check the power supply and connections.
"Failure" LED lit	Device defective	Power off the system and consult the manufacturer or an authorized representative.
"Failure" LED flashing	CAN bus communication not present/interrupted Configuration data missing	Check the cable connections and connections. Check the configuration or consult the manufacturer or an authorized representative.
Engine does not start	Relay output not activated Wire break Configuration data missing Start requirements not met	Check the cable and relay output connections at the AHD 514 A and in the engine terminal box. Verify the start requirements according to the system settings. Check the configuration or consult the manufacturer or an authorized representative.
No function	Device defective	If the device does not function properly despite all measures taken, the device must be returned to the manufacturer for diagnosis.

Errors

10.2.2 AHD 504 A

Error	Possible Cause	Error Diagnosis/Correction
No function "Power" LED not lit	Wire break Power supply not present or switched on	Check the power supply and connections.
"Failure" LED lit	Device defective	Power off the system and consult the manufacturer or an authorized representative.
"Failure" LED flashing	CAN bus communication not present/interrupted Configuration data missing	Check the cable connections and connections. Check the configuration or consult with the manufacturer or an authorized representative.
Engine does not start.	Relay output not activated Wire break Configuration data missing Start requirements not met	Check the cable and relay output connections at the AHD 504 A and the engine terminal box. Verify the start requirements according to the system settings. Check the configuration or consult with the manufacturer or an authorized representative.
No function	Device defective	If the device does not function properly despite all measures taken, the device must be returned to the manufacturer for diagnosis.

10.2.3 AHD 514 S

Error	Possible Cause	Error Diagnosis/Correction
No function "Power" LED not lit	Wire break Power supply not present or switched on Configuration data missing	Check the power supply and connections. Check the configuration or consult with the manufacturer or an authorized representative.
"Failure" LED flashing	CAN bus communication not present/interrupted	Check the cable connections and connections.
LED for the input channel flashing slowly (approximately 0.3 Hz)	A sensor failure was discovered for the sensor input. Measured signal outside the specifications. Wire break	Check the sensor's connection and function. You may need to replace the defective sensor.

Error Correction

Error	Possible Cause	Error Diagnosis/Correction
LED for the input channel flashing quickly (approximately 0.6 Hz)	Alarm for the analog sensor has been triggered but not yet been acknowledged. (not an error condition)	Check the alarm indicators on the system's display and operation unit.
LED for the input channel continuously lit	Sensor failure or alarm triggered and acknowledged. (not an error condition)	
No function	Device defective	If the device does not function properly despite all measures taken, the device must be returned to the manufacturer for diagnosis.

10.2.4 AHD 504 NG

Error	Possible Cause	Error Diagnosis/Correction
No function "Power" LED not lit	Wire break Power supply not present or switched on	Check the power supply and connections.
"Failure" LED flashing	CAN bus communication not present/interrupted	Check the cable connections and connections.

10.2.5 AHD 514 OP/AHD 514 OP B

Error	Possible Cause	Error Diagnosis/Correction
No function "Power" LED not lit	Wire break Power supply not present or switched on	Check the power supply and connections.
"Failure" LED flashing	CAN bus communication not present/interrupted	Check the cable connections and connections.
The display shows the message: <No configuration forced flash mode>	DIP switch 3 on the device rear is in the ON position.	Return DIP switch 3 to the OFF position and restart the device.
No function	Device defective	If the device does not function properly despite all measures taken, the device must be returned to the manufacturer for diagnosis.

Disassembly

11 Disassembly

After the device has reached its end of life, it must be disassembled and disposed of in an environmentally safe manner.

11.1 Safety

11.1.1 Personnel

- Only a specially trained professional may perform the disassembly.
- Only electricians may work on the electric system.

11.1.2 Basic Information



CAUTION!

Risk of injury due to improper disassembly!

Stored residual energies, edged parts, points, and corners on and inside the device or the required tools can cause injury.

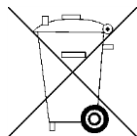
Therefore:

- Ensure sufficient space before beginning any work.
- Use caution when handling parts with exposed sharp edges.
- Observe orderliness and cleanliness in the work area! Parts and tools that are loosely stacked or lying about are accident sources.
- Uninstall parts properly.
- When in doubt, consult the manufacturer.

11.2 Disassembly

- Before beginning disassembly: disconnect the device from the power supply and secure it against reconnection
- Disconnect the cable connections and mark them, if necessary. Secure free wire ends against short circuit and earth/ground fault.
- Loosen the device mountings.
- Uninstall the device through proper measures.
- Clean and disassemble the device for selection according to workplace safety and environmental protection regulations.

11.3 Disposal



In the absence of a return or disposal agreement, recycle the disassembled components:

- Scrap metals.
- Recycle plastic components.
- Dispose of the other components according to their material properties.



CAUTION!

Environmental damages due to improper disposal!

Electrical scraps, electronic components, lubricants, and other auxiliary materials are subject to hazardous waste regulations and may only be disposed by licensed specialist companies!

Your local authorities or specialized disposal companies can provide you with information about environmentally safe disposal.

Index

12 Index

A		Ports	48
About this manual	11	Technical data	74
AHD 504 A	30	AHD 514 A	20
Alarm and event memory	36	Alarm and event memory	28
Approvals	66	Approvals.....	60
Configuration	36	Configuration	28
Configuration with DIP switches.....	38	Connection	62
Connection	67	Current inputs	
Device address.....	92	Wiring	63
Device electronics	32	Device address.....	92
Dimensions.....	67	Device electronics	23
Error correction.....	126	Dimensions.....	61
Functions	30	DIP switches.....	26
Input configuration with jumpers	37	Error correction.....	125
Inputs and outputs.....	33	Flyback diode	25, 34
Mechanical structure	32	Functions	20
Modbus.....	39	Inputs and outputs	23
Name plate	66	Mechanical structure	22
Ports	35	Minimum distance to compass	59
System configuration.....	36	Modbus.....	29
Technical data	65	Name plate	60
AHD 504 A COM.....	39	Ports	27
Connection	69	Technical data	59
Modbus.....	69	Termination resistor.....	63
Connection	70	AHD 514 A COM.....	28
AHD 504 COM	35	Connection	64
AHD 504 NG	48	Modbus	
Approvals	74	Connection.....	65
Configuration	49	Technical data	64
Connection	76	AHD 514 OP	49
Device address.....	93	Configuration	52
Dimensions.....	75	Connection	80
Error correction.....	127	Device address.....	93
Functions	48	Dimensions.....	79
Name plate	75	DIP switches.....	82

Error correction	127	Safety stop	41
Firmware upload / Graphic configuration	83	Technical data	70
Functions	50	Wire break monitoring	42
Minimum distance to compass	77	Alarm acknowledgement	31
Name plate	78	Alarm acknowledgement	22
Operation elements	98	Alarm and warning visualization	107
Ports	51	Alarm suppression AHD 504 A/AHD 514 A	119
Technical data	77	Alerting	21
Transferring the configuration	83	Approvals	78
AHD 514 OP B	53	Automatic alarm stop of the engine	108
Configuration	55	C	
Connection	81	Checks	
Device address	93	Regular	122
Functions	53	Classification	
Minimum distance to compass	77	DNV	41, 108
Ports	54	Cleaning	122
Technical data	77	Configuration example AHD 504	57
AHD 514 S	40	Configuration example AHD 514	56
Alarm acknowledgement	42	Copyright	13
Alerting	42	Customer service	14
Approvals	71	D	
Configuration	47	Device address	91
Connection	73	Disassembly	128
Device address	92	Display	
Device electronics	43	Advanced configuration	112
Dimensions	72	Other functions	111
DIP switches	46	Disposal	129
Emergency stop	41	E	
Error correction	126	Earthing	90, 93, 100
Flyback diode	45	Electrostatic Discharge	86, 88
Functions	41	Emergency engine stop	110
Inputs and outputs	44	Engine	
Lamp test	42	Alerting	31
Mechanical structure	43	Automatic alarm stop	108
Minimum distance to compass	70	Emergency stop	110
Name plate	72	Manual stop	105
Ports	47	Overspeed test	110
Reset	43	Start	20, 30, 51, 103

Index

Stop	21, 31	P	
Errors	123	Packaging	85
ESD.....	86, 88	Personnel	
Events list.....	115	Disassembly	128
Explanation of symbols.....	12	Electrician	16
F		Errors	123
Function	19	Initial Startup.....	88
Functions executable on AHD 504 A / AHD 514 A	102	Installation	88
Functions executed on AHD 514 S.....	108	Requirements	16
H		Specialist	16
Horn test	22	Trained Person	16
Hornt test	31	Power Off	118
I		Power On	100
Illustrations.....	12	R	
Initial startup.....	88, 93	Remote control.....	102
Installation	88	Requirements for 24 V DC main and emergency power supplies.....	58
Requirements	89	Reset.....	22, 32
Intended use	17	S	
Item numbers	11	Safety	15
L		Selecting the operating mode	102
Limitation of liability.....	13	Sending to manufacturer.....	124
Local control.....	102	Settings	111
M		Spare parts.....	14
Manual engine stop	105	Speed sensor	
Modbus	28, 35	Specifications	24, 33, 44
N		Start blocking	104
Nondisclosure	13	Startup procedure	95
O		Startup requirements	93
Operating mode	102	Storage.....	85, 87
Local	54	Structure.....	19
Local control.....	102	T	
Remote	54	Technical information	59
Remote control	102	Transport.....	85
Operation	98	Transport inspection	85
Operator's responsibilities	15	U	
Option		Unauthorized persons.....	17
AHD 514 A COM	29	W	
Overspeed test.....	110	Warranty terms.....	14

List of Illustrations

13 List of Illustrations

Illustration 1: AHD 514 A Start/Stop Alarm System (version without COM module).....	20
Illustration 2: Installation of a flyback diode for AHD 514 A.....	25
Illustration 3: Position of the DIP switches on AHD 514 A	26
Illustration 4: AHD 514 A COM.....	29
Illustration 5: AHD 504 A Start/Stop Alarm System.....	30
Illustration 6: Installation of a flyback diode for AHD 504 A.....	34
Illustration 7: Jumpers for the input configuration of AHD 504 A.....	37
Illustration 8: DIP switch settings of AHD 504 A.....	38
Illustration 9: AHD 504 A Start/Stop Alarm System, version with COM Module	39
Illustration 10: Safety System AHD 514 S	40
Illustration 11: Installation of a flyback diode for AHD 514 S.....	45
Illustration 12: DIP switches for output terminals 24/25 of AHD 514 S	46
Illustration 13: Power Grid and Generator Monitoring Device AHD 504 NG	48
Illustration 14: Display and Operation Unit AHD 514 OP	49
Illustration 15: Display and Operation Unit AHD 514 OP B.....	53
Illustration 16: Configuration example AHD 514.....	56
Illustration 17: Configuration example AHD 504.....	57
Illustration 18: Name plate AHD 514 A.....	60
Illustration 19: Dimensions of AHD 514 A in millimeters	61
Illustration 20: Connection schematic AHD 514 A, terminals 1 – 39.....	62
Illustration 21: Connection schematic AHD 514 A, terminals 40 – 81.....	63
Illustration 22: Name plate AHD 504 A.....	66
Illustration 23: Dimensions of AHD 504 A in millimeters	67
Illustration 24: Connections AHD 504 A (terminals 1 – 22)	68
Illustration 25: Connections AHD 504 A (terminals 23 – 49)	69
Illustration 26: Name plate AHD 514 S.....	72
Illustration 27: Dimensions AHD 514 S in millimeters	72
Illustration 28: Connections AHD 514 S, terminals 1 - 45	73
Illustration 29: Name plate AHD 504 NG	75
Illustration 30: Dimensions AHD 504 NG in millimeters	75
Illustration 31: Connections AHD 504 NG	76
Illustration 32: Name plate AHD 514 OP	78
Illustration 33: Dimensions AHD 514 OP in millimeters	79
Illustration 34: Connections of AHD 514 OP	80
Illustration 35: Connections of AHD 514 OP B.....	81
Illustration 36: Cable for firmware update and upload of graphic configuration of AHD 514 OP	83
Illustration 37: Startup: Boot screen of AHD 514 OP.....	95

List of Illustrations

Illustration 38: Startup: Message “Start blocking”	96
Illustration 39: Startup: Message “Ready for start”	96
Illustration 40: Display and operation elements of AHD 514 OP	98
Illustration 41: “Switch off” state on AHD 514 OP	101
Illustration 42: “Ready for start” state on AHD 514 OP	101
Illustration 43: Starting the engine on AHD 514 OP	103
Illustration 44: AHD 514 OP after successful engine start	104
Illustration 45: Message “Start blocking”	104
Illustration 46: “Engine – stop” on AHD 514 OP	105
Illustration 47: “Ready for start” after engine stop	106
Illustration 48: “Start – blocking” after activating “system off”	106
Illustration 49: Visualization of alarms and warnings	107
Illustration 50: Automatic alarm stop on AHD 514 OP	109
Illustration 51: Emergency stop on AHD 514 OP	110
Illustration 52: “Basic Configuration” page of AHD 514 OP	111
Illustration 53: “Advanced Configuration” page of AHD 514 OP	113
Illustration 54: “Diagnosis” page of AHD 514 OP	113
Illustration 55: General system information on AHD 514 OP	113
Illustration 56: Device versions on AHD 514 OP	114
Illustration 57: Login for changing system parameters	114
Illustration 58: Opening the events list	115
Illustration 59: Transmission error while reading the events	116
Illustration 60: Events list	116



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