

LOWRANCE

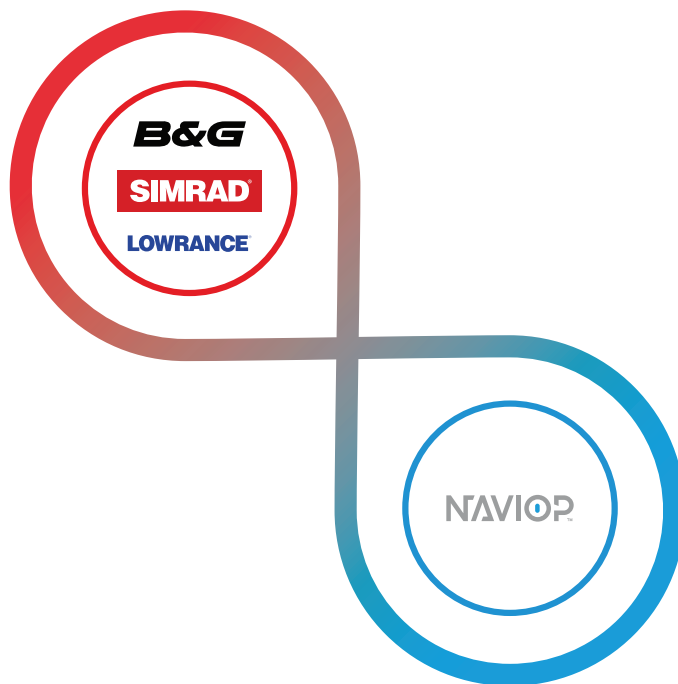
SIMRAD

B&G

Loop S

User Manual

ENGLISH



Preface

Disclaimer

The manufacturer disclaims all liability for any use of this product in a way that may cause accidents, damage or that may violate the law. This document may contain inaccuracies or typographical errors. The user is liable for any use of the information contained in this document.

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About this manual

This manual is a reference guide for installing and operating the Loop system.

Some features may not be activated or available for screenshots in the manual. As a result, screenshots of menus and dialogs may not match the look of your unit.

Important text that requires special attention from the reader is emphasized as follows:

→ **Note:** Used to draw the reader's attention to a comment or some important information.

 **Warning:** Used when it is necessary to warn personnel that they should proceed carefully to prevent risk of injury and/or damage to equipment/ personnel.


General safety

- All installation and repair work should be performed with care.
- All waste must be handled and disposed of properly in compliance with applicable laws.

Compliance statements

This product complies with:

- CE under EMC Directive 2014/30/EU
- the requirements of level 2 devices of the Radio communications (Electromagnetic Compatibility) standard 2017

 **Warning:** The user is cautioned that any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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Introduction

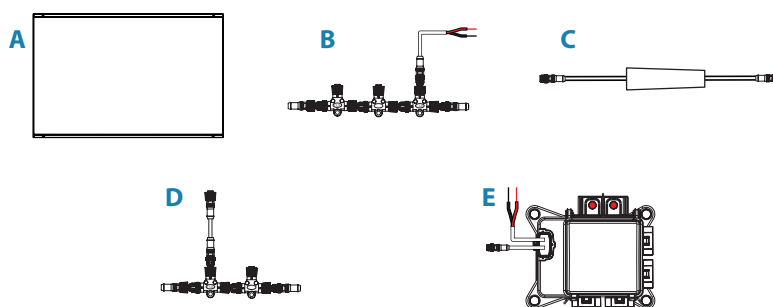
Introduction to the system

The Loop system is used to monitor and control electrical equipment. When connected to a compatible MFD (Multiple Function Display), the MFD can be used to operate the Loop system.

⚠ Warning: The Loop system should only be used to aid navigation. In no way can this system replace the experience and awareness of the captain who bears sole responsibility for safety during navigation. The operation of equipment or devices installed on the boat does not depend on the status of the Loop system. If the supervision system is switched off or there are communication errors between the system and the equipment it monitors, all bypassed relays can be controlled manually.

→ **Note:** For specific information on the operation of equipment that cannot be controlled by the system, consult the specific technical documentation supplied by the manufacturer of the equipment (not included in this manual).

System parts



A MFD (1 or more MFDs connected to the NMEA 2000 network)

B NMEA 2000 network

C AT30 protocol converter

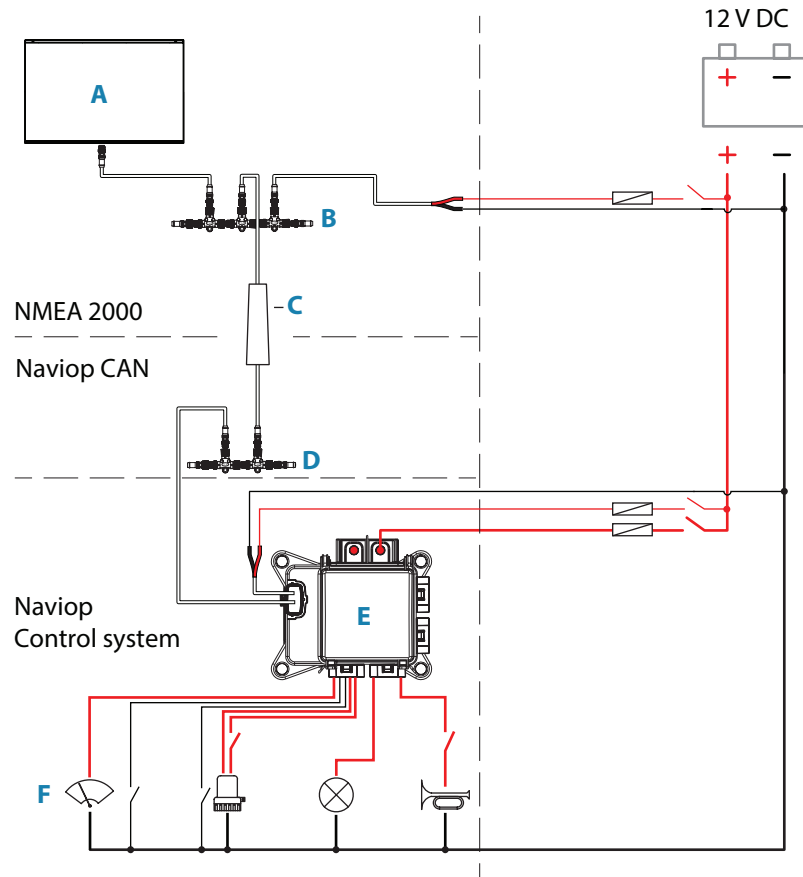
D Naviop CAN network

E Egon+ board

→ **Note:** Maximum 2 Egon+ boards can be installed. Each board can control and monitor 8 relays and monitor 8 power outputs.

→ **Note:** Loop S is equipped with one Egon+ board. Loop S+ is equipped with two Egon+ boards.

System example



- A** MFD
- B** NMEA 2000 network
- C** AT30 protocol converter
- D** Naviop CAN network
- E** Egon+ board
- F** Controlled and/or monitored equipment

Get the system up and running

To get the system up and running you have to perform the following task:

- Installation and wiring
- Configuration of the system

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Installation

Mounting

Mounting guidelines

Choose the mounting location carefully, make sure that there are no hidden electrical wires or other parts behind the panel before you drill or cut. Ensure that any cutting or drilling done is in a safe position and will not weaken the boat's structure. If in doubt, consult a qualified boat builder, or marine electronics installer.

Do not:

- Mount any part where it can be used as a hand hold.
- Mount any part where it might be submerged or exposed to moisture.
- Mount any part where it will interfere with the operation, launching, or retrieving of the boat.

Do:

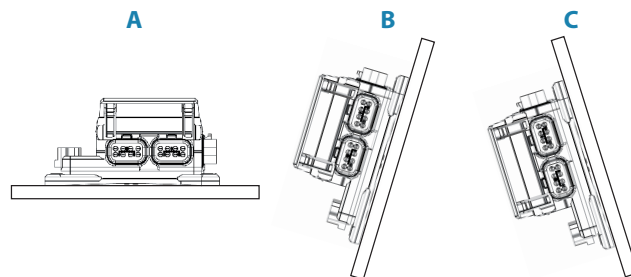
- Consider the overall width and height requirements.
- Leave sufficient clearance to connect all relevant cables.
- Check that it is possible to route cables to the intended mounting location.

→ **Note:** The enclosure should be dry and well ventilated. In small enclosures, it may be required to fit forced cooling.

Warning: Inadequate ventilation and subsequent overheating of the equipment may cause unreliable operation and reduced service life. Exposing the equipment to conditions that exceeds the specifications could invalidate your warranty. Refer to the "Technical Specifications" on page 24.

Egon+ and AT30 protocol converter

The recommended mounting orientation for the Egon+ board is horizontal (**A**). If horizontal mounting is not possible, it is recommended that the devices are mounted at an angle 0-90° from horizontal (**B**). It is NOT recommended to mount the devices at an angle greater than 90° from horizontal (**C**) due to drainage issues.



Check the labels on the AT30 protocol converter cable to ensure the correct connectors are attached to the NMEA 2000 network and to the Naviop CAN network.

Other equipment

Other equipment shall be mounted as described in the documentation following the equipment.

Wiring

Wiring guidelines

Do not:

- Make sharp bends in the cables
- Run cables in a way that allows water to flow down into the connectors
- Run the data cables adjacent to radar, transmitter, or large/high current carrying cables or high frequency signal cables
- Run cables so they interfere with mechanical systems
- Run cables over sharp edges or burrs

Do:

- Make drip and service loops
- Use cable-tie on all cables to keep them secure
- Solder/crimp and insulate all wiring connections if extending or shortening the cables
- Use suitable crimp connectors or solder and heat shrink when extending cables. Keep joins as high as possible to minimize possibility of water immersion
- Leave room adjacent to connectors to ease plugging and unplugging of cables

⚠ Warning: Before starting the installation, be sure to turn electrical power off. If power is left on or turned on during the installation, fire, electrical shock, or other serious injury may occur. Be sure that the voltage of the power supply is compatible with the unit.

⚠ Warning: The electrical wiring, connections and installation shall be in accordance with the requirements of ISO 10133, ABYC E-11, AC or DC electrical system on boats.

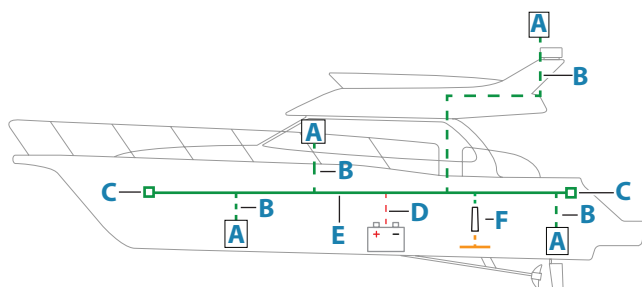
NMEA 2000 network

A NMEA 2000 network consists of a powered backbone from which drop cables connect to NMEA 2000 devices. The backbone needs to run within 6 m (20 ft) of the locations of all products to be connected, typically in a bow to stern layout.

The network requires its own 12 V DC power supply, protected by a 3A fuse.

The following guidelines apply:

- The total length of the backbone should not exceed 100 m (328 ft)
- A single drop cable has a maximum length of 6 m (20 ft). The total length of all drop cables combined should not exceed 78 m (256 ft)
- The backbone needs to have a terminator at each end of the backbone. The terminator can be a terminator plug or a unit with built-in terminator



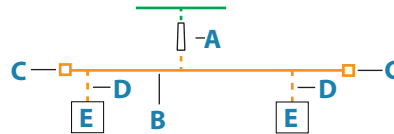
A NMEA 2000 device

B Drop-cable

- C** Terminator
- D** Power supply
- E** Backbone
- F** AT30 protocol converter (NMEA 2000 to Naviop CAN)

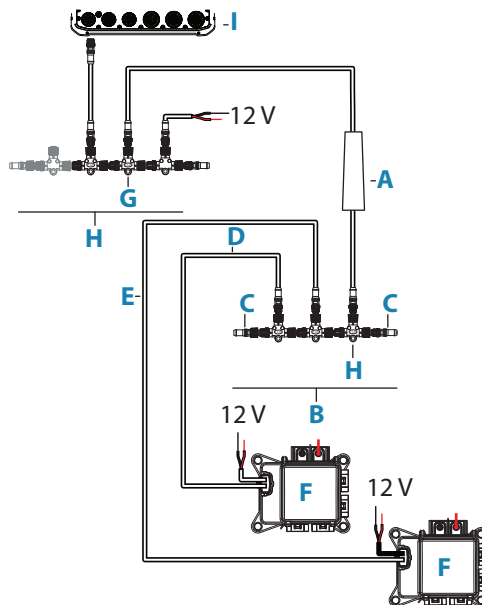
Naviop CAN network

The Naviop CAN network consists of a backbone from which drop cables connect to the Egon+ board(s). Each Egon+ board is identified by a CAN ID displayed on the drop-cable. The Naviop CAN network uses the same components as a NEMA 2000 network, however the two networks shall not be directly connected to each other. The AT30 protocol converter should be installed as a bridge between the networks.



- A** AT30 protocol converter (NMEA 2000 to Naviop CAN)
- B** Naviop CAN network backbone
- C** Terminators
- D** Drop-cables, maximum length 1.8 m (6 ft)
- E** Egon+ boards (maximum 2 Egon+ boards can be installed)

Example



- A** AT30 protocol converter (NMEA 2000 to Naviop CAN)
- B** Naviop CAN backbone
- C** Terminators
- D** Egon+ drop-cable CAN ID:1
- E** Egon+ drop-cable CAN ID:2 (only available for Loop S+)
- F** Egon+ boards (maximum 2 Egon+ boards can be installed)
- G** T-connectors
- H** NMEA2000 backbone
- I** MFD

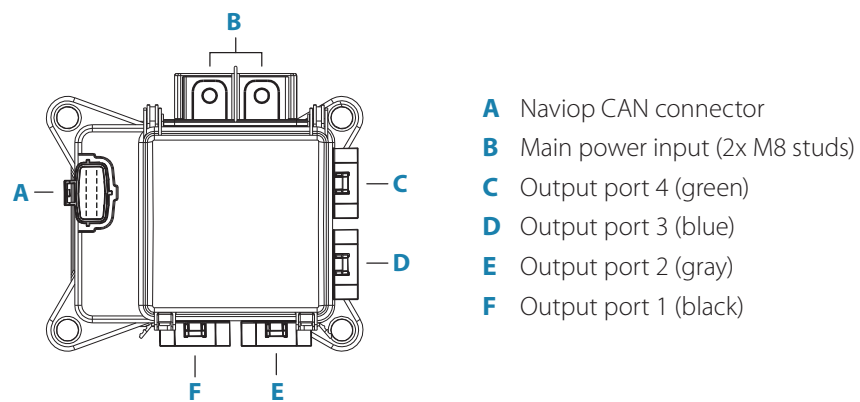
System IDs

System	Egon + boards	Controlable outputs	Monitored power outputs	Drop-cable ID
Loop S	1	8	8	CAN ID: 1
Loop S+	2	16	16	CAN ID: 1 CAN ID: 2

Egon+ board

Warning: For details about maximum load and other specifications, refer to the “Technical Specifications” on page 24. Exposing the unit to conditions that exceeds the specifications could invalidate your warranty.

Connector overview



Relay and fuse overview

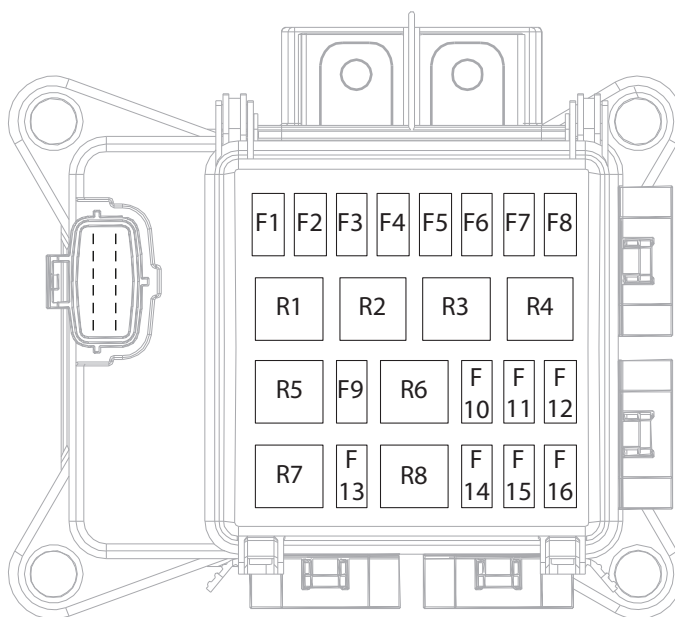
All relays and fuses can be found under the protective cover. The Egon+ board is equipped with 12 V DC rated relays. The input voltage should match the voltage rating of the relays.

Warning: IGNITION PROTECTED ONLY WHEN EQUIPPED WITH IGNITION PROTECTED FUSES AND COVER CLOSED.

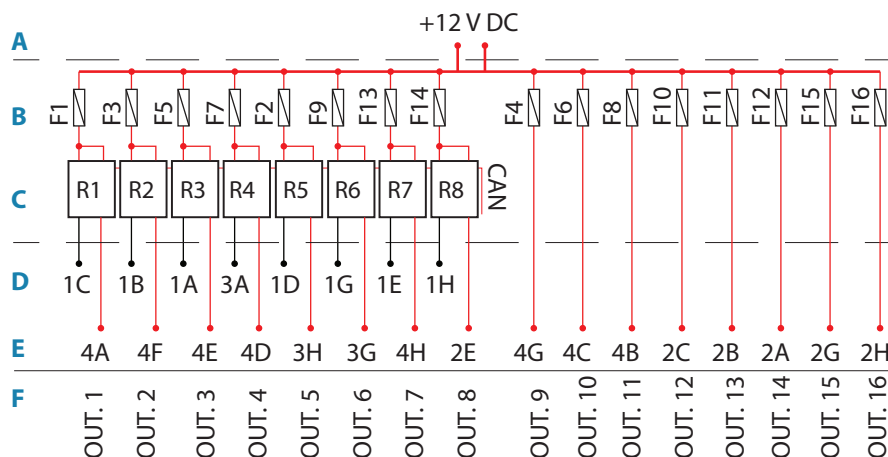
ANY REPLACEMENT FUSES MUST BE IGNITION PROTECTED. COVER MUST BE CLOSED IN EVERY OPERATIONAL CONDITION!

Warning:

- Always use a fuse that is appropriate for the connected load, the supplied fuses may have to be replaced to match the outputs connected load. Using an incorrect fuse size compromises the safety of the electrical system on board and increases the risk of electrical fire.
- Fuse installation and replacement must be done by expert technicians.
- Replace fuses in a ventilated area.
- All replaced fuses must be ignition protected fuses.
- Do not replace a fuse by short circuiting the poles in the fuse sockets.
- Do not short circuit the poles of the relay sockets.



Simplified schematic of the relays and fuses:



- A** Main power input
- B** Fuses
- C** Relays
- D** Override pins for relay outputs
- E** Output pins for relays and fuses
- F** Output number

→ **Note:** For maximum load and fuse sizes for Output 1 to 8 see Relay and fuse channels in “Technical Specifications” on page 24.

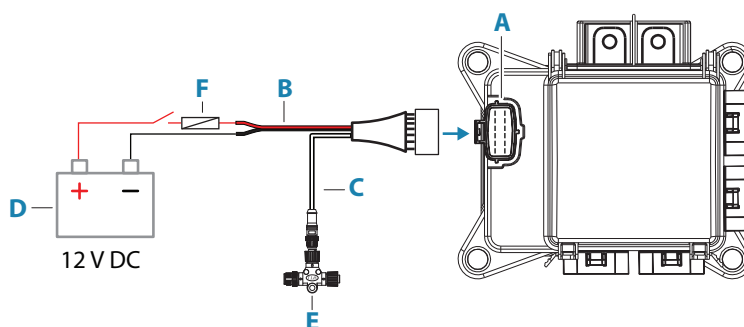
→ **Note:** For maximum load and fuse sizes for Output 9 to 16 see Fuse channels in “Technical Specifications” on page 24.

Naviop CAN connector

The Naviop CAN connector is used for connecting the Egon+ board to the Naviop CAN backbone and to supply the processor with power. The ID of the Egon+ board is determined by the ID of the cable.

- Loop S ships with one Egon+ board and a cable with CAN ID: 1.
- Loop S+ ships with two Egon+ boards and cables with CAN ID: 1 and CAN ID: 2.

The Egon+ board requires its own 12 V DC power supply, protected by a 2A fuse.



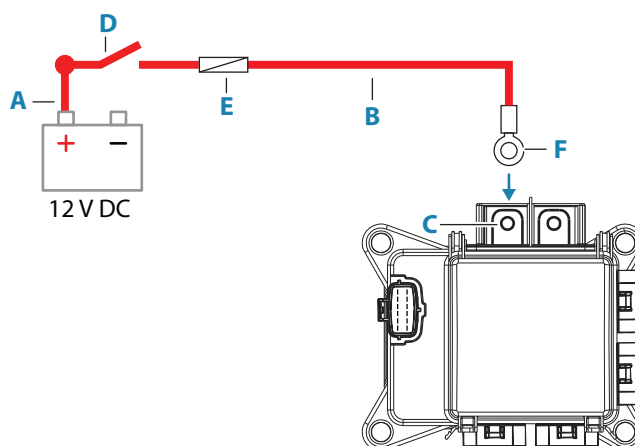
- A** Naviop CAN connector
- B** Red wire (DC positive) and black wire (DC negative)
- C** Naviop CAN drop-cable marked with the ID of the cable/Egon+ board
- D** 12 V DC power supply
- E** Naviop CAN backbone
- F** Fuse 2A

Egon+ board power input

Warning: The Egon+ board is equipped with 12 V DC rated relays. The input voltage should match the voltage rating of the relays.

Connect the boat's main power supply to the screw terminal (M8 stud). The cable must be of enough size to carry the maximum current of all loads connected to the Egon+ board and have a fuse/circuit breaker rated to protect the cable. Voltage drop should be kept to a minimum.

→ **Note:** DC negative should be connected to the controlled and/or monitored equipment.

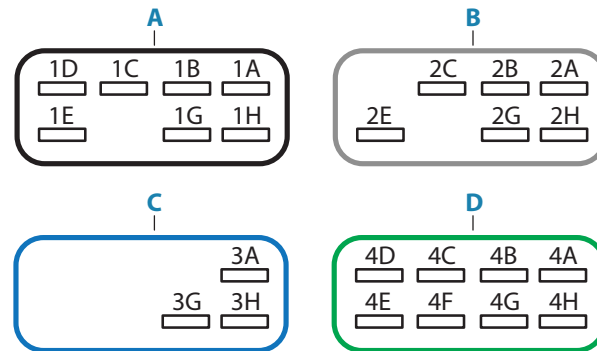


- A** 12 V DC positive bus
- B** Power input cables (the cable must be able to carry the maximum current of all loads)
- C** Power input terminals (2x M8 studs)

- D** Main battery switch
- E** Overcurrent protection (fuse or circuit breaker)
- F** M8 ring terminal (not included in the box)

Output ports

Each Egon+ board has 8 controllable relays protected by 8 individually monitored fuses. Each relay can be manually bypassed by an external signal. In addition each Egon+ board has 8 fuse protected outputs that can be monitored.



- A** Output port 1 (black)
- B** Output port 2 (gray)
- C** Output port 3 (blue)
- D** Output port 4 (green)

Output port 1 (black)	Output port 2 (gray)
1A - bypass for relay R3	2A - output fuse F12
1B - bypass for relay R2	2B - output fuse F11
1C - bypass for relay R1	2C - output fuse F10
1D - bypass for relay R5	-
1E - bypass for relay R7	2E - output relay R8 (fuse F14)
-	-
1G - bypass for relay R6	2G - output fuse F15
1H - bypass for relay R8	2H - output fuse F16

Output port 3 (blue)	Output port 4 (green)
3A - bypass for relay R4	4A - output relay R1 (fuse F1)
-	4B - output fuse F8
-	4C - output fuse F6
-	4D - output relay R4 (fuse F7)
-	4E - output relay R3 (fuse F5)
-	4F - output relay R2 (fuse F3)
3G - Output relay R6 (fuse F9)	4G - output fuse F4
3H - Output relay R5 (fuse F2)	4H - output relay R7 (fuse F13)

Bypassing a relay

The bypass is an override, it cannot be used as a parallel control. By connecting the bypass pin of a relay to DC negative the relay is closed and the output activated. If the output is already activated by the software, connecting the bypass pin to DC negative has no effect. It is not possible to turn off an output with an active override from the software.

The main important appliances (bilge pumps, navigation lights, blower, horn etc) must be equipped with a bypass for the safety of the boat.

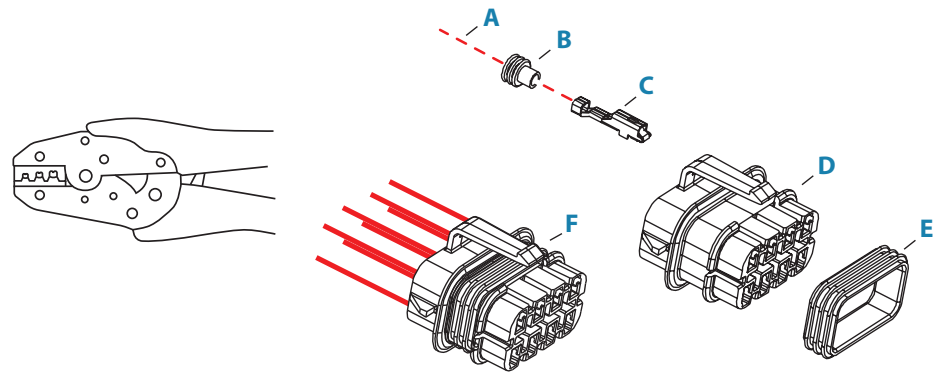
Output connector wiring

The electrical wiring, connections and installation shall be in accordance with the requirements of ISO10133, ABYC E-11, AC and DC electrical system on boats. The wire size should be calculated based on the channels total load and the cable length (1.31 mm² - 5.26 mm² (#10-16 AWG)). For bypass wires a #16 AWG cable is sufficient.

For high current loads (25-30A) connected with a long wire, thicker wires are required (e.g. 10 mm² (#7 AWG)). In this case crimp a short 5.27 mm (#10 AWG) wire, maximum 20 cm (7.87"), to the output connector pin. Then connect the thinner wire to the thicker wire with a screw terminal block.

A proper crimping tool for barrel open terminals should be used to crimp the cables to the wire terminals.

Always use a fuse that is appropriate for the connected load. The fuses supplied may have to be replaced to match the outputs connected load.

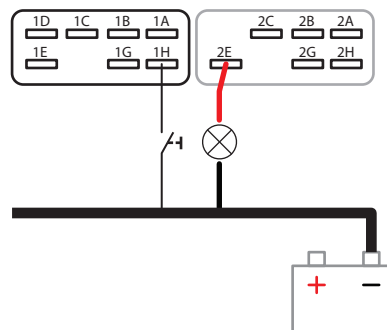


- A** Wire
- B** Wire seal
- C** Wire terminal (female)
- D** Connector body
- E** Connector seal
- F** Assembled connector

Connection examples

→ **Note:** 12 V DC should be connected to the power input of the Egon+ board.

Device with bypass



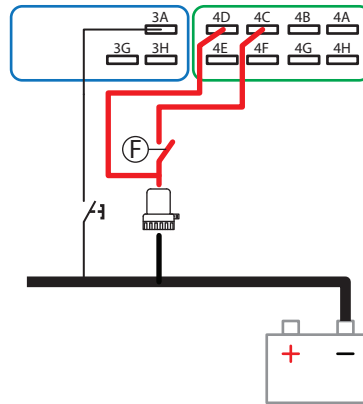
The example shows a load (light bulb) connected between the DC negative bus and the gray connector pin 2E. Connector pin 2E is the output pin of relay R8 and can be controlled from the Loop system.

An external bypass switch is connected to the black connector pin 1H. Connector pin 1H is the bypass pin for relay R8. While the bypass switch is closed, the relay will be closed independent of the status in the software. If the bypass switch is closed, it is not possible to

turn the light off from the software.

The bypass switch is optional and only necessary if you want to be able to bypass the relay/software.

Device with bypass and external switch



The example shows a load (bilge pump) connected between the DC negative bus and the green connector pin 4D and 4C. Connector pin 4D is the output pin of relay R4 and can be controlled from the Loop system. Connector pin 4C is the output pin of fuse F6 and can be monitored (not controlled) from the Loop system.

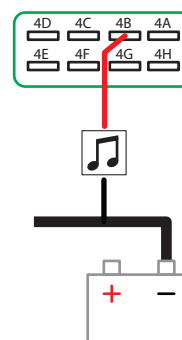
A bypass switch is connected to the blue connector pin 3A. Connector pin 3A is the bypass pin for relay R4. While the bypass switch is closed, the relay will be closed independent of the status in the software. If the bypass switch is closed, it is not possible to turn the bilge pump supply off from the software.

The bypass switch is optional and only necessary if you want to be able to bypass the relay.

The bilge pump in this example is equipped with a float switch and the bilge pump will be running if the relay is closed or if the float switch is activated.

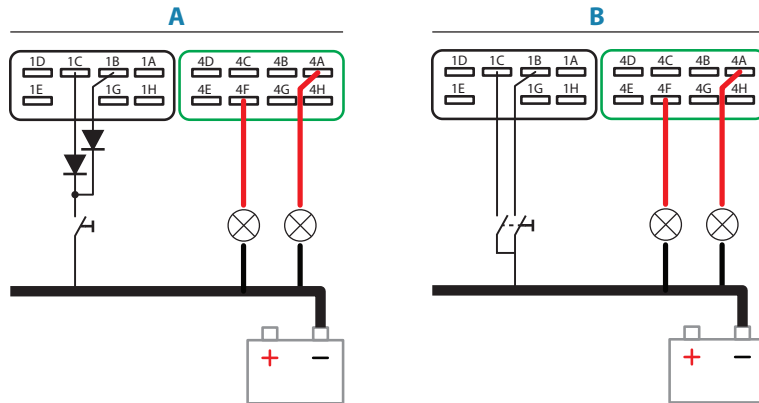
The Loop system will indicate when the bilge pump is running and if it is activated by the loop system or by an external switch/bypass.

Device connected to a fuse output



The example shows a load (stereo amplifier) connected between the DC negative bus and the green connector pin 4B. Connector pin 4B is the output pin of fuse F8 and can be monitored (but not controlled) from the Loop system.

Control two devices with one bypass switch



The examples show two loads (light bulbs) connected between the DC negative bus and the green connector pin 4A and 4F. Connector pin 4A is the output pin of relay R1 and pin 4F is the output pin of relay R2, both relays can be individually controlled from the Loop system.

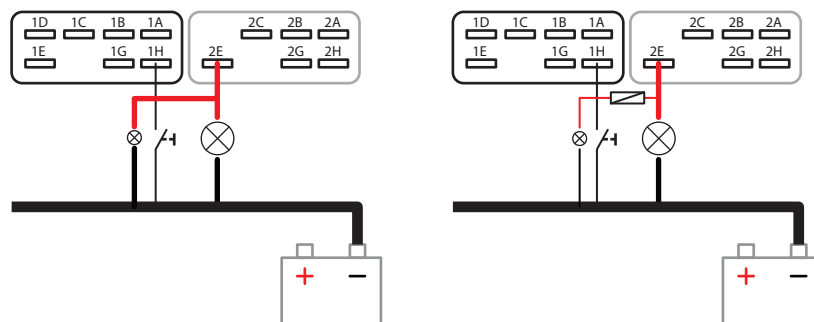
An external bypass switch is connected to the black connector pin 1C and 1B. Connector pin 1C is the bypass pin for relay R1 and connector pin 1B is the bypass pin for relay R2.

While the bypass switch is closed, the relays will be closed independent of the status in the software. If the bypass switch is closed, it is not possible to turn any of the lights off from the software.

Example A: Two diodes are connected to avoid conflicts between the outputs when controlled from the software.

Example B: A two pole switch is used to avoid conflicts between the outputs when controlled from the software.

Connecting an indicator light to a relay output



The example shows a load (light bulb) connected between the DC negative bus and the gray connector pin 2E. Connector pin 2E is the output pin of relay R8 and can be controlled from the Loop system. In addition to the main load an indicator light is connected between connector pin 2E and the DC negative bus.

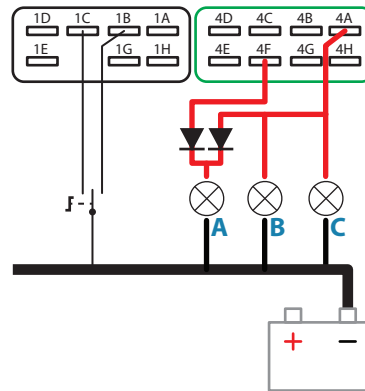
An external bypass switch is connected to the black connector pin 1H. Connector pin 1H is the bypass pin for relay R8. While the bypass switch is closed, the relay will be closed independent of the status in the software. If the bypass switch is closed, it is not possible to turn the light off from the software.

The bypass switch is optional and only necessary if you want to be able to bypass the relay/software.

Example A: The indicator light is connected directly to the relay output pin. For safety, the wire size must be of the same dimension as the main load wire.

Example B: The indicator light is connected via a fuse to the relay output pin. The fuse rating and wire dimension should be selected based on the indicator light's specification. The fuse should be connected as close to the relay output as possible.

Device controlled from two relays (for example mast navigation light)



- A** Mast navigation light (white, 360 degrees)
- B** Starboard navigation light (green)
- C** Port navigation light (red)

The examples shows three navigation lights connected between the DC negative bus and the green connector pin 4A and 4F. Connector pin 4A is the output pin of relay R1 and pin 4F is the output pin of relay R2, both relays can be individually controlled from the Loop system. Diodes are connected to avoid conflicts between the relay outputs and the Mast navigation light (can be powered by both relays).

→ **Note:** Only use diodes that can handle the total load of the connected equipment.

A 3-way bypass switch is connected to the black connector pin 1C and 1B. Connector pin 1C is the bypass pin for relay R1 and connector pin 1B is the bypass pin for relay R2. The bypass switch has three positions, mast navigation light bypassed, all navigation lights bypassed and no bypass active.

When the bypass switch is closed (either bypassing relay R1 or R2), the corresponding relay will be closed independent of the status in the software. If the bypass switch is closed, it is not possible to turn the bypassed navigation light off from the software.

3

Configuration

Warning: The Loop system must only be configured by a competent installer. If your Loop system has not been preconfigured for you, please contact your dealer for advice on how to have the Loop system configured by a competent installer.

- **Note:** It is recommended to save a copy of the configuration file to a USB stick and then kept on board the vessel. In the unlikely event of hardware failure, this saved configuration file can be loaded into the replacement hardware to restore full functionality.
- **Note:** Navico takes no responsibility for the correct setup and availability of the configuration file created by the boat builder and/or installing dealer. Safe storage and retrieval of this unique file is the responsibility of the boat builder and/or installing dealer. It is important to make a copy of this configuration file, for example on a USB stick, and store in a safe location for future use.

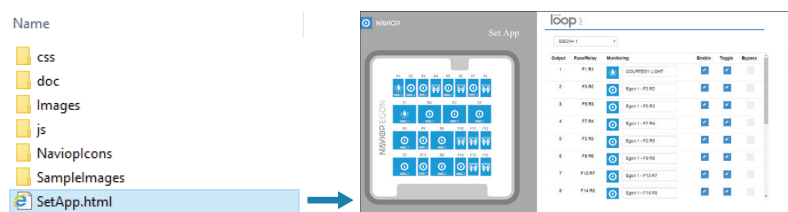
Before the Loop system can be operated from the MFD, it has to be configured. The web based Loop Set App is used to generate the configuration files and can be downloaded from one of the three brand websites: www.lowrance.com, www.bandg.com, www.simrad-yachting.com

Requirements

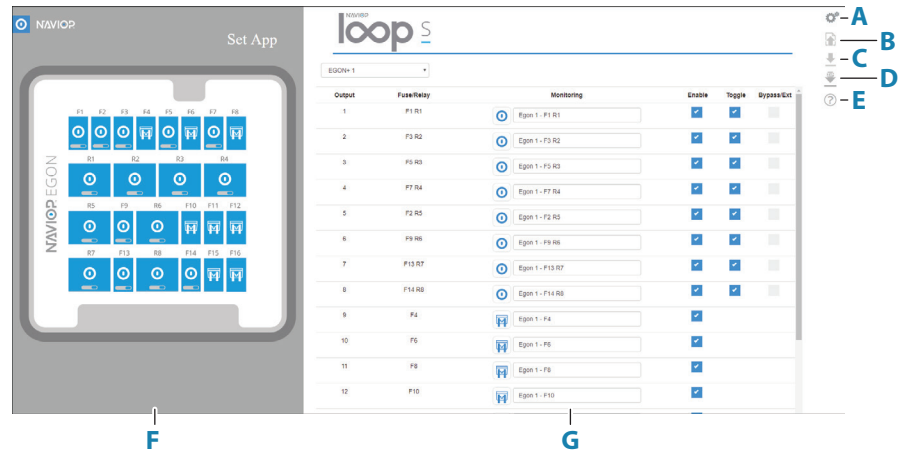
- A storage device that fits the MFD.
- MAC or PC with a web browser (Google Chrome, Mozilla Firefox, Safari or Microsoft Edge 11+) installed.

Configuring

Locate the SetApp.html file and select it. The configurator will open in your web browser.



Configurator overview



A Settings

Opens the settings dialog. Refer to “The settings dialog” on page 19.

B Load config

Used to load an already created configuration (XML file) created with the same Set App version.

C Download xml file

Used to generate and download the new/updated configuration XML file.

D Download zip file

Used to generate and download a zip archive containing all files needed to install the Loop software in the boat.

E Set App configurator help

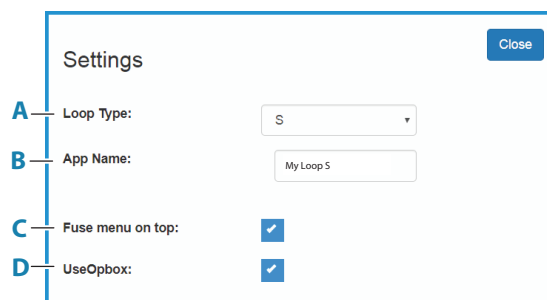
Opens the Set App user manual.

F Overview of the Egon+ board's fuses, channels with icons

G Channel/output settings

Refer to “Edit channels/output settings” on page 20.

The settings dialog



A Loop type

Define the type of the installed system.

S: one Egon+ board.

S+: two Egon+ boards.

M/M+ shall not be used for Loop S systems.

B App name

Specify a name for the configuration. The name is used to identify the configuration to be used by the MFD.

C Fuse menu on top

If selected the fuse list button will be shown at the top of the MFD control bar. Refer to “Fuses” on page 23.

D Use OP-Box (Loop S/S+ only)

Enabled if an OP-Box is used instead of an AT30 protocol converter (not covered by this manual).

Edit channels/output settings

Output	Fuse/Relay	Monitoring	Enable	Toggle	Bypass/Ext
1	F1 R1	Egon 1 - F1 R1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	F3 R2	Egon 1 - F3 R2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	F5 R3	Egon 1 - F5 R3	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	F7 R4	Egon 1 - F7 R4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	F2 R5	Egon 1 - F2 R5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	F9 R6	Egon 1 - F9 R6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	F13 R7	Egon 1 - F13 R7	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	F14 R8	Egon 1 - F14 R8	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	F4	Egon 1 - F4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	F6	Egon 1 - F6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	F8	Egon 1 - F8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	F10	Egon 1 - F10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A Egon+ board(s)

Select the Egon+ board you want to configure (for configuration with two Egon+ boards).

B Output/Channel number

Indicates the output associated to the row.

C Fuse/relay identification

Indicates the Fuse/Relay associated to the channel/output.

D Image

Select an appropriate image for the connected equipment. When the icon is clicked a dialog with available options will be shown. This image will be shown in the MFD software.

E Description

Enter a name that describes the connected equipment. This name will be shown in the MFD software.

F Enable

Enable/Disable the channel/output.

G Toggle (not applicable for fuse outputs)

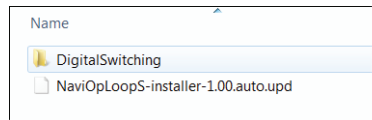
If selected, the button in the MFD software will be a toggle button. If not selected, the button in the MFD software will be a momentary button (the output is active as long as the button is pressed).

H Bypass/Ext (not applicable for fuse outputs)

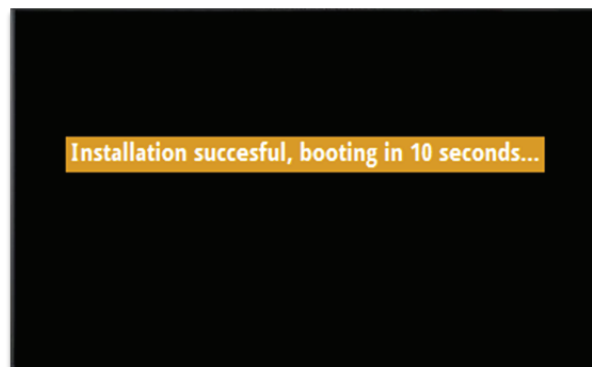
Select if a bypass is connected to the relay or if the connected device can be manually or automatically controlled by an external switch. For connection examples, refer to “Connection examples” on page 14.

How to install the Loop S software

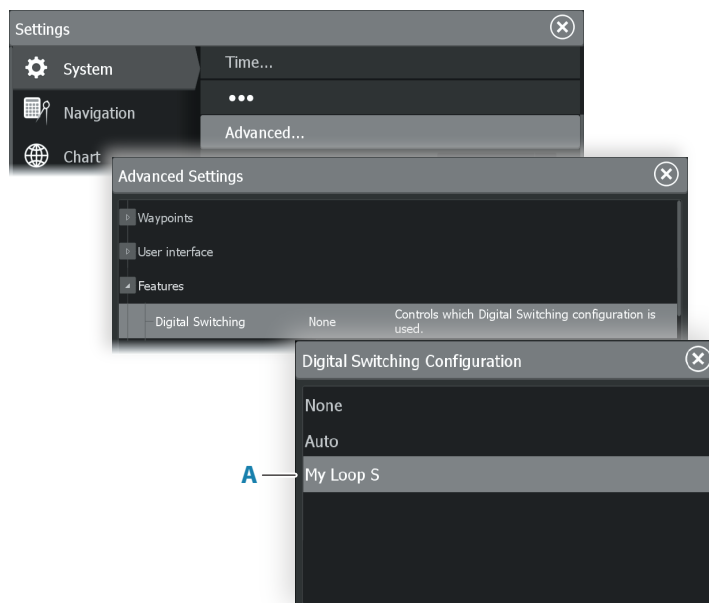
- 1 Select the Set App to open the configurator.
- 2 Open the Settings dialog and make the appropriate settings.
- 3 Configure channels/output settings.
- 4 Download the Zip file containing all necessary files for the installation.
- 5 Extract the files created at step 4 to the root folder of a storage device that fits your MFD.



- 6 Make sure that the MFD is turned off and insert the storage device in it.
- 7 Turn the MFD on and wait until the installation is complete.



- 8 When the MFD has booted up, remove the storage device.
- 9 Activating the Loop S control bar feature.
The Loop S control bar feature should be automatically enabled when the MFD is configured and the Loop system is correctly installed. If it does not show up, you can manually activate the feature from the advanced system settings.



The application name (A) in the menu is the same as the name assigned in the Set App.

→ **Note:** Perform steps 6 to 9 for each MFD that you would like to operate the Loop S system.

4

Operation

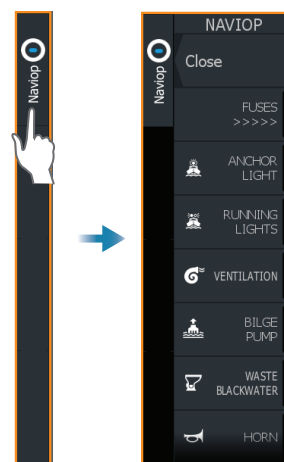
Start up

When the system is powered, the Loop system will initialize. After the system is initialized, normally less than 2 minutes after turning on the power, the system is ready to be used.

Warning: Before using the system, wait for the system's initialization procedure to end. If you are not able to operate the system, check the display's power supply and restart the display. If the problem persists, stop using the system immediately and contact an authorized service center.

The Loop S system is operated from the MFD's control bar. Refer to the MFD documentation for details about how to operate the MFD.

The control bar interface



Buttons

The button indicates the status of the connected equipment.

	Off (black) The relay is open.
	On (blue) The relay is closed.
	Override (yellow) The relay control is bypassed by an external switch or the equipment is powered from another source, not via the relay.
	Error (red) The fuse and/or relay is broken.

The buttons can be configured either as toggle buttons or as momentary buttons. Refer to "Configuration" on page 18.

Toggle buttons changes status when pressed. If it is off it will be turned on when pressed and vice versa.

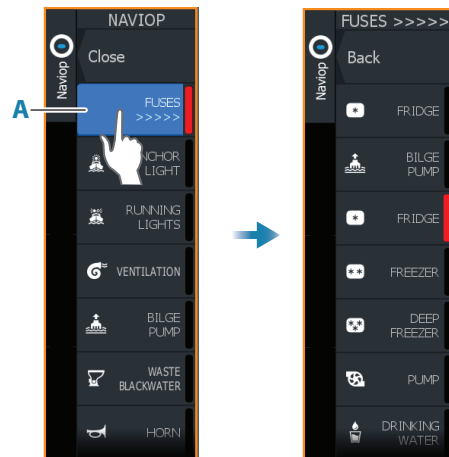
Momentary buttons are activated as long as they are pressed.

Fuses

The fuse button (**A**) location in the control bar depends on the settings in the configuration file. Refer to “Configuration” on page 18.

If one or more fuses are broken, the fuse button will have a red indication. The fuse bar will indicate the fuses that are broken. The red indication is removed when all broken fuses are replaced.

- **Note:** The fuses bar displays diagnostic information for fuse outputs, not for fuses protecting a relay channel/output. The fuse outputs cannot be operated and are powered as long as the fuse is ok.



Communication error

If a communication error occurs, all button and fuses status indicators will turn red.

Egon+ board behavior

If the MFD is turned off, the relays will keep their state until the Egon+ board is powered off.

If the power to the Egon+ board is turned off the relays will be deactivated/opened. After a power up, all relays will be open.

5

Technical Specifications

Egon+ board

⚠ Warning: IGNITION PROTECTED ONLY WHEN EQUIPPED WITH IGNITION PROTECTED FUSES AND COVER CLOSED.

ANY REPLACEMENT FUSES MUST BE IGNITION PROTECTED. COVER MUST BE CLOSED IN EVERY OPERATIONAL CONDITION!

Environmental	
Operating temperature	-40°C to 85°C
Storage temperature	-40°C to 125°C
Mechanical shock	SAE J2030 (RDEC2002), Section 6.16
Bombardment test	24 hour of dust, sand and gravel
Salt fog	96 hour period of salt fog per ASTM B117-94
Protection class	IP 66
Vibration	SAE J1455 (R2006), Section 4.10.4.2
Chemical resistance	Break fluid, AT fluid, antifreeze fluid, windshield wash fluid, PS fluid and oil.
Electrical	
Power supply voltage	12 V DC (8-16 V DC)
Dielectric voltage withstanding	80 V DC
Current consumption	1.5 mA battery quiescent current
Total current limit	200 A
Total current limit per connector	100 A
Overload	135%
Temperature rise	60°C
Insulation resistance	10 MOhm
Max load	
Fuse channels	30 A at 12 V DC
Relay and fuse channels	20 A (resistive load)/16 A (inductive, motor, pump load) at 12 V DC
Maximum board load	200 A
Power connector	2x M8 input studs, each rated at 100 A maximum
Power wire size	Calculated based on total board consumption
Output wire size	1.31 mm ² - 5.26 mm ² (#10-16 AWG)
Fuses	Mini blade fuse
Relays	280 footprint, 4 pin relay
Abnormal conditions	
Revers polarity protection	- 24 V DC, SAE J1455 (RJUN2006) - duration of 5 minutes
Short circuit protection	
Short to ground	5 minutes, ER455 (R2008) Section 5.10.4
Short to 16 V DC	5 minutes, ER455 (R2008) Section 5.10.4
Power up operation	Ramp battery voltage from 0 to minimum operating voltage ad 1 V/ms, EP455 (R2008) Section 5.10.7

AT30

<i>Operating temperature</i>	-25°C to 65°C
<i>Power supply voltage</i>	8-16 V DC
<i>NMEA 2000 current consumption</i>	1 LEN
CE	EN 60945



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