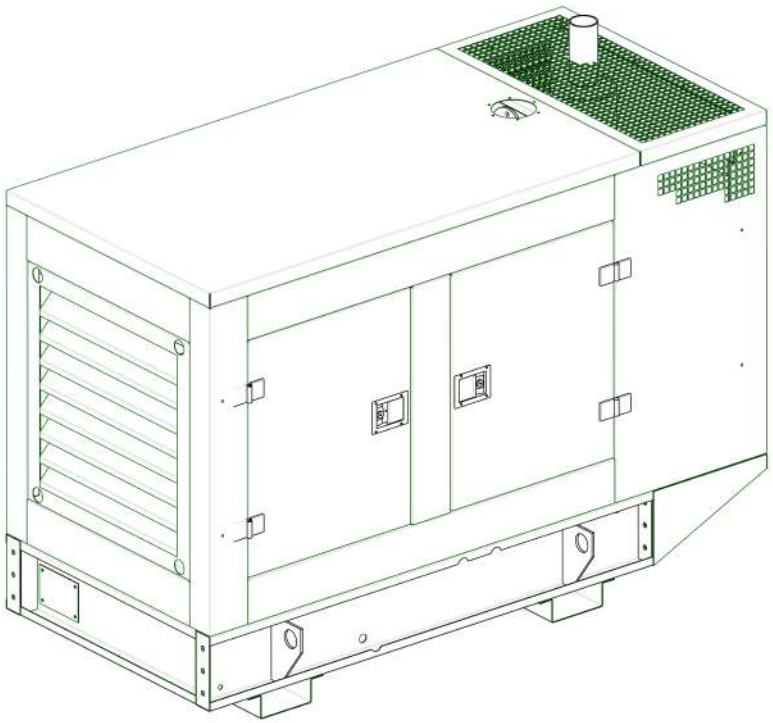
DOOSAN

Portable Power

G20, G30, G45, G60 50Hz (XF/XW)
G24, G36, G48, G71 60Hz (XF/XW)
OPERATION & MAINTENANCE MANUAL

Original Instruction



This manual contains important safety information and must be made available to personnel who operate and maintain this machine.

SP001/01/09/17 -ENG-

Portable Power

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REFERENCE INFORMATION

Write the correct information for YOUR DIPP generator in the spaces below. Always use these numbers when referring to your DIPP generator.

Generator Serial Number _____

Engine Serial Number _____

NOTES:

_____

_____

_____

_____

YOUR DIPP DEALER:

_____

ADDRESS:

_____

PHONE:

_____

CE

Doosan Bobcat EMEA s.r.o.
U Kodetky 1810,
Dobris, 263 12
Czech Republic

Portable Power

FOREWORD

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FOREWORD

The contents of this manual are considered to be proprietary and confidential to and should not be reproduced without the prior written permission of the company.

Nothing contained in this document is intended to extend any promise, warranty or representation, expressed or implied, regarding the products described herein. Any such warranties or other terms and conditions of sale of products shall be in accordance with the standard terms and conditions of sale for such products, which are available upon request.

This manual contains instructions and technical data to cover all routine operation and scheduled maintenance tasks by operation & maintenance staff. Major overhauls are outside the scope of this manual and should be referred to an authorised service department.

The use of repair parts / lubricants / fluids other than those included within the approved parts list may create hazardous conditions over which the company has no control. Therefore the company cannot be held responsible for equipment in which non-approved repair parts are installed.

The company reserves the right to make changes and improvements to products without notice and without incurring any obligation to make such changes or add such improvements to products sold previously.

The intended uses of this machine are outlined below and examples of unapproved usage are also given, however the company cannot anticipate every application or work situation that may arise.

IF IN DOUBT CONSULT SUPERVISION.

This machine has been designed and supplied for use only in the following specified conditions and applications:

- Operation within the ambient temperature range specified in the *GENERAL INFORMATION* section of this manual.

The use of the machine in any of the situation types listed in table 1:

a) Is not approved,

b) May impair the safety of users and other persons, and

c) May prejudice any claims made against the company.

TABLE 1
Use of the machine outside the ambient temperature range specified in the *GENERAL INFORMATION SECTION* of this manual.
This machine is not intended and must not be used in potentially explosive atmospheres, including situations where flammable gases or vapours may be present.
Use of the machine fitted with non approved components / lubricants / fluids.
Use of the machine with safety or control components missing or disabled.
Use of the machine for storage or transportation of materials inside or on the enclosure except when contained within the toolbox.
GENERATOR
Use of the generator to supply load(s) greater than those specified.
Use of unsafe or unserviceable electrical equipment connected to the generator.
Use of electrical equipment: (a) Having incorrect voltage and / or frequency ratings. (b) Containing computer equipment and / or similar electronics.

The company accepts no responsibility for errors in translation of this manual from the original English version.

GENERAL DATA

CONTENTS

GENERAL DATA

UNIT MODEL (50Hz)	G20	G30	G45	G60
Engine Speed - RPM	1500	1500	1500	1500
Engine Fuel	Diesel	Diesel	Diesel	Diesel
Manufacturer	Cummins	Cummins	Cummins	Cummins
Model	X2.5-G2	X3.3-G1	S3.8-G6	S3.8-G7
FLUID CAPACITIES				
Engine Crankcase Lubricant (litres)	8.0	8.0	11.0	11.0
Fuel Tank (litres)	130	130	170	170
Radiator & Engine Coolant (litres)	7.0	8.6	7.0	7.0
Electrical System	12VDC	12VDC	12VDC	12VDC
UNIT MEASUREMENTS / WEIGHTS				
Overall length (mm)	2200	2200	2450	2450
Overall width (mm)	1000	1000	1100	1100
Overall height (mm)	1400	1400	1600	1600
Weight (with fuel) (kg)	980	1010	1470	1520
Weight (less fuel) (kg)	850	880	1300	1350

UNIT MODEL (60Hz)	G24	G36	G48	G71
Engine Speed - RPM	1800	1800	1800	1800
Engine Fuel	Diesel	Diesel	Diesel	Diesel
Manufacturer	Cummins	Cummins	Cummins	Cummins
Model	X2.5-G4	X3.3-G2	S3.8-G8	S3.8-G10
FLUID CAPACITIES				
Engine Crankcase Lubricant (litres)	8.0	8.0	10.0	10.0
Fuel Tank (litres)	130	130	170	170
Radiator & Engine Coolant (litres)	7.0	8.6	7.0	7.0
Electrical System	12VDC	12VDC	12VDC	12VDC
UNIT MEASUREMENTS / WEIGHTS				
Overall length (mm)	2200	2200	2450	2450
Overall width (mm)	1000	1000	1100	1100
Overall height (mm)	1400	1400	1600	1600
Weight (with fuel) (kg)	980	1010	1470	1520
Weight (less fuel) (kg)	850	880	1300	1350

ELECTRICAL DATA

50Hz						
GENSET MODEL	GENSET DUTY	ENGINE MODEL	ALTERNATOR MODEL	400/230V		CB Size
				kVA	kW	
G20	Standby	X2.5G2	S0L2-G1	21	17	32
G20	Prime	X2.5G2	S0L2-G1	20	16	
G30	Standby	X3.3G1	S0L2-P1	32	26	50
G30	Prime	X3.3G1	S0L2-P1	30	24	
G45	Standby	S3.8G6	S1L2-N1	48	38	80
G45	Prime	S3.8G6	S1L2-N1	45	36	
G60	Standby	S3.8G7	S1L2-Y1	66	53	100
G60	Prime	S3.8G7	S1L2-Y1	63	50	

50Hz				
GENSET MODEL	GENSET DUTY	415/240V		CB Size
		kVA	kW	
G20	Standby	21	17	32
G20	Prime	20	16	
G30	Standby	32	26	50
G30	Prime	30	24	
G45	Standby	48	38	80
G45	Prime	45	36	
G60	Standby	66	53	100
G60	Prime	63	50	

60Hz						
GENSET MODEL	GENSET DUTY	ENGINE MODEL	ALTERNATOR MODEL	480/277V		CB Size
				kVA	kW	
G24	Standby	X2.5G4	S0L2-G1	25	20	32
G24	Prime	X2.5G4	S0L2-G1	24	19	
G36	Standby	X3.3G2	S0L2-P1	38	31	50
G36	Prime	X3.3G2	S0L2-P1	36	29	
G48	Standby	S3.8G8	S1L2-N1	54	43	80
G48	Prime	S3.8G8	S1L2-N1	48	38	
G71	Standby	S3.8G10	S1L2-Y1	79	63	100
G71	Prime	S3.8G10	S1L2-Y1	71	57	

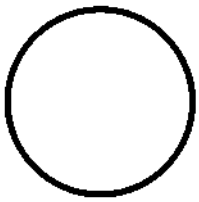
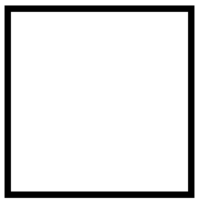
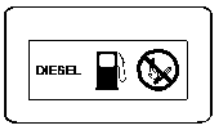
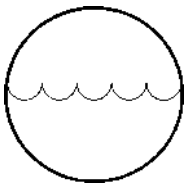
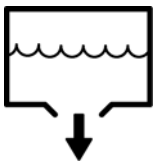
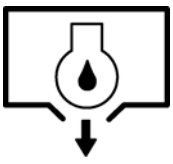
60Hz								
GENSET MODEL	GENSET DUTY	380/220V		CB Size	220/127V		CB Size
		kVA	kW		kVA	kW	
G24	Standby	20	16	32	24	19	63
G24	Prime	19	15		23	18	
G36	Standby	30	24	50	36	29	100
G36	Prime	29	23		34	27	
G48	Standby	45	36	80	54	43	160
G48	Prime	43	34		48	38	
G71	Standby	64	51	100	74	59	200
G71	Prime	59	47		69	55	

SAFETY

CONTENTS

SAFETY DECALS

GRAPHIC FORM AND MEANING OF ISO SYMBOLS

		
PROHIBITION / MANDATORY	**INFORMATION / INSTRUCTIONS**	**WARNING**
		
WARNING: Electrical shock risk.	WARNING - Hot surface.	Tie down point.
		
Lifting point.	On (power).	Off (power).
		
Read the Operation & Maintenance manual before operation or maintenance of this machine is undertaken.	Diesel fuel No open flame.	Crush Warning
		
No Water.	Coolant Fill.	Earthing Point.
		
Warning: Hot Liquid.	Coolant Drain.	Engine Oil Drain.

WARNING - Flammable liquid.

SAFETY INSTRUCTIONS

⚠ DANGER

This machine is not designed for operating life-sustaining equipment. It is equipped with a safety shutdown system that will cause the machine to stop operating whenever a shutdown condition is present.

Never operate the machine inside a building without adequate ventilation. Avoid breathing exhaust fumes when working on or near the machine.

⚠ WARNING

A battery contains sulfuric acid and can give off gases which are corrosive and potentially explosive. Avoid contact with skin, eyes, and clothing. In case of contact, flush area immediately with water.

⚠ WARNING

Improper operation of this equipment can cause severe injury or death. Read the Operation & Maintenance manual supplied with this machine before operation or service.

Modification or alteration of this machine CAN result in severe injury or death. Do not alter or modify this machine without the express written consent of the manufacturer.

⚠ WARNING

This machine is equipped with an Auto Start System, which can cause the machine to start at any time. Follow all safety recommendations outlined in this manual to avoid injury to personnel. DISCONNECT BATTERY BEFORE SERVICING.

⚠ CAUTION

Exercise extreme caution when using booster battery. To jump battery, connect ends of one booster cable to the positive (+) terminal of each battery. Connect one end of other cable to the negative (-) terminal of the booster battery and other end to a earth connection away from dead battery (to avoid a spark occurring near any explosive gases that may be present). After starting unit, always disconnect cables in reverse order.

⚠ WARNING

Never inspect or service unit without first disconnecting battery cable(s) to prevent accidental starting.

Wear eye protection while cleaning unit with compressed air, to prevent debris from injuring eyes.

⚠ WARNING

HOT PRESSURISED FLUID - Remove cap slowly to relieve PRESSURE from HOT radiator. Protect skin and eyes. HOT water or steam and chemical additives can cause serious personal injury.

⚠ WARNING

Flammable Fuels - Do not fill tank when engine is running.

Do not smoke or use an open flame in the vicinity of the generator set or fuel tank. Do not permit smoking, open flame, or sparks to occur near the battery, fuel, cleaning solvents or other flammable substances and explosive gases.

Do not operate Genset if fuel has been spilled inside or near the unit.

⚠ WARNING

Electrical Shock -

Do not operate electrical equipment while standing in water, on wet earth or with wet hands or shoes.

Use extreme caution when working on electrical components. Battery voltage (12V / 24V DC) is present unless the battery cables have been disconnected. Higher voltage (potentially 480V) is possibly present at all times.

⚠ WARNING

Always treat electrical circuits as if they were energised.

Disable Start Control before attempting any repair service, disconnect all leads to electrical power requirements and disconnect battery to prevent start up.

EARTHING

Comply with applicable electrical codes.

⚠ WARNING

The Generator Set can produce high voltages, which can cause severe injury or death to personnel and damage to equipment. The Generator Set should have proper internal and external earth when required by IEC 364-4-41.

The Generator Set is internally earthed neutral to the frame of the Generator Set. This internal earth connection is essential for proper Generator Set performance and personal protection.

External earthing consists of connecting the generator neutral to a solid earth, and is the responsibility of the operator, when earthing is required by IEC 364-4-41 Protection Against Electric Shock, and other local codes as applicable.

Several methods are employed to externally earth portable generator sets, depending on the intended use and code requirements. In all cases, a continuous length of splice-free copper cable, no smaller than 10 mm^2, shall be used for the external earth conductor, when earthing is required.

A qualified, licensed electrical contractor, knowledgeable in local codes, should be consulted.

⚠ WARNING

Failure to properly earth the Generator Set can result in severe injury or death.

IF USED AS ALTERNATE POWER SUPPLY

Connect only after the main service entrance switch has been DISCONNECTED and LOCKED OPEN. In addition, circuit overload protection must be provided in accordance with National Electrical Codes and local regulations.

⚠ CAUTION

Welding -

Prior to any welding, disconnect alternator relays, diagnostic circuit board, voltage regulator circuit board, meters, circuit breakers and battery cables. Open all circuit breakers, and remove any external connections (except earthing rod). Connect the welding earth as close as possible to the area being welded.

⚠ WARNING

Electrical Loading -

Never make electrical connections with the unit running.

Before placing the unit in operation, verify the electrical rating of the Generator Set and do not exceed generator set ratings.

HAZARDOUS SUBSTANCE PRECAUTION

⚠ CAUTION

Use extreme care to avoid contacting hot surfaces (engine exhaust manifold and piping).

Ensure that adequate ventilation of the cooling system and exhaust gases is maintained at all times.

The following substances are used in the manufacture of this machine and may be hazardous to health if used incorrectly.

Avoid ingestion, skin contact and breathing fumes for the following substances: Antifreeze, Engine Lubricating Oil, Preservative Grease, Rust Preventative, Diesel Fuel and Battery Electrolyte.

The following substances may be produced during the operation of this machine and may be hazardous to health:

- Avoid build-up of engine exhaust fumes in confined spaces.
- Avoid breathing exhaust fumes.
- Avoid breathing brake lining dust during maintenance.
- **Always operate in a well ventilated area.**

WARNINGS

Warnings call attention to instructions which must be followed precisely to avoid injury or death.

CAUTIONS

Cautions call attention to instructions which must be followed precisely to avoid damaging the product, process or its surroundings.

NOTES

Notes are used for supplementary information.

GENERAL INFORMATION

Ensure that the operator reads and understands the decals and consults the manuals before maintenance or operation.

Ensure that the Operation & Maintenance manual, and the manual holder, are not removed permanently from the machine.

Ensure that maintenance personnel are adequately trained, competent and have read the Maintenance Manuals.

Make sure that all protective covers are in place and that the canopy / doors are closed during operation.

The specification of this machine is such that the machine is not suitable for use in flammable gas risk areas. If such an application is required then all local regulations, codes of practice and site rules must be observed. To ensure that the machine can operate in a safe and reliable manner, additional equipment such as gas detection, exhaust spark arresters, and intake (shut-off) valves may be required, dependant on local regulations or the degree of risk involved.

A weekly visual check must be made on all fasteners / fixing screws securing mechanical parts. In particular, safety-related parts such as coupling hitch, drawbar components, road-wheels, and lifting bail should be checked for total security.

All components which are loose, damaged or unserviceable, must be rectified without delay.

Electricity

The human body has a low tolerance for electricity and is a very good conductor. Exposure to electrical shock can results in an interruption of normal heart activity, thermal burns, severe muscle contractions and even death.

Never operate the generator without all protections in place. Controller and busbar doors must be closed at any time during operation.

If life testing is necessary, it should only be performed by properly trained people.

While testing on life electrical equipment, rubber sole shoes and adequate rubber gloves must be worn, and all local regulations must be respected.

Materials

The following substances may be produced during the operation of this machine:

- engine exhaust fumes

AVOID INHALATION.

Ensure that adequate ventilation of the cooling system and exhaust gases is maintained at all times.

The following substances are used in the manufacture of this machine and may be hazardous to health if used incorrectly:

- anti-freeze
- engine lubricant
- preservative grease
- rust preventative
- diesel fuel
- battery electrolyte

AVOID INGESTION, SKIN CONTACT AND INHALATION OF FUMES.

Should engine lubricants or fuel come into contact with the eyes, then irrigate with water for at least 5 minutes.

Should engine lubricants or fuel come into contact with the skin, then wash off immediately.

Consult a doctor if large amounts of engine lubricants or fuel are ingested.

Consult a doctor if engine lubricants or fuel are inhaled.

Never give fluids or induce vomiting if the patient is unconscious or having convulsions.

Safety data sheets for engine lubricants and fuel should be obtained from the lubricant supplier.

Battery

Batteries contain corrosive liquid and produce explosive gas. Do not expose to naked lights. Always wear personal protective clothing when handling. When starting the machine from a slave battery ensure that the correct polarity is observed and that connections are secure.

DO NOT ATTEMPT TO SLAVE START A FROZEN BATTERY SINCE THIS MAY CAUSE IT TO EXPLODE.

Radiator

Hot engine coolant and steam can cause injury. Ensure that the radiator filler cap is removed with due care and attention.

Transport

When loading or transporting machines ensure that the specified lifting and tie down points are used.

OPERATING INSTRUCTIONS

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OPERATING INSTRUCTIONS

Never operate unit without first observing all safety warnings and carefully reading the operation & maintenance manual shipped from the factory with this machine.

COMMISSIONING

Upon receipt of the unit, and prior to putting it into service, it is important to adhere strictly to the instructions given below in *PRIOR TO STARTING*.

Ensure that the operator reads and *understands* the decals and consults the manuals before maintenance or operation.

⚠ CAUTION

Ensure the *emergency stop* device location is known and clearly visible with ease of access for operation. It is important to ensure that the *emergency stop* device is functioning correctly and the method of operation is known.

Attach the battery cables to the battery(s) ensuring that they are tightened securely. Attach the negative cable before attaching the positive cable.

The operating controls and instruments are arranged on the control panel as shown. A description of each panel device is as follows:

Ensure that all transport and packing materials are discarded.

Ensure that the correct fork lift truck slots or marked lifting / tie down points are used whenever the machine is lifted or transported.

When operating the machine ensure that there is sufficient clearance for ventilation and exhaust requirements, observing any specified minimum dimensions (to walls, floors etc.).

Adequate clearance needs to be allowed around and above the machine to permit safe access for specified maintenance tasks.

Ensure that the machine is positioned securely and on a stable foundation. Any risk of movement should be removed by suitable means, especially to avoid strain on any rigid discharge piping.

CONNECTING THE LOAD

Make sure the wires are not cracked or damaged in any way.

Connect the proper phase wire to its corresponding bar L1–L2–L3. Mixing phases connections can result in equipment damage, accidents causing injuries or even death.

Always use the 5 connections, 3 phases, neutral and earth.

Make sure your installation is in compliance with local regulations.

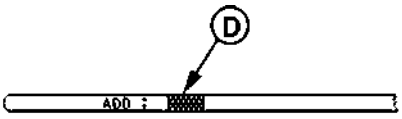
PRIOR TO STARTING

Before starting the engine, carry out the following checks:

1. Engine oil level: Add as required.

⚠ CAUTION

DO NOT fill above the top mark on the dipstick. Oil levels anywhere within crosshatch (D) are considered in the acceptable operating range.



2. Engine coolant level: Add as required.
3. Fuel filter: Drain any accumulation of water. Clean or replace element as required.
4. Air cleaner service indicator (if equipped): Service immediately if showing "red" when the engine is running.
5. Fuel level in tank: Fill, using CLEAN DIESEL fuel, at the end of the day to minimise condensation.
6. Battery: Keep terminals clean and lightly greased.
7. Engine belts and hoses: Check for proper fit and / or damage. Service as required.
8. Air Vents / Grilles: Both engine radiator and generator cooling air. Check for obstructions (leaves, paper, etc.).
9. Visual inspection: Check for excessive fluid leaks, evidence of arcing around control panel, loose wire-routing clamps, etc.

⚠ CAUTION

Call a qualified person to make electrical repairs.

⚠ WARNING

Do not remove the cap from a HOT engine radiator. The sudden release of pressure from a heated cooling system can cause severe injury or death.

⚠ CAUTION

Loading of Generator - If run for extended periods under an extremely light load, the engine efficiency will decrease and eventually become damaged. The impact of running a generator on a light load is extremely detrimental to the engine and will result in:

- **Fuel dilution of the lubricating oil.**
- **Carbon build up in the cylinder and turbocharger.**
- **Cylinder head valve sticking.**
- **Reduced performance.**

In order to prevent damage, the machine should not be loaded below 40% of the generator's nominal rating for ectended periods of time.

STARTING

⚠ CAUTION

Use the EMERGENCY STOP button ONLY in the event of an emergency.

NEVER use it for normal shut-down.

Verify the following:

1. All external electrical power loads are turned “OFF”.
2. Main Breaker is “OFF”.
3. Battery Disconnected Switch is “ON”.
4. Reset (pull to unlatch) Emergency Stop Button.
5. Push the controller “START” Button.
6. Wait for preheating if enabled.

⚠ CAUTION

Do NOT use engine starting fluids.

⚠ DANGER

POWER is present upon cranking the engine.

⚠ CAUTION

Allow starter to cool for one minute between start attempts.

If engine shuts down, the generator controller will indicate the problem. Correct the problem before continuing.

7. Allow the engine to warm-up for 3 to 5 minutes.
8. Check the CONTROL Panel for proper voltages.
9. With main breaker “ON” power is present and available for use.
10. Close side doors for optimum cooling of the unit while running.

STOPPING

1. Turn off all external electrical power loads.
2. Turn Main Breaker “OFF”.
3. Allow 5 minute cool down.
4. Push controller “STOP” Button.
5. Wait at least 15 seconds before restarting.
6. Fill fuel tank at end of working day to prevent condensate.

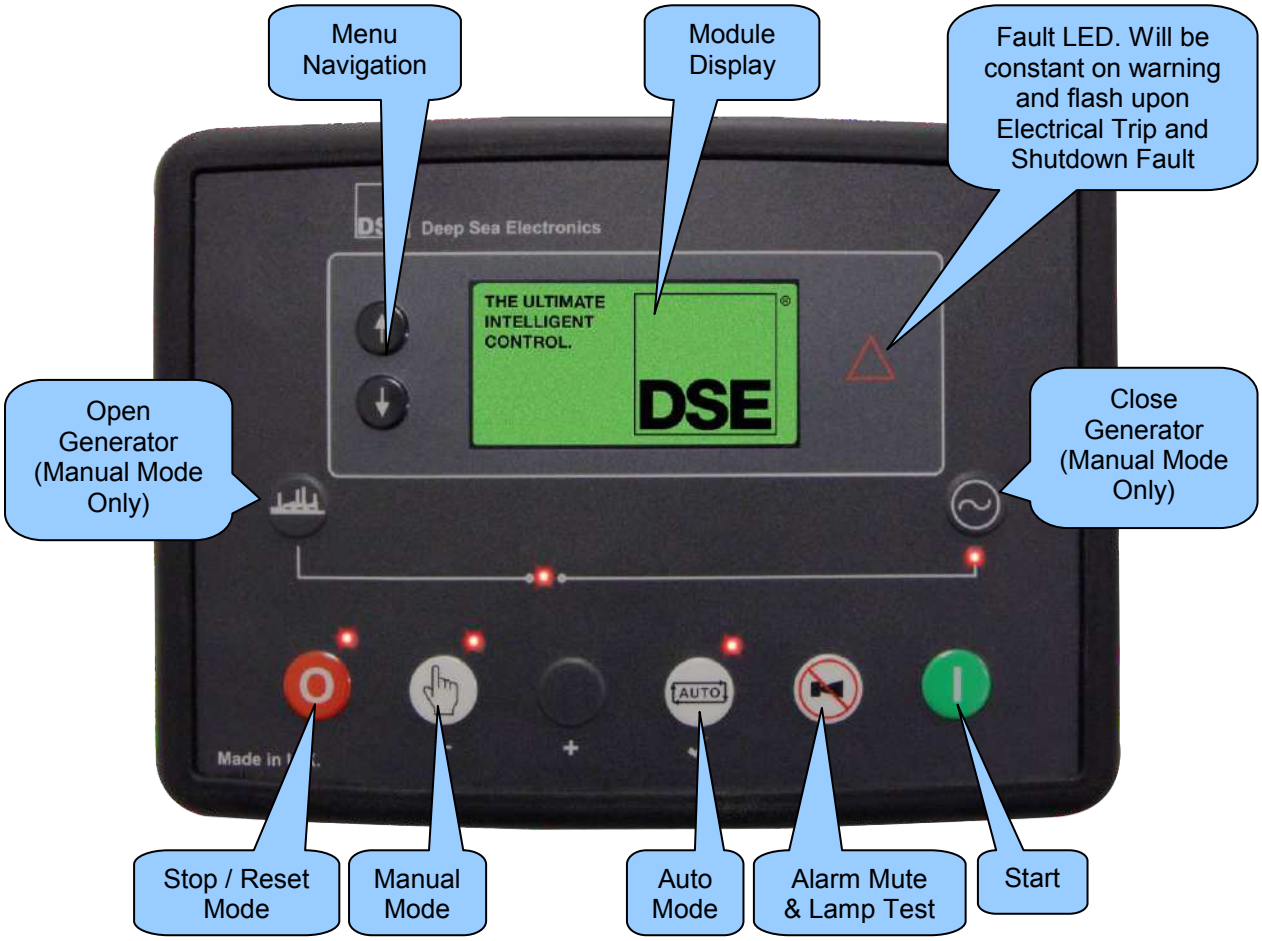
DESCRIPTION OF CONTROLS

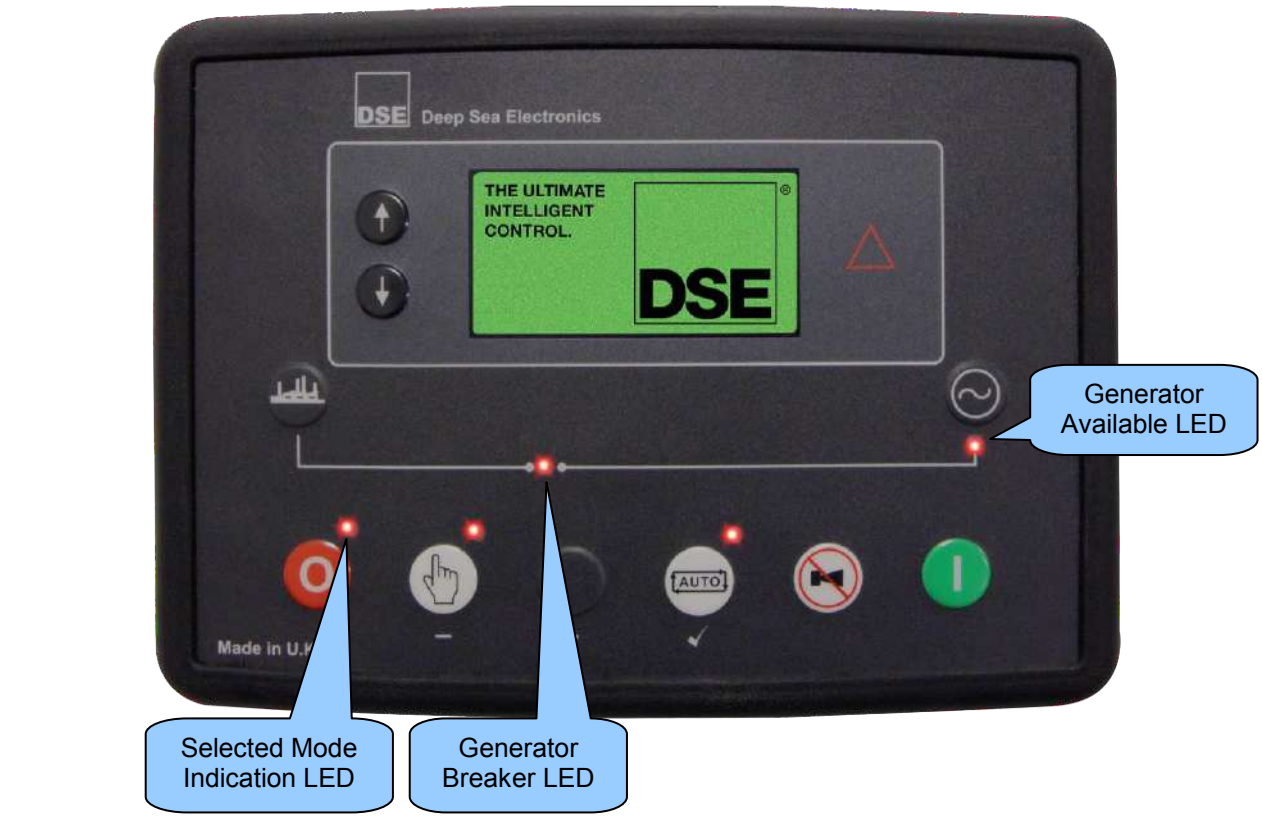
⚠ CAUTION

The module may instruct an engine start event due to external influences. Therefore, it is possible for the engine to start at any time without warning. Prior to performing any maintenance on the system, it is recommended that steps are taken to remove the battery and isolate supplies.

Note: The following descriptions detail the sequences followed by a module containing the standard 'factory configuration'. Always refer to your configuration source for the exact sequences and timers observed by any particular module in the field.

Control of the module is via push buttons mounted on the front of the module with Stop/Reset Mode , Manual Mode , Test Mode (DSE6020 MKII Only), Auto Mode and Start functions. For normal operation, these are the only controls which need to be operated. Details of their operation are provided later in this document.


Menu Navigation
Module Display
Fault LED. Will be constant on warning and flash upon Electrical Trip and Shutdown Fault
Open Generator (Manual Mode Only)
Close Generator (Manual Mode Only)
Deep Sea Electronics
THE ULTIMATE INTELLIGENT CONTROL.
DSE
AUTO
Stop / Reset Mode
Manual Mode
Auto Mode
Alarm Mute & Lamp Test
Start


Generator Available LED
Deep Sea Electronics
THE ULTIMATE INTELLIGENT CONTROL.
DSE
AUTO
Selected Mode Indication LED
Generator Breaker LED

CONTROL PUSH-BUTTONS

Icon	Description
	**Stop / Reset Mode** This button places the module into its *Stop/Reset Mode* . This clears any alarm conditions for which the triggering criteria have been removed. If the engine is running and the module is put into Stop mode, the module automatically instructs the generator to unload (*Close Generator and Delayed Load Output 1, 2, 3 & 4 become inactive (if used)*). The fuel supply de-energises and the engine comes to a standstill. Should any form of *remote start signal* be present when in *Stop Mode* the generator remains at rest
	**Manual Mode** This button places the module into its *Manual Mode* . Once in *Manual Mode* , the module responds to the *Start* button to start the generator and run it off load. To place the generator on load, use the *Transfer to Generator* button. The module automatically instructs the changeover device to place the generator on load ('Close Generator' *and Delayed Load Output 1, 2, 3 & 4 becomes active (if used)*). To place the generator off load, use the *Transfer to Mains* or *Open Generator* buttons. The module automatically instructs the changeover device to place the generator off load *(Close Generator and Delayed Load Output 1, 2, 3 & 4 becomes inactive (if used))*. Additional digital inputs can be assigned to perform these functions. If the engine is running off-load in *Manual Mode* and a remote start signal becomes present, the module automatically instructs the changeover device to place the generator on load ('Close Generator' and 'Delayed Load Output 1, 2, 3 & 4' becomes active (if used)) . Upon removal of the *Remote Start Signal*, the generator remains on load until either selection of the *Stop/Reset Mode* or *Auto Mode* . *For further details, please see* section entitled 'Operation' *elsewhere in this manual.*
	**Test Mode (DSE6020 MKII Only)** This button places the module into its *Test Mode* . Once in *Test Mode* , the module responds to the *Start* button to start the generator and run it off load. Once the set has started the set automatically be placed on load (*Close Generator* and *Delayed Load Output 1, 2, 3 & 4* become active in order from lowest to highest (if used)). For further details, please see section entitled 'Operation' elsewhere in this manual.

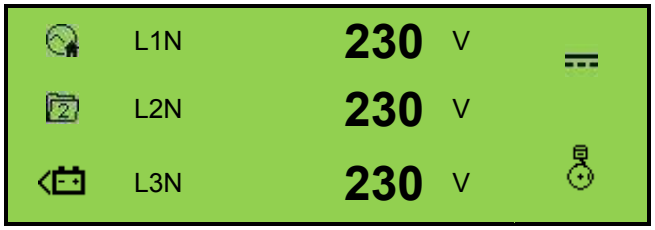
Icon	Description
	**Auto Mode** This button places the module into its *Auto Mode* . This mode allows the module to control the function of the generator automatically. The module monitors the *remote start* input and once a start request is made, the set is automatically started and placed on load *(Close Generator and Delayed Load Output 1, 2, 3 & 4 become active in order from lowest to highest (if used))*. Upon removal of the starting signal, the module removes the load from the generator and shut the set down observing the *stop delay* timer and *cooling* timer as necessary *(Close Generator and Delayed Load Output 1, 2, 3 & 4 become inactive at once (if used))*. The module then waits for the next start event. *For further details, please see section entitled Operation elsewhere in this manual.*
	**Alarm Mute / Lamp Test** This button de-activates the audible alarm output (if configured) and illuminates all of the LEDs on the module's facia.
	**Start** This button is only active in the *Stop/Reset Mode* , *Manual Mode* and *Test Mode* . Pressing the *Start* button in *Stop/Reset Mode* powers up the ECU but does not start the engine. This can be used to check the status of the CAN communication and to prime the fuel system. Pressing the *Start* button in *Manual Mode* or *Test Mode* starts the generator and runs it off load in *Manual Mode* or on load in *Test Mode* .
 	**Menu Navigation** Used for navigating the instrumentation, event log and configuration screens. *For further details, please see* section entitled 'Operation' *elsewhere in this manual.*
	**Transfer To Generator** This button is only active in the *Manual Mode* and allows the operator to transfer the load to the generator.
	**Open Generator (DSE6010 MKII Only)** This button is only active in the *Manual Mode* and allows the operator to open the generator breaker and remove the load.
	**Transfer To Mains (DSE6020 MKII Only)** This button is only active in the *Manual Mode* and allows the operator to transfer the load to the mains.

MODULE DISPLAY

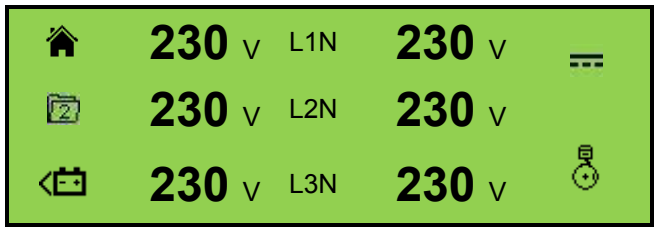
The module's display contains the following sections:

Note: Depending upon the module's configuration, some display screens may be disabled. For further details of module configuration, refer to DSE Publication: 057-223 DSE60xx MKII Configuration Software Manual.

Example of DSE6010 MKII Home Page Display



Example of DSE6020 MKII Home Page Display



Backlight

The LCD backlight is on if the unit has sufficient voltage while the unit is turned on, unless the unit is cranking for which the backlight is turned off.

Active Configuration

An icon is displayed in the Active Config section to indicate the active configuration within the currently selected within the controller.

Icon	Details
	Appears when the main configuration is selected.
	Appears when the alternative configuration is selected.

Instrumentation Icons

When viewing instrumentation pages, an icon is displayed in the *Inst. Icon* section to indicate what section is currently being displayed.

Icon	Details
	The default home page which displays generator voltage and mains voltage (DSE6020 MKII only)
	Generator voltage and frequency instrumentation screen
	Mains voltage and frequency instrumentation screen (DSE6020 MKII only)
	Generator current instrumentation screen
	Mains current instrumentation screen (DSE6020 MKII only when CT in load location)
	Load power instrumentation screen
	Engine speed instrumentation screen
	Hours run instrumentation screen
	Battery voltage instrumentation screen
	Oil pressure instrumentation screen
	Coolant temperature instrumentation screen
	Flexible sensor instrumentation screen
	Appears when the event log is being displayed
	Current time held in the unit
	The current value of the scheduler run time and duration
	ECU diagnostic trouble codes
	Oil Filter maintenance timers
	Air Filter maintenance timers
	Fuel Filter maintenance timers

Front Panel Editor (FPE) / Auto Run Icon

Note: For further details about the Front Panel Editor, see the section entitled 'Front Panel Editor' elsewhere in this manual.

When running in ***Auto Mode*** and on the Home / page, an icon is displayed in the ***FPE /Auto Run*** section to indicate the source of the auto start signal.

Icon	Auto Run Reason
	Appears when a remote start input is active
	Appears when a low battery run is active
	Mains failure
	Appears when a scheduled run is active

Mode Icon

An icon is displayed in the *Mode Icon* section to indicate the mode the controller is currently in.

Icon	Details
	Appears when the engine is at rest and the unit is in *Stop/Reset Mode*
	Appears when the engine is at rest and the unit in *Manual Mode*
	Appears when the engine is at rest and the unit is *Test Mode*
	Appears when the engine is at rest and the unit is in *Auto Mode*
	Appears when a timer is active, for example cranking time, crank rest etc.
	Appears when the engine is running, and all timers have expired, either on or off load. The animation speed is reduced when running in idle mode.
	Appears when the unit is in the front panel editor.
	Appears when a USB connection is made to the controller.
	Appears if either the configuration file or engine file becomes corrupted.

Alarm Icons (Protections)

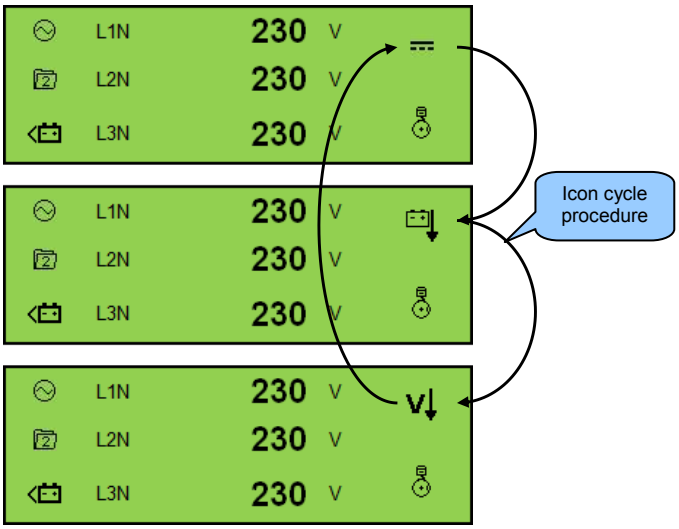
An icon is displayed in the *Alarm Icon* section to indicate the alarm that is current active on the controller.

In the event of a warning alarm, the LCD only displays the *Alarm Icon*. In the event of an electrical trip or shutdown alarm, the module displays the *Alarm Icon* and the *Stop/Reset Mode* button LED begins to flash.

If multiple alarms are active at the same time, the *Alarm Icon* automatically cycles through all the appropriate icons to indicate each alarm which is active.

Example

If the DSE controller was sensing a *charge alternator failure alarm, delay over current alarm* and a AC under voltage alarm at the same time, it would cycle through all of the icons to show this.



Alarm Icons (Cont'd)

1. Warning Alarm Icons

Warnings are non-critical alarm conditions and do not affect the operation of the generator system, they serve to draw the operators attention to an undesirable condition.

By default, warning alarms are self-resetting when the fault condition is removed. However enabling *all warnings are latched* causes warning alarms to latch until reset manually. This is enabled using the DSE Configuration Suite in conjunction with a compatible PC.

Icon	Fault	Description
	Auxiliary Inputs	The module detects that an auxiliary input which has been user configured to create a fault condition has become active.
	Analogue Input	The module detects that an input configured to create a fault condition has become active.
	Fail To Stop	**Note: *Fail to Stop* could indicate a faulty oil pressure sensor. If engine is at rest check oil sensor wiring and configuration.** The module has detected a condition that indicates that the engine is running when it has been instructed to stop.
	Charge Failure	The auxiliary charge alternator voltage is low as measured from the W/L terminal.
	Low Fuel Level	The level detected by the fuel level sensor is below the *low fuel level pre-set* pre-alarm setting.
	High Fuel Level	The level detected by the fuel level sensor is above the *high fuel level pre-set* pre-alarm setting.
	Battery Under Voltage	The DC supply has fallen below or risen above the *low volts pre-set* pre-alarm setting.
	Battery Over Voltage	The DC supply has risen above the *high volts pre-set* pre-alarm setting.
	Generator Under Voltage	The *generator output voltage* has fallen below the *pre-set* pre-alarm setting after the Safety On timer has expired.
	Generator Over Voltage	The *generator output voltage* has risen above the *pre-set* pre-alarm setting.
	Generator Under Frequency	The *generator output frequency* has fallen below the *pre-set* pre-alarm setting after the Safety On timer has expired.
	Generator Over Frequency	The *generator output frequency* has risen above the *pre-set* pre-alarm setting.
	CAN ECU Fault	The engine ECU has detected an alarm
	CAN Data Fail	The module is configured for CAN operation and does not detect data on the engine Can data link.
	Immediate Over Current	The measured current has risen above the configured trip level.
	Delayed Over Current	The measured current has risen above the configured trip level for a configured duration.
	Oil Filter Maintenance Alarm	Maintenance due for oil filter.
	Air Filter Maintenance Alarm	Maintenance due for air filter
	Fuel Filter Maintenance Alarm	Maintenance due for fuel filter.

Alarm Icons (Cont'd)

2. Electrical Trip Alarm Icons

Note: The alarm condition must be rectified before a reset takes place. If the alarm condition remains, it is not possible to reset the unit (The exception to this is the *Low Oil Pressure alarm* and similar a*ctive from safety on* alarms, as the oil pressure is low with the engine at rest).

Electrical trips are latching and stop the Generator but in a controlled manner. On initiation of the electrical trip condition the module de-energises all the *Delayed Load Output* and the *Close Gen Output* outputs to remove the load from the generator. Once this has occurred the module starts the Cooling timer and allows the engine to cool off-load before shutting down the engine. The alarm must be accepted and cleared, and the fault removed to reset the module.

Electrical trips are latching alarms and to remove the fault, press the *Stop/Reset Mode* button on the module.

Icon	Fault	Description
	Auxiliary Inputs	The module detects that an auxiliary input which has been user configured to create a fault condition has become active.
	Analogue Input	The module detects that an input configured to create a fault condition has become active.
	Low Fuel Level	The level detected by the fuel level sensor is below the low fuel level pre-set alarm setting.
	High Fuel Level	The level detected by the fuel level sensor is above the high fuel level pre-set alarm setting.
	Delayed Over Current	The measured current has risen above the configured trip level for a configured duration.
	kW Overload	The measured kW has risen above the configured trip level for a configured duration.

Alarm Icons (Cont'd)

3. Shutdown Alarm Icons

Note: The alarm condition must be rectified before a reset takes place. If the alarm condition remains, it is not be possible to reset the unit (The exception to this is the *Low Oil Pressure alarm* and similar *active from safety on* alarms, as the oil pressure is low with the engine at rest).

Shutdown alarms are latching and immediately stop the Generator. On initiation of the shutdown condition the module de-energises all the *Delayed Load Output* and the *Close Gen Output* outputs to remove the load from the generator. Once this has occurred, the module shuts the generator set down immediately to prevent further damage. The alarm must be accepted and cleared, and the fault removed to reset the module.

Shutdowns are latching alarms and to remove the fault, press the *Stop/Reset Mode* button on the module.

Icon	Fault	Description
	Auxiliary Inputs	The module detects that an auxiliary input which has been user configured to create a fault condition has become active.
	Analogue Input	The module detects that an input configured to create a fault condition has become active.
	Fail To Start	The engine has failed to start after the configured number of start attempts
	Low Oil Pressure	The module detects that the engine oil pressure has fallen below the low oil pressure pre-alarm setting level after the Safety On timer has expired.
	Engine High Temperature	The module detects that the engine coolant temperature has exceeded the high engine temperature pre-alarm setting level after the Safety On timer has expired.
	Under Speed	The engine speed has fallen below the under speed pre alarm setting
	Over Speed	The engine speed has risen above the over speed pre alarm setting
	Charge Failure	The auxiliary charge alternator voltage is low as measured from the W/L terminal.
	Low Fuel Level	The level detected by the fuel level sensor is below the low fuel level pre-set alarm setting.
	High Fuel Level	The level detected by the fuel level sensor is above the high fuel level pre-set alarm setting.
	Generator Under Voltage	The generator output voltage has fallen below the pre-set alarm setting. after the Safety On timer has expired.
	Generator Over Voltage	The generator output voltage has risen above the pre-set alarm setting.

Additional shutdown alarm icons can be viewed overleaf.

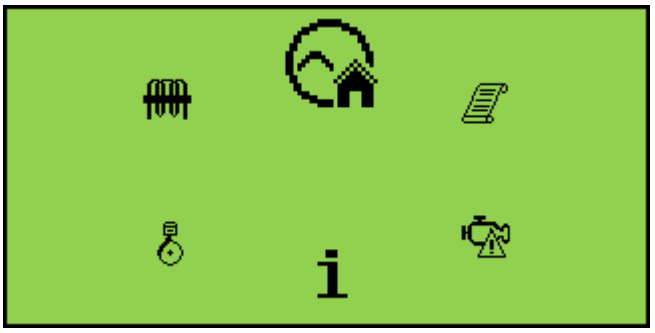
Alarm Icons (Cont'd)

Icon	Fault	Description
	Generator Under Frequency	The generator output frequency has fallen below the pre-set alarm setting after the Safety On timer has expired.
	Generator Over Frequency	The generator output frequency has risen above the pre-set alarm setting.
	Delayed Over Current	The measured current has risen above the configured trip level for a configured duration.
	kW Overload	The measured kW has risen above the configured trip level for a configured duration.
	CAN ECU Fault	The engine ECU has detected an alarm – CHECK ENGINE LIGHT Contact Engine Manufacturer for support.
	CAN Data Fail	The module is configured for CAN operation and does not detect data on the engine Can data link.
	Emergency Stop	The emergency stop button has been depressed. This failsafe (normally closed to emergency stop) input and immediately stops the set should the signal be removed.
	Oil Sender Open Circuit	The oil pressure sensor has been detected as being open circuit.
	Coolant Temperature Sender Open Circuit	The coolant temperature sensor has been detected as being open circuit.
	Oil Filter Maintenance Alarm	Maintenance due for oil filter.
	Air Filter Maintenance Alarm	Maintenance due for air filter
	Fuel Filter Maintenance Alarm	Maintenance due for fuel filter.

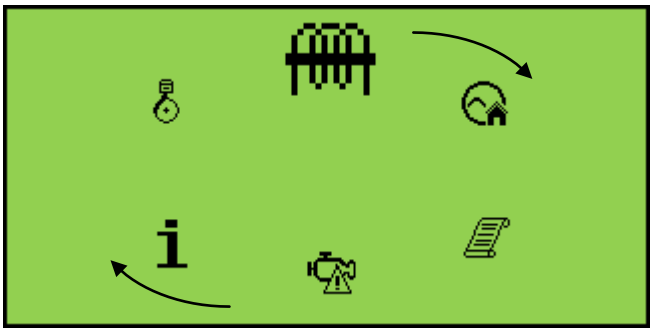
VIEWING THE INSTRUMENT PAGES

Navigation Menu

To enter the navigation menu, press both the (up) and (down) buttons simultaneously.



To select the required icon, press the (up) button to cycle right or the (down) button to cycle left until the desired instrumentation section is reached.



Once the desired icon is at the top, press the *Auto Mode* (✓) button to enter that instrunmentation section.

If the *Auto Mode* (✓) button is not pressed, the display automatically returns to the Home (/) page after the configured setting of the *LCD Scroll Timer*.

1. Navigation Menu Icons

Icon	Details
	Generator and mains voltage instrumentation (DSE6020 MKII only)
/	Generator instrumentation
	Mains instrumentation (DSE6020 MKII only)
	Current and load instrumentation
	Engine instrumentation
	Module information
	Engine DTCs (Diagnostic Trouble Codes) if active
	Event Log

General Navigation

Note: For further details of module configuration, refer to DSE Publication: 057-223 DSE60xx MKII Configuration Software Manual.

It is possible to scroll through the display to view different pages of information by repeatedly operating the (up) or (down) naviagation buttons.

Example:

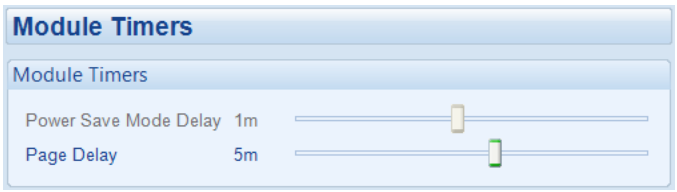
Home → Press (down) → Generator → Press (down) → Mains

And so on until the last page is reached. A Further press of the navigation (down) button returns the display to the Home (/) page.

Once selected, the page remains on the LCD display until the user selects a different page or, after an extended period of inactivity (Page Delay Timer), the module reverts back to the Home (/) page.

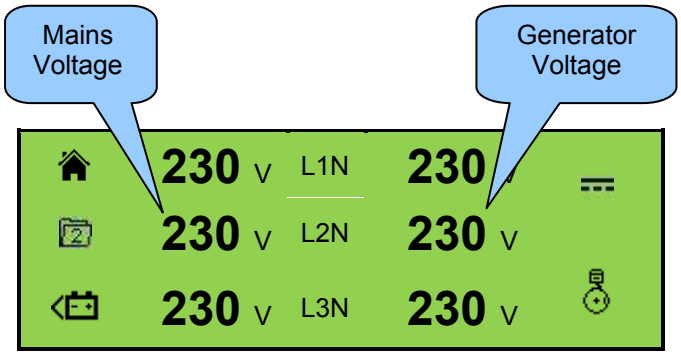
Note: If you want to view one of the instrument pages towards the end of the list, it may be quicker to scroll up through the pages rather than down.

The *Page Delay Timer* is configurable using the DSE Configuration Suite Software or by using the Front Panel Editor.



Home

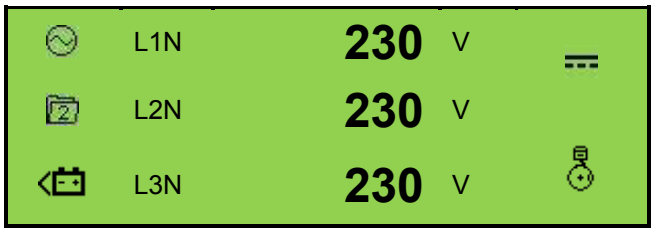
This is the page that is displayed when no other page has been selected and is automatically displayed after a period of inactivity (*Page Delay Timer*) of the module facia buttons. It also contains the voltage reading of the generator and mains that is measured from the module's voltage inputs.



- Generator Voltage (ph-N / ph-ph)
- Mains Voltage (ph-N / ph-ph) (DSE6020 MKII only)

Generator

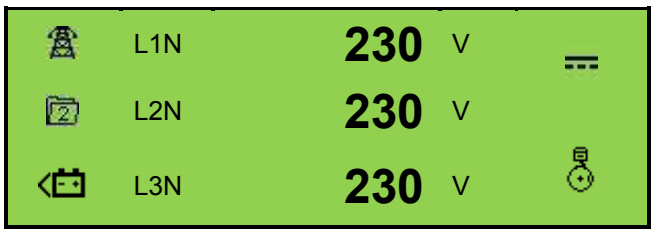
These pages contain electrical values of the generator, measured or derived from the module's voltage inputs.



- Generator Voltage (ph-N)
- Generator Voltage (ph-ph)
- Generator Frequency

Mains (DSE6020 MKII ONLY)

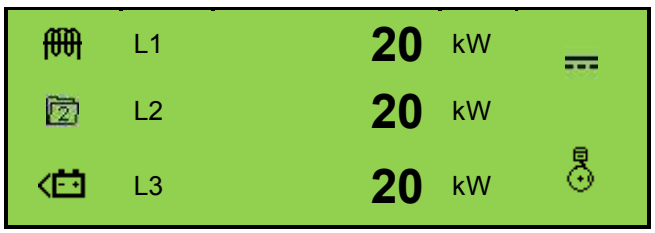
These pages contain electrical values of the mains, measured or derived from the module's voltage inputs.



- Mains Voltage (ph-N)
- Mains Voltage (ph-ph)
- Mains Frequency

Load

These pages contain electrical values of the load, measured or derived from the module's voltage and current inputs. The power values displayed depend on which supply is on load.



- Generator Current (A)
- Mains Current (A) (DSE6020 MKII only)
- Load ph-N (kW)
- Total Load (kW)
- Load ph-N (kVA)
- Total Load (kVA)
- Load ph-N (kVAr)
- Total Load (kVAr)
- Power Factor ph-N
- Power Factor Average
- Accumulated Load (kWh, kVAh, kVArh)

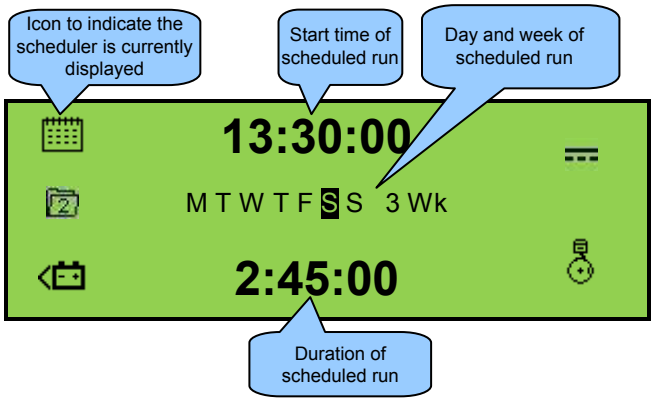
Engine

These pages contain instrumentation gathered about the engine measured or derived from the module's inputs, some of which may be obtained from the engine ECU.

- Engine Speed
- Engine Run Time
- Engine Battery Volts
- Engine Coolant Temperature
- Engine Oil Pressure
- Engine Fuel Level
- Flexible Sensor
- Engine Maintenance Due – Oil
- Engine Maintenance Due – Air
- Engine Maintenance Due – Fuel

Info

These pages contain information about the controller.



- Module's date and time
- Scheduler settings
- Product description and USB identification number
- Application and Engine Version

Event Log

Note: For further details of module configuration, refer to DSE Publication: 057-223 DSE60xx MKII Configuration Software Manual.

This module's event log contains a list of the last 50 recorded events and the engine hours at which they occurred. The events recorded are customisable via the DSE Configuration Suite PC Software.

Example below shows the possible configuration of the event log (DSE Configuration Suite Software). This also shows the factory settings of the module.

Once the log is full, any subsequent event overwrites the oldest entry in the log. Hence, the log always contains the most recent events. The module logs the alarm, along with the engine running hours.

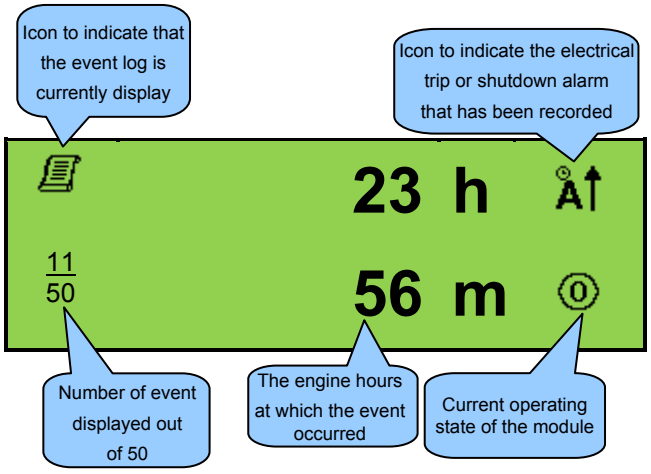
1. Viewing the event log:

To view the event log, press both (up) and (down) buttons simultaneously, the navigation menu is then displayed. Once entered, cycle to the event log ( ) section and enter.

To view the event log, repeatedly press the (up) or (down) buttons until the LCD screen displays the desired event.

Continuing to press down the (up) or (down) buttons cycles through the past alarms after which the display shows the most recent alarm and the cycle begins again.

To exit the event log, press the (up) and (down) buttons simultaneously to enter the navigation menu. Once entered, cycle to the desired intrunmentation section.



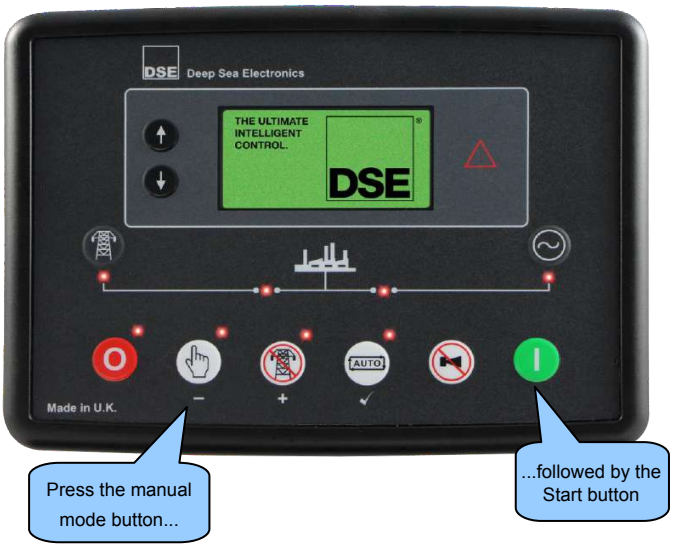
OPERATION

Note: The following descriptions detail the sequences followed by a module containing the standard 'factory configuration'. Always refer to your configuration source for the exact sequences and timers observed by any particular module in the field.

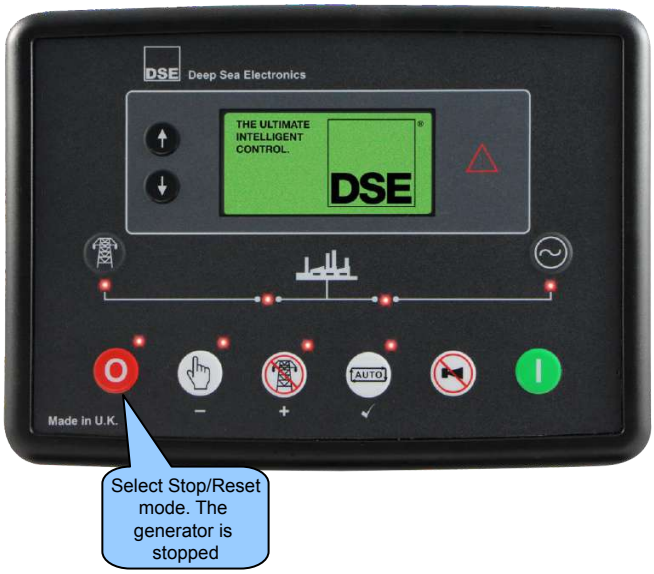
QUICKSTART GUIDE

This section provides a quick start guide to the module's operation.

Starting the engine



Stopping the engine:



STOP/RESET MODE

Note: If a digital input configured to *Panel Lock* is active, changing module modes is not possible. Viewing the instruments and event logs is NOT affected by *Panel Lock*. For further details of module configuration, refer to DSE Publication: 057-223 DSE60xx MKII Configuration Software Manual.

Stop/Reset Mode is activated by pressing the Stop/Reset Mode button. The Stop/Reset Mode icon is displayed to indicate Stop/Reset Mode operations.

In Stop/Reset Mode , the module removes the generator from load (if necessary) before stopping the engine if it is already running.

If the engine does not stop when requested, the FAIL TO STOP alarm is activated (subject to the setting of the Fail to Stop timer). To detect the engine at rest the following must occur :

- Engine speed is zero as detected by the CAN ECU
- Generator AC Voltage and Frequency must be zero.
- Engine Charge Alternator Voltage must be zero.
- Oil pressure sensor must indicate low oil pressure

When the engine has stopped, it is possible to send configuration files to the module from DSE Configuration Suite PC software and to enter the Front Panel Editor to change parameters.

Any latched alarms that have been cleared are reset when Stop/Reset Mode is entered.

The engine is not started when in Stop/Reset Mode . If remote start signals are given, the input is ignored until Auto Mode is entered.

When left in Stop/Reset Mode with no presses of the fascia buttons and configured for Power Save Mode, the module enters Power Save Mode. To 'wake' the module, press any fascia control buttons.

Power Save Mode in the DSE Configuration Suite Software

MANUAL MODE

Manual Mode is activated by pressing the *Manual Mode* button. The *Manual Mode* icon is displayed to indicate *Manual Mode* operations. In *Manual Mode*, the set does not start automatically. To begin the starting sequence, press the Start button.

Starting Sequence

Note: There is no start delay in this mode of operation. If the unit has been configured for CAN, compatible ECU's receives the start command via CAN. For further details of module configuration, refer to DSE Publication: 057-223 DSE60xx MKII Configuration Software Manual.

The fuel relay is energised and the engine is cranked. If the engine fails to fire during this cranking attempt then the starter motor is disengaged for the *Crank Rest Timer* duration after which the next start attempt is made. Should this sequence continue beyond the set *Number Of Attempts*, the start sequence is terminated and the display shows *Fail to Start.*

The starter motor is disengaged when the engine fires. Speed detection is factory configured to be derived from the AC alternator output frequency, but can additionally be measured from a Magnetic Pickup mounted on the flywheel or from the CANbus link to the engine ECU depending on module configuration.

Additionally, rising oil pressure can be used to disconnect the starter motor (but cannot detect underspeed or overspeed). After the starter motor has disengaged, the *Safety On Delay* timer activates, allowing Oil Pressure, High Engine Temperature, Under-speed, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault.

Engine Running

Note: The load transfer signal remains inactive until the Oil Pressure has risen. This prevents excessive wear on the engine.

Once the engine is running and all starting timers have expired, the animated Engine Running icon is displayed.

In *Manual Mode* , the load is not transferred to the generator unless a 'loading request' is made. A loading request can come from a number of sources.

- Press the *Transfer to Generator* button
- Failure of mains supply (DSE6020 MKII only)
- Activation of an auxiliary input that has been configured to Remote Start On Load or Auxiliary Mains Fail (DSE6020 MKII Only).
- Activation of the inbuilt exercise scheduler if configured for 'on load' runs.

Once the generator has been placed on load, it is not automatically removed. To manually remove the load either:

- Press the *Open Generator* (DSE6010 MKII Only) or *Transfer to Mains* (DSE6020 MKII Only) button.
- Press the *Auto Mode* button to return to automatic mode. The set observes all *Auto Mode* start requests and stopping timers before beginning the *Auto Mode Stopping Sequence*.
- Press the *Stop/Reset Mode* button to remove load and stop the generator.
- Activation of an auxiliary input that has been configured to *Generator Load Inhibit.*

Stopping Sequence

In *Manual Mode* the set does not continue to run until either:

- The *Stop/Reset Mode* button is pressed – The delayed load outputs are de-activated immediately and the set immediately stops.
- The *Auto Mode* button is pressed. The set observes all *Auto Mode* start requests and stopping timers before beginning the *Auto Mode Stopping Sequence*.

TEST MODE

Note: If a digital input configured to *Panel Lock* is active, changing module modes is not be possible. Viewing the instruments and event logs is NOT affected by *Panel Lock*.

Test Mode is activated by pressing the *Test Mode* button. The *Test Mode* icon is displayed to indicate *Test Mode* operations. In *Test Mode*, the set does not start automatically. To begin the starting sequence, press the *Start* button.

Starting Sequence

Note: There is no Start Delay in this mode of operation. If the unit has been configured for CAN, compatible ECU's receives the start command via CAN. For further details of module configuration, refer to DSE Publication: 057-223 DSE60xx MKII Configuration Software Manual.

The fuel relay is energised and the engine is cranked. If the engine fails to fire during this cranking attempt then the starter motor is disengaged for the *crank rest* duration after which the next start attempt is made. Should this sequence continue beyond the set number of attempts, the start sequence is terminated and the display shows *Fail to Start*.

The starter motor is disengaged when the engine fires. Speed detection is factory configured to be derived from the AC alternator output frequency, but can additionally be measured from a Magnetic Pickup mounted on the flywheel or from the CANbus link to the engine ECU depending on module configuration.

Additionally, rising oil pressure can be used to disconnect the starter motor (but cannot detect underspeed or overspeed). After the starter motor has disengaged, the *Safety On Delay* timer activates, allowing Oil Pressure, High Engine Temperature, Under-speed, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault.

Engine Running

Note: The load transfer signal remains inactive until the Oil Pressure has risen. This prevents excessive wear on the engine.

Once the engine is running and all starting timers have expired, the animated *Engine Running* icon is displayed.

In *Test Mode*, the load is automatically transferred to the generator.

Once the generator has been placed on load, it is not automatically removed. To manually remove the load either:

- Press the *Manual Mode* button followed by the *Open Generator* (DSE6010 MKII Only) or *Transfer to Mains* (DSE6020 MKII Only) button.
- Press the *Auto Mode* button to return to automatic mode. The set observes all *Auto Mode* start requests and stopping timers before beginning the *Auto Mode Stopping Sequence*.
- Press the *Stop/Reset Mode* button to remove load and stop the generator.
- Activation of an auxiliary input that has been configured to Generator *Load Inhibit.*

Stopping Sequence

In *Test Mode* the set continue to run until either:

- The *Stop/Reset Mode* button is pressed – The delayed load outputs are de-activated immediately and the set immediately stops.
- The *Auto Mode* button is pressed. The set observes all *Auto Mode* start requests and stopping timers before beginning the *Auto Mode Stopping Sequence*.

AUTOMATIC MODE

Note: If a digital input configured to *Panel Lock* is active, changing module modes is not be possible. Viewing the instruments and event logs is NOT affected by *Panel Lock*.

Auto Mode is activated by pressing the *Auto Mode* button. The *Auto Mode* icon is displayed to indicate *Auto Mode* operations. *Auto Mode* allows the generator to operate fully automatically, starting and stopping as required with no user intervention.

Waiting In Auto Mode

If a starting request is made, the starting sequence begins. Starting requests can be from the following sources:

- Failure of mains supply (DSE6020 MKII only).
- Activation of an auxiliary input that has been configured to Remote Start or Auxiliary Mains Fail (DSE6020 MKII Only).
- Activation of the inbuilt exercise scheduler.

Starting Sequence

Note: If the unit has been configured for CAN, compatible ECU's receive the start command via CAN and transmit the engine speed to the DSE controller. For further details of module configuration, refer to DSE Publication: 057-223 DSE60xx MKII Configuration Software Manual.

To allow for 'false' start requests, the *start delay* timer begins.

Should all start requests be removed during the *start delay* timer, the unit returns to a stand-by state. If a start request is still present at the end of the *start delay* timer, the fuel relay is energised and the engine is cranked.

If the engine fails to fire during this cranking attempt then the starter motor is disengaged for the *Crank Rest* duration after which the next start attempt is made. Should this sequence continue beyond the *Set Number Of Attempts*, the start sequence is terminated and the display shows *Fail to Start*. The starter motor is disengaged when the engine fires. Speed detection is factory configured to be derived from the AC alternator output frequency, but can additionally be measured from a Magnetic Pickup mounted on the flywheel or from the CAN link to the engine ECU depending on module.

Additionally, rising oil pressure can be used to disconnect the starter motor (but cannot detect underspeed or overspeed).

After the starter motor has disengaged, the *Safety On Delay* timer activates, allowing Oil Pressure, High Engine Temperature, Under-speed, Charge Fail and any delayed Auxiliary fault inputs to stabilise without triggering the fault.

Engine Running

Note: The load transfer signal remains inactive until the Oil Pressure has risen. This prevents excessive wear on the engine.

Once the engine is running and all starting timers have expired, the animated *Engine Running* icon is displayed.

The generator is placed on load if configured to do so. If all start requests are removed, the *stopping sequence* begins.

Stopping Sequence

The *Return Delay* timer operates to ensure that the starting request has been permanently removed and isn't just a short term removal. Should another start request be made during the cooling down period, the set returns on load.

If there are no starting requests at the end of the *Return Delay* timer, the load is removed from the generator to the mains supply and the cooling timer is initiated.

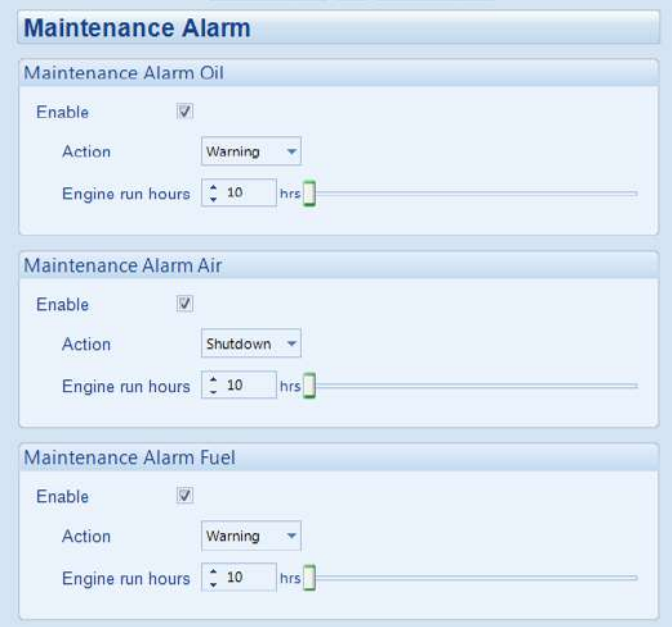
The *Cooling Down* timer allows the set to run off load and cool sufficiently before being stopped. This is particularly important where turbo chargers are fitted to the engine.

After the *Cooling Down* timer has expired, the set is stopped.

MAINTENANCE ALARM

Depending upon module configuration one or more levels of engine maintenance alarm may occur based upon a configurable schedule.

Example 1: Screen capture from DSE Configuration Suite Software showing the configuration of the Maintenance Alarm for Oil, Air and Fuel.



When activated, the maintenance alarm can be either a *Warning* (set continues to run) or *Shutdown* (running the set is not possible).

Resetting the *Maintenance Alarm* is normally actioned by the site service engineer after performing the required maintenance. The method of reset is either by:

- Activating an input that has been configured to *Maintenance Reset Alarm* x, where x is the type of maintenance alarm (Air, Fuel or Oil).
- Pressing the maintenance reset button in the DSE Configuration Suite, Maintenance section.
- Pressing and holding the *Stop/Reset Mode* button for 10 seconds on the desired Maintenance Alarm status page. This can be protected by a PIN number.

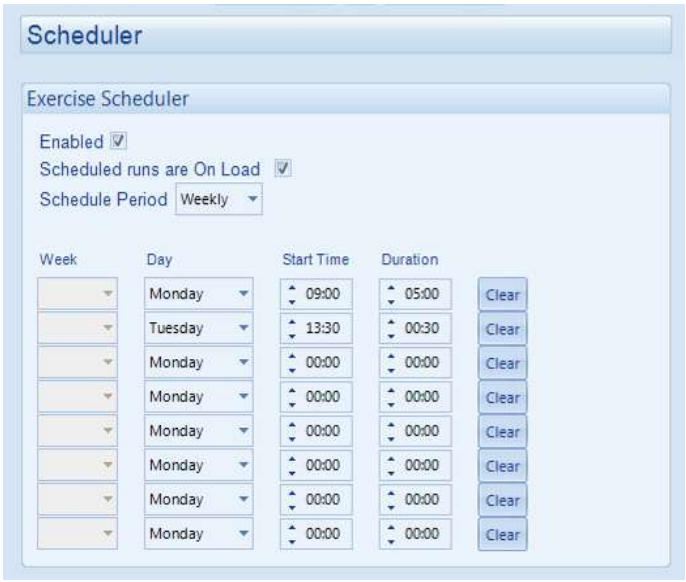
Example 2: Screen capture from DSE Configuration Suite Software showing the configuration of a digital input for Maintenance Reset Alarm Air.

Example 3: Screen capture from DSE Configuration Suite Software showing the Maintenance Alarm Reset 'button' in the DSE Configuration Suite SCADA | MAINTENANCE section.

SCHEDULER

The controller contains an inbuilt exercise run scheduler, capable of automatically starting and stopping the set. Up to 8 scheduled start/stop sequences can be configured to repeat on a 7-day or 28-day cycle. Scheduled runs may be on load or off load depending upon module configuration.

Example: Screen capture from DSE Configuration Suite Software showing the configuration of the Exercise Scheduler. In this example the set starts at 09:00 on Monday and run for 5 hours, then start at 13:30 on Tuesday and run for 30 minutes.



Stop Mode

- Scheduled runs do not occur when the module is in *Stop/Reset Mode*

Manual Mode

- Scheduled runs do not occur when the module is in *Manual Mode* waiting for a start request.
- Activation of a Scheduled Run 'On Load' when the module is operating OFF LOAD in *Manual Mode* forces the set to run ON LOAD.

Test Mode

Scheduled runs do not occur when the module is in *Test Mode*  waiting for a start request.

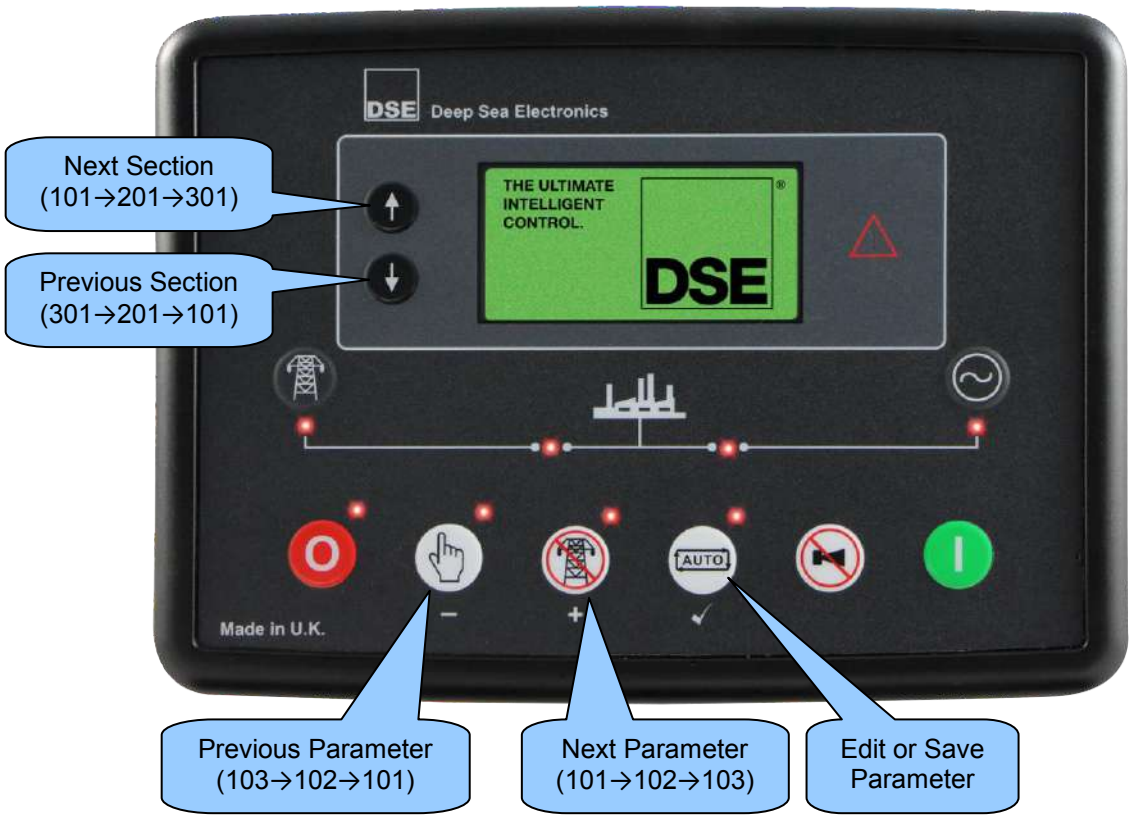
Auto Mode

- Scheduled runs operate ONLY if the module is in *Auto Mode*  with no Shutdown or Electrical Trip alarm present.
- If the module is in *Stop/Reset Mode*  or *Manual Mode*  when a scheduled run begins, the engine is not started. However, if the module is moved into *Auto Mode*  during a scheduled run, the engine is called to start.
- Depending upon configuration by the system designer, an external input can be used to inhibit a scheduled run.
- If the engine is running OFF LOAD in *Auto Mode*  and a scheduled run configured to 'On Load' begins, the set is placed ON LOAD for the duration of the Schedule.

FRONT PANEL CONFIGURATION

This configuration mode allows the operator to fully configure the module through its display without the use of the DSE Configuration Suite PC Software.

Use the module's facia buttons to traverse the menu and make value changes to the parameters:



ACCESSING THE FRONT PANEL CONFIGURATION EDITOR

Note: Pressing and holding the ↑ or ↓ navigation buttons provides the auto-repeat functionality. Values can be changed quickly by holding the navigation buttons for a prolonged period of time.

The editor automatically exits after 5 minutes of inactivity to ensure security.

The PIN number is not set by DSE when the module leaves the factory. If the module has a PIN code set, this has been affected by your generator supplier who should be contacted if you require the code. If the code has been 'lost' or 'forgotten', the module must be returned to the DSE factory to have the module's code removed. A charge is made for this procedure. This procedure cannot be performed away from the DSE factory.

The PIN number is automatically reset when the editor is exited (manually or automatically) to ensure security.

More comprehensive module configuration is possible via PC configuration software. For further details of module configuration, refer to DSE Publication: 057- 223 DSE60xx MKII Configuration Software Manual.

- Press the *Stop/Reset Mode* and *Auto Mode* (✓) buttons together to enter the editor mode.
- Press the ↑ (up) or ↓ (down) navigation buttons to cycle through the front panel editor in increments of 100.
- Press the (+) or (-) navigation buttons to cycle through the front panel editor in increments of 1.

- When viewing the parameter to be edited, press the *Auto Mode* (AUTO) (✓) button and the value begins to flash.
- Press the (+) or (-) navigation buttons to adjust the value to the required setting.
- Press the *Auto Mode* (AUTO) button the save the current value, the value ceases flashing.
- Press and hold the *Auto Mode* (AUTO) button to save and exit the editor, the configuration icon is removed from the display.

FAULT FINDING

STARTING

Symptom	Possible Remedy
Unit is inoperative Read/Write configuration does not operate	Check the battery and wiring to the unit. Check the DC supply. Check the DC fuse.
Unit shuts down	Check DC supply voltage is not above 35 Volts or below 9 Volts Check the operating temperature is not above 70°C. Check the DC fuse.
Fail to Start is activated after pre-set number of attempts to start	Check wiring of fuel solenoid. Check fuel. Check battery supply. Check battery supply is present on the Fuel output of the module. Check the speed-sensing signal is present on the module's inputs. Refer to engine manual.
Continuous starting of generator when in the *Auto Mode*	Check that there is no signal present on the "Remote Start" input. Check configured polarity is correct. Check the mains supply is available and within configured limits
Generator fails to start on receipt of Remote Start signal.	Check Start Delay timer has timed out. Check signal is on "Remote Start" input. Confirm correct configuration of input is configured to be used as "Remote Start". Check that the oil pressure switch or sensor is indicating low oil pressure to the controller. Depending upon configuration, the set does not start if oil pressure is not low.
Pre-heat inoperative	Check wiring to engine heater plugs. Check battery supply. Check battery supply is present on the Pre-heat output of module. Check pre-heat configuration is correct.
Starter motor inoperative	Check wiring to starter solenoid. Check battery supply. Check battery supply is present on the Starter output of module. Ensure oil pressure switch or sensor is indicating the "low oil pressure" state to the controller.

LOADING

Symptom	Possible Remedy
Engine runs but generator does not take load	Check Warm up timer has timed out. Ensure generator load inhibit signal is not present on the module inputs. Check connections to the switching device. Note that the set does not take load in *Manual Mode* unless there is an active load signal.
Incorrect reading on Engine gauges Fail to stop alarm when engine is at rest	Check engine is operating correctly. Check that sensor is compatible with the module and that the module configuration is suited to the sensor.

ALARMS

Symptom	Possible Remedy
Low oil Pressure fault operates after engine has fired	Check engine oil pressure. Check oil pressure switch/sensor and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed) or that sensor is compatible with the module and is correctly configured.
High engine temperature fault operates after engine has fired.	Check engine temperature. Check switch/sensor and wiring. Check configured polarity (if applicable) is correct (i.e. Normally Open or Normally Closed) or that sensor is compatible with the module.
Shutdown fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
Electrical Trip fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
Warning fault operates	Check relevant switch and wiring of fault indicated on LCD display. Check configuration of input.
CAN ECU WARNING CAN ECU SHUTDOWN	This indicates a fault condition detected by the engine ECU and transmitted to the DSE controller.
CAN DATA FAIL	Indicates failure of the CAN data link to the engine ECU. Check all wiring and termination resistors (if required).
Incorrect reading on Engine gauges Fail to stop alarm when engine is at rest	Check engine is operating correctly. Check sensor and wiring paying particular attention to the wiring to terminal 10 (refer to appendix). Check that sensor is compatible with the module and that the module configuration is suited to the sensor.

INSTRUMENTS

Symptom	Possible Remedy
Inaccurate generator measurements on controller display	Check that the CT primary, CT secondary and VT ratio settings are correct for the application. Check that the CTs are wired correctly with regards to the direction of current flow (p1,p2 and s1,s2) and additionally ensure that CTs are connected to the correct phase (errors occur if CT1 is connected to phase 2). Remember to consider the power factor (kW = kVA x powerfactor). The controller is true RMS measuring so gives more accurate display when compared with an 'averaging' meter such as an analogue panel meter or some lower specified digital multimeters. Accuracy of the controller is better than 1% of full scale. Generator voltage full scale is 415 V ph-N, accuracy is ±4.15 V (1 % of 415 V).

MISCELLANEOUS

Note: The above fault finding is provided as a guide check-list only. As the module can be configured to provide a wide range of different features, always refer to the source of your module configuration if in doubt.

Symptom	Possible Remedy
Module appears to 'revert' to an earlier configuration	When editing a configuration using the PC software it is vital that the configuration is first 'read' from the controller before editing it. This edited configuration must then be "written" back to the controller for the changes to take effect. When editing a configuration using the fascia editor, be sure to press the the ***Auto Mode*** (✓) button to save the change before moving to another item or exiting the fascia editor

Portable Power