Manual# 1006423

Configuration Manual

Marine Pro.

400E Series

DCU 410E – Engine Control Unit

RP 410E – Remote Panel

RP 410E

DCU 410E

auto MASKIN

Marine Pro.

Configuration Manual

for

Marine Pro 400E Series

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DCU 410E Diesel Engine Control Unit

RP 410E Remote Panel

Revision 1.1

Revised September 20, 2016

Revision history:

Rev.	Date	Description
1.0	16.11.15	Initial Release Revision
1.1	20.09.16	Updates for RP410E

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Marine Pro.

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Marine Pro.

Document Information

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.

⚠ **Warning!**

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

⚠ **Warning!**

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.

Matching firmware

This Configuration Manual is for the 400E Series of panels.

It has been updated to match the following firmware releases.

Panel	Firmw.	Release
DCU 410E	3.5	Sep. 2016
RP 410E	3.5	Sep. 2016
DCU 410	2.11 P9	May 2016
RP 410	2.12 P3	May 2016

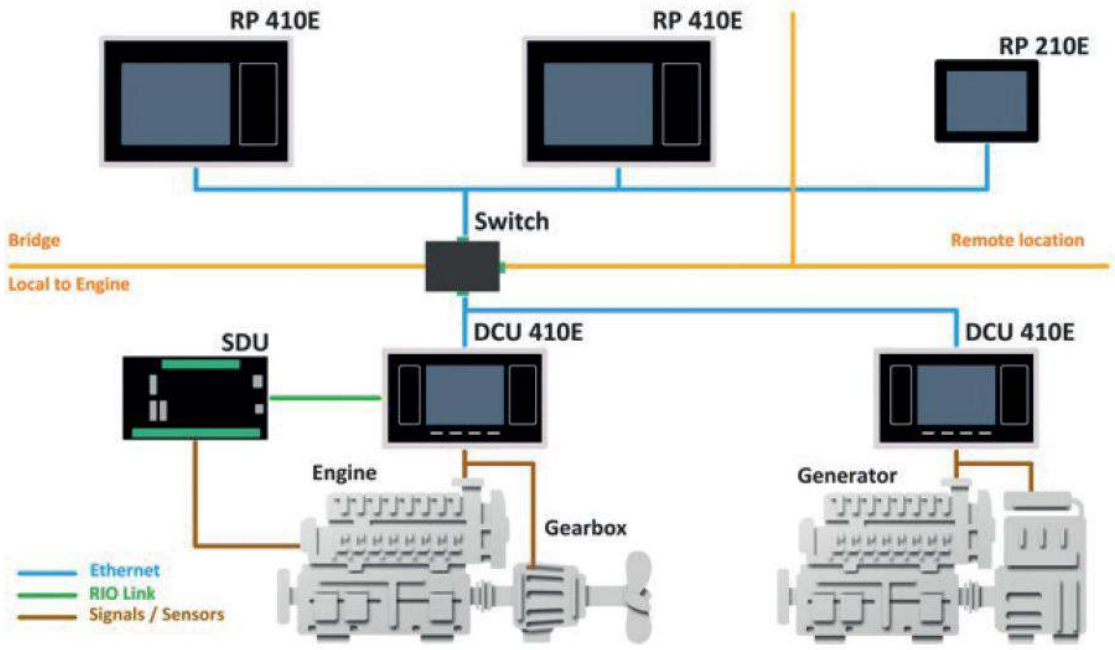
Ordering information

The Marine Pro covers a wide range of compatible products within both the 200- and 400 Series. Please visit our web site for more information.

http://auto-maskin.com/marine/

Overview of the 400 series

The drawing below shows a typical layout.DCU 410E Engine Panel



The DCU 410E engine panel is the main building block in the 400 Series.

Engine sensor values are displayed on the colour screen, and commands and other user interaction is also here.

Configuration

An ordinary PC web-browser is used to configure the DCU, using the inbuilt web-server on the DCU.

RP 410E Remote Panel

The optional RP remote panel brings everything on the DCU to a remote location, with the exact same user interface. It does not need any configuration, as it is reading the configuration from the DCU.

As such, the RP can easily be retrofitted.

The RP also supports IP-cameras installed on the network for live video feed display.

Ethernet Switch

The Ethernet switch is not necessary if only one DCU 410E and one RP 410E is in use. These can then be wired with an Ethernet cable directly.

It is recommended to make use of an Ethernet switch though, as it simplifies PC configuration connection and future expansion to remote panels and/or camera interface.

Expansion

The basic system can be expanded with more input and output channels using the versatile RIO units (Remote I/O).

Currently, there are RIO units for:

- General I/O expansion, RIO 410 and RIO 210.
- Exhaust temperature monitoring, RIO 412
- Generator monitoring, RIO 425
- Load sharing, LSU 408

Connections

Connect power to the panel according to guidelines in the Installation manual.

First Power-On Wizard

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

All wizard settings can be changed later.

First Power-On

Preparations

First, make sure to consult the Quick Installation Guide (QIG) that came with the panel.

Installation

Install the panel according to guidelines in the Installation manual.

Configuration of the DCU

This section explains the configuration of the DCU

Configuration- and Firmware files

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

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.

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.

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.

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

- Connect an Ethernet cable between your laptop and the DCU port COM 6 (Ethernet port).
- In the DCU menu, select **Version Information**. Note the IP-address. From factory, the IP-address is 192.168.0.101.
- In your web browser, type the IP-address, eg. http://192.168.0.101 in the address field.
- Press **Enter**, and note the login screen.
- 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 7.
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 LANs 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 DCUs 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 410E 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 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 404/410 safety unit configuration.

The SDU is mandatory in classed installation.

The configuration is saved in the SDU, 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.

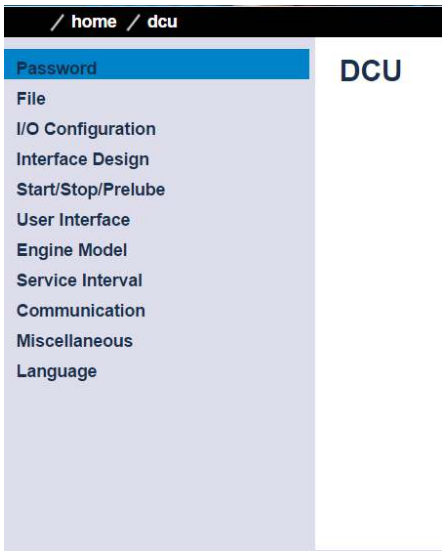
The following can be verified for the DCU:

- 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

Main DCU web server menu



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.

Note! To get access to the configuration file, it needs to be uploaded to DCU first. See "Upload to DCU" for more information.

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! When upgrading a DCU to a new firmware it is recommended to also upgrade any connected RPs to the latest available firmware as well. If upgrading a RP it is similarly recommended to upgrade related DCUs.

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 9.

I/O Configuration

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

Config Outputs

This is the section for configurable outputs. For example, a signal or function can be assigned to a 24V output, a relay or to a J1939 signal.

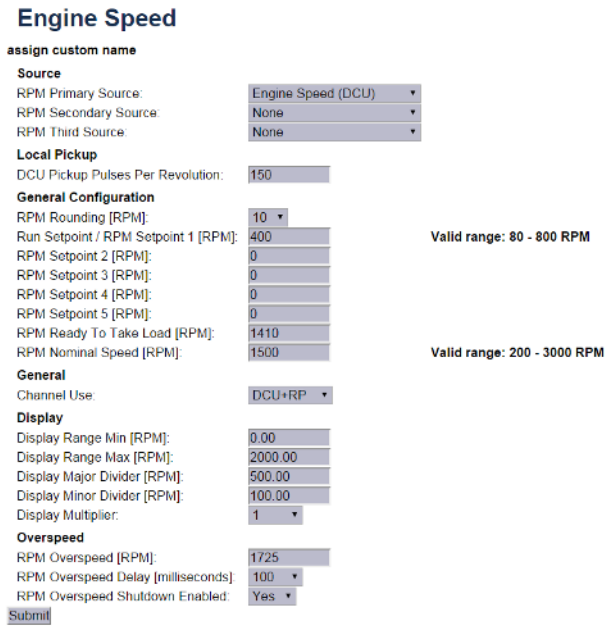
Note! Always remember to press the **Submit** button after each change on the configuration pages. No changes will be saved until this button is pressed!

Config Inputs

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

Engine Speed

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



Home →DCU →I/O Configuration →Engine Speed

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

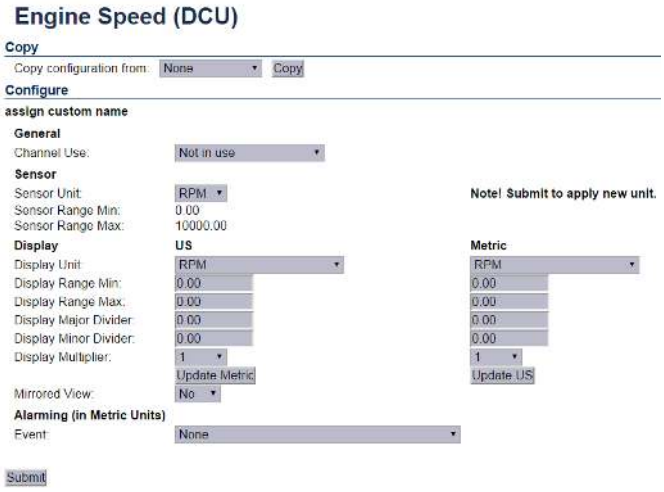
RPM Overspeed is the setpoint where the DCU indicates overspeed.
RPM Overspeed Delay is the delay – in milliseconds – before alarm or shutdown. Typical setpoint is 100ms.
RPM Overspeed Shutdown Enabled is where the overspeed behaviour is selected.
Select **Yes** for the DCU to shutdown the engine. Select **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.

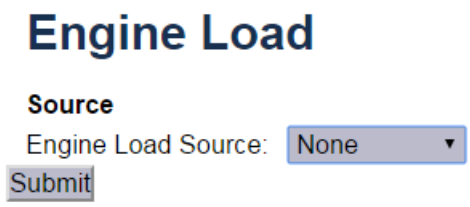
- Engine Speed (DCU)
- Engine Speed (J1939)
- Engine Speed (J1939):2 (If enabled)
- Engine Speed (SDU 410)
- Engine Speed (SDU 404)



Home →DCU →I/O Configuration →Individual speed sensor

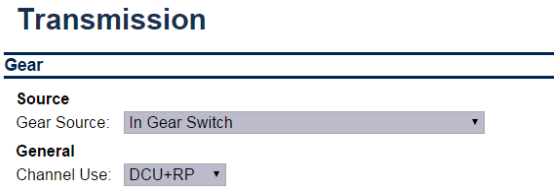
Engine Load

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.



Home →DCU →I/O Configuration →Engine Load

Gear



Home →DCU →I/O Configuration →Transmission

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**.

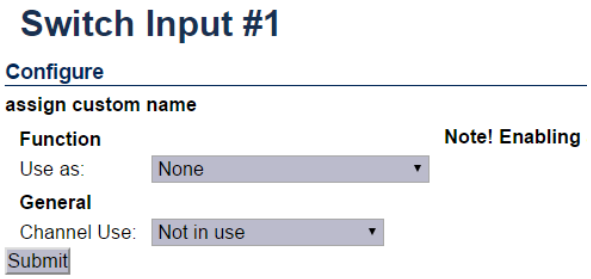
- **J1939 Transmission Current Gear (SPN 523)**

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.



Home →DCU →I/O Configuration →Switch

General

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. This is mainly useful to connecting outputs to input signal conditions.

Event

Select from Warning, Alarm, Load reduction or Shutdown.

Input State

Select NO (normally open), or NC (normally closed). NO means the contact must be closed/energized to make the event, whereas NC means the contact must open to make the event.

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!
Normal denotes a running engine with no alarm.

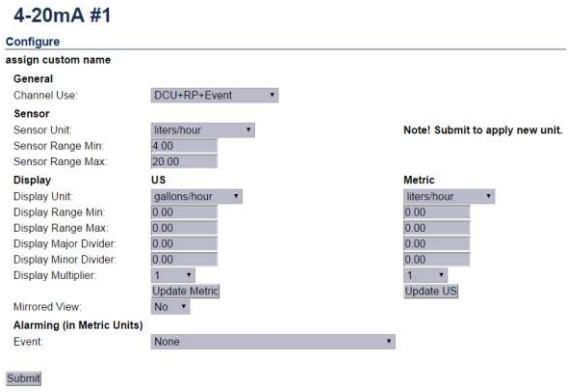
If two or more engine speed (pickup) sources[1] are in use, then it is recommended leaving this off for all switches. Set to **No**.

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 404/410 safety unit.

4-20 mA

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



Home →DCU →I/O Configuration →4-20mA

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.

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

Type of use	DCU		RP	
	D	E	D	E
Not in use				
Event		x		x
DCU	x			
DCU + Event	x	x		x
RP			x	
RP + Event			x	x
DCU + RP	x		x	
DCU + RP + Event	x	x	x	x
Silent Event				
DCU + Silent Event	x			
RP + Silent Event			x	
DCU + RP + Silent Event	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 (4 mA) and max (20 mA), 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** the 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.

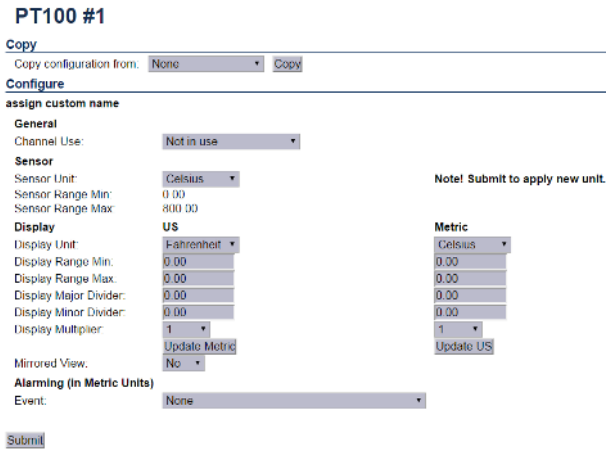
Note! Do not use any other pressure sensors – or any other signals – as the engine running indication!

Typical setting:
If two or more engine speed (pickup) sources[2] 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

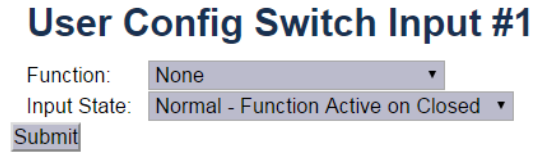
First, select any of the four PT100 channels. Then, for each selected channel, set the parameters, as for the 4-20 mA section, page 17.



Home →DCU →I/O Configuration →pt100 #1

24V Inputs

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



Home →DCU →I/O Configuration →24V input functions

Note! These are *fixed function* inputs, and not the general switch input channels, as described on page 13.

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
- Local Start
- Local Stop
- Local Acknowledge

[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 404/410 safety unit.

- 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

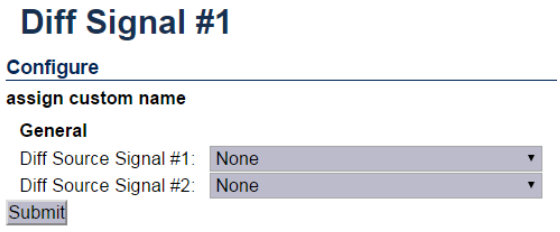
The function is deactivated when the input is left open, or connected to 0V.

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 17.

Differential



Home →DCU →I/O Configuration →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.

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.

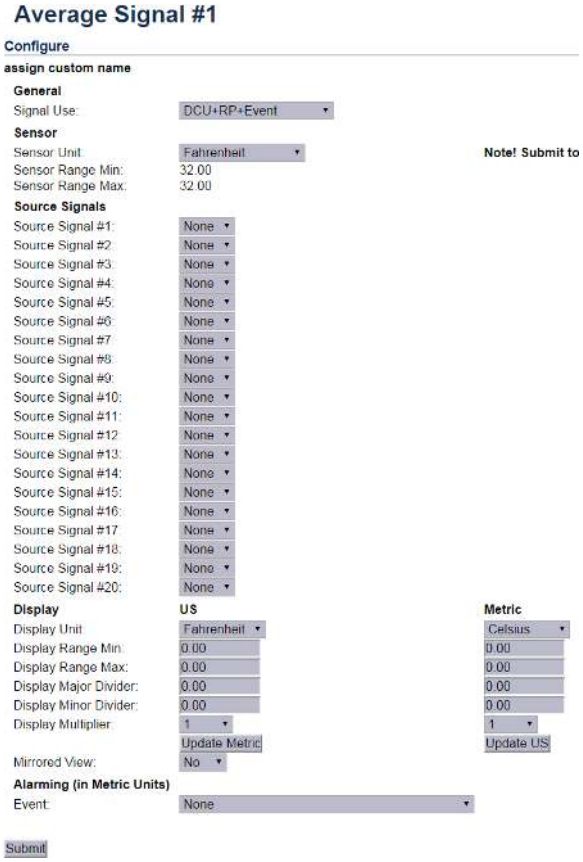
Then, select two signals of the same unit type. The differential channel result can be assigned to an instrument widget.

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.

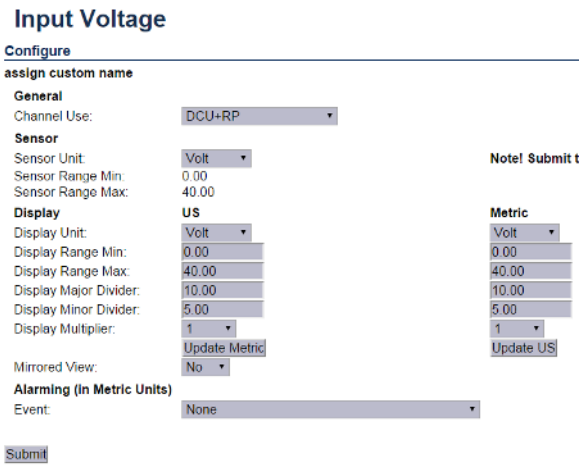


Home →DCU →I/O Configuration →Average →Average signal #1

Special

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

Input Voltage



Home →DCU →I/O Configuration →Special →Input Voltage

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

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 bar graph.

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.

Home →DCU →I/O Configuration →Special →Calc. Fuel Rate

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

Select the channel and configure accordingly.

Calculated Engine Hours

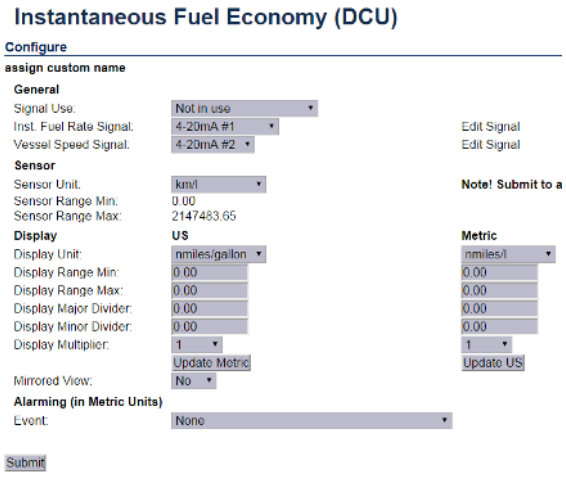
If the engine hours are not sourced from the J1939 CAN bus, it is being calculated internally by the DCU.

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)

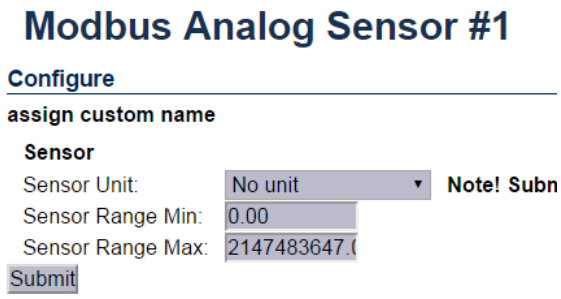
The DCU has seven 24V outputs. The function on the output is configured here.



Home →DCU →I/O →Configuration →Special →Instantaneous Fuel Economy (DCU)

Analog Modbus

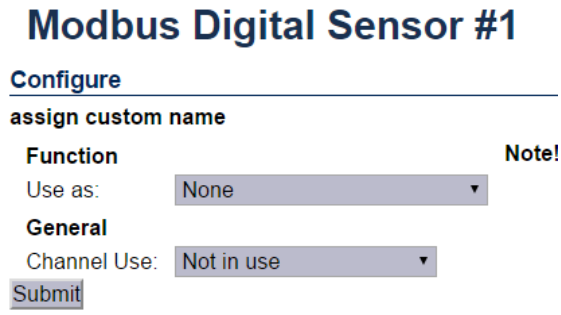
The DCU has 50 analog Modbus registers that users can write to from external devices. The values can be used as signal sources, and set up in the same way as 4-20 mA sensors. Please see the communication manual for further technical description of the registers.



Home →DCU →I/O Configuration →Modbus Analog

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.

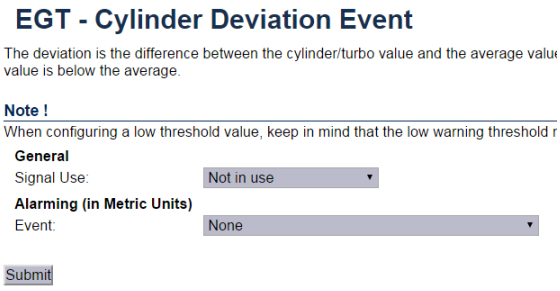


Home →DCU →I/O Configuration →Modbus Digital

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.



Home →DCU →I/O Configuration →EGT →cylinder Deviation Event

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.

Config outputs

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.

Home →DCU →I/O Configuration →24v output functions

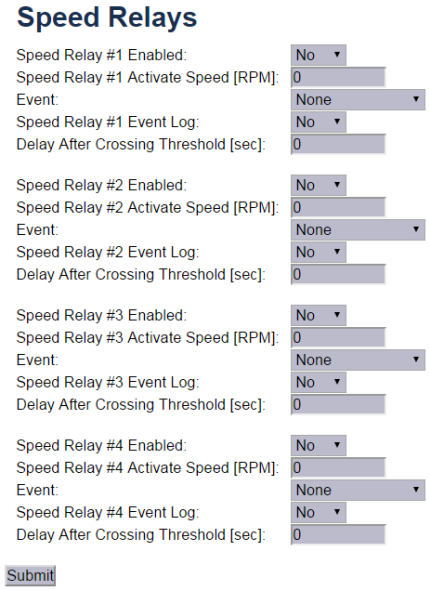
Relays

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.



Home →DCU →I/O Configuration →Speed Relays

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.
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)

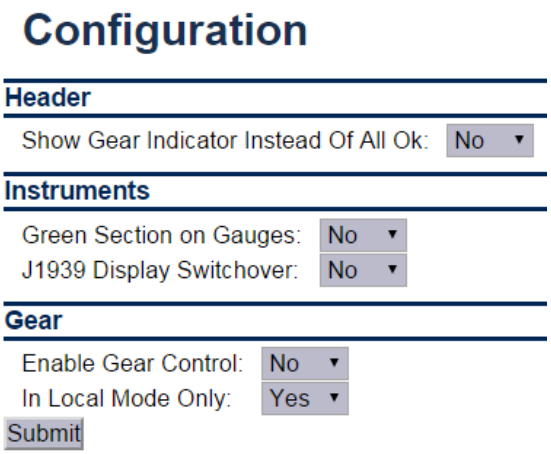
Interface Design

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.



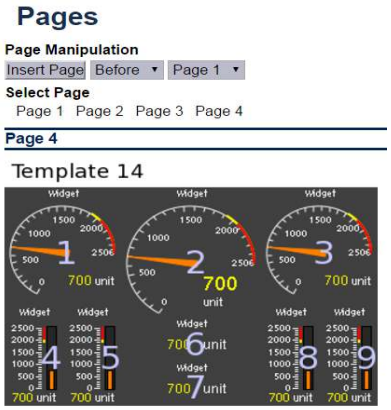
Home →DCU →Interface design →configuration

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.



Home →DCU →Interface design →Pages

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.

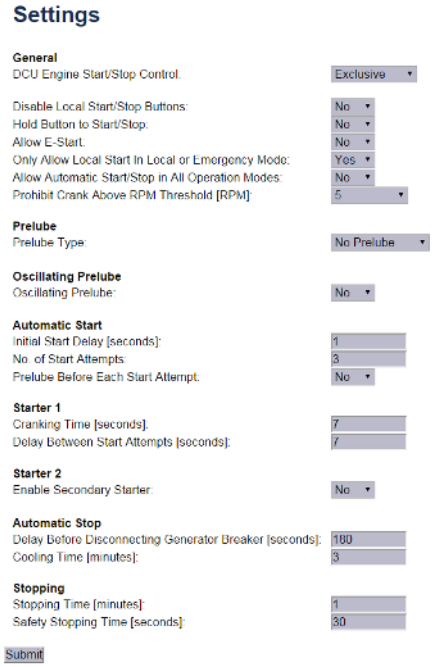
RP Home View Configuration

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

This is configured in each DCU.

Start/Stop/ Prelube

Settings



Home →DCU →Start/Stop/Prelube →Settings

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

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 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.

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 configure, 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.

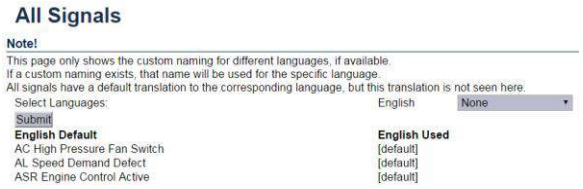
Stopping Time is the timer for the duration of the normal stopping state. **Safety Stopping Time** is the timer for the duration of safety stopping, where the DCU/SDU has lost the running state via either Pickup/J1939 or other additional run signals.

User Interface

Language

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

All Signals



Home →DCU →User interface →Language →all signals

Press All Signals to display <u>all</u> 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.

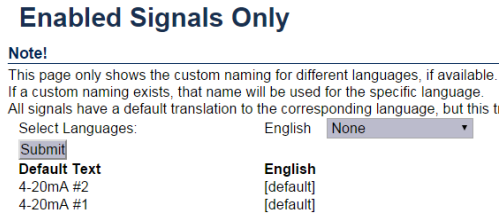
English Default	English Used	2nd Language
Engine Oil Press.	Engine Oil Pressure	Motoroljetrykk
Engine Speed	[default]	Motorturtall

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.

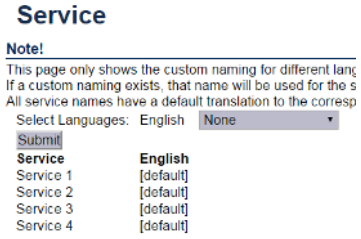
Enabled Signals Only

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



Home →DCU →User interface →Language →Enable Signals Only

Service



Home →DCU →User interface →Language →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.

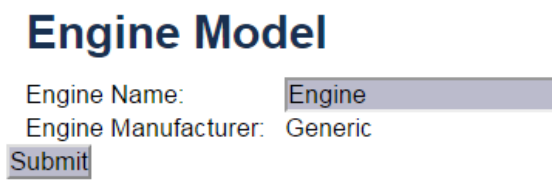
Gear Indicator

Show Gear Indicator Instead Of All Ok

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

Engine Model

Engine Name



Home →DCU →Engine Model

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”.

Service Interval

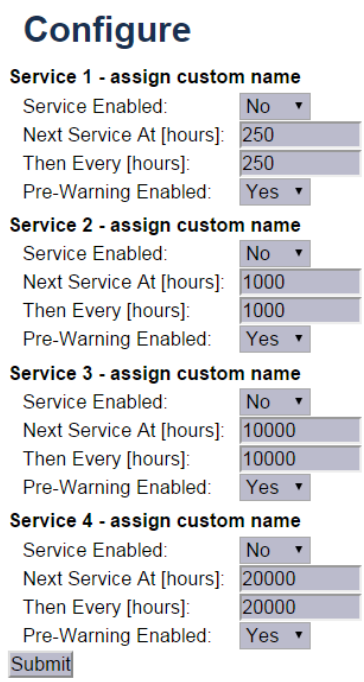
View Service Status

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 a*ssign custom name* link.



Home →DCU →Service Interval →Configure

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.

Communication

Network Configuration

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.

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.

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 ad Modbus)

Save As…

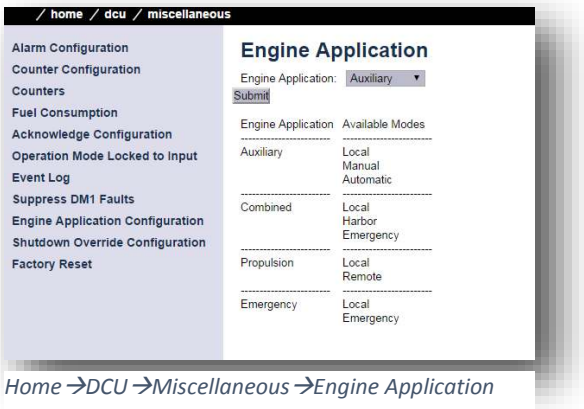
The current list of events can be saved into a text file.

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.



Home →DCU →Miscellaneous →Engine 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.

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 410E capacity

Functionality and content highlights

- 2 x 24 V DC redundant supply
- 5.7" TFT colour
- 4 x PT100 input channels
- 4 x analogue input channels, 4-20 mA
- 8 x switch input channels
- 1 x tacho 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 410E 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 **Error! Bookmark not defined.**.

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

RIO 410 Configuration

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

Home →RIO →RIO 410 #1

RP 410E Configuration

To get to the system configuration, do as follows.

Press the **Home** button

Select the **Menu** touch button

Select the **Configuration** icon

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.

Timeout Behaviour

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 Connections

This form provides a method of managing a list of DCUs the RP is connected to.

Press search to get an up to date list of currently available DCUs. Toggle the ignore check box on or off to assign a desired set of connected DCUs. Once ready with the selection, press Ok and the RP will automatically self-configure to match each of the selected DCUs configuration.

The RP 410E can at most be connected to 8 simultaneous DCUs.

Ignoring a DCU makes it completely invisible to an operator on the RP.

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.

IP-address

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

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

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.

If using the Generic Camera Type, the protocol must be selected, either HTTP or RTSP. Only limited configuration of the Generic camera type is available from the panel screen. Should more advanced configuration be required, such as login details and paths etc, such options are available from the Web Interface of the RP.

Note: Connecting a Generic camera to the RP normally requires specific configuration of the camera itself. Consult the documentation from the Camera provider.

Camera position

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

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

Certain functions can be configured to control onboard relay 1-4.

If the optional relay board module MK-14 is connected to the RP port COM 5, 14 additional relays will be available.

Functional Inputs

Each of the available Switch Inputs can be assigned a function that will activate once the input is energized. Examples of such functions are Start, Stop and Acknowledge.