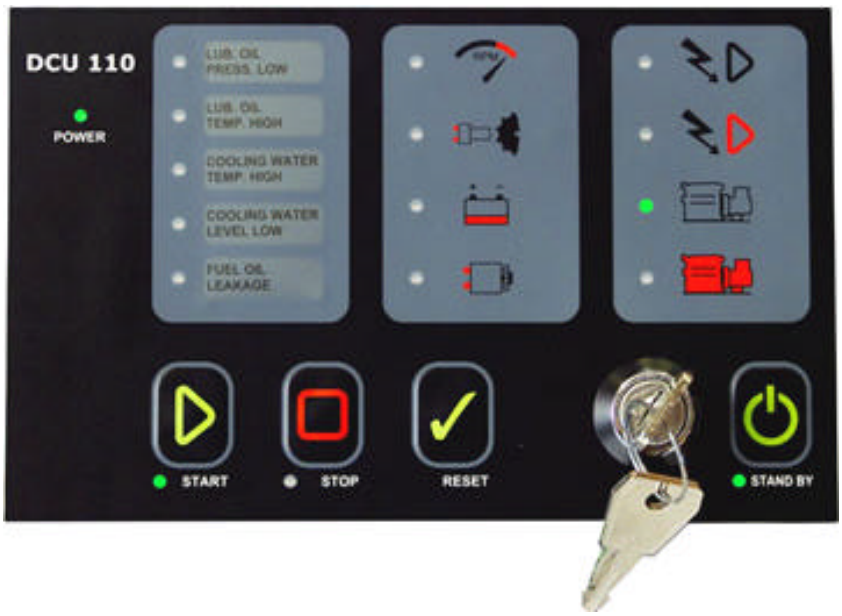
DCU 110

Installation Manual

Diesel Engine Control Unit



Contents

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Introduction

About this manual

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

Work on the boats low-tension circuit should only be carried out by qualified and experienced persons. Installation or work on the shore power equipment *must only* be carried out by electricians authorised to work with such installations.

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 dealer.

About the DCU 110

General Overview

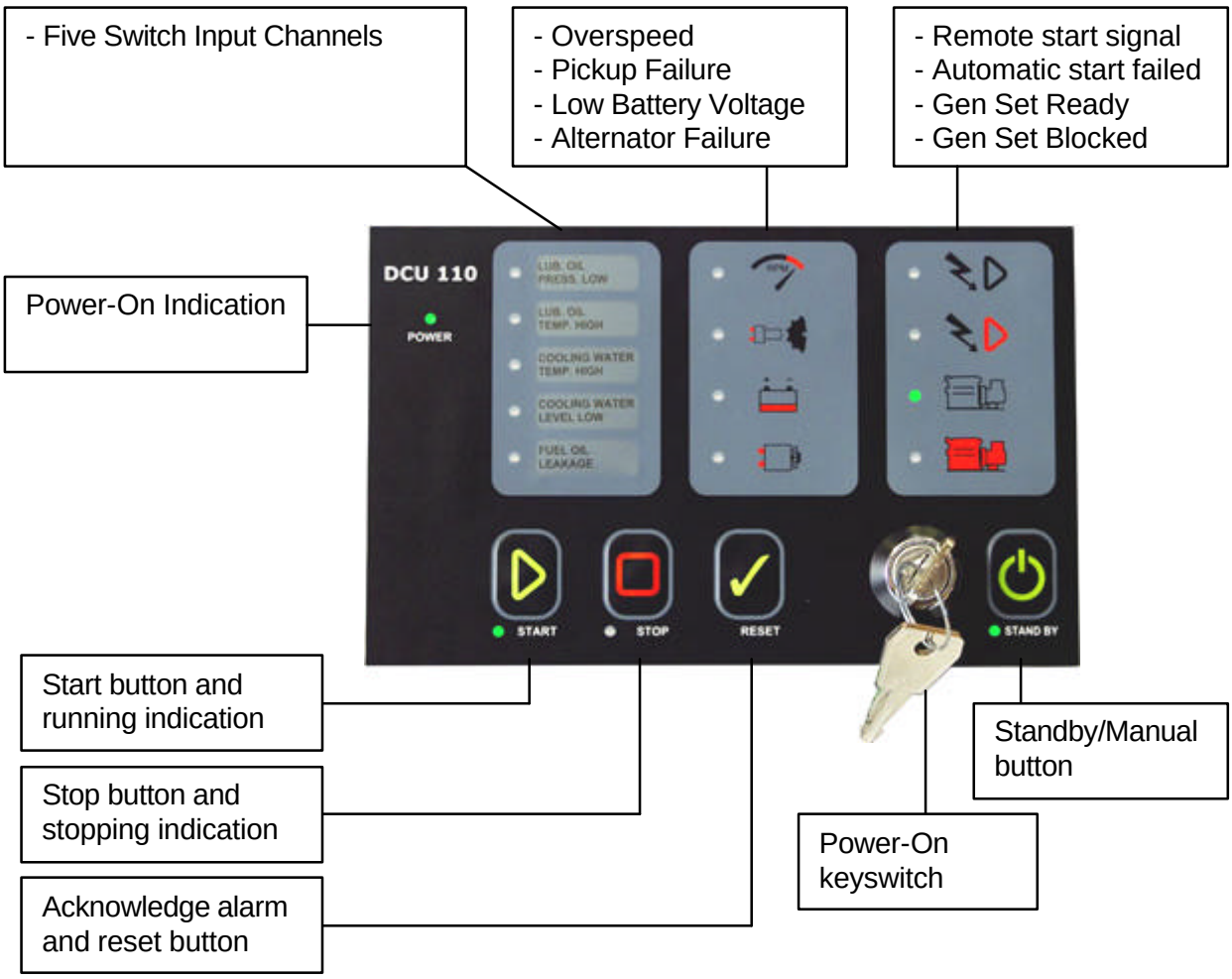
The DCU 110™ is an electronic control unit for control and monitoring of diesel engines used as propulsion engines or gen. sets.

Switches and senders from the engines are connected on the rear side of the DCU 110.

The DCU 110 is configured using the buttons on the frontpanel.

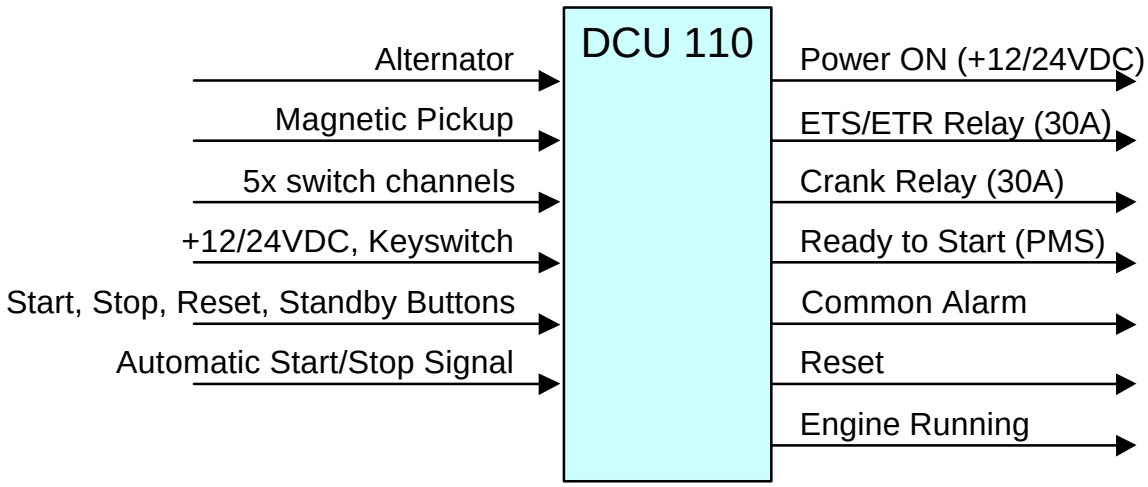
Frontpanel Overview

The frontpanel has four buttons, a key switch and a number of LEDs for indication.



Signal Float Overview

This figure illustrates the float of signals to/from the DCU 110.

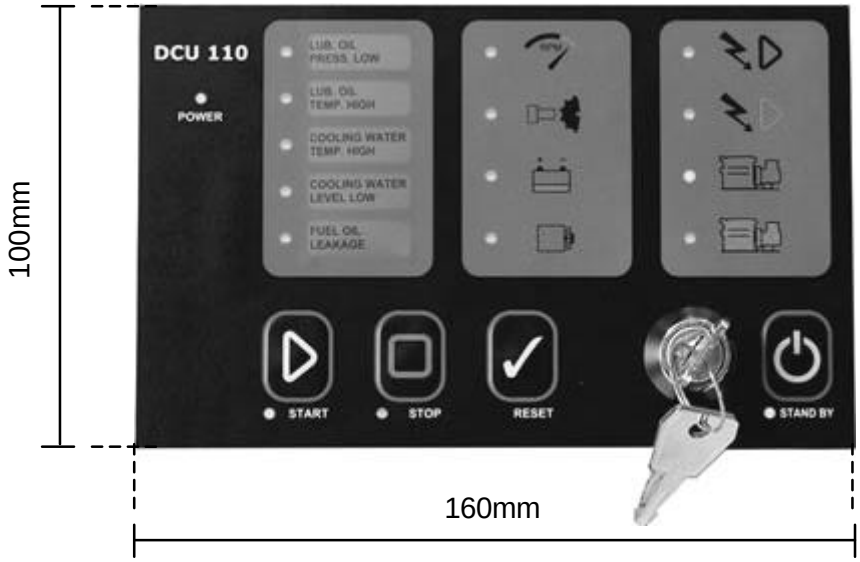


Built-in Alarms

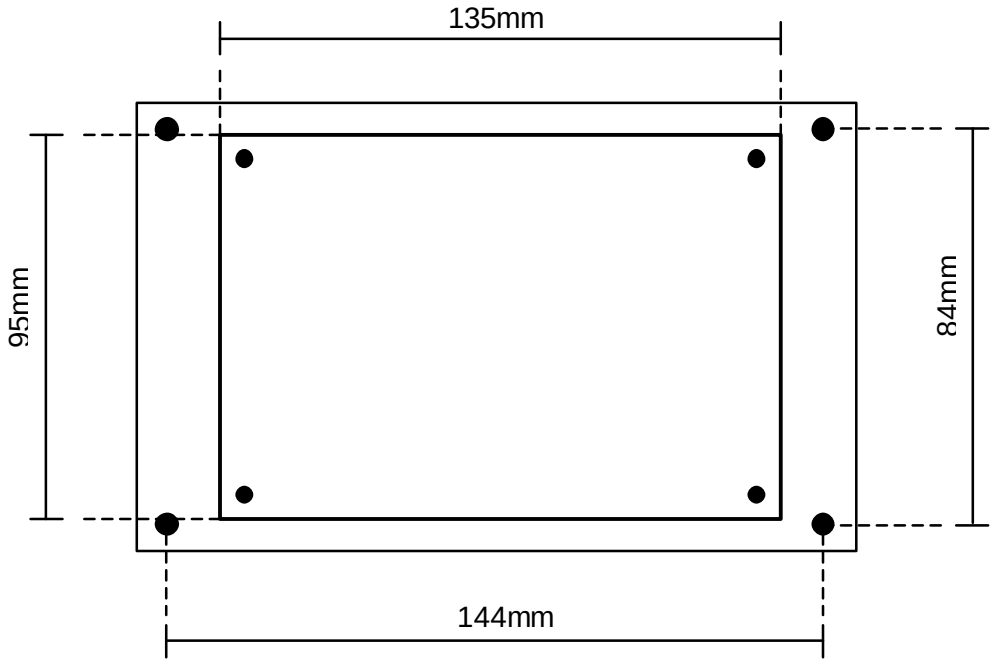
Alarm text	Comment	Delay
Low battery voltage	Low voltage at the start battery. 12V systems: Below 11.5V [+/- 2%] 24V systems: Below 23.5V [+/- 2%]	60 sec
Overspeed	Engine running faster than the overspeed setpoint.	0.25 sec ([1])
Engine Stopped	Engine stopped for no known reason. No diesel?	1 sec
Engine failed to stop	After issuing the stop command, the engine still seems to be running.	120 sec
Start failure	Engine failed to start after the third and last automatic start attempt.	7 sec
Pickup failure	Unable to read the pickup signal while engine is running.	10 sec
Alternator failure	Alarms if the alternator is not charging on a running engine.	60 sec

[1] For engines with 20 or less pulses/revolution, the overspeed detection delay is 1.0 sec.

Front Dimensions



Rear Dimensions



Depth: 30mm

Connections

All Connections

To protect against EMC noise, we recommend that all cables be screened.

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

Some cables are to be grounded in one end only, others in both ends.

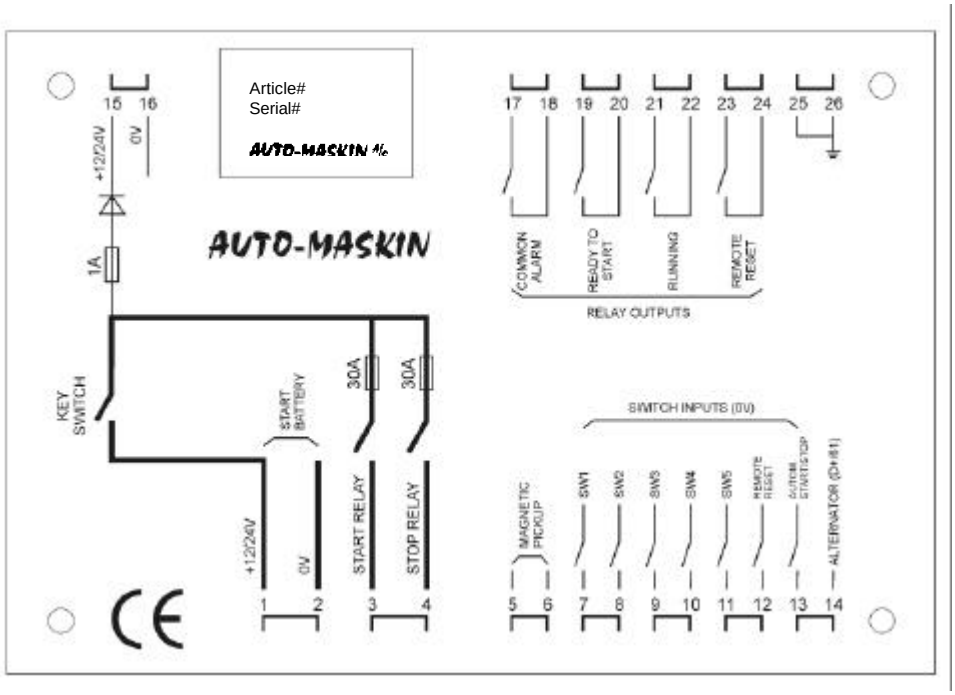
Some cables shall be separate – for instance the pickup signal. Others can be in a multi-cable with screen.

Wire Terminal Overview

Terminal	Function	Comment
1	Positive power supply. +12VDC or +24VDC.	Connect to Start Battery
2	0V supply.	Connect to Start Battery
3	Start (Crank) Relay, 30A.	
4	ETS/ETR, depending on the configuration.	
5	Magnetic Pickup	
6	Magnetic Pickup	
7	Switch Input Channel 1	Connect to 0V
8	Switch Input Channel 2	Connect to 0V
9	Switch Input Channel 3	Connect to 0V
10	Switch Input Channel 4	Connect to 0V
11	Switch Input Channel 5	Connect to 0V
12	Remote Reset Input	Connect to 0V

Terminal	Function	Comment
13	Automatic Start/Stop	0V = Start Open = Stop
14	Alternator	Connect to alternator D+/61.
15	Power-On output	+12/24VDC, Max 1A
16	Power-On output	0V
17	Common Alarm, C	Relay
18	Common Alarm, NO	Relay
19	Ready To Start, C	Relay
20	Ready To Start, NO	Relay
21	Running, C	Relay
22	Running, NO	Relay
23	Remote Reset, C	Relay
24	Remote Reset, NO	Relay
25	Ground	Internally connected to terminal 26
26	Ground	Internally connected to terminal 25

Rear Lid Graphical Layout



Power Supply [1 – 2]

+12VDC or +24VDC supply

The DCU 110 is designed to run on 12VDC or 24VDC supply voltage.

Use a *twisted pair* wire to minimize the effect of noise on the cable. Connect the cable straight from the start battery to terminals 1 and 2.

Note! Make sure supply power is sourced from the start battery, NOT from the starter engine, as the voltage drop over the latter is significant.

Keep the cable as short as possible, and use **at least 2.5mm^2** wires.

Start (Crank) Relay [3]

The DCU 110 can supply a maximum of 30A on wire terminal 3.

Note! Terminal 3 should be connected to an external auxiliary relay, NOT to the starter engine.

ETS/ETR Relay [4]

The choice of ETS or ETR is done in the Configuration.

- ETS = Energize to Stop
- ETR = Energize to Run

The DCU 110 can supply a maximum of 30A on wire terminal 4.

Note! Terminal 4 should be connected to an external auxiliary relay, NOT to the run/stop solenoid.

Magnetic Pickup Sensor [5 – 6]

Connect the magnetic pickup to terminals 5 and 6. Please verify that the signal strength is between 2.5-30Vpp. Use a cable with twisted pair wires.

Note: The pickup cable must be shielded to ground, NOT to 0V.

Switch Input Channels [7 – 11]

The control unit has five on/off input channels, which can be used to detect the status of switches in the installation.

Note: Do NOT connect +12/24V to the switch inputs! All switches must be connected between its wire terminal input and 0V.

Switch channel 1 → Oil Pressure

Channel one is special and different from the other four channels.

It is designed to be connected to the oil pressure switch. When oil pressure appears, it will – together with the magnetic pickup signal – indicate to the DCU 110 that the engine is running.

Note! The oil pressure switch is drawn normally closed (NC), as it opens for oil pressure and closes for low oil pressure while running.

Switch Channels 2 – 5

These channels are equal and can be configured individually.

Note!

An *alarm* channel is NO. Close the switch to make an alarm.
A *shutdown* channel is NO. Close the switch to make a shutdown.

Remote Reset [12]

Connect terminal 12 to 0V to make a reset from remote. Works as the Reset button on the frontpanel.

Automatic Start and Stop [13]

Terminal 13 is for automatic start and stop of the engine.

Automatic Start

Connect terminal 13 to 0V to initiate the automatic start sequence.

- Start attempts: 3
- Cranking time: 7 sec
- Delay between attempts: 7 sec

After the final unsuccessful start attempt (plus delay time), the DCU 110 indicates the alarm Start Failure.

Automatic Stop

Leave terminal 13 open to initiate the automatic stop sequence.

After a two minute cooling down period, the DCU 110 will stop the engine.

Note: Terminal 13 has no effect unless the DCU 110 is set to Standby.

Alternator [14]

Connect terminal 14 to the alternator terminal D+/61.

If no alternator is present, connect terminal 14 to permanent +12/24VDC to avoid the alternator alarm on the DCU 110.

Power-On Output [15 – 16]

The Power-On output is intended to drive auxiliary instruments, relays, etc.

The +12/24VDC on terminal 15 are secured with a 1A automatic fuse. The fuse will repair itself in an event of a short circuit.

Common Alarm Relay [17 – 18]

This relay activates in an event of a new (unacknowledged) alarm.

Pressing the Reset button (acknowledge alarm) deactivates the relay, even though the alarm might still be present.

Ready to Start Relay [19 – 20]

This relay activates when the gen set is ready to start, and is intended used by a *Power Management System*, PMS.

Note! The relay activates when the DCU 110 is set to Standby and is not in the Blocked state.

Running Relay [21 – 22]

This relay activates when the DCU 110 senses that the engine is running.

Remote Reset Relay [23 – 24]

This relay activates when the reset- or remote reset button is pressed.

Ground [25 – 26]

Please keep ground and 0V separated!

Please observe the difference between Ground and *0V!*

In marine installations, ground and 0 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 110 system, +12/24V and 0V are filtered to ground using special filter components. This is done to avoid noise in the system. If ground and 0V is connected together, these filters do not work properly.

Note! Make a ground connection to terminal 25 and/or 26. Keep this wire as short as possible, and **at least 1.5mm^2**.

Overspeed Test

This section describes how to enter the Overspeed Test mode.

While in Overspeed Test mode, the configured Overspeed Setpoint (typically 1500rpm + 15% = 1725 rpm) is reduced to nominal speed (typically 1500 rpm).

Note: The formula used is
Overspeed Test Setpoint = Overspeed Setpoint * 20/23.

Follow these steps to enter the RPM-test mode:

- Use the Keyswitch to turn power OFF.
- Press and hold the STOP-button.
- Use the Keyswitch to turn power ON.

The DCU is now in *Overspeed Test* mode, and indicates this with a rapid flashing of the Overspeed alarm LED.

Note: The test automatically times out after 5 minutes. To leave the test earlier, press the reset button or power OFF and then back ON.

Configuration

Entering Configuration Mode

To enter the *Configuration Mode*, do as follows:

- Power OFF
- Press and *hold* the **Reset** and **Standby** buttons
- Power ON
- Release the buttons

The DCU 110 will now be in the configuration mode and will indicate this by blinking the LED for switch channel 1.

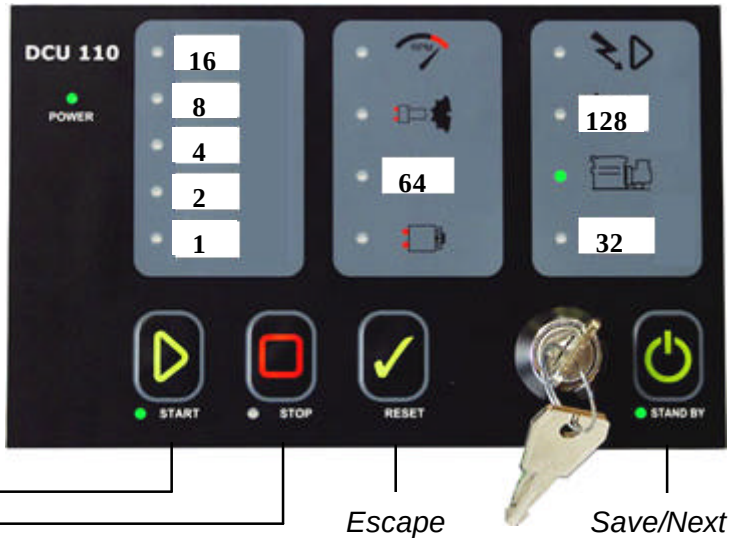
The following can be configured

Item	Comment	Configuration	Meaning
Switch 1-5	Alarm when engine running only	Start button On: Start button Off:	YES NO
	Alarm or Shutdown	Stop button On: Stop button Off:	Shutdown Alarm
	Time delay in seconds before Alarm/Shutdown (0 – 63)	Start button: Stop button:	Increase (+1) Decrease (-1)
Overspeed	Overspeed RPM. **Note:** Offset is 500 RPM. (500 – 3050)	Start button: Stop button:	Increase (+10) Decrease (-10)
Pulses/rev	Magnetic pickup pulses/revolution (1 – 255)	Start button: Stop button:	Increase (+1) Decrease (-1)
ETS/ETR	Energize to Stop or Energize to Run	Start button On: Start button Off:	ETR ETS
Common Alarm NO/NC	Default = NO (Normally Open = Closes on Alarm)	Start button On: Start button Off:	NO NC

Press the Standby button to advance to the next configuration.
See figure page 15.

LED values in Configuration Mode

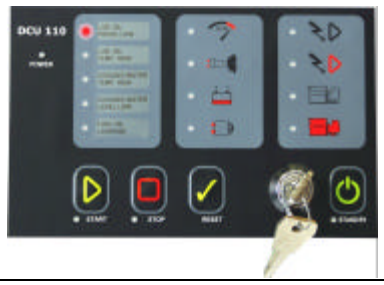
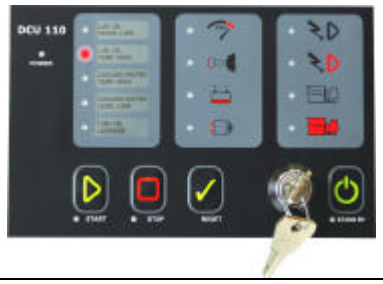
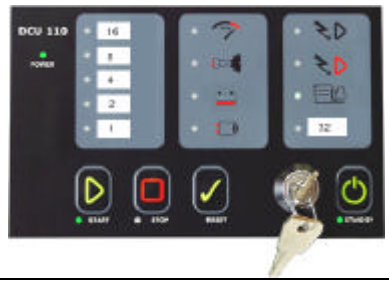
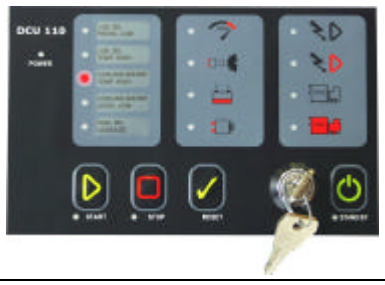
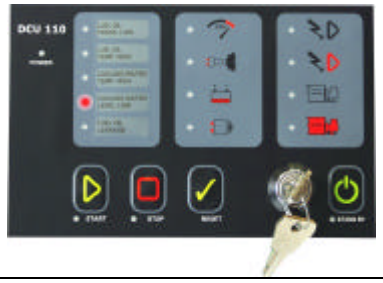
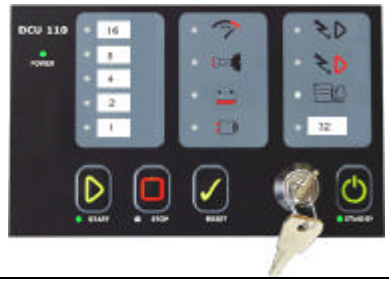
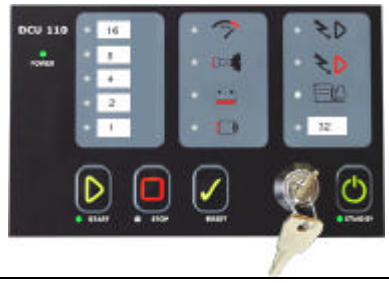
In Configuration Mode, the LEDs and buttons work like this.



Toggle	*Increment*
Toggle	*Decrement*

To get the total value, add the number for each of the LEDs.
Example: LED 1 and LED 4 equals value 5.

Starting the configuration

	Toggle	Increment/Decrement
	Start button LED: - ON = Alarm when engine running only - OFF = Alarm any time **Stop button LED:** - ON = Channel is Shutdown - OFF = Channel is Alarm	**Start button:** - Increase value **Stop button:** - decrease value *See figure on page 15 for values.*
SW 1		
SW 2		
SW 3		
SW 4		
SW 5		

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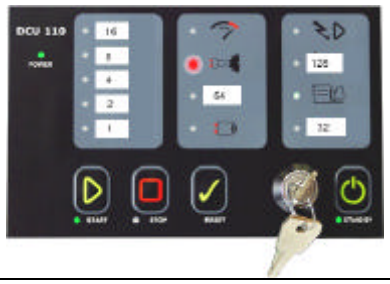
	Toggle	Increment/Decrement
Over-speed	*Start button: +1* *Stop button: -1* ***Overspeed** = ((LED value) * 10) + 500* *Example:* *1730 rpm = ((64+32+16+8+2+1)*10)+500*	 ➔
Pulses/ rev.	*Start button: +1* *Stop button: -1* ***Pulses/rev** = LED value*	 ➔
ETS/ ETR	 ➔	*Start button On: ETR* *Start button Off: ETS* *ETS = Energize to Stop* *ETR = Energize to Run*
Common Alarm	 ➔	*Start button On: NO* *Start button Off: NC* *NO = Normally Open* *NC = Normally Closed*

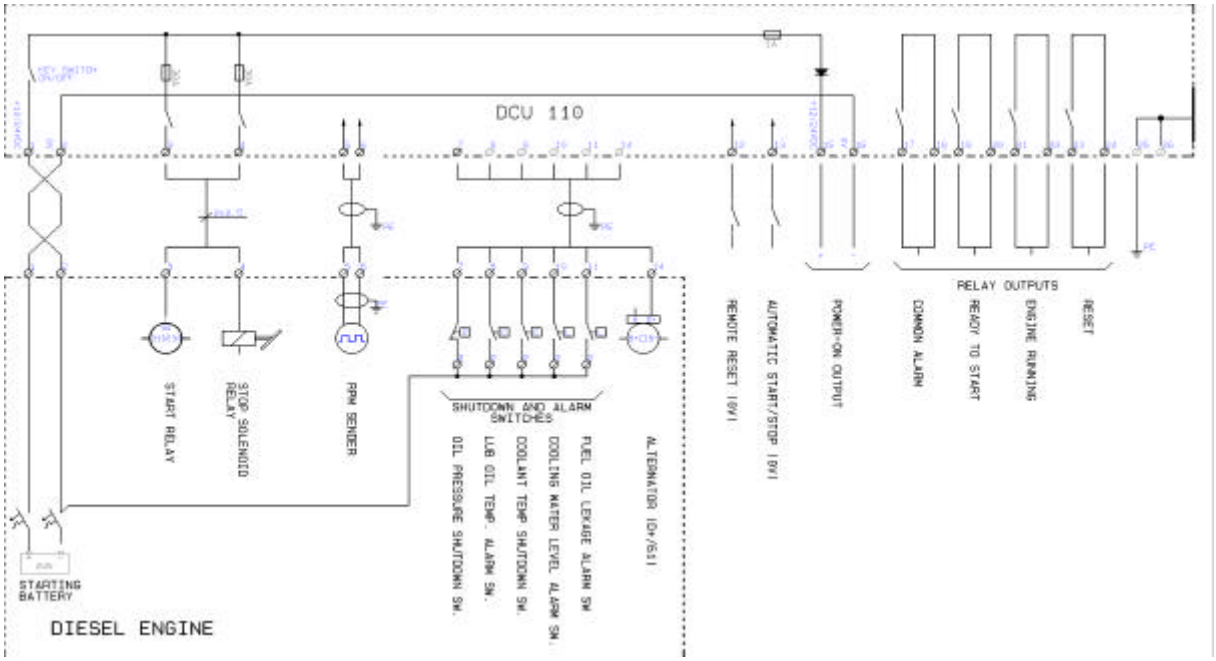
Finalizing the configuration

When pressing the (Standby) button the last time, the DCU 110 stores the final configuration and leaves the Configuration Mode.

Note! You can leave the configuration early by pressing Reset. All configurations after the last press of Standby are stored.

Schematic Drawing

Sample Schematic



The schematic shows a typical DCU 110 installation. See Connections page 8.

Technical Specification

Part	**Value**	
Overall dimensions	160 x 100 x 30mm (W x H x D)	
Cut-out dimensions	135 x 95mm (W x H)	
Fastening Bolts	4x M5	
Supply voltage	24VDC 12VDC	16-32VDC 10-16VDC
Power consumption	Typical : 150mA @ 24VDC	
Weight	Control unit	450g
Protection level	Front panel Back panel	IP54 IP30
Ambient temperature	Operation Storage	-20-70°C -20-70°C
Air humidity	Operation Storage	<90% Dry
Relays (Ready to Start, Common Alarm, Reset, Running)	24VDC 125VAC	1A 0.3A
Relays (ETS/ETR, Crank)	24VDC	30A