
Installation and Configuration Manual

Marine Pro.

DCU 410/408 – Engine Control Unit
RP 410 – Remote Panel



FW 2.11

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Document Information

Valid Versions

This Installation Manual is valid for the following firmware releases of the DCU 410/408, and the RP 410.

Panel	Firmware	Release
DCU 410	2.11	June 2014
DCU 408	2.11	June 2014
RP 410	2.11	June 2014

Manual Revisions

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Ordering Information

The following parts are available in **Marine Pro**.

Item	Part #
DCU 410 Engine Control Unit	1006450
DCU 408 Engine Control Unit	1006455
RIO 410 I/O Expansion Unit	1006453
RIO 425 Generator Interface Unit	1006409
RIO 412 Exhaust Monitoring Unit	1006454
SDU 410 Safety Unit	1006451
RP 410 Remote Panel Unit	1006452
MK-14 Relay Expansion	1121341
Ethernet Switch, 5 channels, 24V supply, DIN-rail	1050165
J1939 CAN bus Cable	1009110
IP Camera	1121258

About this manual

This manual has been published primarily for professionals and qualified personnel. The user of this material is assumed to have basic knowledge in marine systems, and must be able to carry out related electrical work.

Work on the low voltage circuit should only be carried out by qualified and experienced personnel. Installation or work on the shore power equipment *must only* be carried out by electricians authorized to work with such installations.

Responsibilities

It is the *sole responsibility of the installer* to ensure that the installation work is carried out in a satisfactorily manner, that it is operationally in good order, that the approved material and accessories are used and that the installation meet all applicable rules and regulations.

Note! Auto-Maskin continuously upgrades its products and reserves the right to make changes and improvements without prior notice.

All information in this manual is based upon information at the time of printing.

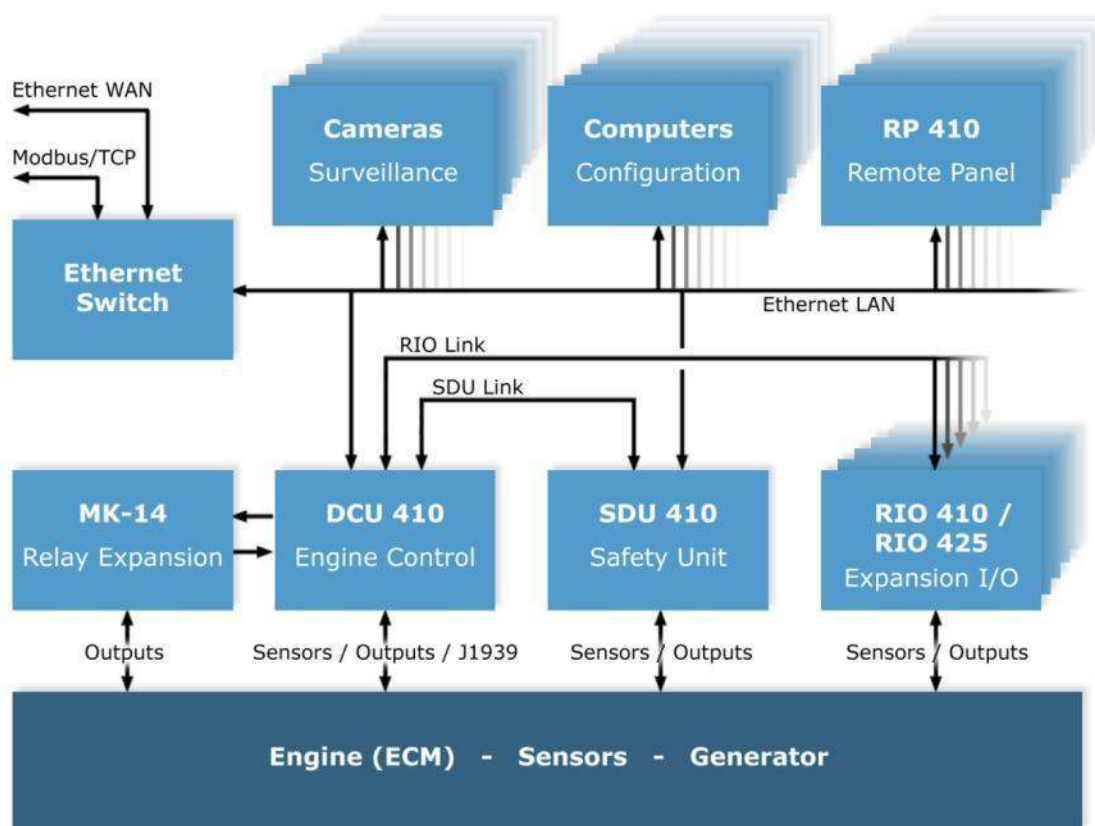
For updated information, please contact your local distributor.

400 Series Overview

Typical Layout

The following shows a typical layout. The SDU safety unit is used in classed installations, whereas the RIO expansion units are used to expand the I/O capacity.

The RP remote panels can be attached for remote monitoring and control.



Available units in the 400 Series

DCU 410 and DCU 408 Engine Control Units

DCU 410 and DCU 408 are the engine monitoring and control units. One panel is required for each engine.

The DCU 410 has a colour screen and buttons for user interaction.

The DCU 408 is the low cost version of the DCU 410, without a user interface, and intended for use with remote panels.

The DCU 410 and DCU 408 are hereafter referred to as the “DCU”.

SDU 410 Safety Unit

The SDU 410 (hereafter referred to as the “SDU”) is the safety unit, which is mandatory in a classed installation. It is completely self-contained and separate from the DCU.

The DCU communicates with the SDU on a link.

RIO 410 I/O Expansion Unit

The RIO 410 (hereafter referred to as the “RIO”) is an expansion I/O unit. A maximum of four RIO units can be connected to any one DCU.

The DCU communicates with the RIO on a link, and when connected, the DCU automatically detects the unit and add it into its configuration.

RIO 425 Generator Interface Unit

The RIO 425 is a generator interface unit. It is linked to the DCU, which will find it automatically.

When connected, a new page is made available on the DCU – and on the remote panel RP 410 – that displays generator parameters such as phase voltages, phase currents, frequency, power, efficiency factor (Cos phi), etc.

RIO 412 Exhaust Monitoring Unit

The RIO 412 is a compact unit with 20 thermocouple channels. Each cylinder’s thermocouple is connected to a predefined channel on the unit.

The DCU automatically detects the unit, and adds a new page with exhaust temperature data, such as individual cylinder temperature, average temperature, etc.

RP 410 Remote Panel Unit

The RP 410 (hereafter referred to as the “RP”) is the remote panel for the DCU.

One RP can monitor and control a maximum of eight DCU engine units, and there can be an unlimited number of RP units in the network. Each RP can monitor the same engine, or it can monitor separate engines.

The RP communicates to the DCU on Ethernet.

Note! For redundant Ethernet connection use *managed* Ethernet switches.

Precautions in Classed Systems

Requirements

In a classed and type approved installation, the following is required:

- The DCU 410 and DCU 408 engine control units requires:
 - Separate power supplies to its primary and secondary supply inputs.
 - An engine speed sensor connected to the DCU. This can be physical, or from the J1939 CAN bus.
- The SDU 410 Safety Unit requires:
 - Minimum one engine speed sensor connected to the SDU.
 - Must be supplied by an alternative supply to the DCU 410 primary supply.

Certification

All modules in the **400 Series** are certified by major classification societies.

Certificates can be obtained from the Auto-Maskin website, or from your local distributor.

DCU 410 Engine Panel Installation

Mechanical Installation

Location

The DCU is normally located in the engine room due to the number of cables and wires from the engine sensors and to reduce electrical noise levels, which might else result from long cable stretches.

The DCU should be mounted at about eye level and the user should have easy access to all buttons on the panel.

The DCU may be mounted on the engines supporting structure provided shock absorbers are used either between the structure and the engine, or between the structure and the DCU. The DCU shall not be mounted directly onto the engine due to vibrations.

The DCU should be mounted so that easy access to the cable connections at the back is ensured. This might for instance be accomplished by mounting it in a cabinet with a hinged front panel.

Wire Terminal Layout Overview

These are the wire terminals on the DCU back lid.

Power supply inputs /auxiliary power output		
1	+24VDC Primary Supply	In
2	0V Primary Supply	In
3	+24VDC Secondary Supply (Redundant)	In
4	0V Secondary Supply	In
5	24VDC Supply Out, 1A	Out
6	0V Supply Out	Out
System On / Off		
7	+24VDC 0.2A Supply for Power On	Out
8	Power On 24VDC	In
9	0V Opto Supply for Power On	Out
10	0V Supply for Power On	In
Reserved for future expansion		
11	No connection	–
12	No connection	–
13	No connection	–
14	No connection	–
15	No connection	–
Switch Inputs Channels (8 channels)		
16	+24VDC 0.2A Supply for Switch Inputs	Out
17	#1 Switch Input 24V	In
18	#2 Switch Input 24V	In
19	#3 Switch Input 24V	In
20	#4 Switch Input 24V	In
21	#5 Switch Input 24V	In
22	#6 Switch Input 24V	In
23	#7 Switch Input 24V	In
24	#8 Switch Input 24V	In
25	0V Opto For Switch Input	Out
26	0V For Switch Input	In

4–20 mA Inputs (4 channels)		
27	+24VDC 0.2A Supply for 4–20 mA Sensors	Out
28	#1 4–20 mA Input	In
29	#2 4–20 mA Input	In
30	#3 4–20 mA Input	In
31	#4 4–20 mA Input	In
PT100 inputs (4 channels)		
32	#1 PT100 A	In
33	#1 PT100 B	In
34	#1 PT100 C	In
35	#2 PT100 A	In
36	#2 PT100 B	In
37	#2 PT100 C	In
38	#3 PT100 A	In
39	#3 PT100 B	In
40	#3 PT100 C	In
41	#4 PT100 A	In
42	#4 PT100 B	In
43	#4 PT100 C	In
Pickup input (tacho / speed input)		
44	#1 Pickup A	In
45	#1 Pickup B	In
CANopen /J1939#2 interface (COM 5)		
46	#1 CANopen/J1939#2 Shield	–
47	#1 CANopen/J1939#2 L	–
48	#1 CANopen/J1939#2 H	–
CANJ1939 interface (COM 4)		
49	#1 CAN J1939 Shield	–
50	#1 CAN J1939 L	–
51	#1 CAN J1939 H	–
MODBUS RTU (COM 3)		
52	Modbus 0V	In
53	Modbus Shield	–
54	Modbus L	–
55	Modbus H	–

56	Modbus +24VDC Supply	In
RIO 410 Remote I/O Interface (COM 2)		
57	RIO 410 Remote I/O Interface Shield	–
58	RIO 410 Remote I/O Interface L	–
59	RIO 410 Remote I/O Interface H	–
SDU 410 Safety Module Interface (COM 1)		
60	SDU 410 Safety Module Interface Shield	–
61	SDU 410 Safety Module Interface L	–
62	SDU 410 Safety Module Interface H	–
Configurable Relays		
63	#1 Configurable Relay NC	Out
64	#1 Configurable Relay C	Out
65	#1 Configurable Relay NO	Out
66	#2 Configurable Relay NC	Out
67	#2 Configurable Relay C	Out
68	#2 Configurable Relay NO	Out
Configurable 24VDC Outputs		
69	#1 Configurable Output 24VDC	Out
70	#2 Configurable Output 24VDC	Out
71	#3 Configurable Output 24VDC	Out
72	#4 Configurable Output 24VDC	Out
Common Alarm Relay		
73	Common Alarm Relay NC	Out
74	Common Alarm Relay C	Out
75	Common Alarm Relay NO	Out
Configurable 24VDC Outputs		
76	#5 Configurable Output 24VDC	Out
77	#6 Configurable Output 24VDC	Out
78	#7 Configurable Output 24VDC	Out
Fixed 24VDC Outputs		
79	Energize to Shutdown 24VDC	Out
80	Energize to Stop (ETS) 24VDC	Out
81	Energize to Run (ETR) 24VDC	Out
82	Engine Running 24VDC	Out
83	Crank (Start) 24VDC	Out

84	Prelube Activation 24VDC	Out
Fixed 24VDC Inputs		
85	+24VDC Supply for Fixed Functional Inputs	Out
86	Prelube Complete 24VDC switch input	In
87	Start Disabled 24VDC switch input	In
88	Automatic Mode 24VDC switch input	In
89	Automatic Start (PMS) 24VDC switch input	In
90	Automatic Stop (PMS) 24VDC switch input	In
91	Remote Start 24VDC switch input	In
92	Remote Stop 24VDC switch input	In
93	Remote Acknowledge/Silence Alarm 24VDC switch input	In
94	Shutdown Override 24VDC switch input (engine protection override)	In
95	In Gear 24VDC switch input	In
96	#1 Configurable Input 24VDC switch input	In
97	#2 Configurable Input 24VDC switch input	In
98	0V Opto For Fixed Functional Inputs	In
99	0V For Fixed Functional Inputs	In
Ground (PE)		
100	Ground	–
Ethernet MODBUS/TCP (COM 6)		
COM 6	RJ45 Ethernet port	In/Out
Console (COM 7)		
COM 7	DSUB-9 (RS-232) serial port	In/Out
MK-14 Relay Expansion Module Link (COM 8)		
COM 8	DSUB-15	In/Out
USB Interface		
USB	USB Memory Interface	In/Out

Electrical Connections

General

To protect against EMC noise, we recommend that all cables are shielded.

Note! The screen of all cables shall be connected to ground/hull, NOT to 0V!

Some cables shall be kept as separate from other signals as possible – for instance the pickup signal. Others can be in a shielded multi-cable.

Note! Connect shield at one end only.

Grounding

Note! Please keep ground and 0V separated!

In marine installations, ground and 0V volt should not be connected together. In a ship installation, the hull is the “ground” whilst the battery minus is the 0V.

In the DCU system, +24V and 0V are filtered to ground using special filter components. This is done to reduce electrical noise entering the system. If ground and 0V are connected together, these filters do not work properly.

Note! Make a ground connection to terminal 100. Keep this wire as short as possible, and at least 1.5mm².

Terminals 46, 49, 53, 57, 60 and 100 are all ground connections, internally connected to ground, and should *not* be connected to 0V.

Primary Power Supply [1 – 2]

The DCU is designed to run on 24VDC supply voltage.

Note! Make sure the primary supply power is sourced directly from the battery, NOT from the starter of the engine, as the voltage drop over the latter is significantly higher.

Power Supply Requirements

- Valid full functionality range: 18–32VDC.

- Minimum capacity: 5A

Note! There are fixed low battery voltage alarm setpoints. For the primary supply, these are at 21V and 18V. For the Secondary supply, the setpoint is at 20V.

All these alarms are delayed.

Use a twisted pair wire to minimize the effect of noise on the supply cables. Connect the cables straight from the battery (and NOT the starter engine) and keep the cable as short as possible.

Use at least 2.5mm² wires for the power supply.

Secondary Power Supply [3 – 4]

It is recommended that the secondary supply is connected to a redundant power supply to ensure sufficient supply voltage upon cranking the engine.

Without a separate secondary supply, a crank can result in a reboot of the DCU.

Power Supplies in General [1 – 4]

Mandatory straps when not using opto-coupling

The DCU support opto-coupled inputs and outputs on several of its terminals.

When this capability is not used, the following straps must be inserted.

Purpose	Strap	Comment
Power the DCU	7-8 and 9-10	Disconnect jumper 7-8 to set the DCU into System Off mode.
Activate Switch Inputs	25-26	Disconnect this jumper if an external 24V supply (not terminal 16) is used to activate the switch inputs.

Activate Fixed Functions	98-99	Disconnect this jumper if an external 24V supply (not terminal 85) is used to activate the functions.
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Supply Selection

The DCU internal circuitry is sourced from either the primary OR the secondary supply.

The primary supply has priority over the secondary supply. If the primary supply voltage drops below 18V, the DCU will immediately switch over and use the secondary supply, but only if the secondary supply is above 20V.

The primary supply is selected over the secondary supply when the primary supply voltage again rises above 18V. There is a two second delay when switching from secondary to primary supply.

The DCU will run equally well – with full functionality – on the secondary supply.

All voltage levels are $\pm 5\%$.

Power Supply Low Alarms

The active supply (the supply currently feeding the DCU) is monitored. This is normally the primary supply.

- If the supply falls below 21V+30sec, this is indicated with an amber alarm.
- If the supply falls below 18V+30sec, this is indicated with a red alarm.

Auxiliary Power Output [5 – 6]

The Auxiliary Power Output is intended to drive auxiliary instruments, relays, Ethernet switches, etc. that should be powered together with the DCU.

The Auxiliary supply is secured with an automatic fuse.

System On/Off [7 – 10]

The DCU has a System On/Off function. System On is the normal mode of operation.

In System Off mode, the DCU internal circuitry is still active, but it acts as powered off.

Normal operation

To power the DCU for normal operation, connect a strap between terminals 7–8 and another strap between terminals 9–10.

The DCU is now always on.

System Off

To set the DCU in System Off mode, remove the strap between terminals 7–8.

The 24VDC supply at terminal 7 is secured with a 10mA automatic fuse.

System On

To activate the DCU, connect terminals 7–8 again. The DCU is immediately ready for use.

External supply

Alternatively, this function can be activated with an external 24V supply. In this case, do not connect any jumpers, and do not use terminals 7 and 10.

To activate the DCU (System On), connect a 24V supply to terminal 8, and the 0V to terminal 9.

Reserved [11 – 15]

Not implemented in this release.

No connection to these terminals.

Switch Input Channels [16 – 26]

There are eight configurable switch input channels which can be used to detect the status of switches in the installation.

The state of each channel is controlled by the voltage between the +24V switch input terminal (terminals 17–24) and the +0V opto terminal (terminal 25) as follows:

- 0 – 2V = logic “0”
- 8 – 32V = logic “1”
- 2 – 8V = undefined, avoid this area.

Further switch input details

- Overvoltage protection: 40 VDC
- Not connected = 0V (47 kohm pull-down).

The 24VDC on terminal 16 shall be used for the switch input supply. It is secured with a 40 mA automatic fuse.

Normal Use

Terminals 25 and 26 *shall* be strapped.

Terminals 17 – 24 connected to 24V (terminal 16) through external switches.

Opto-coupled Use

Terminals 25 and 26 shall *not* be strapped.

External voltage input between terminals 17 – 24 (+24V) and terminal 25 (0V opto) is electrically isolated from the DCU by the means of integrated opto-coupled devices.

4–20 mA Input Channels [27 – 31]

There are four configurable 4–20 mA analogue sensor inputs.

If the signal is out of range, a warning will be displayed. Out of range is defined as:

- <2 mA (broken)
- >24 mA (short)

Update rate: 2Hz

PT100 Input Channels [32 – 43]

There are four PT100 input channels. The channels support PT100 sensors with two or three wires.

Note! If connecting a two-wire PT100 sensor, then strap the two wire terminals A and B at the DCU end.

If the signal is out of range, a warning will be displayed.

Out of range is defined as:

- <90 ohm (short)
- >390 ohm (broken)

Update rate: 2 Hz

Magnetic Pickup (Speed) Sensor [44 – 45]

Connect the magnetic pickup to terminals 44 and 45. Please verify that the signal strength is between 4–32 Vpp.

Note! The signal waveform shall be a sinusoidal shape, not a square.

Use a 2x 0.5 mm² (minimum) twisted pair cable.

Note! The pickup cable shall be shielded to ground in the pickup end. Do NOT connect shield to 0V.

Range: 0.1–10 kHz

CANopen/J1939#2 Interface (COM 5) [46 – 48]

This is a communication interface for remote panels or equipment.

The CANopen interface is able to communicate all signals available in the DCU.

- Terminal 46 – CANopen/J1939#2 Shield
- Terminal 46 – CANopen/J1939#2 Low
- Terminal 46 – CANopen/J1939#2 High

CAN J1939 Interface (COM 4) [49 – 51]

Engine J1939 CAN bus interface for connection to the engine ECM, electronic control module.

- Terminal 49 – CAN Shield
- Terminal 50 – CAN Low
- Terminal 51 – CAN High

MODBUS RTU, RS-485 (COM 3) [52 – 56]

The MODBUS RTU may be connected either with common 0V or electrically isolated with an optocoupler.

- Terminal 53 – Shield
- Terminal 54 – Low
- Terminal 55 – High

Not Optoisolated Communication

Supply the Modbus section from the DCU as follows:

- Terminal 56 to terminal 5 (24V)
- Terminal 52 to terminal 6 (0V)

Optoisolated Communication

This requires the supply from the remote equipment to be supplied into the DCU terminals

- Terminal 56 (24V)
- Terminal 52 (0V)

RIO 410 Link (COM 2) [57 – 59]

This is the link for the optional RIO 410 Remote I/O units. A maximum of four RIO units can be connected.

- Terminal 57 – Shield
- Terminal 58 – Low
- Terminal 59 – High

SDU 410 Link (COM 1) [60 – 62]

This is the link to the SDU 410 Safety Module.

- Terminal 60 – Shield
- Terminal 61 – Low
- Terminal 62 – High

Configurable Relays [63 – 68]

There are two configurable relays on the DCU, Relay 1 and Relay 2. Each relay may be enabled or disabled.

If enabled, operation is controlled by selecting one of the many possible events available through the configuration web server.

The relay contact centre tap is secured with a 1A automatic fuse.

For additional configurable relays, see the section about the optional MK-14 unit.

Configurable 24VDC Outputs [69 – 72, 76–78]

There are seven configurable 24V outputs on the DCU, Config 1 to Config 7. Each output may be enabled or disabled.

If enabled, operation is controlled by selecting one of the many possible events available through the configuration.

Common Alarm Relay [73 – 75]

The relay is activated in a normal situation, and releases for any alarm.

The centre tap is secured with a 1A fuse.

Shutdown Output [79]

The shutdown output activates when the DCU activates an automatic engine safety shutdown.

It does not activate for a normal engine stop.

ETS – Energize to Stop [80]

The ETS activates on a normal engine stop or an automatic engine safety shutdown.

The signal stays activated a few seconds after the engine has stopped.

ETR – Energize to Run [81]

The ETR activates when the DCU is about to start the engine. It stays activated as long as the engine is running.

The ETR deactivates on any stop command.

Running [82]

This output activates when the engine is running. This is normally when the engine has reached the running setpoint, typically set at 400 rpm.

The output deactivates at any stop command.

Crank [83]

The output activates to engage the engine starter. It is disabled on a running engine.

Prelube Act. [84]

The Prelube Activation signal activates if the DCU is configured to prelube the engine prior to a start.

24V Supply for Fixed Function Inputs [85]

Use this 24V supply output to power all the inputs in the wire terminal range 86 to 97.

Prelube Comp. [86]

If the DCU is configured to perform a prelube cycle until the sensed oil pressure is above a certain setpoint (provided by the prelube equipment), then the DCU will not continue onto the crank cycle until this signal appears.

Start Disable [87]

If activated, the DCU is inhibited to perform any start attempts .

Automatic Mode [88]

In Automatic Mode, the DCU will perform automatic start attempts if an automatic start signal is applied to terminal 89.

In this mode, the DCU will also react to an automatic stop signal on terminal 90.

Automatic Start [89]

Apply this signal to start the engine according to the DCU start configuration.

Note that this terminal input is disabled if Automatic Mode [88] is inactive. This signal has to be applied until a running state is achieved.

Automatic Stop [90]

Apply this signal to stop the engine according to the DCU stop configuration.

Note that this terminal input is disabled if Automatic Mode [88] is inactive. This signal has to be applied until a stopped state is achieved.

Remote Start /Stop [91 – 92]

Apply a signal to either of these inputs to activate the function.

The Remote Start and Remote Stop works always, and independent of the Automatic Mode setting [88].

Acknowledge [93]

The remote Acknowledge input acknowledges all new (unacknowledged) alarms.

Shutdown Ovr. [94]

The Shutdown Override (SO) input disables all DCU shutdowns (automatic stop), but not the SDU shutdowns!

Note! In future firmware 2.11, the SO input to the DCU will also set the SDU 410 in shutdown override mode.

Note! In systems where there is an SDU connected to the DCU, make sure to activate Shutdown Override on the DCU and on the SDU. In reality, the SDU will signal SO to the DCU.

- On the DCU, the SO is activated with a 24V signal to terminal 94.
- On the SDU, the SO is activated by closing a switch over terminals 50 and 51. Note that the switch requires a 10k resistor connected across it.

Note! On the SDU, note that some channels may be configured to disregard Shutdown Override mode. Consult the SDU configuration section to verify this.

Note! Overspeed will always be enabled, even in Shutdown Override mode. This is true for the DCU and the SDU.

In Shutdown Override mode, if a shutdown channel is activated, the DCU will indicate this with an alarm instead of activating a shutdown.

The DCU will also display a “SO” symbol in the status bar (top right) when Shutdown Override mode is active.

In Gear [95]

When In Gear is signalled, the DCU will prohibit start (crank) attempts.

Configurable Inputs [96 – 97]

These two channels have a configurable function. The function is configured using the web server.

Connect the input to 24V to activate the configured function.

Shield (Grounding) [100]

Connect this terminal to shield. Please note that 0V and shield shall be separated.

Other Communication Interfaces

Ethernet MODBUS/TCP (COM 6)

The DCU connects to a LAN (Local Area Network) or directly to a PC through a standard CAT-5 network cable connected to the RJ45 port (COM 6).

The IP setting of the DCU and/or the local PC's need to be set in order to access the DCU configuration from a PC.

The DCU has an inbuilt DHCP server for use in single PC configuration. See page 31 for the configuration procedure.

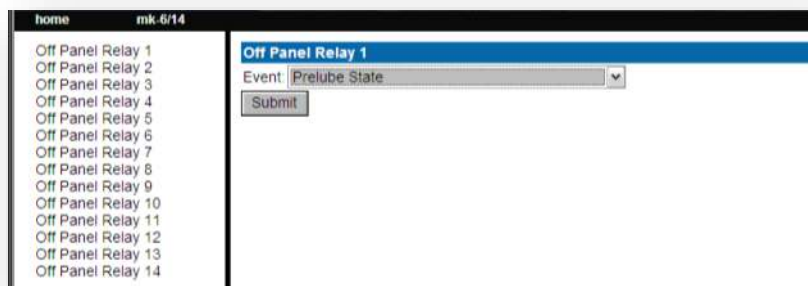
Note! This is not an autoMDIX port, crossover cable will be needed when connecting directly between a DCU and RP.

Console (COM 7)

This port is for factory service only.
No user connection.

MK-14 Relay Expansion Link (COM 8)

Connect the 15-pin DSUB-connector from the MK-14 optional relay expansion module.



The function to be present at each relay channel is configured in the DCU web server. Select Home - MK-14.

USB Memory Interface

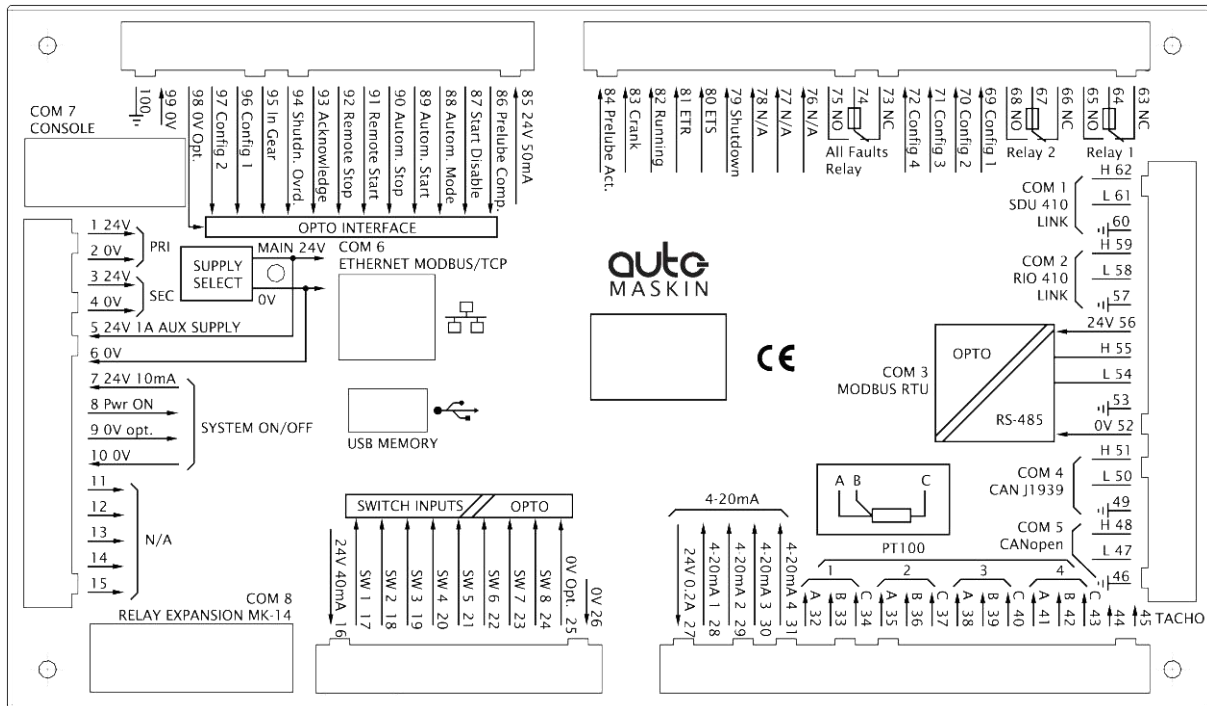
This interface is for USB memory stick only. It has two main functions:

- Load/Save a configuration file
- Load a firmware file

It can also be used to load a new firmware file to any connected RP 410 remote panel.

Rear Lid Graphical Layout

Back lid of the DCU 410 seen below.



First Power-On

Preparations

Installation

Install the DCU according to guidelines and suggestions, see page 8.

Connections

Connect power according to guidelines and suggestions, see page 13.

First Power-On Wizard

The DCU will display a *first power-on wizard* at the first power up after delivery, or after a factory reset of the panel.

All the settings are available in the menu interface later.

Select Installation Language

Follow on-screen instructions.

Choose Administrator password

Follow on-screen instructions.

Select IP-address

Follow on-screen instructions.

Valid numbers in the first group is 1 – 254, second and third group is 0 – 254 and fourth group is 2 – 254. Actual numbers to use will depend on the network in which the DCU is a member.

Note! The last two digits in the fourth group will set the engine number for this DCU. For example, entering 192.168.0.211 becomes “**Engine #11**”.

*Read the chapter **Connecting to the DCU** to decide which IP-address to use; see page 31.*

Press **Save** when all four number groups are entered to change the IP-address of the DCU, then press **Next** to continue.

Press **Next** only, to continue without changing the IP-address of the DCU.

System Type

Press **down** arrow to select Engine Application.

Press **Edit** enter Engine Application menu.

Choose between:

- Auxiliary
- Combined
- Propulsion
- Emergency

Press **OK** to save this setting.

Press **down** arrow to select nominal speed for the selected Application.

Select Classed

Press **right** arrow to select classed type.

Press **edit** to enter classed selection menu.

- Not Classed
- Classed

Primary RPM Source

Press **right** arrow to select Primary RPM Source.

Press **edit** to enter Primary RPM Source selection menu.

- Not Used
- CAN J1939
- DCU TACHO
- SDU TACHO

Secondary RPM Source

Press **right** arrow to select Secondary RPM Source.

Press **edit** to enter Secondary RPM Source selection menu.

- Not Used
- CAN J1939
- DCU TACHO
- SDU TACHO

Third RPM Source

Press **right** arrow to select Third RPM Source.

Press **edit** to enter Third RPM Source selection menu.

- Not Used
- CAN J1939
- DCU TACHO
- SDU TACHO

DCU Pickup pulses/revolution

Press **right** arrow to select DCU Pickup pulses/rev.

Press **up** arrow or **down** arrow to change each digit and press **left** arrow or **right** arrow to scroll through digits to change. Press **Cancel** to keep the previous value. Press **OK** to choose the new value.

Load a configuration

Press **right** arrow to load a configuration.

Press **up** arrow or **down** arrow to select the configuration menu entry, or press **Next** to use the factory default.

Press **Edit** to enter the configuration menu entry.

Press **left** arrow or **right** arrow to scroll through available configurations.

Press **OK** to choose configuration.

Press **Next** to go to the next step.

Done

Press **Finished**. The DCU will proceed with the new settings and display the main menu.

Configuration of the DCU

The configuration of the DCU is outlined in this section.

Configuration– and Firmware files

The DCU may be configured in one of the following three ways:

1) DCU Web Server Configuration Interface

The DCU has an inbuilt web server, offering access to full configuration of the DCU.

Note! This is the primary configuration interface.

Approved browsers

The following browsers are approved for use. Other browsers and versions may work.

Browser	Version
Internet Explorer™	7 or higher
Firefox™	5 or higher
Chrome™	13 or higher

2) DCU User Interface Menu

For quick and easy changes to the configuration, there is a configuration entry point in the menu.

Note! This manual will not describe the panel menu configuration interface in detail. Only the web server menu operation is covered.

3) USB Memory Interface

Insert a USB memory with the configuration file(s) and follow the guidelines appearing on the DCU screen.

Note! The configuration file name can only contain the following characters:

- a-z
- A-Z
- 0-9
- “_” (underscore)
- “-” (hyphen)

If other characters are being used, then the DCU will not “see” it. Rename the configuration file to solve the issue.

Procedure:

- When the USB memory is inserted, the DCU asks for the administration password (4 digits).
- The DCU then lists the configuration file(s) available on the USB memory.
- Select file(s), then select **COPY** to copy these files into the User Files area in the DCU. Note that this does not activate the file; it is merely a copy of the file into the DCU.

Select a file, and then select **USE** to copy and activate this configuration file.

Note! The DCU 408 does not have a screen interface and hence this method does not work on that unit.

Firmware upgrade

The USB memory can be used to copy a new firmware to the DCU and also any connected RP.

Note! If upgrading both DCU and RP firmware, make sure to upgrade the RP firmware first!

Copy configuration file

This function copies the current configuration file to the USB stick. It will name/label this file **current_config.cfg**.

Connecting to the DCU

It is possible to connect to the DCU either directly or through a LAN (Local Area Network) Ethernet network.

Note! For use in an existing Ethernet, check the configuration of the LAN with the LAN manager.

The components in **Marine Pro**, including the DCU, uses fixed (not dynamic) IP-addresses, which must be set manually.

To connect to the DCU

1. Connect an Ethernet cable between your laptop and the DCU port COM 6 (Ethernet port).
2. In the **DCU menu**, select **Version Information**. Note the IP-address. From factory, the IP-address is 192.168.0.101.
3. In your web browser, type the IP-address, eg. <http://192.168.0.101> in the address field.
4. Press **Enter**, and note the login screen.
5. In the login screen, type
 - Username = **dcu**
 - Password = **1234** (from factory)

Note! If the password is unknown, then use the Encrypted PIN and send this to service@auto-maskin.com to obtain the correct PIN.

Logged In?

Proceed to the Web Server Configuration chapter, page 35.

Not Logged In?

Continue with connection settings as described below.

Further connection settings

Change the IP-address of the DCU

If necessary, the IP-address of the DCU can easily be changed.

Note! The last digit in the IP-address becomes the engine number.

The DCU has a fixed IP-address that is set during the first power-on set up. The IP-address may also be changed later, in the DCU panel menu:

**Menu / Settings / Administration (locked/open) /
Miscellaneous / Network**

The Administration folder is password protected by a password. It will remain open for 60 minutes after valid password.

Use the *up / down arrows* to select each of the four groups of numbers and press *edit* to edit each group.

IP-address convention

The factory default IP of the DCU is 192.168.0.101. The first three groups must be the same for all components in the LAN, for instance 192.168.0.X, where X is the other unit in the LAN.

Note! The X-figure must be unique within the LAN. Also, the two last digits in X will represent the engine number.

Example: A DCU with the IP-address 192.168.0.104 will be named “Engine #4”.

Connect the DCU to a single PC

First, make sure that the PC’s Ethernet network configuration is set to automatically receive an IP-address (as most PCs are). Then in the DCU panel menu:

Menu /Settings Connect a PC...

Press the **down arrow** and then **Toggle**. The DHCP-server will now be active for 10 min. Repeat if it takes longer than 10 min to ready the PC.

Connect the PC to the DCU with a CAT-5 Ethernet cable. The DCU’s DHCP-server will now automatically set up the PC to communicate with the DCU. It may be necessary to use a network reset/repair function for the PC’s Ethernet connection in order for the PC to receive the new IP-address.

Alternatively, set the IP-address of the PC manually to a free IP-address in the same subnet as the DCU.

For instance, if the DCU’s IP-address is 192.168.0.101, the PC may use any IP-address starting with 192.168.0 except 192.168.0.101.

To connect the DCU to a LAN with a DHCP server

For use in a LAN with a DHCP server (Dynamic Host Configuration Protocol), the IP-addresses to be used by **Marine Pro** components must be set outside the IP-address range used by the DHCP server. Most DHCP servers are configured with an IP-address range that leaves room for fixed addresses outside it.

If for instance the LAN's subnet is 192.168.230 and the DHCP's IP-address range is set to 50 – 210, valid IP-addresses of the DCU would be for instance 192.168.230.211, 192.168.230.7 or 192.168.230.231.

Do *not* use the DCU inbuilt DHCP-server (the **Menu / Connect a PC...** menu entry) in a LAN with its own DHCP server, since two DHCP servers in the same LAN may create conflicting IP-addresses.

Connection to a LAN using fixed IP-addresses

Set the IP-address of the DCU to a free/available IP-address within the LAN's subnet.

Factory defaults for the DCU

Factory defaults are valid at initial startup only.

- IP-address: 192.168.0.101
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.0.1

For later resets, the current IP configuration will be kept even through the manual Factory reset operation.

DHCP IP-address range: 101 – 199 within the subnet defined by the DCU's IP-address.

IP-address conflict

Two or more DCU units with the same IP-address should not be connected in the same network. The result may be that a PC or RP 410 remote panel will be able to address one of the DCU units only.

Change the IP-addresses until all units have a unique address.

Web Server Configuration

Once logged in, the DCU can be configured. The following are the Web Server main menu items.

Home

When logged in, the browser displays the following.



The Home screen lists the following menu items.

DCU

This is the top level menu for the entire DCU 410 (or DCU 408) configuration.

The configuration is saved in the configuration file, located in the DCU.

RIO

This is the top level menu for the optional expansion I/O modules RIO 410.

The configuration is saved in the DCU configuration file.

SDU

This is the menu top level for the SDU 410 safety unit configuration.

The SDU 410 is mandatory in classed installation.

The configuration is saved in the SDU 410, and stored in the DCU configuration file, located in the DCU.

Upload Wallpaper

A user wallpaper can be uploaded, and can be used as background for instruments, popups and other dialogs.

MK-14

The relays on the optional relay module MK-14 can be assigned a function here.

Versions

This top level menu item lists the hardware and software version of the DCU, and the software version of the SDU.

Troubleshooting

The troubleshooting section makes it possible to troubleshoot I/O and communication on the DCU, and also the RIO units.

The following can be verified for the DCU:

- Supplies
- Switch inputs
- 4–20 mA inputs
- PT100 inputs
- Communication channels
- J1939 Nodes
- MK14 outputs
- Outputs (functional 24V outputs and relays)
- Inputs (functional inputs)
- Run sources (engine running indications)
- RPM sources (which sources are in use) and their priority

The following can be verified for the RIO:

- Versions
- Supplies
- Switch inputs
- 4–20 mA inputs
- PT100 inputs
- TC
- 0–5V
- Outputs

Home – DCU



This is the main menu for the DCU configuration. The following is an overview of the menu items.

Password

The DCU configuration is password protected with a PIN code.

Select this option to change the password. First, type in the old password, and then the new password twice.

If the password is unknown, then use the Encrypted PIN and send this to service@auto-maskin.com to obtain the correct PIN.

File

Load any file

To change the configuration of the DCU, load a new configuration file.

- **Factory Default**
From here, a predefined factory configuration file can be opened.
- **User Uploaded**
This lists the files previously uploaded to this DCU. Pick a file to select a new configuration for the DCU.

Delete Configuration File

Delete any number of configuration files on the DCU.

Configuration Printout

This gives a quick overview of the current configuration.

Save file as

This saves the current configuration of the DCU into a file. The default file extension is .cfg.

Save CANopen EDS-file

This saves the CANopen I/O electrical datasheet to a file on your PC.

Upload to DCU

Uploaded files are files transferred to the DCU.

The inbuilt firmware can be updated whenever there is a new firmware available.

A new configuration file can be loaded into the DCU panel

- **Firmware update**

Select the new DCU panel firmware to upload. The file name shall be "dcu410_release.tar.gz".

The latest firmware release can be obtained from the Auto-Maskin web site at http://www.auto-maskin.com/marine_pro/index.php#123

Note! The DCU and RP firmware needs to be matched, meaning they must have the same major and minor firmware number, unless the DCU is loaded with firmware 2.11. In which case this 2.11 firmware is compatible with all RP firmware down to 2.5

For instance, DCU 2.2p2 is a match with RP 2.2, but DCU 2.3 is not a match with RP 2.2.

- **Wallpaper**

Select a picture file for the DCU. The file must be of type .png. Only one user wallpaper may be uploaded. Uploading a new file will remove the old one.

- **Configuration file upload**

Select a user configuration file for the DCU. The file must be of type *file_name.cfg*.

When uploaded, the file is stored in the DCU, and is later available for use from the User Uploaded files section, see page 38.

Home – DCU – I/O Configuration

The I/O section holds menu items for input and output signals. These are separated into two sections.

- **Config Inputs**

This is where the I/O input channels are configured, such as 4–20 mA, PT100 and switch inputs.

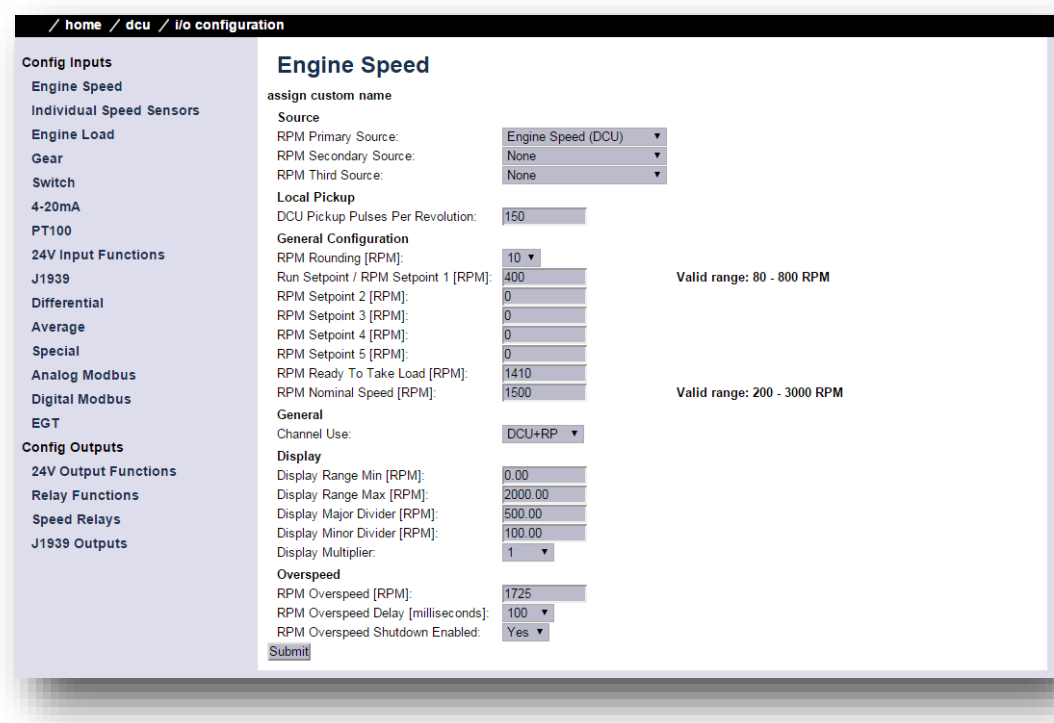
- **Config Outputs**

This is the section for configurable outputs. A signal or function can be assigned to a 24V output or a relay.

Note! Always remember to press the **Submit** button after each change on the configuration pages. No changes will be saved until this button is pressed!

Engine Speed

This is where engine speed sensors are configured, and the overspeed setpoint is set.



Source

The DCU can read engine speed from up to three sensor sources.

Source	Comment
J1939 #1 J1939 #2	J1939 CAN bus connected to terminals 49–51 (COM 4) or 47–48 (COM5)
DCU	Magnetic pickup locally connected to DCU, terminal 44 and 45.
SDU 410	One of the two pickups connected to the SDU safety unit. The SDU has a scheme for selecting from its two connected pickups.
SDU 404	Magnetic pickup locally connected to SDU.

- Priorities

The engine speed sources are prioritized. The DCU will use the sensor assigned as the primary source first.

If the primary source is lost, then the secondary source will be used. If the secondary source is lost, then the third source will be used.

Local Pickup

If there is a pickup connected to the DCU, or “DCU” is selected among the sources above, then set the flywheel teeth count here.

General Configuration

- **RPM Rounding** rounds off the displayed value to nearest 1, 5 or 10 RPM.
- **RPM setpoint** is the RPM at which the DCU indicates the engine is running. There are also four additional RPM setpoints that can be used as additional input to switch /functions.
- **RPM Ready to take Load** is a signal that can be configured to an output relay. It activates when that RPM is reached. It deactivates when a stop command is given, OR the speed drops below the threshold minus 15%.
- **RPM Nominal Speed** is the engines nominal speed, and is used to calculate the overspeed setpoint and RPM overspeed test setpoints.

General

- Channel use is the selection of where the signal shall be displayed. Select DCU+RP to display the instrument in the DCU and in the RP.

Display

The values here define how the instrument widget is presented.

- **Display Unit** is the signals unit, here RPM.
- **Display Range Min** is the minimum value displayed, normally 0 (zero).

- **Display Range Max** is the maximum value displayed. For an engine running at 1500 rpm nominally, a typical maximum setting would be 1800 RPM.
- **Display Major Divider** is where the instrument widget writes an RPM value, normally every 500 RPM.
- **Display Minor Divider** is the ticked marks between the major divider marks, normally every 100 RPM.
- **Display Multiplier** is the multiplier value. The value is displayed in the RPM meter.

Overspeed

- **RPM Overspeed** is the setpoint where the DCU indicates overspeed.
- **RPM Overspeed Delay** is the delay – in milliseconds – before alarm or shutdown. Typical setpoint is 100ms.
- **RPM Overspeed Shutdown Enabled** is where the overspeed behaviour is selected.
Select **Yes** for the DCU to shutdown the engine.
Select **No** to disable overspeed shutdown.

Note! Disabling DCU overspeed is valid for the DCU only. The SDU is able to shutdown the engine.

Individual Speed Sensors

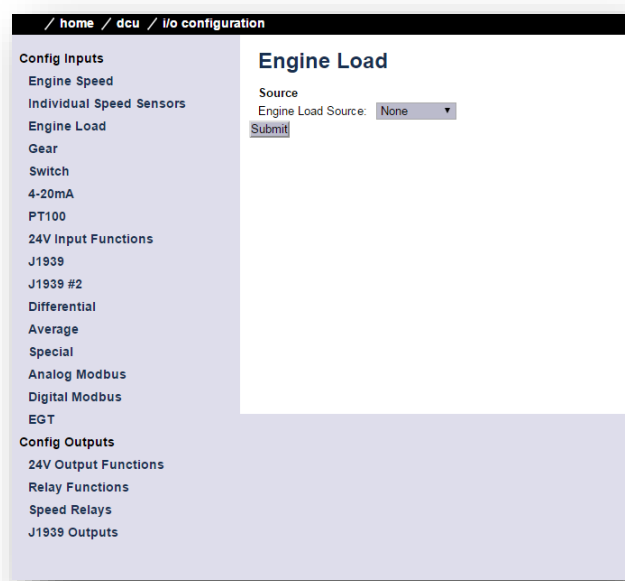
This is where the display and alarm settings of the three different types of speed sensors available, can be configured.

- Engine Speed (DCU)
- Engine Speed (J1939)
- Engine Speed (J1939):2 (If enabled)
- Engine Speed (SDU 410)
- Engine Speed (SDU 404)

The screenshot displays the 'Individual speed sensors' configuration page for 'Engine Speed (DCU)'. The interface is divided into a sidebar and a main configuration area. The sidebar lists five sensor types: Engine Speed (DCU), Engine Speed (J1939), Engine Speed (J1939):2, Engine Speed (SDU 410), and Engine Speed (SDU 404). The main area is titled 'Engine Speed (DCU)' and contains several sections for configuration. At the top, there is a 'Copy' button and a 'Copy configuration from:' dropdown menu set to 'None'. Below this is a 'Configure' section with an 'assign custom name' field. The 'General' section includes a 'Channel Use' dropdown set to 'Not in use'. The 'Sensor' section has 'Sensor Unit' set to 'RPM', 'Sensor Range Min' set to '0.00', and 'Sensor Range Max' set to '299995.00'. The 'Display' section includes 'Display Unit' set to 'RPM', 'Display Range Min' set to '0.00', 'Display Range Max' set to '0.00', 'Display Major Divider' set to '0.00', 'Display Minor Divider' set to '0.00', and 'Display Multiplier' set to '1'. There are 'Update Metric' and 'Update US' buttons. The 'Alarming (in Metric Units)' section has an 'Event' dropdown set to 'None'. At the bottom, there is a 'Use As Additional Run' dropdown set to 'No' and a 'Submit' button. Notes on the right side of the interface state 'Note! Submit to apply new unit.' and 'Note! Run = No Alarm'.

Engine Load

First, configure either a 4–20mA, 0–5V input or the J1939 PGN 0xf003, SPN 92. Select then the engine load source from the dropdown menu. Engine load can now be used as an additional setting when configuring alarms.



Gear

First select gear source from the dropdown menu.



- **In Gear Switch**

This is fixed input 95 on the DCU 410

- **Ahead/Astern Switches**

Configure 2 switch inputs as functions **Ahead** and **Astern**.

- **J1939 Transmission Current Gear (SPN 523)**

The gear settings can now be used as additional settings for alarms, or shown directly on the DCU. This is done by going to / home / dcu / user interface.

Select Gear indicator and select to show instead of all ok symbol.

Switch

First, select any of the eight switch channels. Then, for each channel, set the following parameters.

General

The screenshot shows the 'Switch Input #1' configuration page. On the left is a sidebar with a list of switch inputs from #1 to #8. The main area is titled 'Switch Input #1' and contains a 'Copy' button, a 'Copy configuration from' dropdown (set to 'None'), and a 'Copy' button. Below this is a 'Configure' section with the following fields: 'assign custom name' (text input with 'Fuel leak level high'), 'English Used' (text input), 'Function' (text input), 'Use as' (dropdown set to 'None'), 'General' section with 'Channel Use' (dropdown set to 'Not in use'), 'Event' (dropdown set to 'Alarm'), 'Input State' (dropdown set to 'Normally Closed. Event on open'), 'Delay Before Event [sec]' (text input with '5'), 'Requires Running Engine' (dropdown set to 'No'), 'Requires in Gear' (dropdown set to 'No'), 'Requires Engine Load' (dropdown set to 'No'), and 'Use As Additional Run' (dropdown set to 'No'). A 'Submit' button is at the bottom left. A note on the right states: 'Note! Enabling a function will automatically disable the channel use.' and another note at the bottom right states: 'Note! Run = Normal State'.

- **Channel Use**
Set to **Event** if in use. An event can be a warning, an alarm or a shutdown scenario.
Set to **Silent Event** for an active channel, but no panel alarms. The event will be available on communication only.
- **Event**
Select from Warning, Alarm, Load reduction or Shutdown.
- **Input State**
Select NO (normally open), or NC (normally closed). NO means the contact must close to make the event, whereas NC means the contact must open to make the event.
Note! *Normal* denotes a running engine with no alarm.
- **Delay Before Event**
Choose the desired persistence time before the event triggers.
Typical values:
Engine Oil Pressure Low: 2 seconds.
Engine Coolant Temp. High: 5–10 seconds.

- **Requires Running Engine**

Select **Yes** if the switch normally changes state when the engine goes from standstill to running, or vice versa.

This means the switch will alarm only when the DCU senses the engine is running.

Typical setting: Set to **Yes** for all pressure switches. Several different RPM set points are available.

- **Requires In-Gear**

This means the switch will alarm only when the DCU has a high input on In-gear input.

- **Requires Engine Load**

This means the switch will alarm only when the DCU has reached the configured % load.

- **Initial Delay**

Note! Available only if **On Run Only** is selected.

The switch event is disabled for this many seconds after the engine is running. After the timer has elapsed, the channel is enabled.

Typical value: 5–10 seconds.

- **Use as Additional Run**

If the DCU has one pickup source only, it is recommended to add an engine oil pressure switch as an engine running indication.

Note! Do not use any other pressure sensors – or any other signals – as the engine running indication!

If two or more engine speed (pickup) sources¹ are in use, then it is recommended leaving this off for all switches. Set to **No**.

If one engine speed source only, locate the engine oil pressure switch and use this as the Additional Run signal. Set to **Yes**.

¹ An engine speed source can be the magnetic pickup connected to the DCU, the J1939 CAN bus signal connected to the DCU, or the speed signal coming from the connected SDU 410 safety unit.

4–20 mA

First, select any of the four 4–20 mA channels. Then, for each selected channel, set the following.

4-20mA #1

4-20mA #2

4-20mA #3

4-20mA #4

4-20mA #1

assign custom name

General

Channel Use:

Not in use

Sensor

Sensor Unit:

milliAmpere

Sensor Range Min:

4.00

Sensor Range Max:

20.00

Display

Display Unit:

US

Display Range Min:

0.00

Display Range Max:

0.00

Display Major Divider:

0.00

Display Minor Divider:

0.00

Display Multiplier:

1

Update Metric

Metric

milliAmpere

0.00

0.00

0.00

0.00

1

Update US

Alarming (in Metric Units)

Event:

Alarm

High Alarm Threshold [milliAmpere]:

0.00

Low Alarm Threshold [milliAmpere]:

0.00

Delay After Crossing Alarm Threshold [sec]:

0

Threshold Type:

High & Low

Requires Running Engine:

Yes

Requires In Gear:

No

Initial Delay [sec]:

0

Use As Additional Run:

Yes

Submit

Note! Submit to apply new unit.

Note! Run = No Alarm

General

- **Channel Use**
This selects the panel the instrument widget is displayed on. It is possible to display the instrument on
 - the DCU engine panel, and
 - the RP remote panel, or
 - a combination of the two.

It is also possible to suppress the alarm events, as can be seen in the following table overview.

Use	DCU		RP		Config. outputs
	Display	Event	Display	Event	
Not in use					
Event		X		X	X
DCU	X				X
DCU + Event	X	X			X

Use	DCU		RP		Config. outputs
	Display	Event	Display	Event	
RP			x		x
RP + Event			x	x	x
DCU+RP	x		x		x
DCU + RP + Event	x	x	x	x	x
Silent Event					x
DCU + Silent Event	x				x
RP + Silent Event			x		x
DCU + RP + Silent Event	x		x		x

Display = the signal is displayed in a gauge, or a numerical format.

Event = warning, alarm or shutdown.

Silent Event = no local event, but event on communication only.

Note! Normally, and in most cases, the selection should be “DCU + RP + Event”, as highlighted in the table above. This makes sure the channel is displayed in the DCU and in the RP, if – or when – the RP is installed.

Sensor

- **Sensor Unit**
Select the unit, as printed on the sensor. An oil pressure sensor might for instance be in Bar or psi.
- **Sensor Range Min and Max**
Select the sensor range values for min and max, as printed on the sensor.

Display

- **Display Unit**
For the above sensor, select the desired displayed unit for US and Metric values.
- **Display Range Min and Max**
For the above sensor, select the desired minimum and maximum values displayed in the instrument, for US and Metric values.

- **Display Major and Minor Divider**

For the above sensor, select the desired major and minor divisions in the instrument, for US and Metric values. The major divider number is displayed at each major divider.

- **Display Multiplier**

Select a multiplication factor as necessary.

An instrument with displayed range 0–10,000 would display as 0–1,000 with a multiplication factor of 10. The multiplication factor is displayed in the instrument (round gages only).

- **Update Metric and US**

When the US section has been completed, then the web server can calculate the other section, and vice versa.

Note! The application does not round off values. It is highly recommended to adjust the calculated values by hand, and set sensible round figure values.

Alarming

This section is always completed in the currently selected system unit. To switch unit, simply press the Unit button on the DCU 410 front panel.

- **Event**

Select the desired combination of warning, alarm and shutdown. Select “RPM dependent” for a setpoint that varies with RPM, and complete the boxes.

- **Alarm Threshold [unit]**

Type in the alarm threshold value, in the correct units.

- **Delay After Crossing Alarm Threshold**

Set the persistence time before the event. Value is in seconds.

- **Threshold Type**

Set the event to appear on a rising (higher) or falling (lower) signal. A temperature fail is normally “too high”, and a pressure fail is normally “too low”. In addition, a high and low threshold set point can be configured.

- **Requires Running Engine**

Select between one of the following.

- Set **Yes** to disable the event when the engine is not running (enabled when engine is running only).
- Set **No** to enable the event always.
- Choose between other RPM setpoints if configured in the engine speed configuration.

See menu / dcu / io configuration / engine speed /

- **Initial Delay**

If **Yes** above, set the persistence time after the engine is running until the channel is enabled.

- **Requires In Gear**

This means the event will alarm only when the DCU has a high input on the **In Gear** input.

- **Requires Engine Load**

This means the switch will alarm only when the DCU has reached the configured % load.

- **Use As Additional Run**

- If the DCU has one pickup source only, it is recommended to add an engine oil pressure switch as an engine running indication.
Note! Do not use any other pressure sensors – or any other signals – as the engine running indication!
- Typical setting:

- If two or more engine speed (pickup) sources² are in use, then it is recommended leaving this off for all switches. Set to *No*.
- If one engine speed source only, locate the engine oil pressure switch and use this as the Additional Run signal. Set to *Yes*.

PT100

First, select any of the four PT100 channels.



Then, for each selected channel, set the parameters, as for the 4–20 mA section, page 50.

24V Inputs

First, select any of the two 24V input channels.



Note! These are *fixed function* inputs, and not the general switch input channels, as described on page 45.

These two inputs can be given a function from a list of available functions. The current available functions are:

- Local Mode
- Remote mode
- Backlight 100%
- Prelube Override

² An engine speed source can be the magnetic pickup connected to the DCU, the J1939 CAN bus signal connected to the DCU, or the speed signal coming from the connected SDU 410 safety unit.

- Local Start
- Local Stop
- Local Acknowledge
- Local/Remote Acknowledge
- In Gear (Ahead)
- In Gear (Astern)
- Toggle Crank Mode

Activate the function

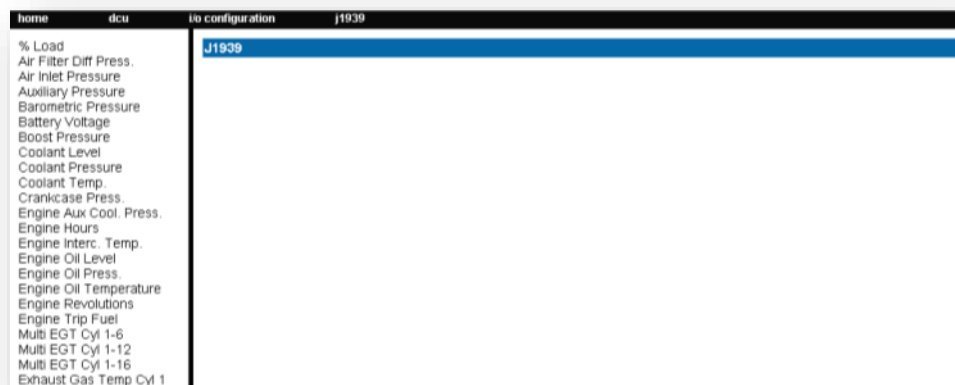
The function is activated when the input is connected to 24V.

Deactivate the function

The function is deactivated when the input is left open, or connected to 0V.

J1939

Select a J1939 CAN bus signal from the list.



Then, for each selected channel, set the parameters as for the 4–20 mA section, page 50.

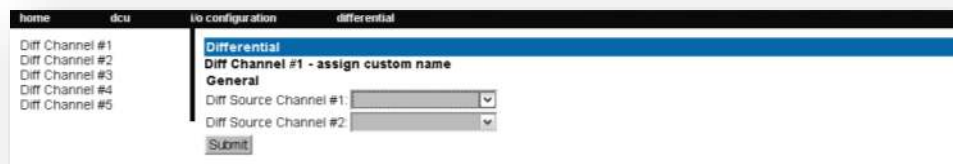
Differential

A *differential* channel is a *logical* (not physical) channel, made up by two physical channels. The physical channels may be hardwired or from the J1939 CAN bus.

Marine Pro.

The differential channel will output the difference between the two source channels. The sensor unit must be the same for the two selected source signals, for instance they must both be bar, and not one bar and one psi.

Select one of the five differential channels.



The screenshot shows the 'differential' configuration window in the Marine Pro. software. The window has a dark header with navigation tabs: 'home', 'dcu', 'io configuration', and 'differential'. On the left, a sidebar lists 'Diff Channel #1' through 'Diff Channel #5'. The main area is titled 'Differential' and 'Diff Channel #1 - assign custom name'. Under the 'General' section, there are two dropdown menus for 'Diff Source Channel #1' and 'Diff Source Channel #2'. A 'Submit' button is located at the bottom left of the main area.

Then, select two signals of the same unit type. The differential channel result can be assigned to an instrument widget.

Average

An *average* channel is a *logical* (not physical) channel, made up by two or more physical channels. The physical channels may be hardwired or from the J1939 CAN bus.

The differential channel will output the average between the two or more source channels. The sensor unit must be the same for the selected source signals, for instance they must both be bar, and not one bar and one psi.

Select one of the three differential channels.

Source Signals

Average Event

Deviation From Average Event

Average Signal #1

Configure

Source Signals

Source Signal #1:

None

 Edit Signal

Source Signal #2:

None

Source Signal #3:

None

Source Signal #4:

None

Source Signal #5:

None

Source Signal #6:

None

Source Signal #7:

None

Source Signal #8:

None

Source Signal #9:

None

Source Signal #10:

None

Source Signal #11:

None

Source Signal #12:

None

Source Signal #13:

None

Source Signal #14:

None

Source Signal #15:

None

Source Signal #16:

None

Source Signal #17:

None

Source Signal #18:

None

Source Signal #19:

None

Source Signal #20:

None

Submit

Special

These are a group of “special” signals as follows.



Input Voltage

This is the supply voltage *used in the DCU*, and is the same as the voltage supplied out on terminals 5–6.

A screenshot of the Marine Pro. software interface showing the 'Input Voltage' configuration screen. The top navigation bar has four tabs: 'home', 'dcu', 'io configuration', and 'special'. The 'special' tab is selected. Below the navigation bar, there is a sidebar on the left with three items: 'Input Voltage', 'Calc. Fuel Rate', and 'Calc. Engine Hours'. The main content area is titled 'Special' and 'Input Voltage - assign custom name'. It contains several sections: 'General' with a 'Channel Use' dropdown set to 'DCU+RP'; 'Sensor' with 'Sensor Unit' set to 'Volt', 'Sensor Range Min' set to '0.00', and 'Sensor Range Max' set to '40.00'; 'Display' with 'Display Unit' set to 'US', 'Display Range Min' set to '0.00', 'Display Range Max' set to '40.00', 'Display Major Divider' set to '10.00', 'Display Minor Divider' set to '5.00', and 'Display Multiplier' set to '1'; 'Alarming (in Metric Units)' with 'Event' set to 'None'. There are 'Update Metric' and 'Update US' buttons, and a 'Submit' button at the bottom.

The Input Voltage is the channel that monitors *either* Supply *or* Supply 2, whichever the DCU chooses.

Set the desired ranges for use in a gauge or bargraph.

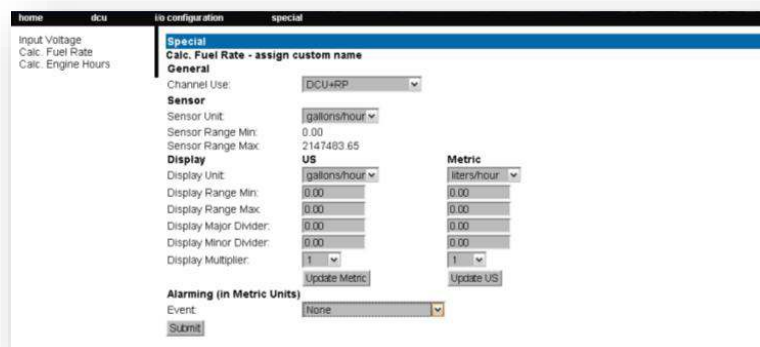
For an alarm, set an event and complete the dialog.

Calculated Fuel Rate

The DCU can calculate the fuel consumption and present an approximate figure.



Note! The Boost Pressure MUST be connected to 4–20 mA channel #2.



Select the channel and configure accordingly.

Calculated Engine Hours

If the engine hours are not sourced from the J1939 CAN bus, it is being calculated internally by the DCU.

The appearance of the counter is configured in this dialog.

It is possible to set an alarm or other event connected to the engine hours.

Instantaneous Fuel Economy (DCU)

The DCU has seven 24V outputs. The function on the output is configured here.

Analog Modbus

The DCU has 50 analog Modbus registers that users can write to from external devices. The values can be used as signal sources, and set up in the same way as 4–20 mA sensors. Please see the communication manual for further technical description of the registers.

Digital Modbus

The DCU has 500 digital Modbus registers that users can write to from external devices. The values can be used as signal sources, and set up in the same way as switch sensors. Please see the communication manual for further technical description of the registers.

EGT (Exhaust Gas Temperature)

Cylinder Deviation Event

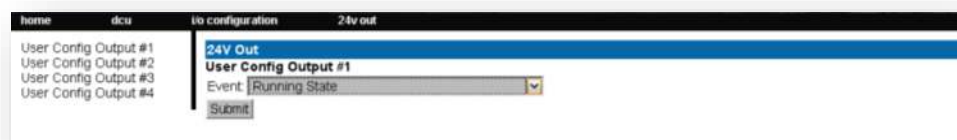
The deviation is the difference between the cylinder value and the average value. Deviation is positive (above zero) if the cylinder value is above the average, and negative (below zero) if the cylinder value is below the average.

Turbo Deviation Event

The deviation is the difference between the turbo value and the average value. Deviation is positive (above zero) if the turbo value is above the average, and negative (below zero) if the turbo value is below the average.

24V Outputs

The DCU has seven 24V outputs. The function on the output is configured here.

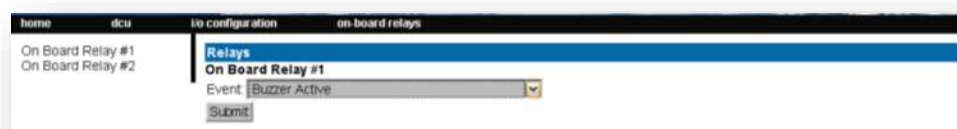


Select one of the seven 24V output channels.

Then, for each channel, select the desired function.

Relays

The DCU has two inbuilt potential free relay contacts,

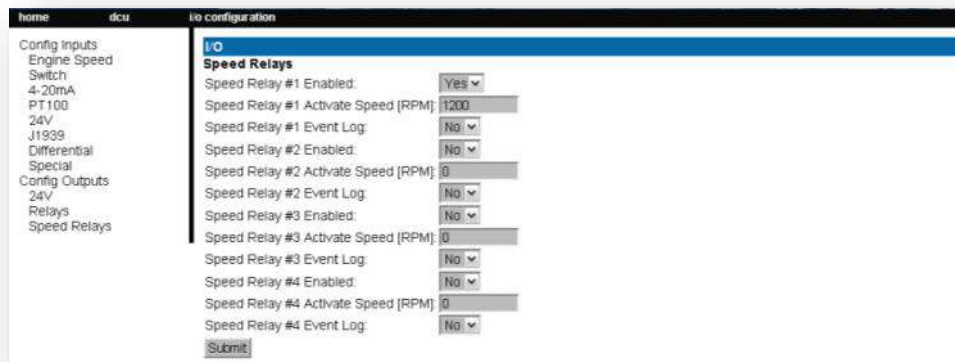


which can be assigned a function.

Select one of the two relays. Then, for each channel, select the desired function.

Speed Relays

A Speed Relay is a relay that activates on a certain engine speed rpm, and deactivates at the same rpm-1.



The screenshot shows the 'I/O configuration' window in the Marine Pro. software. On the left is a sidebar menu with options: Config Inputs, Engine Speed, Switch, 4-20mA, PT100, 24V, J1939, Differential, Special, Config Outputs, 24V, Relays, and Speed Relays. The 'Speed Relays' option is selected. The main panel is titled 'I/O' and 'Speed Relays'. It contains configuration settings for four relays. For Speed Relay #1, 'Enabled' is set to 'Yes' and 'Activate Speed [RPM]' is set to '1200'. For Speed Relay #2, 'Enabled' is 'No' and 'Activate Speed [RPM]' is '0'. For Speed Relay #3, 'Enabled' is 'No' and 'Activate Speed [RPM]' is '0'. For Speed Relay #4, 'Enabled' is 'No' and 'Activate Speed [RPM]' is '0'. All 'Event Log' settings are set to 'No'. A 'Submit' button is at the bottom.

Speed Relay #	Enabled	Activate Speed [RPM]	Event Log
1	Yes	1200	No
2	No	0	No
3	No	0	No
4	No	0	No

For instance, speed relay #1 can be configured to activate at 1200rpm, and will then deactivate at 1199rpm.

Set Event Log to Yes to create an event in the log when the speed relay activates.

The Speed Relay can be assigned to any configurable output.

J1939 Outputs

- The DCU can transmit J1939 on Idle Bus.
- J1939 outputs.
Each channel can be configure to transmit different SPN/PGN signals.
- Special
Transmit Nominal speed to engine (SPN 515)
Start Stop over J1939 (SPN 3452)

Home – DCU – Interface Design

This is the section where templates are populated with the already configured signals from the I/O section.

A *page* on the DCU is built up with a *template*. A *template* has several *slot* positions. Each *slot* position can hold a *widget* type, which in turn can be assigned a *signal*.

Configuration

Chose if the DCU is to display green section on bars when the signal is within parameter.

Option for displaying J1939 switchover from J1939#1 to J1939#2.

Pages

This is where the configuration of the different pages is done.

In the example below, three pages are created.



Insert a new Page

Choose whether the new page is to appear before or after an existing page, then press the **Insert Page** button. The pages will be renumbered.

Choose a Template

A range of templates will be presented. Choose a template and start populating the page with predefined signals.

The chosen template will appear at the bottom of the screen. Select a signal and **Submit** it to clear away the other templates.

Delete a Page

First Select the page, and then press the **Delete** button.

The pages will be renumbered!

Edit the Signal

If the chosen signal is not correctly configured, press **Edit Signal** to edit it.

RP Home View Configuration

The RP 410 home page displays certain parameters from each connected DCU.

This is configured in each DCU.

Home – DCU – Start/Stop/Prelube

Settings

There are several settings for Start/stop on the DCU.

The screenshot shows the 'Settings' page for the DCU Start/Stop/Prelube functions. The page is divided into several sections with various settings:

- General**
 - DCU Engine Start/Stop Control: Exclusive (dropdown)
 - Disable Local Start/Stop Buttons: No (dropdown)
 - Hold Button to Start/Stop: No (dropdown)
 - Allow E-Start: No (dropdown)
 - Only Allow Local Start In Local or Emergency Mode: Yes (dropdown)
 - Allow Automatic Start/Stop in All Operation Modes: No (dropdown)
 - Prohibit Crank Above RPM Threshold [RPM]: 5 (dropdown)
- Prelube**
 - Prelube Type: No Prelube (dropdown)
- Oscillating Prelube**
 - Oscillating Prelube: No (dropdown)
- Automatic Start**
 - Initial Start Delay [seconds]: 1 (text input)
 - No. of Start Attempts: 3 (text input)
 - Prelube Before Each Start Attempt: No (dropdown)
- Starter 1**
 - Cranking Time [seconds]: 7 (text input)
 - Delay Between Start Attempts [seconds]: 7 (text input)
- Starter 2**
 - Enable Secondary Starter: No (dropdown)
- Automatic Stop**
 - Delay Before Disconnecting Generator Breaker [seconds]: 180 (text input)
 - Cooling Time [minutes]: 3 (text input)
- Stopping**
 - Stopping Time [minutes]: 1 (text input)
 - Safety Stopping Time [seconds]: 30 (text input)

A 'Submit' button is located at the bottom left of the settings area.

General

The DCU Engine Start/stop can be configured to three different modes.

- **Exclusive**, the DCU has exclusive control of the engine start/stop. Warnings will be given for unexpected state changes.
- **Shared**, the DCU has shared control of the engine start/stop. No warnings will be given for unexpected state changes.
- **Deactivated**, the DCU is not in control of the engine start/stop. No warnings will be given for unexpected state changes.

The Start and Stop button can be configured to be *Latched* or *Momentary*.

Note! The selection is valid for the Start and Stop button.

Disable Local Start/Stop Buttons

Disable the local start/stop buttons on the DCU.

Hold Button to Start/Stop

- Set to **Yes** for a momentary Hold-To-Start/Stop button. The button must be pressed until the engine has started/stopped.
- Set to **No** for a latched button. The button needs to be pressed momentarily, after which the DCU completes the start/stop sequence as if the button was held continuously.

Typical setting:

- **No** (gives a latched button operation, which is normally preferred).

Allow E-Start

This will give the option of starting with prelube override and shutdown override.

Only Allow Local Start In Local or Emergency Mode

Typical setting is **Yes**.

If setting is **No**, local start/stop will work in any mode of operation.

Allow Automatic Start/Stop in All Operation Modes:

Default setting **NO**.

Prohibit Crank Above RPM Threshold [RPM]

Select between

- Not in use

- 5 RPM
- 300 RPM

Prelube

The DCU can prelube the engine at certain regular intervals, and/or before start.

Prelube Type – Fixed Time

This will activate prelube on terminal 84 (Prelube Act.) for



The screenshot shows a web-based configuration interface for a DCU. On the left, there is a sidebar menu with options: 'Auto Start/Stop', 'Prelube', and 'Start/Stop Buttons'. The main content area is titled 'Start/Stop/Prelube' and contains the following settings: 'Prelube Type' is set to 'Fixed Time' (selected from a dropdown), 'Prelube Time [seconds]' is set to '10' (in a text input field), and 'Override Allowed' is set to 'Yes' (selected from a dropdown).

a fixed time, after which the DCU will crank the engine with terminal 83 (Crank).

Prelube Time

Set the number of seconds the DCU shall prelube before start.

Typical setting:

- 5–30 seconds

Prelube Type – Until Pressure

This will activate prelube on terminal 84, then await the activation of the Prelube Complete signal on terminal 86.



The screenshot shows the same web-based configuration interface. The settings are: 'Prelube Type' is set to 'Until Pressure' (selected from a dropdown), 'Prelube Timeout [seconds]' is set to '1' (in a text input field), and 'Action Upon Timeout' is set to 'Allow Start' (selected from a dropdown). The 'Override Allowed' setting remains 'Yes'.

Prelube Timeout

The DCU expects to receive the Prelube Complete signal on terminal 86 within this timer period.

Typical setting:

- 5–30 seconds

Override Allowed

Select if a prelube should be possible to manually override, to continue the start sequence with an incomplete prelube sequence.

Note! The override is done in the DCU menu – Settings – Prelube Override.

Action Upon Timeout

Select the action if the Prelube Timeout timer elapses.

- Select **Allow Start** to continue cranking the engine anyway.
- Select **Abort Start** to abort the start sequence. The DCU will indicate with a Prelube Failure alarm.

Oscillating

The DCU can prelube the engine continuously, in a never ending sequence. The sequence is disabled while the engine is running.

Oscillating Enabled

Set to **Yes** to enable oscillating prelube.

Oscillating On Time

Set the number of seconds the DCU shall lubricate the engine.

Typical setting:

- 60 seconds

Oscillating Off Time

Set the number of minutes between each lubrication action.

Typical setting:

- 60 minutes

Oscillating Feedback

Set this if a feedback from the oscillating feedback is required. The feedback will have to be connected to prelube complete.

Oscillating Feedback time

Set the timer for oscillating feedback failed warning.

Auto Start/Stop

The DCU can start the engine automatically. The following conditions must be met:

- Terminal 88 (Automatic Mode) must be high (24V), or the DCU menu item Settings – Automatic must be selected.
- Terminal 89 (Automatic Start) must be high (24V). This triggers the start sequence.

Initial Start Delay

When the start sequence activates, this timer must elapse before the DCU will do the first start attempt.

Typical setting:

- 1 second

No. of Start Attempts

The total number of start attempts.

Typical setting:

- 3 attempts

Prelube Before Each Start Attempt

Select **Yes** to prelube before each start attempt.

Select **No** to prelube before the first attempt only.

Starter 1 / Starter 2

Cranking Time

The time the starter engine is engaged.

Typical setting:

- 5–7 seconds

Delay Between Start Attempts

If the engine did not start after the previous attempt, it will delay this many seconds until it does the next start attempt.

Note! The timer starts when the engine rpm is less than 5rpm.

Typical setting:

- 5–7 seconds

Starter type

Configure the type of starter connected to the crank output.

If configured a 2nd starter, a 2nd crank output has to be configured, see 24V outputs in

/ home / dcu / I/o configuration / 24v output functions

Automatic Stop

The DCU can stop the engine automatically. The following conditions must be met:

- Terminal 88 (Automatic Mode) must be high (24V), or the DCU menu item Settings – Automatic must be selected.
- Terminal 90 (Automatic Stop) must be high (24V). This triggers the stop sequence.

Delay Before Disconnecting Generator Breaker

When the automatic stop condition is applied, the DCU will wait this many seconds, and then it will activate a signal to disconnect the generator breaker, if any.

The Disconnect Generator Breaker signal is not a standard output signal, and must be configured to a suitable 24V or relay output.

Typical setting:

- 1–60 seconds

Cooling Time

After the previous timer has elapsed, the engine will continue to run (with no load) for this amount of time to cool down. When the timer has elapsed, the DCU will stop the engine.

Typical setting:

- 1–5 minutes

Stopping

Configurable settings for stopping state.

Stopping Time is the timer for the duration of the normal stopping state.

Safety Stopping Time is the timer for the duration of safety stopping, where the DCU/SDU has lost the running state via either Pickup/J1939 or other additional run signals.

Home – DCU – User Interface

Language

In this section, the signal descriptions can be manually translated to other languages.

All Signals

Press All Signals to display all signals available in the DCU.

The page displays three rows of signal text. The first row is the *English Default* text, the second row is the *English Used* text, and the third row is the 2nd language.

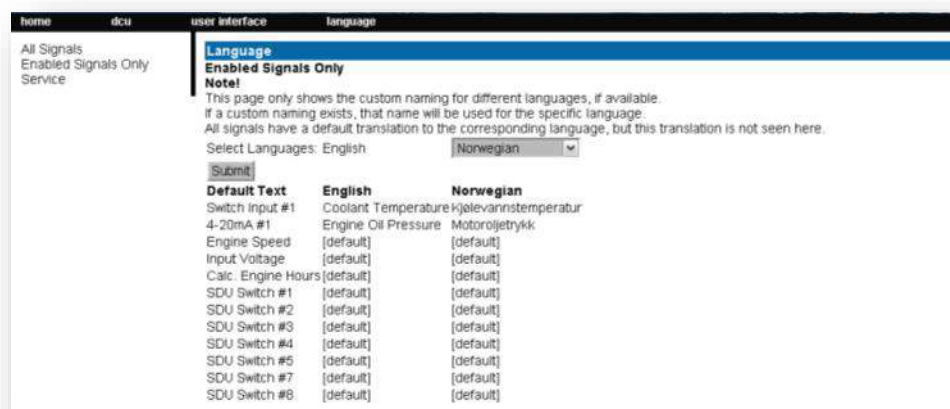
English Default	English Used	2nd Language
Engine Oil Press.	Engine Oil Pressure	Motoroljetrykk
Engine Speed	[default]	Motorturtall

Note! The English language is always available in the DCU and the RP.

The text [default] means that the English default text (column 1) will be used. Select any [default] text to change the signal text description.

Enabled Signals Only

This is the same as **All Signals**, except that only signals that are in use are listed.



Service

The four Service intervals will indicate with a text. The default text can be changed.

As above, press the [default] text to change the default text.

Buzzer

Buzzer Off

Select **Yes** to suppress the buzzer automatically.

The buzzer will activate as before, but the DCU will automatically silence after 5 seconds.

Gear Indicator

Show Gear Indicator Instead Of All Ok

Select **Yes** to show the Gear Indicator instead of All Ok symbol.

Home – DCU – Engine Model

Engine Name

Type the name of the engine, for example “Auxiliary”.

Note! The last two digits in the DCU IP-address becomes the engine number. If the IP-address is 192.168.0.110, then the engine is in this example is named “Auxiliary #10”.

Home – DCU – Service Interval

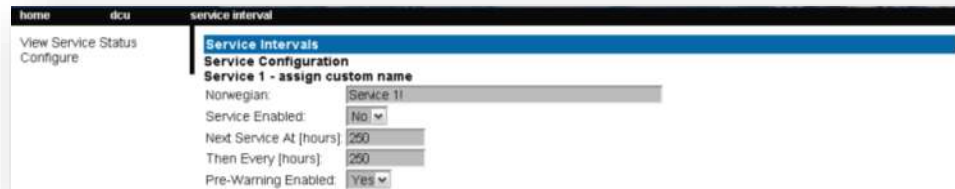
View Service Status

This will list the number of hours until next service is due.

Configure

Up to four different timers can be configured to indicate it is time for engine service.

The default text “Service 1” can be changed by selecting



the *assign custom name* link.

Service Enabled

Select **Yes** to enable this service interval timer.

Next Service At

Select the hour counter value in the DCU for the *first* service. Note that this happens only one time.

This is useful if the first service should have a shorter interval than the regular service interval.

Then Every

Select the service interval in hours. The DCU will indicate every time this number of hours has elapsed.

Example

Current DCU hour counter is 123 hours.

- Next Service At: 150 hours
- Then every: 250 hours

The first service notification will appear in 27 hours, then every 250 hours. All hours are engine running hours.

Home – DCU – Communication

Network Communication

Set the IP-address for the DCU.

Make sure the IP-address is unique on the network. If installing the DCU in an already established ship Ethernet, consult the network manager to obtain an IP-address.

Note! The last two digits becomes the engine number, as part of the engine name.

Example

The Engine name is “Auxiliary”, the IP-address is selected as 192.168.0.110. The engine name then becomes “Auxiliary #10”.

J1939/CANopen

The DCU has an inbuilt CANopen communication interface. This port can be used as a second J1939 interface.

Baudrate

Set the Baudrate (communication speed) for the CANopen interface the DCU is connected to on COM 5.

Typical setting:

- 125kbps

Node ID

Set the Node ID for the DCU CANopen interface.

Typical setting:

- Unique integer number from other CANopen nodes on the same network.

Download EDS file

Select this to download an EDS file.

Modbus RTU

The DCU has an inbuilt Modbus RTU communication interface.

Power

Power the optocoupled interface with 24VDC.

Modbus Parameters

Baudrate: 19200

Databits: 8

Stop bit: 1

Parity: Even

Address

Set the Modbus ID number. The number can be any integer in the range 1–32, and must be unique on the network.

J1939 Configuration

Source Address

Set the address for the J1939 communication.

Default setting is **0xf2**.

Request Address

Setting which address to use for requesting an address for the DCU, **0xFF** is for broadcast.

Default setting is **0x00**.

Allowed Address

Setting for which addresses the DCU will use to present the configured J1939 signals.

Default setting is **Show All**.

By selecting **No**, the user can define up to 10 addresses to be used by the DCU.

Allowed DM1 Address

Setting for which addresses the DCU will use to present the DM1 fault messages.

Default setting is **Show All**.

By selecting **No**, the user can define up to 10 addresses to be used by the DCU.

J1939:2 Request Address

The secondary J1939 channel has to be enabled to be used as a J1939 interface.

Default for this interface is **CANopen**.

Setting which address to use for requesting an address for the DCU, **0xFF** is for broadcast.

Default setting is **0x00**.

J1939:2 Allowed Address

The secondary J1939 channel has to be enabled to be used as a J1939 interface.

Default for this interface is **CANopen**.

Setting for which addresses the DCU will use to present the configured J1939 signals.

Default setting is **Show All**.

By selecting **No**, the user can define up to 10 addresses to be used by the DCU.

J1939:2 Allowed DM1 Address

The secondary J1939 channel has to be enabled to be used as a J1939 interface.

Default for this interface is **CANopen**.

Setting for which addresses the DCU will use to present the DM1 fault messages.

Default setting is **Show All**.

By selecting **No**, the user can define up to 10 addresses to be used by the DCU.

Home – DCU – Miscellaneous

Alarm Configuration

The DCU has a primary and a secondary power supply input.

If the secondary input is not in use, the low voltage alarm on this input needs to be disabled.

Primary Power Fail Alarm Enabled

- Set to **No** to disable the alarm. This is used when there is no connection to the primary supply.
- Set to **Yes** to enable the alarm. This is used when there is a connection to the primary supply.

Typical setting:

- **Yes**. Normally, there shall be a separate supply connected to the primary supply.

Secondary Power Fail Alarm Enabled

- Set to **No** to disable the alarm. This is used when there is no connection to the secondary supply.
- Set to **Yes** to enable the alarm. This is used when there is a connection to the secondary supply.

Typical setting:

- **Yes**. Normally, there shall be a separate supply connected to the secondary supply.

J1939 CAN bus Broken Wire Alarm When Engine Not Running

Default setting is **No**.

J1939 CAN bus Nodes Lost Warning Enabled:

Default setting is **No**.

Erratic J1939 Data Warning Enabled:

Default setting is **No**.

J1939 CAN bus Red Lamp Severity

A red lamp severity DM1 fault can be configured to give an alarm, or shutdown.

J1939 CAN bus Amber Warning Lamp Enabled

An amber warning lamp DM1 fault can be configured to give an alarm.

RP Lost Warning Enabled

Configure if the DCU is to give an alarm if the DCU loses network connection to an RP panel.

Default setting is **No**.

Counters

The DCU calculates and stores engine running hours.

Counter Source

Set the counter source to be either from the J1939 CAN bus, or from a locally generated counter in the DCU.

Update Local Engine Hours

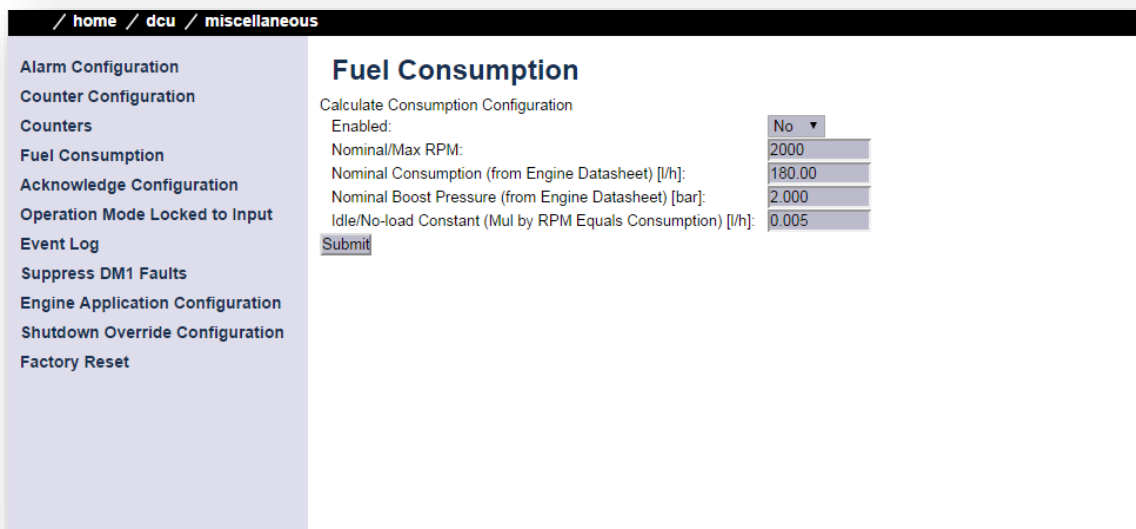
This updates the local counter to any new value.

Current Engine Hours

Set a new total engine hour setting.

Note! If the Counter Source is J1939, then this setting will be overwritten when the DCU receives new data on the J1939 CAN bus.

Fuel Consumption



The screenshot shows the 'Fuel Consumption' configuration page in the Marine Pro. web interface. The breadcrumb trail at the top reads '/ home / dcu / miscellaneous'. The sidebar on the left contains the following links: Alarm Configuration, Counter Configuration, Counters, Fuel Consumption (highlighted), Acknowledge Configuration, Operation Mode Locked to Input, Event Log, Suppress DM1 Faults, Engine Application Configuration, Shutdown Override Configuration, and Factory Reset. The main content area is titled 'Fuel Consumption' and includes the heading 'Calculate Consumption Configuration'. Below this, there are several configuration options, each with a label and a corresponding input field:

Configuration Option	Value
Enabled:	No
Nominal/Max RPM:	2000
Nominal Consumption (from Engine Datasheet) [l/h]:	180.00
Nominal Boost Pressure (from Engine Datasheet) [bar]:	2.000
Idle/No-load Constant (Mul by RPM Equals Consumption) [l/h]:	0.005

At the bottom of the configuration fields is a 'Submit' button.

By inputting the **Nominal RPM**, **Nominal Consumption**, **Boost Pressure** and **Idle/No-Load Constant**, the DCU can calculate an estimated fuel consumption value.

Acknowledge Configuration

The DCU has two different settings for acknowledge function of alarms.

Only Acknowledge Visible Events.

By setting this parameter to yes, the DCU can only acknowledge events that are visible in current view of the alarmlist when using acknowledge all function.

Disable Remote Acknowledge

Enable or disable remote acknowledge.

Operation Mode Locked to input

Disabling local start/stop buttons and the ability to change operation modes on the DCU. Modes of operation and start stop can only be activated by the terminal inputs on the rear of the DCU.

Event Log

The DCU has an inbuilt event log.

Everything

This displays a list of all events in chronological order.

Alarms Only

This displays a list of all warning, alarm and autostop (shutdown) events.

User Interaction Only

This displays a list of all button presses.

- **Local Start/Stop Button**
- **Local Alarm List Button**

- Service Complete Button
- Service Remind me later Button

Commands Only

This displays a list of all remote commands to the DCU.

Events Only

This displays a list of all events that are not alarms.

- Automatic Mode input (terminal 88, or configurable input configured as Automatic Mode).

- Speed Switches
- Prelube Override
- Power On/Off
- Crank Without Prelube
- Start Disabled input (terminal 87)

Sequence Only

The following events are logged as Sequence.

- Automatic Start/Stop (terminal 89/90)
- Remote Start/Stop (terminal 91/92)
- Remote Acknowledge (terminal 93)
- Remote Start/Stop by command (RP and Modbus)
- Remote Acknowledge by command (RP and Modbus)Save As...

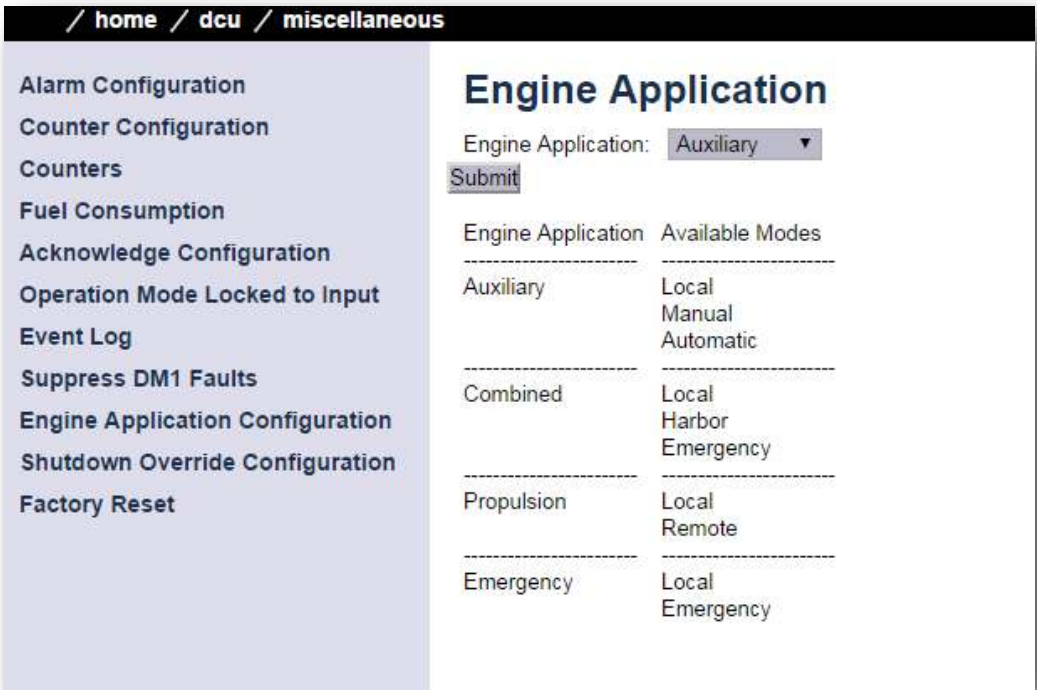
The current list of events can be saved into a text file.

Suppress DM1 Fault

The ability to suppress combinations of SPN and FMI appearing on the J1939 interface.

Engine Application Configuration

Configuration of the Engine Application and displays which modes of operation are available for said application.



Shutdown Override Configuration

Transmit Shutdown Override to SDU

Transmits the shutdown override command from the DCU to the SDU, does not affect the transmitting of shutdown override from SDU to DCU.

Shutdown Override from J1939

The parameter to enable shutdown override from J1939.

Factory Reset

Command for factory resetting the DCU.

Home – DCU – Language

This is a shortcut link to the Language section.

Communication Interface List

The DCU Communications Interface List covers the communication interface for

- Modbus RTU (COM 3)

The Communication I/O list is available online from one of the following links

- Click [here](#), or
- <http://goo.gl/5qk4YH>

DCU 410 and DCU 408 capacity

Functionality and content highlights

- 2 x 24 V DC redundant supply
- 5.7" TFT colour Screen (not DCU 408)
- 4 x PT100 input channels
- 4 x analogue input channels, 4–20 mA
- 8 x switch input channels
- 1 x tachometer input channel
- 1 x Ethernet incl. Modbus/TCP
- 1 x RS-485 Modbus RTU
- 1 x J1939 CAN interface
- 1 x CANopen/J1939#2 interface
- 2 x configurable relay outputs
- 7 x configurable 24 V outputs
- 1 x common alarm relay
- RP 410 Remote Panel link (TCP/IP)
- SDU safety unit link
- RIO expansion I/O link
- MK-14 expansion relays link
- Internal web server for configuration and support
- Password protected configuration
- User selectable units (U.S. / Metric)
- True multilingual
- Sophisticated alarm configuration
- Supply voltage monitoring and alarm

- Extensive alarm list with ECM diagnostics
- SPN/FMI codes, translated into current selected language
- Log of all events
- Configurable prelube functionality
- Service interval timers
- Ambient light sensor for automatic backlight adjustment
- Calculated approximate fuel consumption values
- Certified by major classification societies

Total I/O capacity

The I/O capacity of the DCU can be expanded using one or more of the RIO units, see page 100.

Signal type	Standard	Max
4–20 mA	4	40
PT100	4	36
Switch Inputs	8	24+16
Thermocouple K-type	0	8+20
Configurable Relays	2	24
Configurable 24V Out	4	12
0–5V Inputs	0	4
J1939 Channels	20 pages	20 pages

RP 410 Remote Panel Installation

Location

The RP is normally located in the engine control room and wheelhouse.

The RP should be mounted at about eye level and the user should have easy access to the touch screen and buttons on the panel.



Marine Pro.

General Overview



The RP 410 is the remote panel for the DCU engine control unit. It is connected to the Ethernet network together with the DCU unit, and will – after a network search – locate all connected DCU units, and update its configuration accordingly.

No configuration is necessary on the RP 410. Just connect it to the network and set user preferences using the menu interface.

One RP 410 can control and monitor up to eight DCU units, and there can be an “unlimited” number of RP 410 units connected on the same network.

In an installation where multiple (more than one) RP 410 units are installed, the RP 410 units makes sure only one RP 410 has command of a single DCU at any one time.

Electrical Connections

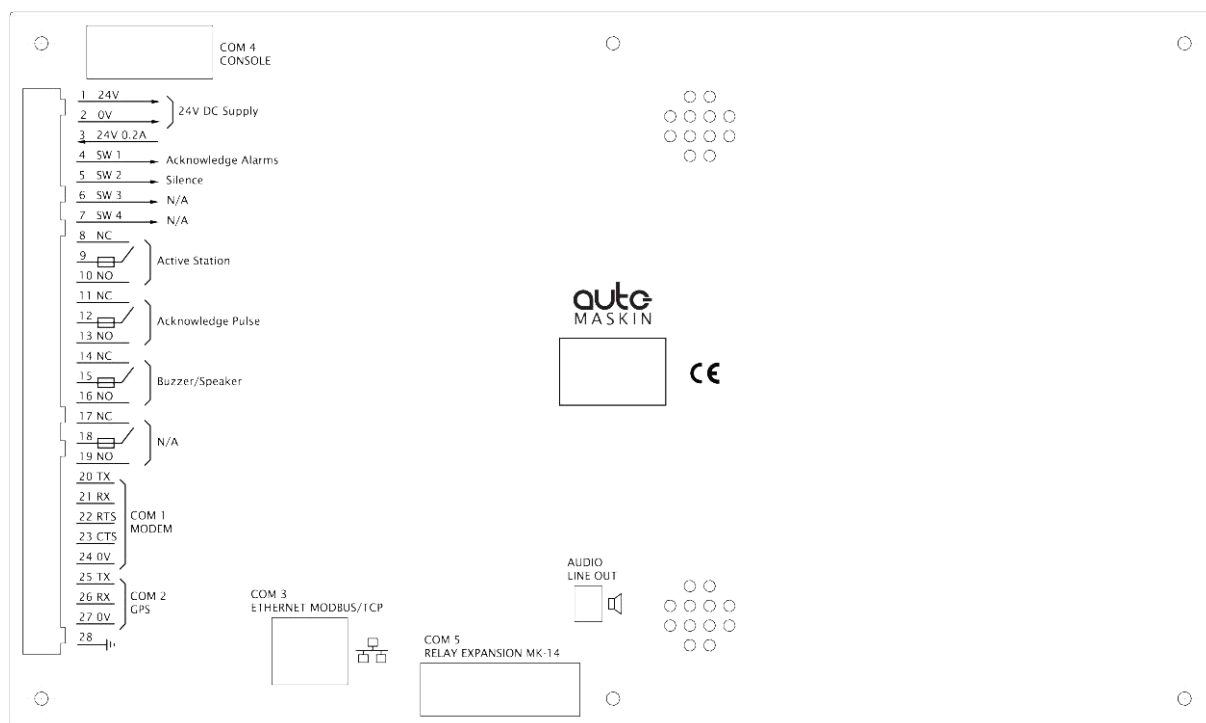
A minimum installation requires only power supply to terminals 1–2, and an Ethernet cable to the Ethernet switch.

Wire Terminal Layout Overview

Power supply input /auxiliary power output			
1	+24VDC Primary Supply, 1A		In
2	0V Primary Supply		In
Switch Inputs			
3	+24VDC Switch Power output, 0.2A		Out
4	Global Acknowledge		In
5	Local Silence		In
6	Switch 3 <reserved>		In
7	Switch 4 <reserved>		In
Relays			
8	Relay 1 NC	Partial/Full Active Station	In/Out
9	Relay 1 Common		In/Out
10	Relay 1 NO		In/Out
11	Relay 2 NC	Acknowledge Button (1 sec pulse)	In/Out
12	Relay 2 Common		In/Out
13	Relay 2 NO		In/Out
14	Relay 3 NC	<reserved>	In/Out
15	Relay 3 Common		In/Out
16	Relay 3 NO		In/Out
17	Relay 4 NC	<reserved>	In/Out
18	Relay 4 Common		In/Out
19	Relay 4 NO		In/Out
Modem Interface – COM 1			
20	Tx		Out
21	Rx		In
22	RTS		Out
23	CTS		In

24	0V	In
GPS Interface – COM 2		
25	Tx	Out
26	Rx	In
27	0V	In
28	Protective Earth	–

Rear Lid Graphical Layout



RP 410 rear lid layout

System Configuration Icon selections

To get to the system configuration, do as follows.

1. Press the **Home** button
2. Select the **Menu** touch button
3. Select the **Configuration** icon
4. Select the **System Configuration** icon

Type the password to get access to the submenu.

Note! The factory default password is 1234. If this password does not work, a new password has been set.

Lost Password

The RP will issue an encrypted code if a wrong password is entered.

This encrypted code can be sent to your distributor, who will be able to obtain the original password.

Change Password

The default password is **1234**.

In order to preserve the configuration from unauthorized access, the password should be changed. Enter a 4-digit code to secure the configuration, and keep the password in a safe place.

Station Priority

Different priorities are used in conjunction with multiple RP remote panels. If only one RP is installed, the priority should be set to 1.

Society regulations require that only one remote panel can control an engine, at any given time.

In the RP, the panel currently controlling an engine is called the Active Station for that engine.

There are three RP priorities.

- **Priority 1** panels will always become an active station if required. It will take the engine control from panels with priority 1, 2 or 3.
- **Priority 2** panels must ask for engine control. Priority 1 and Priority 2 panels with engine control must agree to the handover.
- **Priority 3** panels can never do engine commands.

RP Priority Summary

The following table summarizes the priority scheme.

	Priority 1 Typically highest priority control station, like the engine control room. Also if one RP in the network only.	Priority 2 Typically lower priority control station or wheelhouse.	Priority 3 Typically in a possible public area, or where commands shall not be possible.
Take command	Can always take command from the current active panel; no question asked. Note! If the operator tries to execute a command, and the panel is not the active station, it will immediately become the active station and execute the command.	Can take command from active station panels with priority 1 or 2 after confirmation at the current active panel.	Disabled. This priority can never be an Active Station.
Release command	Will handover command to any other priority 1 panel immediately. May handover command to priority 2 panels, depending upon Confirmation Timeout Priority.	Will handover command to any other priority 1 panel immediately. May handover command to priority 2 panels, depending upon Confirmation Timeout Priority.	If in command, will handover command to priority 1 or 2 panels immediately.

Make sure to select a priority for the RP remote panel that best fits its use.

Timeout Behavior

This function is used in conjunction with multiple RP remote panels and active station handover.

Example: An RP panel X is currently the active station for an engine.

If an RP panel Y is requesting active station for an engine, and the operator at RP panel X does not respond to the request within the defined period of time, then it is assumed there is no operator at RP panel X.

In these instances, the RP panel X can be configured to automatically either release its active station status for the engine, or deny the request altogether.

Note that either action takes place after the defined timeout.

DCU Alarms

If disabled, no alarms will be present on this RP station.

This is typically use in the wheelhouse, if there is another RP panel in a manned engine control room.

DCU Acknowledge

If disabled, alarms cannot be acknowledged on this RP station.

Note! If DCU Alarms is disabled then DCU Acknowledge is also disabled.

Station Location

Select the current location for this panel.

This is used in conjunction with multiple RP remote panels, where there is a need for the other panels to see which panel is asking to become the active station for a certain engine.

Functional Outputs

If the optional relay board module MK-14 is connected to the RP port COM 5, certain functions can be configured to appear at these relays.

See page 108 for a closer description of the MK-14 module.

IP-address

The IP-address for the RP can be changed here.

Note! Make sure the new IP-address is unique on the network.

DCU Connections

This lists the currently connected DCU's. Press Search to make the RP search for all connected DCU units on the network.

When an RP is correctly connected to one or more DCU units, the RP is automatically updated with the same instruments and pages as in the DCU.

Ignore certain engines

If a DCU appears on the list that is unwanted, select the Ignore checkbox for that engine. The DCU (that engine) is now ignored by the RP.

Cameras

Select the camera type and set the IP-address (as printed on the camera) for the camera. Up to four cameras can be installed, and they must have unique IP-addresses.

Camera position

The four cameras are displayed in the RP screen at the following positions.

<i>Camera 1</i>	<i>Camera 2</i>
<i>Camera 3</i>	<i>Camera 4</i>

IP-address

The reserved camera IP-address range is 192.168.0.220 to 192.168.0.239.

Camera type

Select the correct camera type.

Lock

Select this icon to logout from the System Configuration section. The password must be entered to re-enter.

Note! If the System Configuration section is not manually locked, the RP will lock it automatically anyway after a timeout.

Reset to Factory Defaults

Select this to reset the RP panel to its factory default values.

Note! After reset, the factory default password is set to 1234.

After reboot, the RP will start up with the startup wizard questions, and a new password can be set.

Add-On Modules

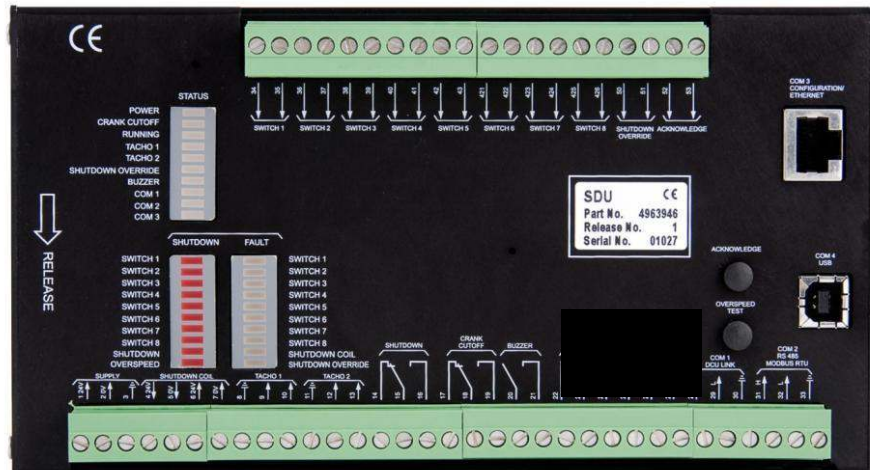
Different expansion units are available, as follows below.

SDU 410 Safety Unit

The SDU 410 Safety Unit operates fully independent from the DCU, but has a communication link.

Note! The SDU is mandatory in type approved installations.

The SDU has a built-in web server and can be configured independently, or it can be configured using the web-server in the DCU.



The configuration is stored internally, as well as in the DCU configuration file.

Capacity

A maximum of eight switch channels are available to command a shutdown.

All eight channels are monitored for a broken wire or a short circuit, to 0V or 24V, on any of the two terminals.

Wire Terminal Layout Overview

Power supply inputs		
1	+24VDC	In
2	0V	In
3	Ground	–
Shutdown Coil		
4	+24VDC	Out
5	0V	Out
6	+24VDC, Supply	In
7	0V, Supply	In
Pickup input (Tacho / Speed input)		
8	Shield	–
9	#1 Pickup A	In
10	#1 Pickup B	In
11	Shield	–
12	#2 Pickup A	In
13	#2 Pickup B	In
Shutdown Relay		
14	Shutdown NC	Out
15	Shutdown Common	In
16	Shutdown NO	Out
Crank Cut-off Relay		
17	Crank Cut-off NC	Out
18	Crank Cut-off Common	In
19	Crank Cut-off NO	Out
Buzzer		
20	Buzzer Out	Out
21	Buzzer In	In
Fault Relay		
22	Fault Relay NC	Out
23	Fault Relay Common	In
24	Fault Relay NO	Out

Running Relay		
25	Running Relay NC	Out
26	Running Relay Common	In
27	Running Relay NO	Out
Com Interface		
28	Com #1 DCU Link High	–
29	Com #1 DCU Link Low	–
30	Shield	–
31	Com #2 RS485 MODBUS High	–
21	Com #2 RS485 MODBUS Low	–
33	Shield	–
Switch Inputs		
34	Switch # 1 (Wire Break Detection)	–
35	Switch # 1 (Wire Break Detection)	–
36	Switch # 2 (Wire Break Detection)	–
37	Switch # 2 (Wire Break Detection)	–
38	Switch # 3 (Wire Break Detection)	–
39	Switch # 3 (Wire Break Detection)	–
40	Switch # 4 (Wire Break Detection)	–
41	Switch # 4 (Wire Break Detection)	–
42	Switch # 5 (Wire Break Detection)	–
43	Switch # 5 (Wire Break Detection)	–
421	Switch # 6 (Wire Break Detection)	–
422	Switch # 6 (Wire Break Detection)	–
423	Switch # 7 (Wire Break Detection)	–
424	Switch # 7 (Wire Break Detection)	–
425	Switch # 8 (Wire Break Detection)	–
426	Switch # 8 (Wire Break Detection)	–
Shutdown Override		
50	Shutdown Override (Wire Break Detection)	–
51	Shutdown Override (Wire Break Detection)	–
Acknowledge		
52	Acknowledge	–
53	Acknowledge	–

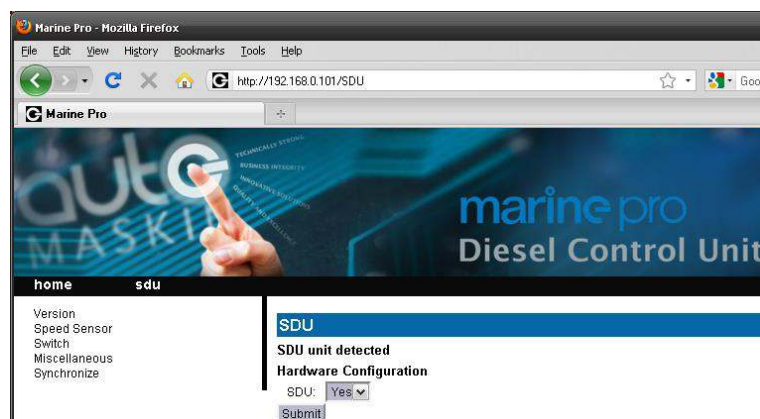
Configuration of the SDU 410

The SDU 410 is being configured on the DCU web server interface. The configuration is stored in the DCU active configuration file, as well as in the SDU.

Note! The SDU 410 can also be configured directly (not via the DCU interface), but this topic is not covered in this manual.

To configure the SDU, log into the DCU web server as explained previously.

- From the DCU web server home screen, select SDU
- Type the DCU User Name and Password if prompted
- The following dialog will appear, and the SDU can now be configured.



Version

This displays the current SDU firmware/software version.

Speed Sensor

This displays the parameters for the two pickups, Pickup #1 and Pickup #2.

Changes can be made and submitted with the **Submit** button.

Switch

This displays the settings for shutdown switch inputs 1–8.

The screenshot shows a web interface with three tabs: 'home', 'sdu', and 'switch'. The 'switch' tab is active. On the left, a list of 'SDU Switch #1' through 'SDU Switch #8' is shown. The main area displays the configuration for 'SDU Switch #1'. It includes a section 'assign custom name' with a 'Password Protected:' dropdown set to 'Yes'. Below this are several settings with dropdown menus: 'Enabled:' (Yes), 'On RUN Only:' (Yes), 'Shutdown Override Disabled:' (No), and 'Enable Speed Dependency:' (Yes). At the bottom of these are three input fields: 'Delay Time [sec]:' (2), 'Initial Delay [sec]:' (15), and 'Speed limit [RPM]:' (800). A 'Submit' button is located at the bottom left of the settings area.

- **Enabled:** Yes = channel enabled
- **On RUN Only:** Yes = channel is active only when engine is running.
- **Shutdown Override Disabled:** Yes = channel is disabled when the Shutdown Override input is active. No = channel is (still) enabled when the Shutdown Override input is active.
- **Delay Time:** The persistence time from closed switch until shutdown activates.
- **Initial Delay:** Timer starts when engine is running, and channel is enabled after timer has elapsed.
- **Speed Limit:** Channels is enabled when engine speed is above this setpoint.

Miscellaneous

Minor user settings.

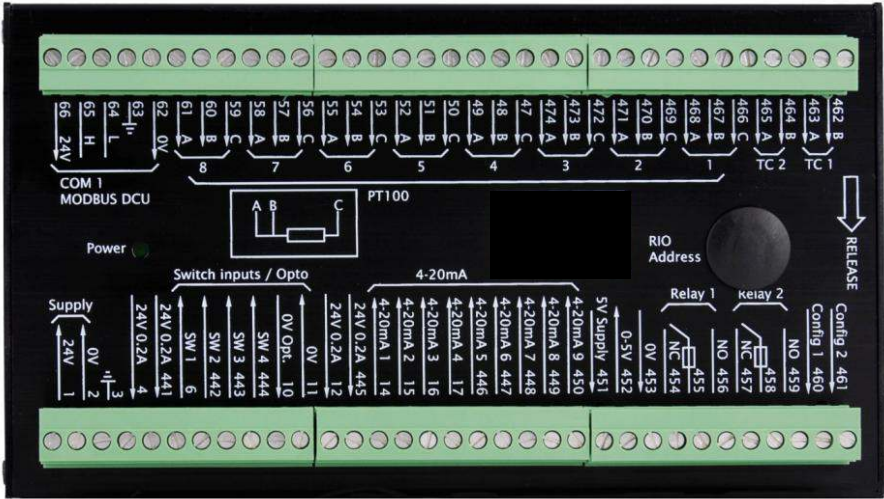
Synchronize

This summarizes the differences between the SDU configuration stored in the SDU, and SDU configuration stored in the DCU.

It also offers to update the configuration to the DCU or to the SDU, and hence synchronize the configuration between the units.

RIO 410 Expansion I/O

The RIO 410 is an optional expansion unit, which increases the overall I/O capacity of the DCU.



It can be mounted in a separate location than the DCU, and communicates with it on a communication link.

Capacity

The RIO has the following I/O channel capacity.

- 24V switch inputs: 4
- 4–20 mA inputs: 9
- Thermocouple type K inputs: 2
- PT100 inputs: 8
- 0–5V input: 1
- Configurable relay outputs: 2
- Configurable 24VDC outputs: 2

Wire Terminal Layout Overview

Power supply inputs		
1	+24VDC	In
2	0V	In
3	Ground	–
Switch inputs		
4	+24VDC 0.2A Switch Supply	Out
441	+24VDC 0.2A Switch Supply	Out

6	Switch # 1	In
442	Switch # 2	In
443	Switch # 3	In
444	Switch # 4	In
10	0V In (Opto.)	In
11	0V Out (Opto.)	Out
4–20 mA inputs		
12	+24VDC 0.2A 4–20 mA Supply	Out
445	+24VDC 0.2A 4–20 mA Supply	Out
14	4–20 mA # 1	In
15	4–20 mA # 2	In
16	4–20 mA # 3	In
17	4–20 mA # 4	In
446	4–20 mA # 5	In
447	4–20 mA # 6	In
448	4–20 mA # 7	In
449	4–20 mA # 8	In
450	4–20 mA # 9	In
0–5V Sensor		
451	5V Supply	Out
452	0–5V Input	In
453	0V	Out
Config Relays		
454	Relay # 1, NC	Out
455	Relay # 1, Common	In
456	Relay # 1, NO	Out
457	Relay # 2, NC	Out
458	Relay # 2, Common	In
459	Relay # 2, NO	Out
Config Outputs		
460	Config Out # 1 (+24V DC)	Out
461	Config Out # 2 (+24V DC)	Out
Thermocouple		
462	TC #1 B	–
463	TC #1 A	–

464	TC #2 B	–
465	TC #2 A	–
PT100 Inputs		
466	PT100 #1 C	–
467	PT100 #1 B	–
468	PT100 #1 A	–
469	PT100 #2 C	–
470	PT100 #2 B	–
471	PT100 #2 A	–
472	PT100 #3 C	–
473	PT100 #3 B	–
474	PT100 #3 A	–
47	PT100 #4 C	–
48	PT100 #4 B	–
49	PT100 #4 A	–
50	PT100 #5 C	–
51	PT100 #5 B	–
52	PT100 #5 A	–
53	PT100 #6 C	–
54	PT100 #6 B	–
55	PT100 #6 A	–
56	PT100 #7 C	–
57	PT100 #7 B	–
58	PT100 #7 A	–
59	PT100 #8 C	–
60	PT100 #8 B	–
62	PT100 #8 A	–
Com		
62	0V DCU Link Supply	In
63	Shield	–
64	Com #1 MODBUS DCU Low	–
65	Com #1 MODBUS DCU High	–
66	+24V DC DCU Link Supply	In

RIO 410 Addressing

A maximum of four RIO units can be connected to one DCU.

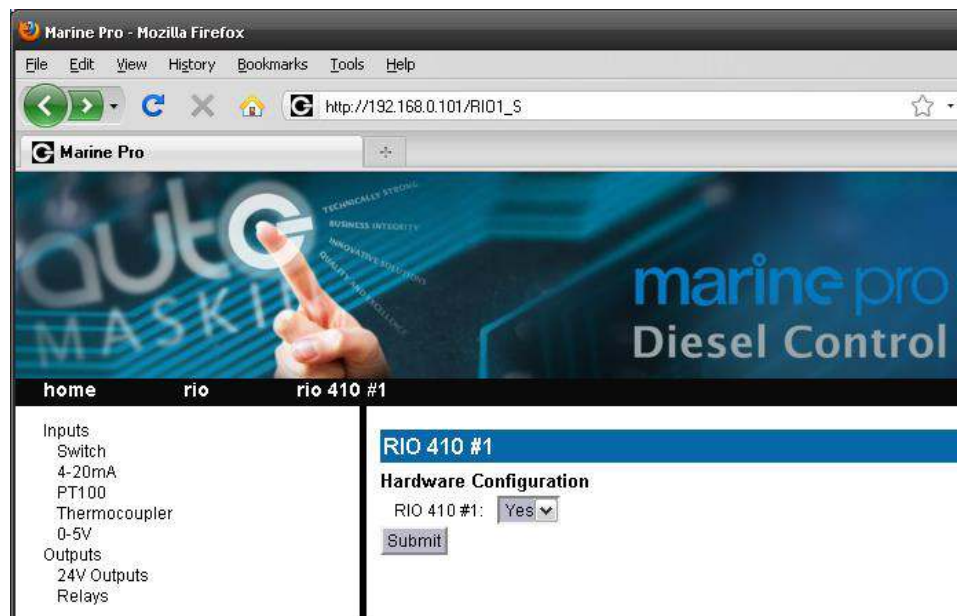
Each connected RIO must have a unique address. The address is set by two DIP-switches located under the rubber cap.

DIP setting	Unit #	Comment
00	1	Factory default
01	2	
10	3	
11	4	

Example: If there are two RIO 410 units being used in the application, leave unit #1 set to factory default address “00”, and unit #2 set to address “01”.

RIO 410 Configuration

The configuration of the RIO 410 is part of the DCU configuration. From the DCU web server home page, select RIO.



Then, configure the RIO channels just like configuring the DCU channels, see page 40.

RIO 425 Generator Interface Unit

The RIO 425 is an interface for the generator on a DCU 410 or DCU 408 being used on an engine connected to a generator.

Capacity

The RIO 425 reads certain parameters from the generator.



The below list of parameters are displayed on the DCU 410 screen, and on the RP 410 screen.

- L1–N Voltage [V]
- L2–N Voltage [V]
- L3–N Voltage [V]
- L1–L2 Voltage [V]
- L2–L3 Voltage [V]
- L1–L3 Voltage [V]
- L1 Current [A]
- L2 Current [A]
- L3 Current [A]
- Frequency [Hz]
- Efficiency [Cos phi]
- Effect [kW]

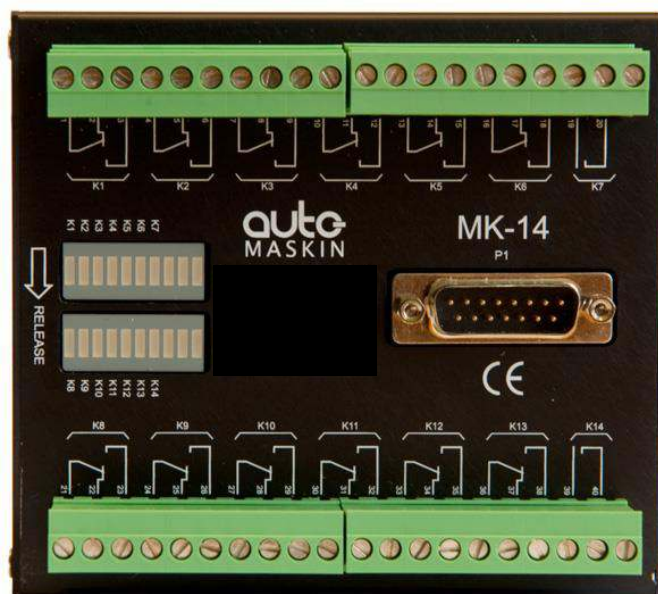
See the Communication Interface list for details.

Installation

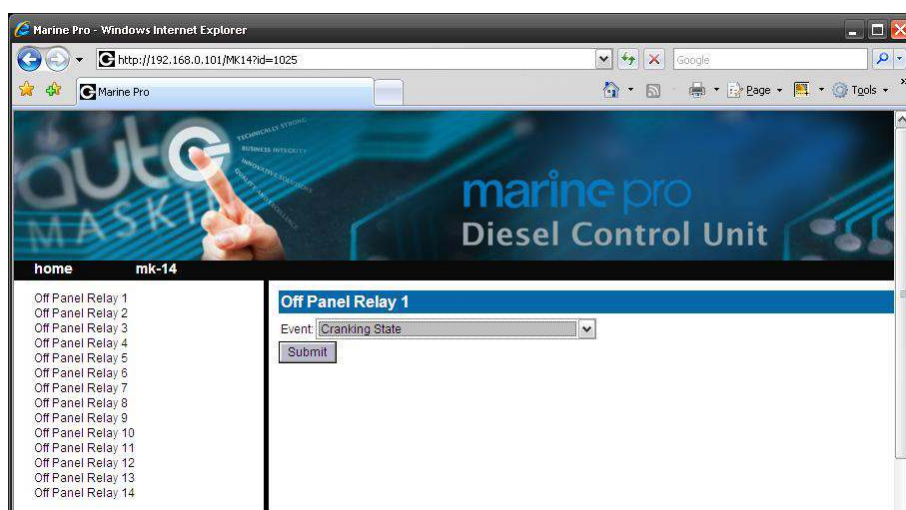
Connect the unit according to its manual. Make sure the communication link is connected to the RIO link on the DCU.

MK-14 Relay Expansion

The MK-14 is an optional relay expansion unit, which can be connected to the DCU engine panel and the RP remote panel.



The function on each relay is configured, from a range of available functions, and this is easily configured from the DCU or RP web-server.



For a list of available functions, see the web server for the DCU and RP.