Monitoring and Control Technology

Superyacht Electronics

Refit Packages

BÖNING

SHIP AUTOMATION

Superyacht Electronics Refit Packages

Böning ship electronics are not only ideally suited for initial outfitting, but also for refit measures on used vessels.

Refitting the ship electronics offers owners of used yachts and commercial vessels the opportunity to bring the electronic systems to the latest technical state and to profit from numerous advantages.

The reasons for a refit may result from a desire for more comfort, better operational characteristics, or from the guidelines of new regulations. The vessel's operating profile, its projected remaining period of operation, and current and future international requirements are essential factors that must be considered when making decisions about refit measures.

Considering technical progress, old systems or systems that are no longer supported are replaced with systems with modern, improved technology and expanded functionality. Therefore, a refit is also an investment in the ship's operational safety as well as its system's reliability. Additionally, a corresponding increase in the ship's value may significantly outweigh the necessary investment.

We furthermore offer specially coordinated retrofit packages for older Böning systems. We would especially like to point out the more than 10,000 yachts which have been equipped with MAN engines and Böning electronics over the last 15 years.

The use of modern communication media on the bridge allows the ship operator comfortable and well-organized access to all data relevant to the vessel's safety and operation. User friendly touchscreen displays, powerful panel PCs, integration of iPad® and iPhone® devices, and repeatedly redundant safety systems are features even owners of older vessels of all types do not have to do with-out. If you like, we will bring your ship to your local office-PC via remote data access.

The Böning team stands for continuous further development and long term availability of spare parts for the remainder of the ship's life.

Regardless of whether you choose one or several refit packages, you will always only need one display for the visualization, since Böning displays are able to show the data and statuses of different systems independently of one another on several display pages.

Contents

Custom Tailored Modernization

- State of the art technology
- Durable, modular products
- Specially attuned retrofit solutions (can be expanded any time)
- Minimal installation/cabling requirement due to the use of bus technology
- Type approved by many classification societies (ABS, BV, DNV, GL, LR)
- Visualization of system data via numerous customer specific analog and digital displays
- High-quality individualized visualization of the propulsion engines and other board systems
- Reduction of service costs via remote maintenance
- Appealing, homogeneous design
- Front end devices for a uniform bridge console
- Integration of navigation systems

15" Touch Screen Display
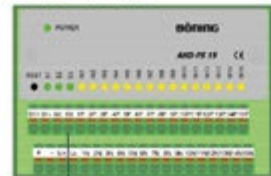## AHD 1215 F - OPTION

SAS
CAN-Bus

iPad2® *)

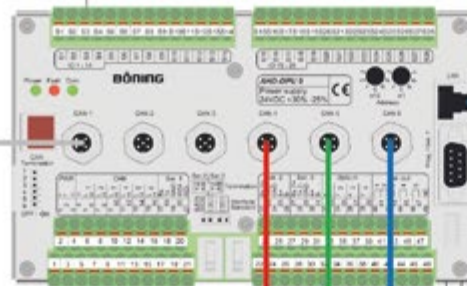**Internet**

8,8" Touch Screen Display
AHD 880 TC - OPTION

SAS
CAN-Bus

Local Router *)

Binary Data Station
AHD-PS 15

15 binäre Eingänge

AHD-WNL (Ethernet LAN Server)

Central Unit AHD-DPU 9

CAT5 *)
Ethernet

CAT5 *)
Ethernet

Power Supply 24VDC +30% / -25%

*) Customer-provided

J1939 *)

J1939 *)

NMEA
2000 *)

NMEA
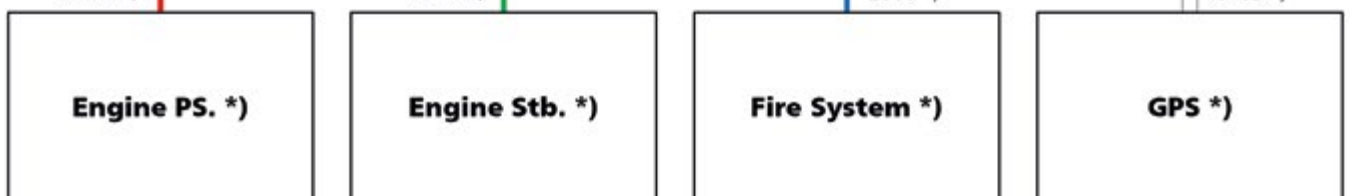0183 *)

Engine PS. *)

Engine Stb. *)

Fire System *)

GPS *)

Refit Package

Remote Access

System Structure

The "Remote Access" refit package consists of a processor unit AHD-DPU 9, a PC AHD-WNL, suitable for maritime use, a Data Station AHD-PS15, and one or several display units.

Data Processing Unit AHD-DPU 9

The Data Processing Station AHD-DPU 9 can accept various data protocols, such as main engine parameters, information from the fire alarm system, GPS data, etc. This unit includes 6 CAN buses, 28 serial inputs, and one LAN (Ethernet network) connection. Various data sources can be connected via these inputs.

Data Station AHD-PS 15

Data Station AHD-PS15 has 15 binary inputs and two serial outputs. This unit is serially connected to the processor unit AHD-DPU 9.

Displays AHD 880 TC and AHD 1215

Color displays of different sizes, such as the 8.8" Touch Screen Color Display AHD 880 TC or the 15" Touch Screen Color Display AHD 1215 can be used for local display of the captured data. Other display sizes are also available, with and without touchscreen functionality, with a glass front or with foil-coated aluminum front. These are connected to the processor unit, which sends all captured data to the displays, via the CAN bus.

Ethernet/LAN Server AHD-WNL

The Ethernet/LAN Server AHD-WNL is used so that all data can also be accessed remotely, e.g. from the office. This server also receives the pre-viously captured data from the processor unit AHD-DPU 9 via Ethernet. To be able to transmit these parameters from the ship, the AHD-WNL server is connected to the local router on board, which has an Internet connection and a WLAN. Through it, the ship data are shown on the iPad® or iPhone®.

For internet access, the local router must be directly accessible from a public IP address.

Functional Description

The processor unit AHD-DPU 9 transmits the data from the main engines, the fire alarm system as well as GPS data for current position, course, speed, etc.

The Binary Data Station AHD-PS15 captures the status information (open/shut) of important doors, such as salon door, garage, side doors, water tight doors, hatches, etc. Free inputs can be used for additional status or alarm messages, among others.

The data and alarm and status messages can be transmitted to e.g. your local office PC or a mo-bile device via the Internet. During a critical alarm state, such as the intrusion of water into the ship's interior (bilge alarm) or fire alarm, you can act quickly, even if no one is on board. Timely alerting can considerably reduce any damages that may occur.

Since GPS data are also transmitted, the vessel's current location can be determined, as well.

Expansion Options

The Remote Access refit package can be expanded with the following refit packages:

- CCTV
- Tank Data and Range Calculation
- Engine Start/Stop System
- Navigation Lights System
- Trim Tabs Control

Böning

15" Touch Screen Display
AHD 1215 F - OPTION

SAS
CAN-Bus

BNC Video

8,8" Touch Screen Display
AHD 880 TC - OPTION

Video Control Unit
AHD-VCP

BNC Video

SAS
CAN-Bus

CAT5 *)
Ethernet

Video Central Unit
AHD-VDCU 16/16

BNC
CAT5
Video Adapter

Flir Thermal Imager Voyager II

BNC
CAT5
Video Adapter

Motor Dome Colour Camera AHD-VC 753

BNC
CAT5
Video Adapter

Infrared Camera AHD-VC 720IR

BNC
CAT5
Video Adapter

Bullet Miniature Colour Camera AHD-VC 711

CAT5
BNC
Video Adapter

AHD-VCS Q4/1
Quad

Power Supply 24VDC +30% / -25%

*) Customer-provided

RG-59

Refit Package

CCTV System

System Structure

The refit package "CCTV System" was developed for the individual operation of up to 16 video cameras, including controlling pan, tilt, and zoom functionality. In this process, the system components can easily be integrated into a Böning ship alarm system, since the same displays are used here. Data communication also occurs on the same CAN bus. One can therefore do without special video monitors that have to be installed separately.

Control

Camera control and presentation of the real-time video signal occurs at any desired on-board installation location, via touchscreen displays with integrated operating elements or alternatively, via monitors with a separate Video Control Panel AHD-VCP.

Components

The system's main components are: Central Unit AHD-VD-CU, Video Control Panel AHD-VCP, and the touchscreen color displays AHD 1215 (15") or AHD 880 TC (8.8").

As a video router, the Central Unit AHD-VDCU process-es the camera's control signals and distributes their video signals to the individual displays. The Central Unit AHD-VDCU is available in three installation variants:

- 4 cameras (video inputs)
  4 video outputs

- 8 cameras (video inputs)
  8 video outputs

- 16 cameras (video inputs)
  16 video outputs

Cameras

You can choose various models for normal and special applications. The robust cameras meet the requirements of maritime environments. By default, they are controlled and supplied with power by the Central Unit AHD-VDCU.

Thermal Imaging and Night Vision

In addition, there is also an option for directly controlling high resolution thermal imaging or night vision cameras, by e.g. FLIR®, via this system and to send video images to any desired display or television set with a video input.

Thermal imaging systems by FLIR Systems® are very efficient at sea. You will be able to spot items drifting on the water that may damage, or worse, sink a ship. Other vessels, buoys, bridges, etc. – all these things can be easily discovered with a thermal imaging system.

Even items that cannot be recognized with a radar system, such as wooden boats or flotsam become visible when using a thermal imaging system.

Multi-Screen Display

Optionally, the video monitoring system can be expanded with a Video Quad Screen Processor Unit AHD-VCS Q4-1, enabling a quad-screen presentation of four selected cameras on a single monitor.
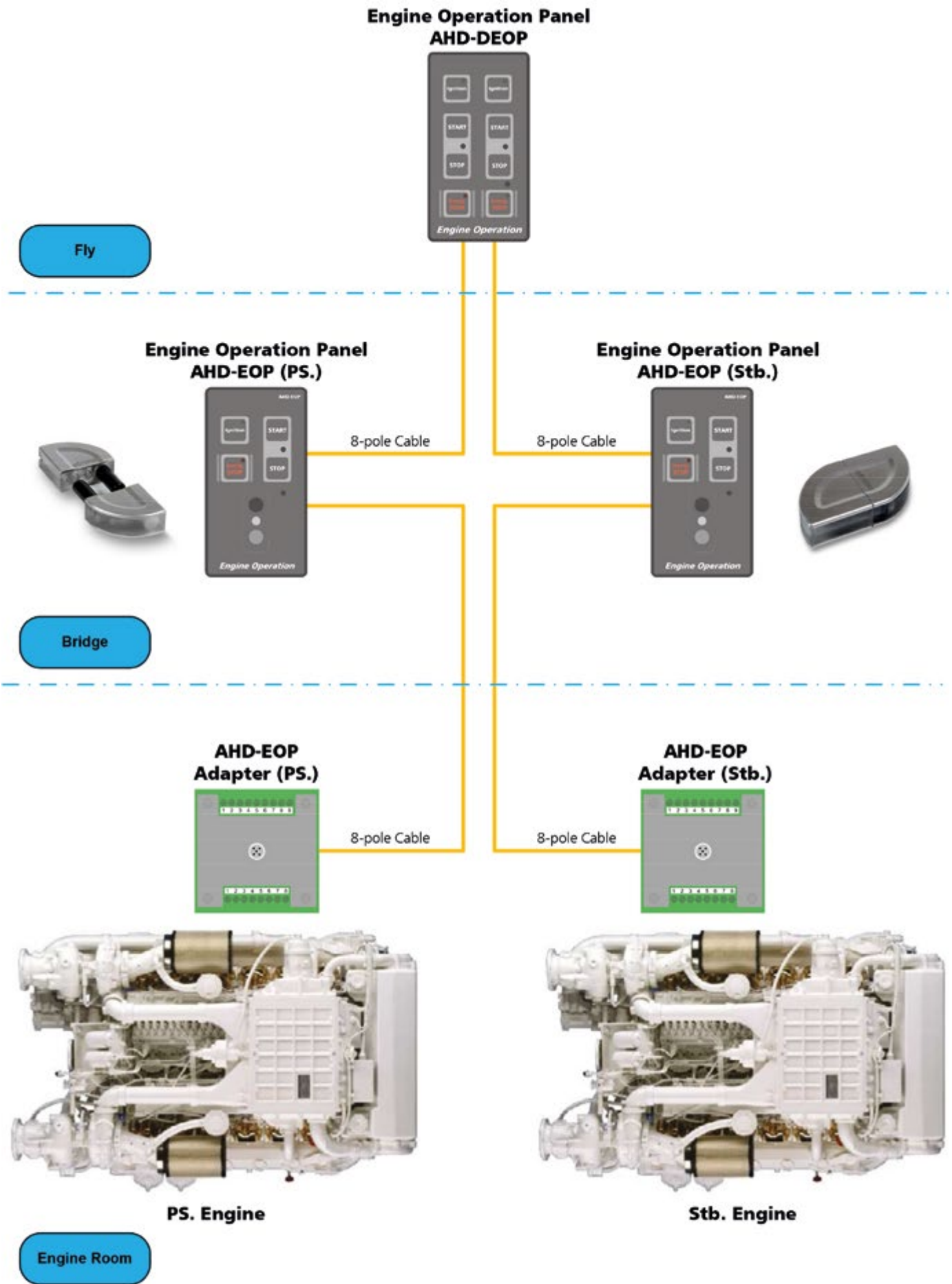
Expansion Options

The CCTV System refit package can be expanded with the following refit packages:

- ✚ Remote Access
- ✚ Tank Data and Range Calculation
- ✚ Engine Start/Stop System
- ✚ Light System Control

Expanding this package with the Remote Access refit package allows camera access, even from a remote location, such as your office, provided an Internet connection is available on board.

In this manner, the local conditions can be examined and corresponding actions can be initiated.

Böning

**Engine Operation Panel
AHD-DEOP**

**Engine Operation Panel
AHD-EOP (PS.)**

**Engine Operation Panel
AHD-EOP (Stb.)**

8-pole Cable   8-pole Cable

Bridge

**AHD-EOP
Adapter (PS.)**

**AHD-EOP
Adapter (Stb.)**

8-pole Cable   8-pole Cable

PS. Engine

Stb. Engine

Engine Room

Power Supply 24VDC +30% / -25%

*) Customer-provided

Refit Package

Engine Start/Stop

System Structure

The refit package "Engine Start/Stop" can be used with any engine by a wide variety of manufacturers, such as MAN, MTU, CAT, Volvo, Yanmar, Cummins, etc.

The system encompasses the Engine Operation Panel for Ship Main Engines AHD-EOP and the AHD-EOP-Adapter for connection to the engine electronics, as well as further Dual Engine Operation Panels for Ship Main Engines AHD-DEOP for additional helms, e.g. the flybridge.

Engine Operation Panel AHD-EOP

With the Engine Operation Panel AHD-EOP you can comfortably start and stop maritime diesel engines. Instead of a traditional ignition switch with start/stop keys and the accompanying extensive cabling, the AHD-EOP with integrated operating keys and transponder technology is used. This simplifies the cabling and significantly increases protection from unauthorized use.

Transponder

The engines are individually unlocked via transponder. For this, the transponder must be inserted into the AHD-EOP's socket. The engine remains operational for as long as the transponder is inserted in the socket, and it can be started and stopped with any panel in the system. The unlocked status is shown on all panels. A key press on the corresponding AHD-EOP or group panel AHD-DEOP starts or stops the engines.

All AHD-EOP units are cascadable, i.e. if necessary, additional panels can be installed on board with minor cabling effort.

Key

Each device has a key with a unique code, preventing its use on other vessels. Two keys per dual engine system can be plugged together, forming a practical and optically appealing unit.

Keys are available in metallic or floatable plastic versions. On customer request, a logo can be engraved on the key.

With the transponder keys' elegant design and high-quality manufacture, this system endows each yacht owner with a special significance, as far as individuality and elegance are concerned.

Expansion Options

The Engine Start/Stop refit package can be expanded with the following refit packages:

➕ Engine Monitoring

➕ Tank Data and Range Calculation

➕ Remote Access

➕ Navigation Lights System

➕ Trim Tabs Control

Böning

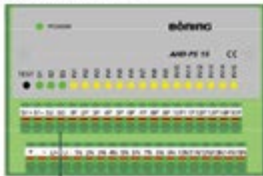## 15" Touch Screen Display
AHD 1215 F - OPTION

SAS
CAN-Bus

8,8" Touch Screen Display
AHD 880 TC - OPTION

SAS
CAN-Bus

Central Unit
AHD-DPU 9 - OPTION

Binary Data Station
AHD-PS 15

Data Station AHD-SAS 15

15 binary Inputs

serial

positive

positive

positive

positive

serial
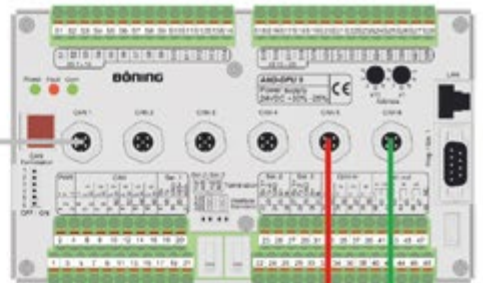
CAN-Bus Engine PS. *)
J1939 *)

CAN-Bus Engine Stb. *)
J1939 *)

Spill Warning Gauge
AHD-SW II

Horn *)

Submersible
Level
Transmitter
AHD-S 201

Tank 1

Tank 2

Tank 14

Tank 15
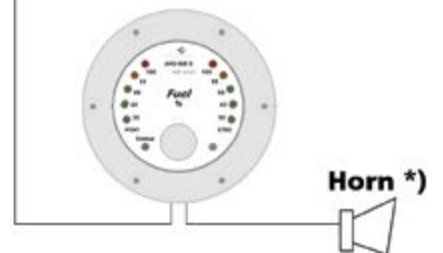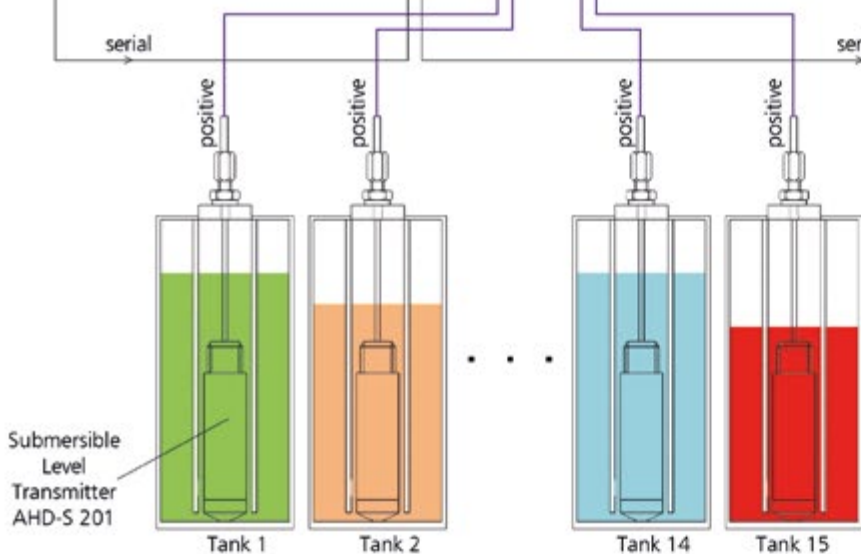
Power Supply 24VDC +30% / -25%

*) Customer-provided

Refit Package

Tank Data and Range Monitoring

System Structure

No yacht should be without the "Tank Data and Range Monitoring" refit package. This system encompasses a Data Station AHD-SAS 15, which can monitor up to 15 different tanks and other components.

Sensorics

By using the very precise Hydro-Static Level Transmitters AHD-S 201, the exact contents of each tank can be determined.

To be able to also monitor e.g. bilges, Binary Data Station AHD-PS15, from which up to 15 switching contacts can be monitored, is deployed.

Displays

The 8.8" Touchscreen Color Display AHD 880 TC is used to display the tank contents. Optionally, larger displays, such as the 15" Touch Screen Display AHD 1215 can also be used. All captured data are provided to the displays via the CAN bus.

Fuel Consumption Information

Depending on the engine type/brand, the AHD-DPU 9 may capture fuel consumption information. Otherwise, flow meters for providing this information can be retrofitted. The range can be calculated from fuel consumption and GPS data and then displayed on the monitors.

Spill Warning Gauge AHD-SW II

The Spill Warning Gauge AHD-SW II is used for safer fueling and to warn of any overflow in a timely manner. The optimal installation position for this gauge is next to the fuel tanks' filling points.
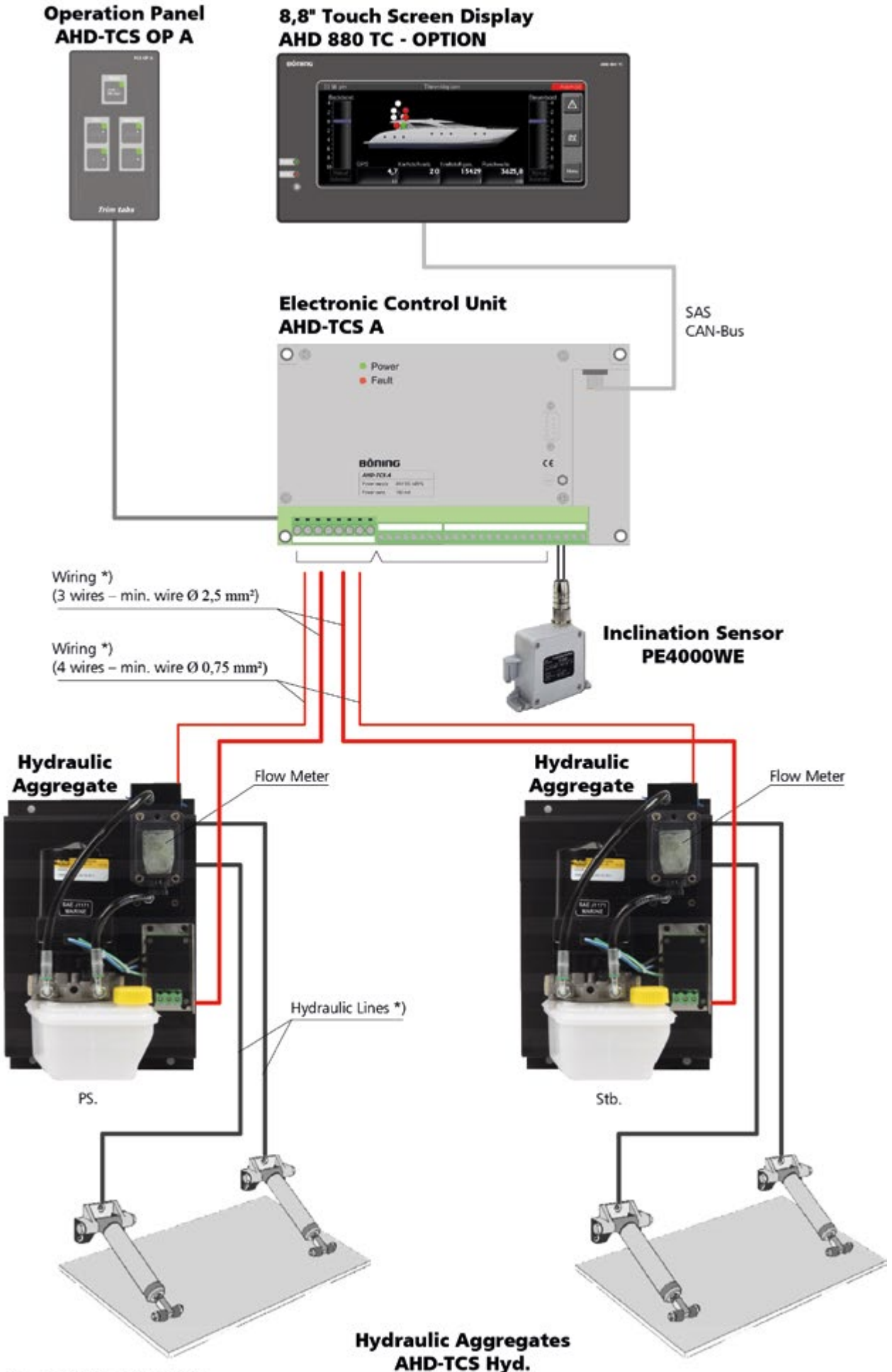
When preset threshold values are reached, corresponding warnings and alerts are issued to prevent the fuel tanks from overflowing.

Expansion Options

The Tank Data and Range Monitoring refit package can be expanded with the following refit packages:

- Remote Access
- CCTV
- Engine Start/Stop System
- Navigation Lights System
- Trim Tabs Control

Böning

**Operation Panel
AHD-TCS OP A**

**8,8" Touch Screen Display
AHD 880 TC - OPTION**

**Electronic Control Unit
AHD-TCS A**

- Power
- Fault

BÖNING

SAS
CAN-Bus

Wiring *)
(3 wires – min. wire Ø 2,5 mm²)

Wiring *)
(4 wires – min. wire Ø 0,75 mm²)

**Inclination Sensor
PE4000WE**

**Hydraulic
Aggregate**

Flow Meter

**Hydraulic
Aggregate**

Flow Meter

Hydraulic Lines *)

PS.

Stb.

**Hydraulic Aggregates
AHD-TCS Hyd.**

Power Supply 24VDC +30% / -25%

*) Customer-provided

Refit Package

Trim Tabs Control

System Structure

The electrohydraulic refit package "Trim Tabs Control" AHD-TCS, developed and patented by Böning, has been constructed for use on board fast yachts, whose handling when cruising is optimized by controlling the trim tabs. The proper alignment of the trim tabs can significantly lower fuel consumption.

Controlling and Monitoring

The trim tabs cylinders are controlled via the Hydraulic Aggregate AHD-TCS HYD's electric directional valves. A special feature of this system is the omission of electric cabling on the vessel's exterior, which is often liable to break down. Instead of customary displacement transducers, special flow meters converting the hydraulic fluid's flow to impulses are used. These are captured by the Electronic Control Unit AHD-TCS A and used for calculating the trim tabs position.

Automatic Control

If a GPS receiver is present in the system (which can be connected directly at the Electronic Control Unit AHD-TCS A or at a Display Unit AHD 880 TC), the trim tabs can also be controlled during automatic operation.

Manual Control

Manual control as well as activation of the automatic mode occurs via 5 buttons on the Operating Panel AHD-TCS OP A. They are backlit and therefore, they can be easily recognized in darkness.

The Electronic Control Unit AHD-TCS A provides the data via CAN bus. Thus, the trim tabs position can be shown graphically (visually) on a color display, e.g. AHD 880 TC.

The control unit, display, and display instruments can be cascaded (e.g. for the flybridge).

In combination with pitch and roll indicators the tilting of the ship can automatically be leveled during the cruise.

Intelligent Protection

Another special feature of the system is that the trim tabs are automatically retracted at speeds of less than 2 kn. This ensures that the trim tabs' cylinders are always retracted when they are not used. It also prevents the growth of mussels and algae on the pistons and potentially high follow-up costs linked to a complete failure of the trim tabs control system.

Expansion Options

The Trim Tabs Control refit package can be expanded with the following refit packages:

➕ Tank Data and Range Calculation

➕ Engine Start/Stop System

➕ Engine Monitoring

Böning

**15" Touch Screen Display
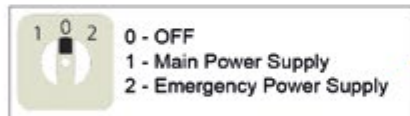AHD 1215 F - OPTION**
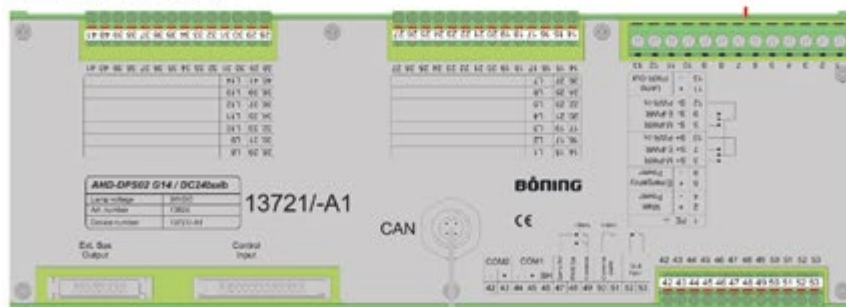
SAS
CAN-Bus

**8,8" Touch Screen Display
AHD 880 TC - OPTION**

**Control Panel
AHD-DPS02 B14**

Power Selector

0 - OFF
1 - Main Power Supply
2 - Emergency Power Supply

SAS
CAN-Bus

**Nav. Lights Control System
AHD-DPS02 G14**

13721/-A1

CAN

BÖNING

Ribbon Cable

Power Supply 24VDC +30% / -25%

*) Customer-provided

Refit Package

Navigation Lights System

System Structure

The "Navigation Lights System" refit package includes a Basic Module AHD-DPS02 G14 with 14 channels, e.g. the 8.8" Touch Screen Display AHD 880 TC, and if the ship is equipped according to the requirements of the classification societies, an emergency operating panel AHD-DPS02 B14.

From the displays' touchscreens, the lamp circuits are activated and their statuses are shown on the displays. If an additional emergency operation unit is present, it is manufactured to the customer's specifications.

Different variants are available for all customary voltages on the ship (24 V DC, 115 V AC, 230 V AC). The basic module is supplied with main and emergency power, and when needed, one can switch from one to the other to power the lamps. Both voltages are permanently monitored. The basic module generates the internal voltage for the electronics from both power supplies, regardless of which voltage has been selected for the lamps.

The channels are short circuit proof and maintenance-free. No fuses need to be changed.

Control and Alarms

There is one switch and one control LED for each lamp circuit on the display as well as the emergency operation unit. An alarm is signaled for the channel in case of short circuit or wire break.

During an alarm, an integrated buzzer (an additional external horn can be connected) is activated in addition to the corresponding LED or display. The acoustic alarm is acknowledged via a pushbutton, which also silences the horn. The LED continues to blink until the channel is switched off or repaired. All LEDs of the emergency operation unit and the Display AHD 880 TC are automatically dimmed via a light sensor.

Group Switching

In addition, the "Navigation Lights System" refit package offers the option to switch the lamps not only individually, but also in groups. The advantage of this feature is that e.g. predefined lamps for cruising can be switched with the mere press of a button on the touchscreen.
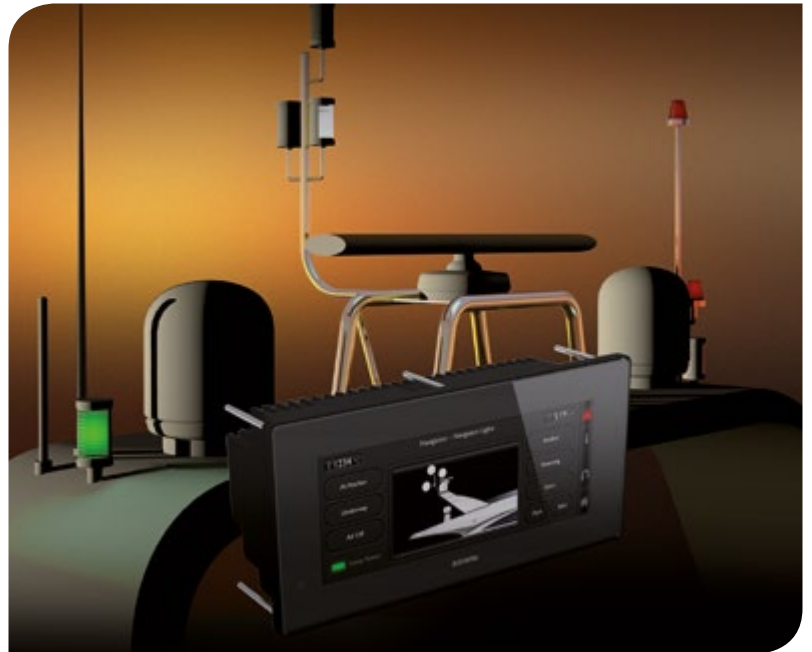
Expansion Options

The Navigation Lamps System refit package can be expanded with the following refit packages:

- Remote Access
- CCTV
- Tank Data and Range Calculation
- Engine Start/Stop System
- Engine Monitoring
- Trim Tabs Control

**15" Touch Screen Display
AHD 1215 F - OPTION**

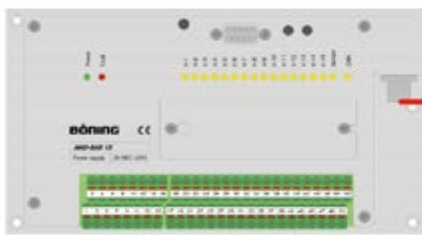**8,8" Touch Screen Display
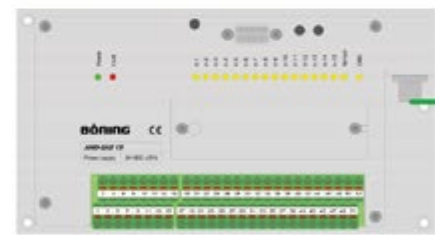AHD 880 TC**

**8,8" Touch Screen Display
AHD 880 TC**

Engine CAN-Bus

Engine CAN-Bus

Data Station AHD-SAS 15

Data Station AHD-SAS 15

Engine sensors

Engine sensors

PS. Engine *)

Stb. Engine *)

Power Supply 24VDC +30% / -25%

*) Customer-provided

Refit Package

Engine Monitoring

System Structure

The "Engine Monitoring" refit package was designed to upgrade older engines with modern technology and adjust them to the current requirements.

Modern engines bundle and transmit their data to higher ranking systems via their own electronics. Older engines send their data separately to the respective display and alarm systems.

Data Station AHD-SAS 15

With the "Engine Monitoring" refit package, the individual sensor data of older engines can be captured via Data Station AHD-SAS 15, electronically processed, and forwarded to a higher ranking system. This also includes the visual representation of all engine data on a display.

In addition to presenting the engine data, the parameters are also monitored for threshold values. Thus, warnings are issued in a timely manner, before engine damage can occur. Every alarm is displayed with text, so there are no longer any misunderstandings about the display symbols and their meanings on the round instruments. A timely warning from the system and reaction by the ship's operator can prevent a total loss in some circumstances.

Data Station AHD-SAS 15 can capture up to 15 analog or binary sensors. Additional data stations can be used, if more than 15 values need to be captured.

8,8" Touchscreen Display AHD 880 TC

The Color Display AHD 880 TC shows visualized round instruments for the most important engine data, engine speed, oil pressure, and cooling water temperature, on its start page. These data are sent to the display via the engine's interface. An alarm page shows the alarms, warnings, and sensor errors registered in the system in tabular format and chronological order.

Alarm System

During an alarm, the system automatically switches to the alarm page, displaying the corresponding message with date and time. In addition, an internal buzzer is activated. New alarms blink until they are acoustically and optically acknowledged. Afterwards, the message remains until the alarm cause has been removed. An integrated configuration page offers the user the option to set device configurations, such as language, time, and unit (metric/Imperial).

Flexible Installation Options

The representation of engine data can be implemented at any desired location on board the vessel. Thus, it is possible to visualize all engine data with a minimum of cabling effort, even on e.g. the flybridge or the owner's cabin.

Larger Displays

Larger displays, such as the touchscreen display AHD 1215, on which both engines' data can be viewed simultaneously, are also available for representing engine data. In this process, large and small displays can always be combined.

Expansion Options

The Engine Monitoring refit package can be expanded with the following refit packages:

- Remote Access
- CCTV
- Tank Data and Range Calculation
- Engine Start/Stop System
- Navigation Lights System
- Trim Tabs Control

Böning

**8,8" Touch Screen Display
AHD 880 TC**

**Terminal
Block**

CAN 1

CAN 3

**Terminal
Block**

CAN Cable

CAN Cable

**Start/Stop
Alarm System
AHD 504-A**

**Start/Stop
Alarm System
AHD 504-A**

PS. Engine *)

Power Supply 24VDC +30% / -25%
*) Customer-provided

**Engine
Terminal Box**

Stb. Engine *)

**Engine
Terminal Box**

Refit Package

BE 1-IO/BE 1-A for MAN Diesel Engines

Modernization and Value Enhancement through Refit Measures

Since 1996, engine manufacturer MAN has equipped ship engines with the alarm systems BE1-A/BE1-IO, which monitor all important measured data and generate an alarm message during a fault. These systems are designed for mechanically controlled engines and are equipped with a simple LED panel. The connected engine sensors are captured and alerted in case of fault (sensor fault, wire break, or threshold violations). However, with these systems, analog measurands cannot be displayed.

Therefore, Böning Automationstechnologie GmbH provides an elegant alternative for modernizing engine data visualization that is custom tailored for older motor yachts.

The existing Alarm System BE1-IO/BE1-A is replaced with modern components by Böning. Combining minimal installation effort with current display technology, this achieves a contemporary appearance. At the same time, improved functionality is provided, significantly increasing economic efficiency and operational safety.

New for Old

The previous LED panels BE 1-A are replaced with an 8.8" color display, type AHD 880 TC, on which all engine data are graphically rendered for viewing on several display pages.

The previous sensor capture via BE 1-IO occurs with the newly developed alarm module, type AHD 504-A. It provides all necessary functions and can even be further expanded.
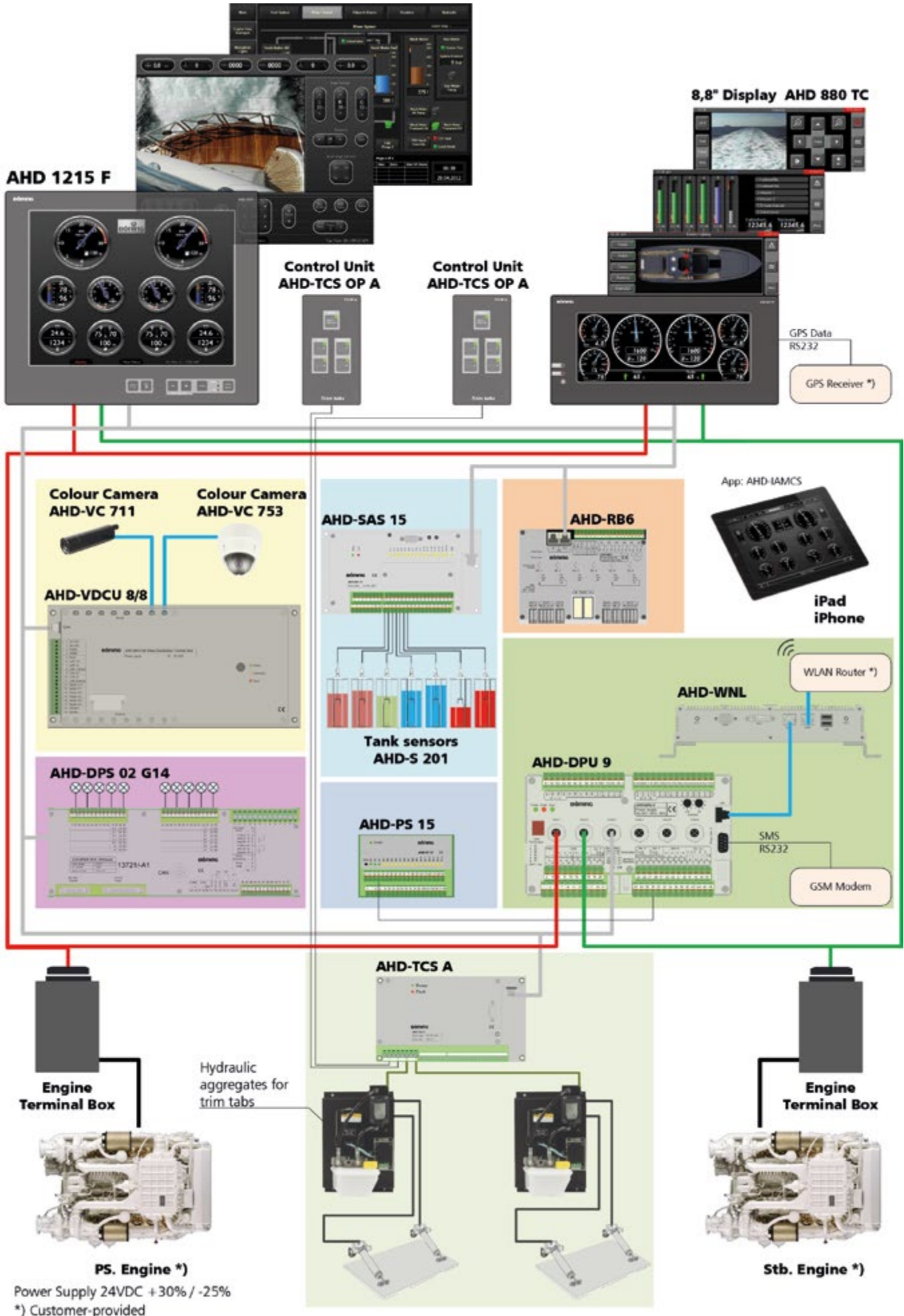
All engine data are captured and processed with the AHD 504-A unit and sent to a display via CAN bus.

The system can always be expanded with minimal effort. For example, additional optional displays can be installed on the fly bridge or in the engine room and integrated into the existing system via CAN bus.

Modernization Benefits

✚ The latest technology

✚ Low cabling effort

✚ Increased cost effectiveness and operational safety

Refit Packages – All Combined in One System

AHD 1215 F

8,8" Display AHD 880 TC

Control Unit AHD-TCS OP A

Control Unit AHD-TCS OP A

GPS Data RS232

GPS Receiver *)

Colour Camera AHD-VC 711

Colour Camera AHD-VC 753

AHD-SAS 15

AHD-RB6

App: AHD-IAMCS

AHD-VDCU 8/8

Tank sensors **AHD-S 201**

WLAN Router *)

iPad iPhone

AHD-WNL

AHD-DPS 02 G14

AHD-PS 15

AHD-DPU 9

SMS RS232

GSM Modem

AHD-TCS A

Engine Terminal Box

Hydraulic aggregates for trim tabs

Engine Terminal Box

PS. Engine *)

Stb. Engine *)
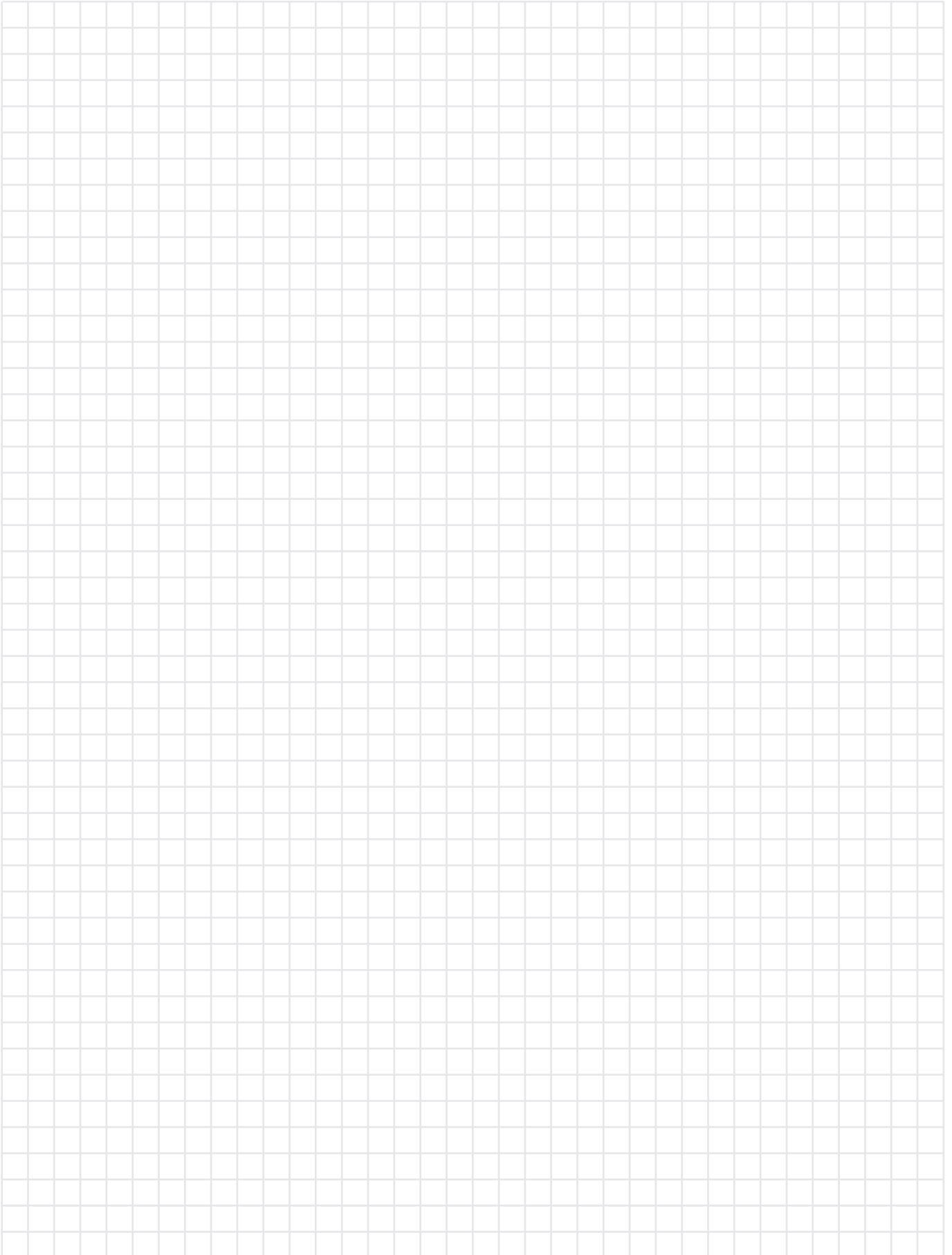
Power Supply 24VDC + 30% / -25%
*) Customer-provided

Application Examples

Notes

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