Scania Engines

Operator's manual

6000
Instrumentation
en-GB 2 268 512

Issue 1.0

Preface

This Operator's manual describes operation of instrument panel 6000. The information was correct at the time of going to press. Scania reserves the right to make alterations without prior notice.

Note:

This Operator's manual describes a generator set that is equipped with all available options. Ignore inputs and outputs, functions, views and other details not found on your generator set.

This Operator's manual is for guidance only; this is because the large number of parameter settings does not make it possible to describe every possible combination.

Note:

Always use Scania spare parts for repair work.

Functions

Instrument panel 6000 is a microcontroller-based instrument panel used to start and stop the generator set manually or automatically via an external signal.

The instrument panel runs and monitors parameters to ensure trouble-free operation of the generator set. The instrument panel display displays the operational status and display messages.

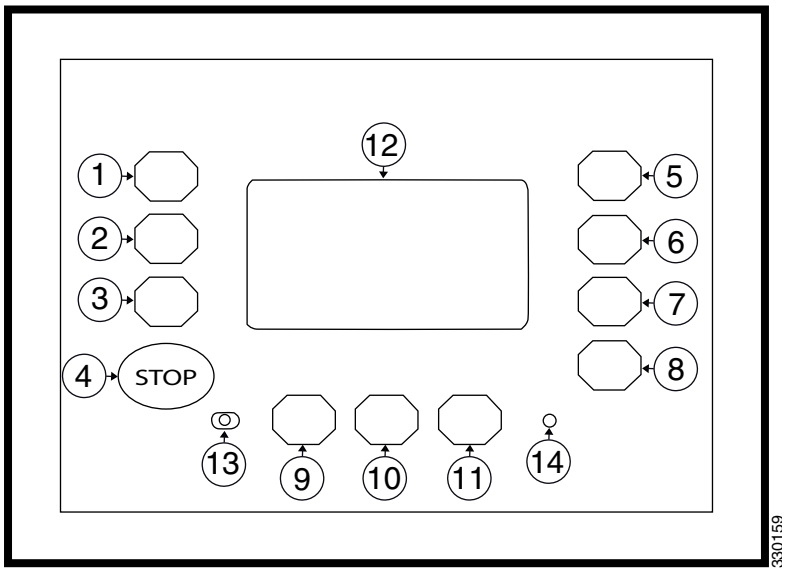
Instrument panel 6000 has the following functions:

- Operates the generator set.
- Protects the engine, generator and electrical power network.
- Measures engine data: oil pressure and temperature, coolant temperature, battery voltage, rotational speed, inspection etc.
- Measures electrical power network and generator data: voltage, current, power, etc.
- Performs load balancing for up to 32 input generator sets.
- Performs load dependent start/stop.
- 3 operating modes: automatic operating mode, manual operating mode and operating mode stop.
- Application modes:
  - starts and stops the engine, no operation of circuit breakers
  - opens the circuit breaker in the generator set
  - opens and closes the circuit breaker in the generator set
  - opens and closes the circuit breaker in the generator set and the circuit breaker in the automatic transfer switch (ATS).
- Handles readings, digital inputs and internal states.
- Starts the engine.
- Displays alarms, trips the miniature circuit breakers and switches off the engine.

- With the generator set in standby mode: starts the generator set automatically upon detection of a power failure on the normal electrical power network.
- Performs operation in critical condition.
- Performs synchronization on normal electrical power network in parallel operation.
- Performs external control of frequency, voltage, power and power factor via analogue input or interface.
- Displays event history with 300 entries.
- Multilingual user interface.
- Retrieves data from the engine control unit via J1939 for diagnostics and forecasting.
- Communicates via CAN with the engine control unit, facility management system, expansion card and ToolKit programming tool.
- Communicates with facility management system via RS-485 Modbus.
- Communicates with facility management system via RS-232 Modbus.

Instrument panel

The illustration below displays the instrument panel with switches, indicator lamps and display.



Item	Function
1-3 and 5-11	Display buttons with functions dependent on the operating mode selected.
4	When pressed the STOP switch switches off the generator set engine. When the operating mode is selected externally, the switch STOP, the display buttons AUTO Mode and MAN mode are deactivated.
12	The display includes display button and displays measurement values, operating mode and alarm messages.
13	The left-hand indicator lamp indicates that the instrument panel is in operating mode stop.
14	The right-hand indicator lamp indicates that there are alarm messages in the instrument panel.

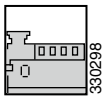
Display navigation

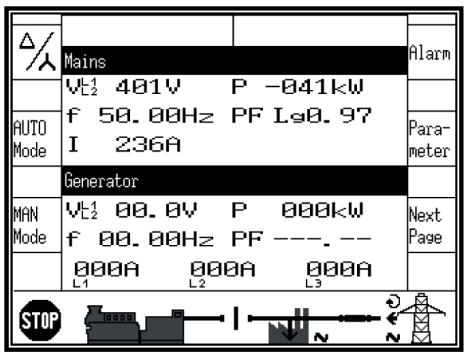
The information content comprises different views.

The display buttons that are available in each view are described below.

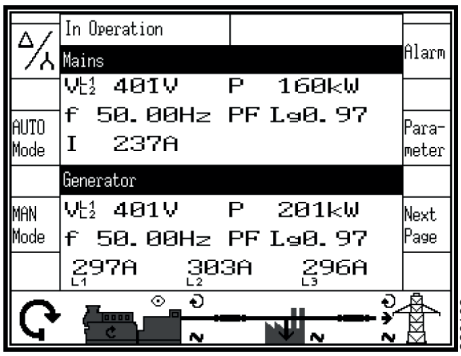
Overview of operating values in the home view

This view is displayed on starting and you can choose between different operating modes.

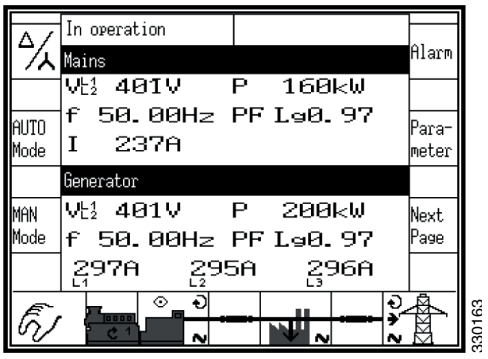
 330290	Switch between display of voltage phase to phase or phase to neutral conductor. The index on the V-symbol indicates what is displayed.
 330291	Switch to automatic operating mode.
 330292	Switch to manual operating mode.
 330293	Switch to operating mode stop.
 330294	Display unacknowledged alarm messages.
 330295	Display configuration view. Requires password for access.
 330296	Display view Next page with choice for further information.
 330297	Acknowledge alarm messages and stop the alarm signal. Displayed only if the warning lamp 14 is flashing.
 330298	Start or switch off the engine. Only displayed in manual operating mode.



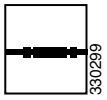
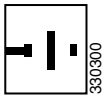
Operating mode stop



Automatic operating mode



Manual operating mode

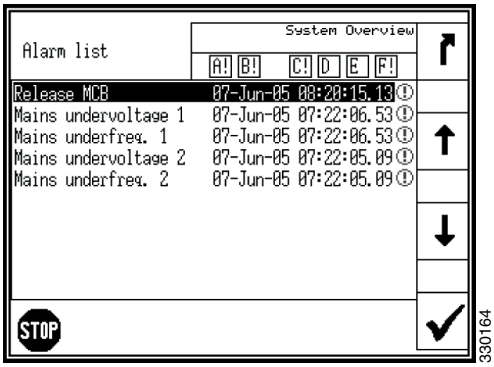
	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.

Note:

If the data view for the electrical power network is disabled, the above view displays only generator set data with larger numbers.

Alarm messages

The view Alarm List is displayed when the display button Alarm on the home view is pressed. All alarm messages that have not been acknowledged are displayed.

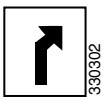
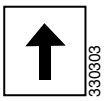
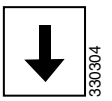


Alarm messages

Each alarm message is displayed with date and time for the alarm in the format year-month-day-hour-minute-second-hundredth of a second.

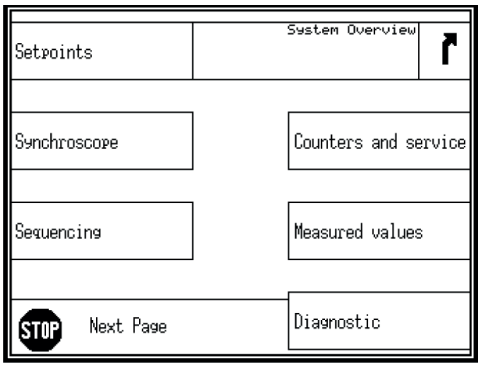
Self-acknowledging alarm messages get a new time stamp when the unit is started. The symbol with the exclamation mark at the far right indicates that the cause of the current alarm persists.

A maximum 16 alarm messages can be displayed. If additional alarm notification occurs, these are displayed only when already displayed alarm messages have been acknowledged.. The symbol with the exclamation mark following the letters A to F, indicates whether the corresponding alarm class is present or not.

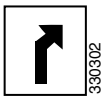
	Return to the Home view.
	Scroll up to the next alarm message.
	Scroll down to the next alarm message.
	Acknowledge the selected alarm message (inverted display). This is possible only if the cause of the alarm is no longer present. If the cause of an alarm persists and the indicator lamp of an alarm flashes, the alarm signal stops and the alarm is marked as confirmed.

Next page

This view is displayed when the display button Next Page on the home view is pressed.



Next page

	Return to the Home view.
Setpoints	Display view for set values.
Synchroskope	Display view of synchroscope.
Sequencing	Display view for load distribution.
Counters and service	Display view for counter and inspection.
Measured values	Display view for measurement values.
Diagnostic	Display view for diagnostics.

Setting values

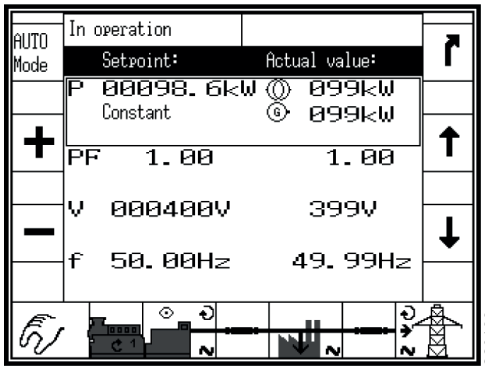
This view is displayed when the display button Setpoints in the Next page view is pressed.

The setting value is displayed on the left half and the actual value on the right half of the view.

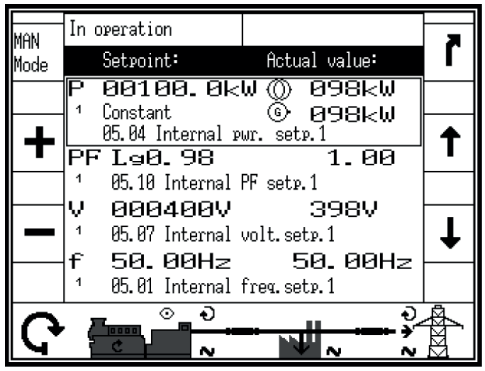
Two symbols indicate electrical power network output and generator output.

The numbers 1 or 2 indicate whether the setting value 1 or 2 is used in automatic operation. The source, used for setting value 1 or setting value 2 is displayed with the respective function number in Logic Manager.

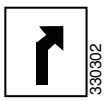
The setting values can only be adjusted for certain functions. Frequency and voltage can be adjusted within the configured operating limits. Active power can be adjusted between 0 and the configured maximum load control setting value. The power factor can be adjusted between 0.71 lead and 0.71 lag.

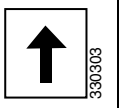
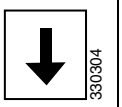
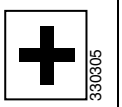
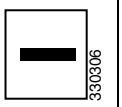


Manual operating mode



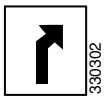
Automatic operating mode

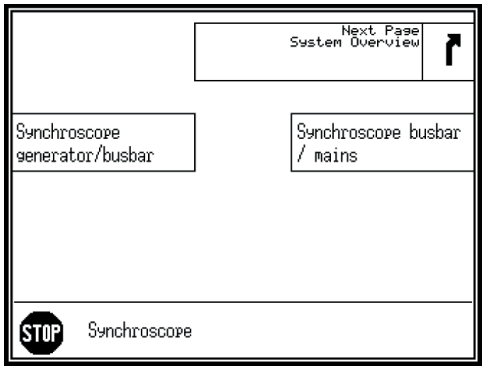
	Return to view Next Page.
	Switch to automatic operating mode.
	Switch to manual operating mode.

	Scroll up to the next setting value.
	Scroll down to the next setting value.
	Increase the selected setting value.
	Decrease the selected setting value.
P	Actual power:
	Constant = control of the generator load
	Import = power control of imports
	Export = power control of exports
PF	Power factor
V	Voltage
f	Frequency

Synchroscope

This view is displayed when the display button Synchroscope in the Next page view is pressed.

 330302	Return to view Next page.
Synchroscope generator/busbar	Display view for synchroscope generator/busbar.
Synchroscope busbar/mains	Display view for synchroscope busbar/normal electrical power network.



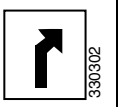
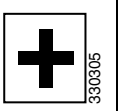
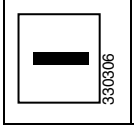
Synchroscope

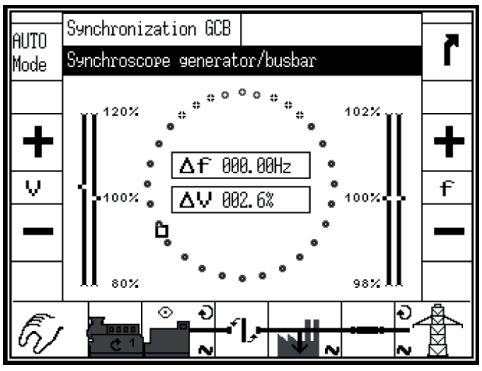
Synchroscope generator/busbar

This view is displayed when the display button Synchroscope generator/busbar in the Synchroscope view is pressed.

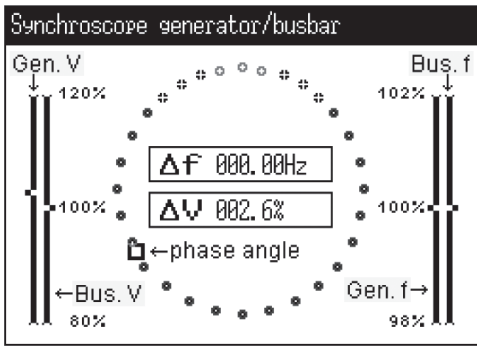
The square symbol indicates the actual phase angle between busbar and generator. The 12 o'clock position means 0° and the 6 o'clock position means 180°.

The frequency and voltage differences are displayed in the centre of the circle.

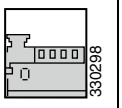
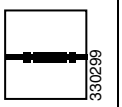
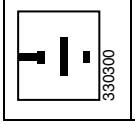
 330302	Return to view Synchroscope.
 330291	Switch to automatic operating mode.
 330292	Switch to manual operating mode.
 330293	Switch to operating mode stop.
 330305	Increase voltage or frequency. Only displayed in manual operating mode.
 330306	Decrease voltage or frequency. Only displayed in manual operating mode.



Synchroscope generator/busbar



Display magnification

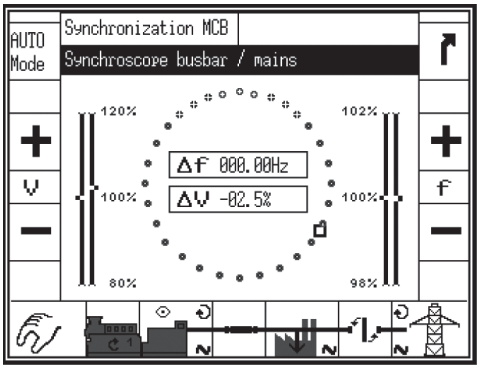
	Start or switch off the engine. Only displayed in manual operating mode.
	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.

Synchroscope busbar/electrical power network.

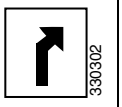
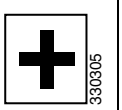
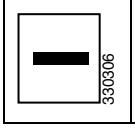
This view is displayed when the display button Synchroscope busbar/mains in the Synchroscope view is pressed.

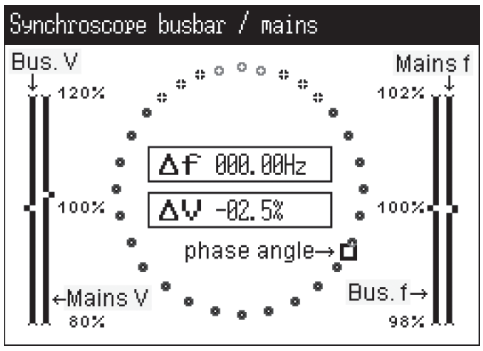
The square symbol indicates the actual phase angle between the busbar and the generator. The 12 o'clock position means 0° and the 6 o'clock position means 180°.

The frequency and voltage differences are displayed in the centre of the circle.

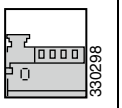
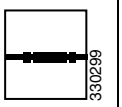
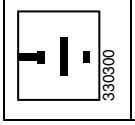


Synchroscope busbar/electrical power network.

	Return to view Synchroscope.
	Switch to automatic operating mode.
	Switch to manual operating mode.
	Switch to operating mode stop.
	Increase voltage or frequency. Only displayed in manual operating mode.
	Decrease voltage or frequency. Only displayed in manual operating mode.



Display magnification

	Start or switch off the engine. Only displayed in manual operating mode.
	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.

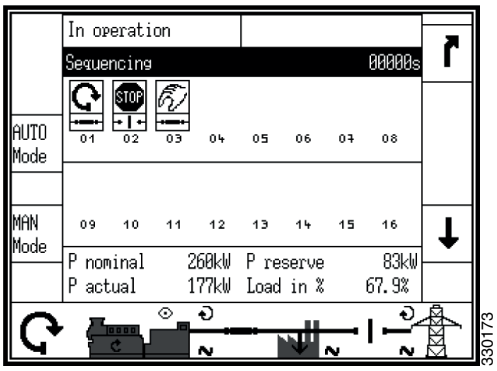
Load sharing

This view is displayed when the display button Sequencing in the Next page view is pressed.

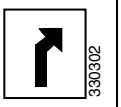
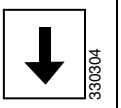
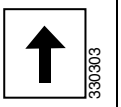
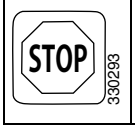
The load sharing view displays all generator sets participating in load distribution. Operating state for each generator set as well as the status of its circuit breaker are displayed.

The symbol above the generator number indicates the automatic, stop or manual operating mode. The small bar indicates whether the circuit breaker is closed or open.

The actual value of the load distribution is displayed below the generator number. If this generator set is not participating in load distribution, LD start stop OFF is displayed here.

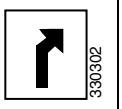
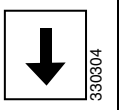
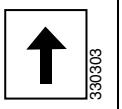
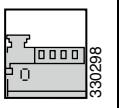
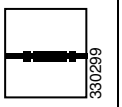
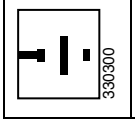


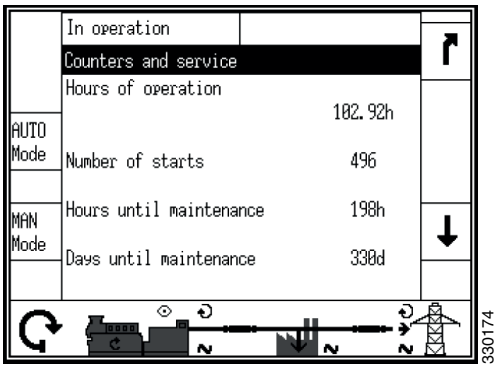
Load sharing

	Return to view Next page.
	Scroll down to the display of the generator set 17 to 32.
	Scroll up to the display of the generator set 1 to 16.
	Switch to automatic operating mode.
	Switch to manual operating mode.
	Switch to operating mode stop.

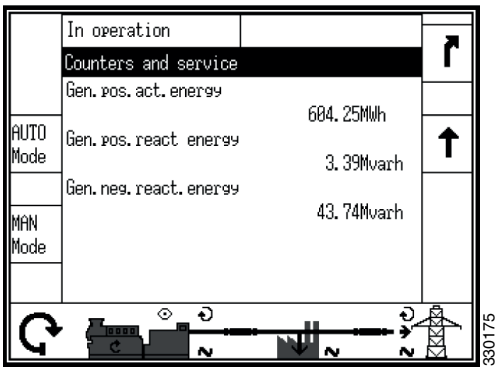
Counter and inspection

This view is displayed when the display button Counters and service in the Next page view is pressed.

 330302	Return to view Next page.
 330304	Scroll down to the view for energy calculator.
 330303	Scroll up to the view for timer.
 330291	Switch to automatic operating mode.
 330292	Switch to manual operating mode.
 330293	Switch to operating mode stop.
 330298	Start or switch off the engine. Only displayed in manual operating mode.
 330299	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
 330300	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.



Counter and inspection, timer



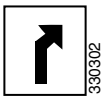
Counter and inspection, energy calculator

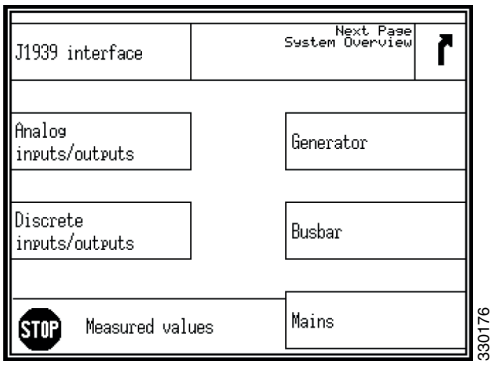
Displayed counters

Hours of operation	Indicates the total operating hours, the decimals are hundredths of an hour.
Number of starts	Indicates the total number of starts.
Hours until maintenance	Indicates the number of hours to the next inspection.
Days until maintenance	Indicates the number of days to the next inspection.
Gen. pos. act. energy	Generator positive active energy, total.
Gen. pos. react. energy	Generator positive reactive energy, total.
Gen. neg. react. energy	Generator negative reactive energy, total.

Measured values

This view is displayed when the display button Measured values in the view Next page is pressed.

	Return to view Next page.
J1939 interface	Display view for J1939 interface.
Analog inputs/ outputs	Display view for analogue inputs and outputs.
Discrete inputs/ outputs	Display view for digital inputs and outputs.
Generator	Display view for generator.
Busbar	Display view for busbar.
Mains	Display view for normal electrical power network.



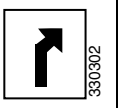
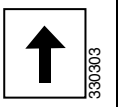
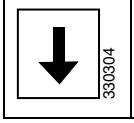
Measured values

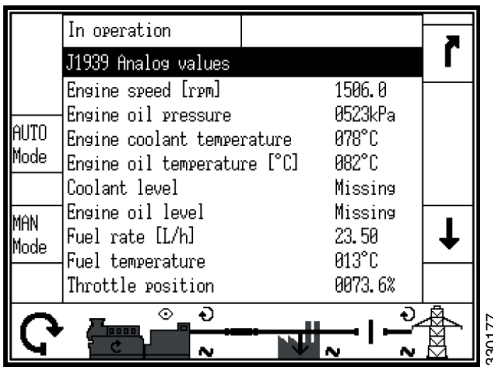
Note:

Digital inputs and outputs are designated as Discrete inputs/outputs on the display button and in views.

J1939 interface

This view is displayed when the display button J1939 interface in the Measured values view is pressed. Values that have been transmitted from the engine control unit are shown here. If a value is not transmitted, Missing is displayed.

	Return to view Measured values.
	Scroll up in the view
	Scroll down in the view

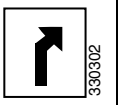
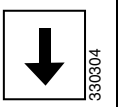
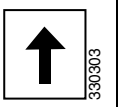
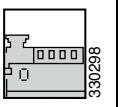
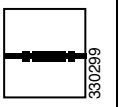
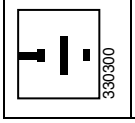


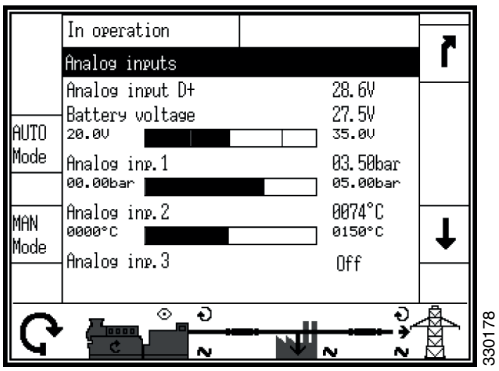
J1939 interface

Analogue inputs and outputs

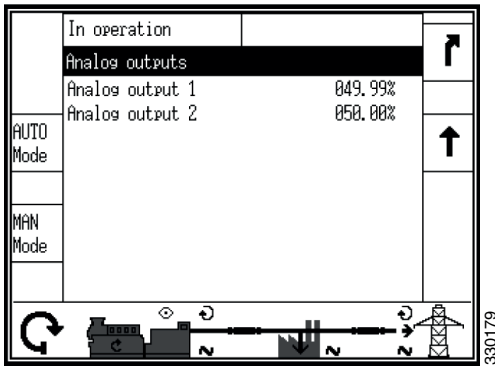
This view is displayed when the display button Analog inputs/ outputs in the Measured values view is pressed.

The analogue outputs are displayed as a percentage of the selected hardware range, i.e. 50% on a 0-20 mA output refers to 10 mA.

 330302	Return to view Measured values.
 330304	Scroll down to the view for analogue outputs.
 330303	Scroll up to the view for analogue inputs.
 330291	Switch to automatic operating mode.
 330292	Switch to manual operating mode.
 330293	Switch to operating mode stop.
 330298	Start or switch off the engine. Only displayed in manual operating mode.
 330299	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
 330300	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.



Analogue inputs



Analogue outputs

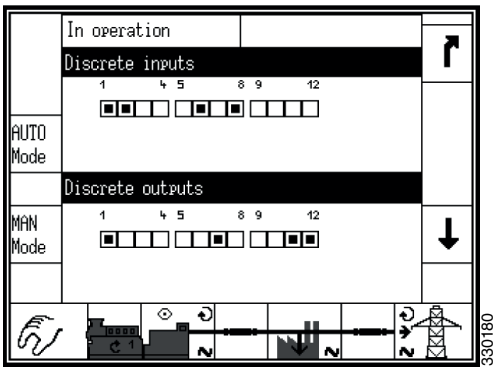
Digital inputs and outputs

This view is displayed when the display button Discrete inputs/ outputs in the Measured values view is pressed.

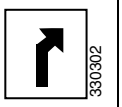
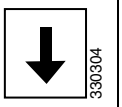
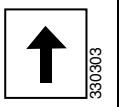
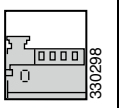
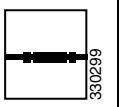
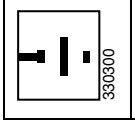
The status of digital inputs and outputs is displayed.

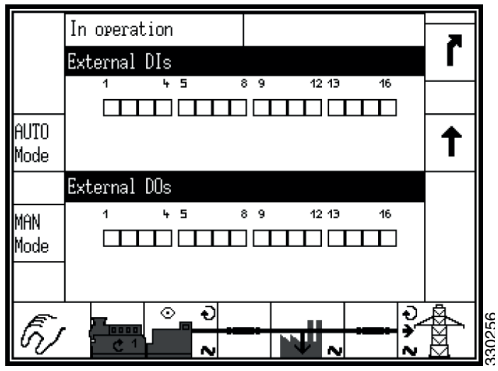
Note:

Digital inputs and outputs are designated as Discrete inputs/outputs on the display button and in views.



Internal digital inputs and outputs

 330302	Return to view Measured values.
 330304	Scroll down to view for external digital inputs and outputs.
 330303	Scroll up to view for internal digital inputs and outputs.
 330291	Switch to automatic operating mode.
 330292	Switch to manual operating mode.
 330293	Switch to operating mode stop.
 330298	Start or switch off the engine. Only displayed in manual operating mode.
 330299	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
 330300	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.

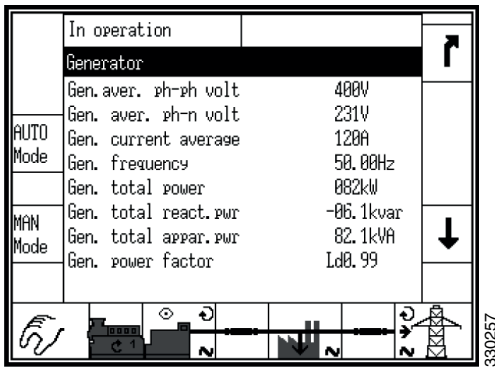


External digital inputs and outputs

Status of digital inputs and outputs is displayed with filled or unfilled square.

The configuration of the input determines how the instrument panel reacts. If the input is configured as normally open it will react when it is energised. If the input is configured as normally closed it will react when it is de-energised. Refer to the table below.

Digital input:	 330141	energized.
	 330140	de-energized.
Digital output:	 330141	activated.
	 330140	deactivated.

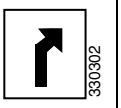
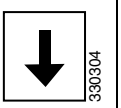
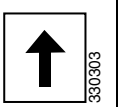
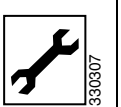


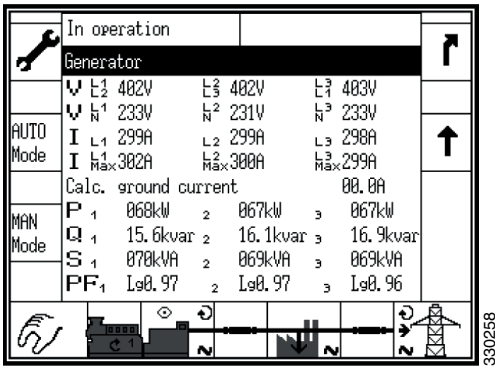
Main measured values for the generator

Generator

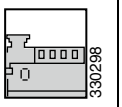
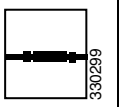
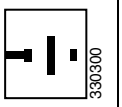
This view is displayed when the display button Generator in the Measured values view is pressed.

All measured generator values are displayed in this view.

 330302	Return to view Measured values.
 330304	Scroll down to the view for additional generator measurements.
 330303	Scroll up to the view for main generator measurements.
 330307	Reset the maximum measured values.
AUTO Mode 330291	Switch to automatic operating mode.



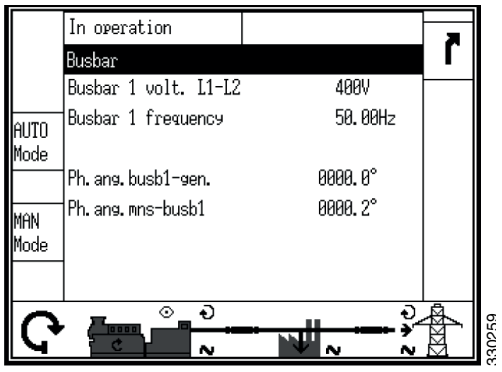
Additional measured values for the generator

	Switch to manual operating mode.
	Switch to operating mode stop.
	Start or switch off the engine. Only displayed in manual operating mode.
	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
V	Voltage.
I	Current.
P	Actual power.
Q	Reactive power.
S	Apparent power.
PF	Power factor.

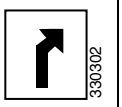
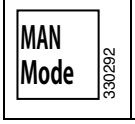
Busbar

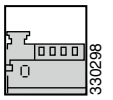
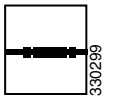
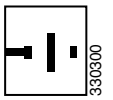
This view is displayed when the display button Busbar in the Measured values view is pressed.

All measured values on the busbar are displayed.



Busbar

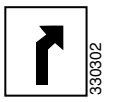
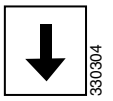
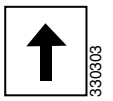
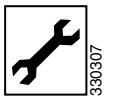
	Return to view Measured values.
	Switch to automatic operating mode.
	Switch to manual operating mode.

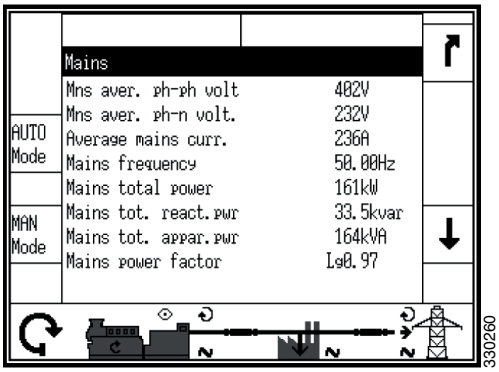
	Switch to operating mode stop.
	Start or switch off the engine. Only displayed in manual operating mode.
	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.

Electrical power network

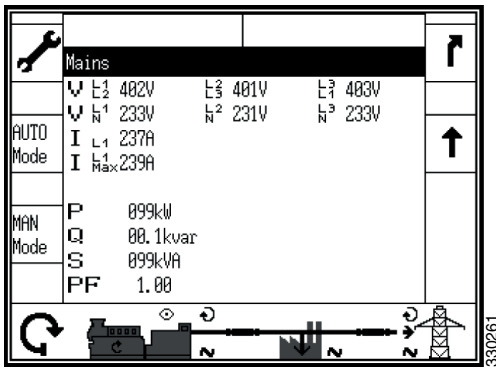
This view is displayed when the display button Mains in the Measured values view is pressed.

All measured values for the electrical power network are displayed.

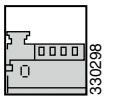
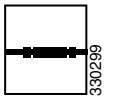
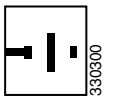
	Return to view Measured values.
	Scroll down to the view for additional network measurements.
	Scroll up to the view for main network measurements.
	Reset the maximum measured values.
	Switch to automatic operating mode.
	Switch to manual operating mode.



Main measured values for the electrical power network

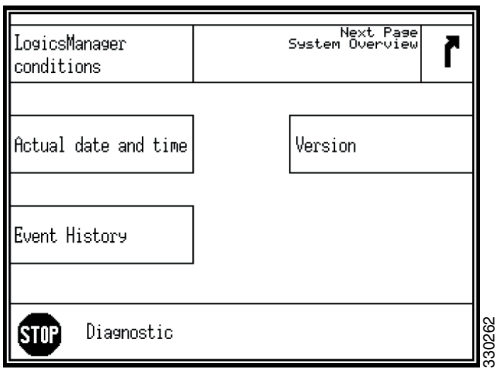


Additional measured values for the electrical power network

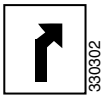
	Switch to operating mode stop.
	Start or switch off the engine. Only displayed in manual operating mode.
	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
V	Voltage.
I	Current.
P	Actual power.
Q	Reactive power.
S	Apparent power.
PF	Power factor.

Diagnostics

This view is displayed when the display button Diagnostic in the Next page view is pressed.



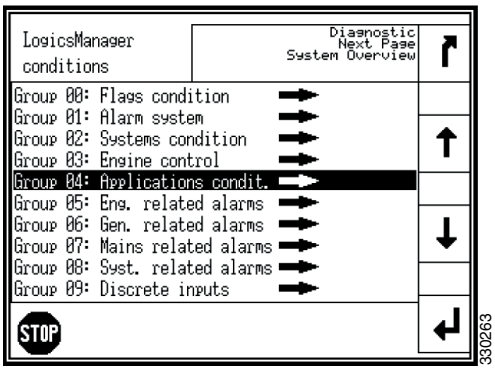
Diagnostics

 330302	Return to view Next page.
LogicsManager conditions	Display the view for handling of the command variables.
Actual date and time	Display the view for current date and time.
Event history	Display view for event history. Requires password for access.
Version	Display view for version. Requires password for access.

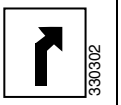
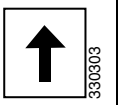
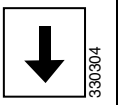
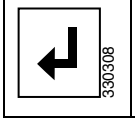
Command variables

This view is displayed when the display button Logics Manager conditions in the Diagnostic view is pressed.

The status is displayed for all variables, divided into groups in the system.

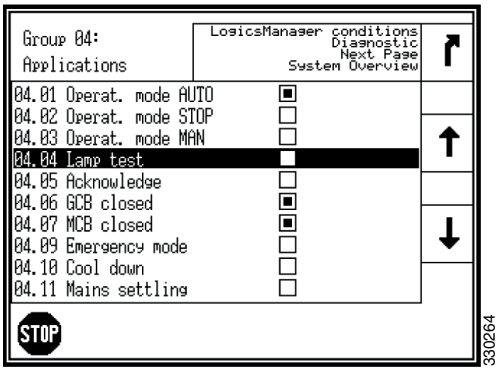


Variable groups

	Return to view Diagnostic.
	Scroll up a group or variable.
	Scroll down a group or variable.
	Select the highlighted variable group and view the status of variables in this group.

Status for variables is displayed with a filled or unfilled square.

	True.
	False.

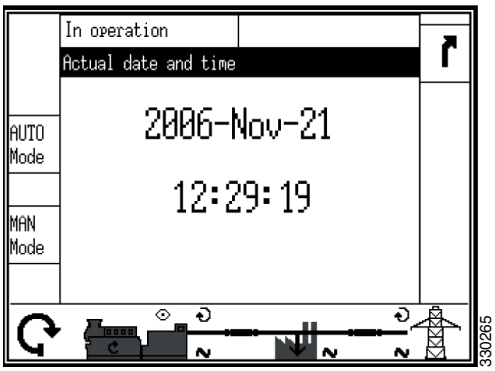


Variable values for group 4 (example)

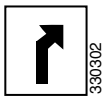
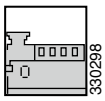
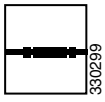
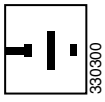
Current date and time

This view is displayed when the display button Actual date and time in the Diagnostic view is pressed.

Current date and time is displayed.



Current date and time

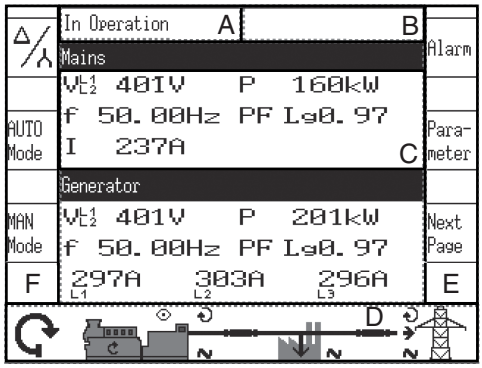
 330302	Return to view Diagnostic.
 330291	Switch to automatic operating mode.
 330292	Switch to manual operating mode.
 330293	Switch to operating mode stop.
 330298	Start or switch off the engine. Only displayed in manual operating mode.
 330299	Open circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.
 330300	Close circuit breaker in the generator set or in the automatic transfer switch. Only displayed in manual operating mode.

Date. xxxx-yyy-zz	xxxx = Year.
	yyy = Month.
	zz = Day.
Time. xx:yy:zz	xx = Hour.
	yy = Minute.
	zz = Second.

Operation

Display

The display is divided into sub views.



A = Operating mode

B = Alarm messages

C = Measurements

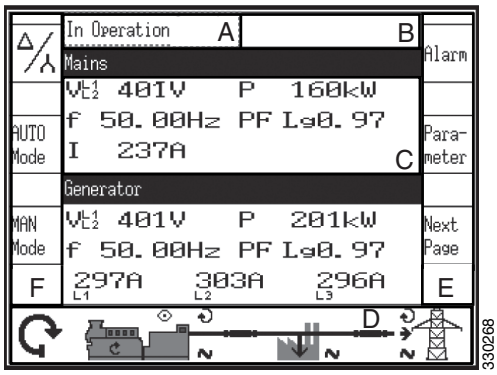
D = Operation

E = Display buttons

F = Display buttons

Operating mode

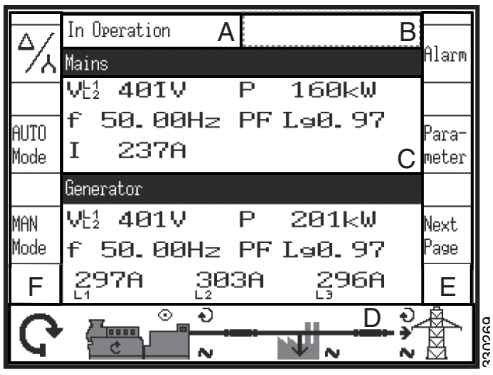
Sub view Operating mode displays actual operating information.



Operating mode

Alarm messages

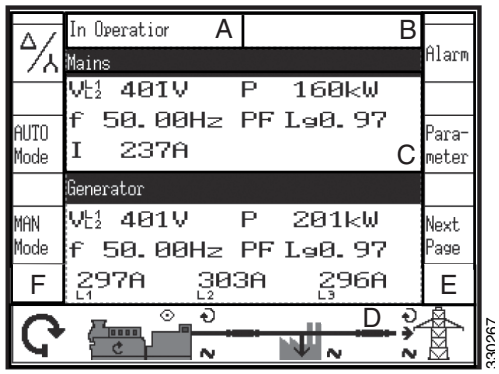
The alarm messages sub view displays the last alarm message that is not yet confirmed.



Alarm messages

Measured values

The measurement sub view displays all the measured power-related information including voltages, currents, frequencies, power and power factor values.

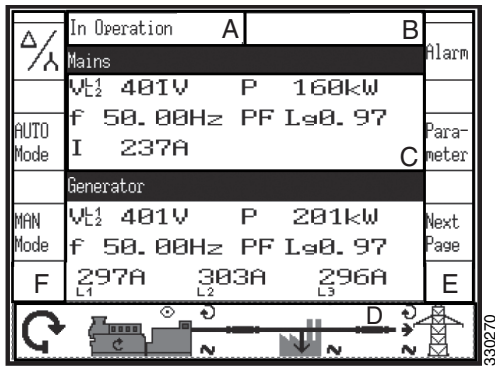


Measured values

Operation

The Operation sub view has a line diagram of the system application that displays the current status of the engine and circuit breakers.

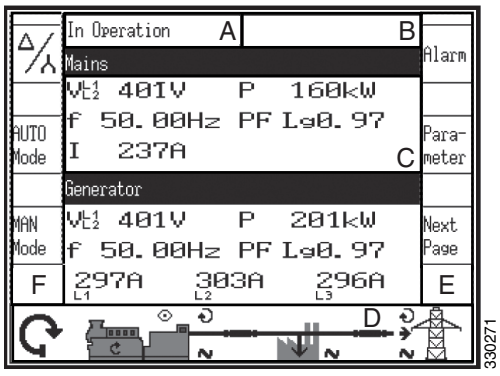
This sub view displays the buttons for manual operation of the generator set.



Operation

Display buttons

The sub view Display buttons allow navigation between views, levels and functions as well as configuration and operation.



Display buttons

Choice of operating modes

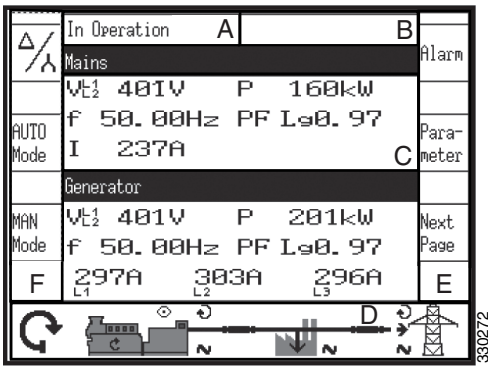
By pressing the display buttons AUTO Mode, MAN Mode or STOP the desired operating mode is selected.

Depending on the selected application mode various display buttons on the display are turned on or off . The active operation mode is displayed to the left of the engine symbol.

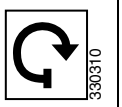
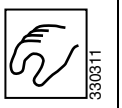
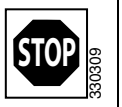
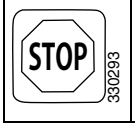
If the operating mode stop is selected, the indicator lamp next to the push-button illuminates and operation mode is displayed to the left of the engine symbol.

Note:

If the instrument panel is configured for the external selection of operating mode, the display buttons for the automatic and manual operating mode are not displayed and the pushbutton for the operating mode stop is disabled. The operating mode cannot be changed.



Display buttons for selecting operating mode

	Automatic operating mode, AUTO Mode. When automatic operating mode is selected, the instrument panel performs the startup and shutdown of the engine as well as closing and opening of circuit breakers. The functions are performed according to how the instrument panel is configured.
	Automatic operating mode is indicated by the symbol in the lower left corner of the view.
	Manual operating mode, MAN Mode. When manual operating mode is selected, the engine is started and stopped and circuit breakers closed and opened manually using display buttons at the bottom of the view.
	Manual operating mode is indicated by the symbol in the lower left corner of the view.
	When the operating mode stop is selected, the engine switches off.
	Operating mode stop is indicated by the symbol in the lower left corner of the view.

Operation

Display buttons in manual operating mode

When manual operating mode is selected, the display buttons are enabled for manual operation of the engine and circuit breakers.

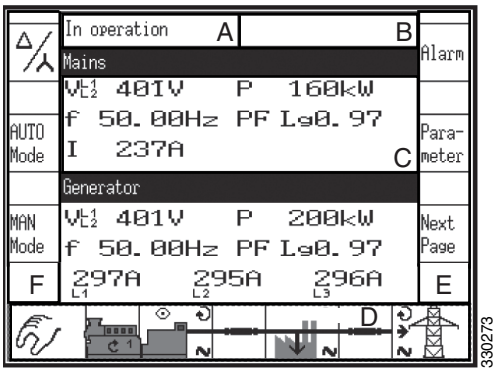
The symbols 0 and 1 indicate if a start command or a stop command is being processed currently.

The arrows on the circuit breaker symbols indicate if an open command or a close command is being processed currently.

The eye symbol indicates that the engine control functions are enabled. The network symbol indicates that there is voltage on each unit: generator, busbar or normal electrical power network.

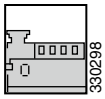
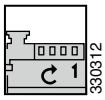
The direction of the circular arrow indicates whether the phase rotation field of the generator or the normal electrical power network is clockwise or anti-clockwise.

The arrow symbol at the normal electrical power network connection point indicates whether the power is exported or imported.

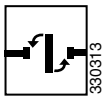


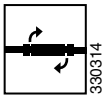
Display buttons in manual operating mode

Start or switch off the engine.

	Press the display button to start the engine. • If the engine starts, the circular arrow indicates the engine is running. The eye symbol indicates that the monitoring functions are enabled. • If the engine fails to start, the message for failed start is displayed.
	Press the display button to switch off the engine. • When the engine is switched off the circular arrow and the eye symbol disappear. • If the engine fails to shut down, the message for failed shutdown is displayed.

Close or open the circuit breaker in the generator set or in the automatic transfer switch

	Press the display button below the desired circuit breaker when the symbol is vertical to close it. • If the circuit breaker closes, the icon changes to a horizontal position. • If the circuit breaker fails to close the symbol remains in a vertical position.

 330314	Press the display button below the desired circuit breaker when the symbol is horizontal to open it. • If the circuit breaker opens, the icon changes to a vertical position. • If the circuit breaker fails to open the symbol remains in a horizontal position.

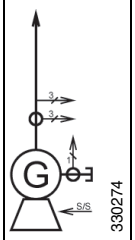
Application modes

The application mode can only be changed during configuration with the authorisation level CL2 or higher.

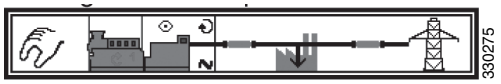
The main characteristics of the four application modes are displayed in the following section.

Application mode {0}

Application mode {0} has the following functions:

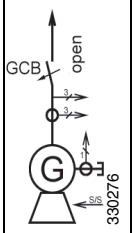


- Measurement of engine parameters, and generator parameters, i.e., voltage, frequency, current, power, coolant temperature, oil pressure, etc.
- Starting or stopping the engine.

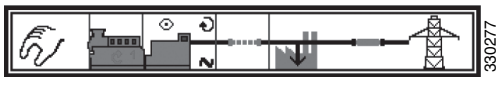


Application mode {1o}

Application mode {1o} has the following functions:

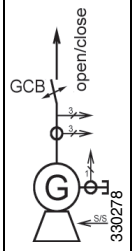


- Measurement of engine parameters, and generator parameters, i.e., voltage, frequency, current, power, coolant temperature, oil pressure, etc.
- Starting or stopping the engine.
- Engine protection and generator protection in the form of relay output in the opening of generator set circuit breakers.
- Detection of power failure on normal electrical power network,

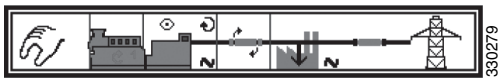


Application mode {1oc}

Application mode {1oc} has the following functions:

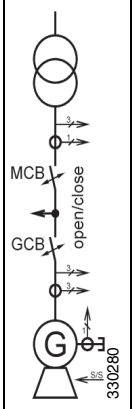


- Measurement of engine parameters, and generator parameters, i.e., voltage, frequency, current, power, coolant temperature, oil pressure, etc.
- Starting or stopping the engine.
- Engine protection and generator protection in the form of relay output in the opening of generator set circuit breakers.
- Relay output for the closure of the generator set circuit breaker.
- Detection of power failure on normal electrical power network,

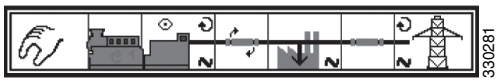


Application mode {2oc}

Application mode {2oc} has the following functions:



- Measurement of engine parameters, and generator parameters, i.e., voltage, frequency, current, power, coolant temperature, oil pressure, etc.
- Starting or stopping the engine.
- Engine protection and generator protection in the form of relay output in the opening of generator set circuit breakers.
- Relay output for the closure of the generator set circuit breaker.
- Relay output for opening and closing of the circuit breaker in the automatic transfer switch.
- Detection of power failure on normal electrical power network and automatic startup and shutdown of the engine.



Operating modes

Operating mode stop

Note:

Operating mode stop is not the same as an emergency stop. In some cases the instrument panel carries out additional logic functions, such as an engine cooling-off period before the engine is turned off. Scania recommends that a digital input for emergency stop is used and programmed as an alarm of class F.

In the operating mode stop neither the engine or generator set circuit breakers run. Depending on the application mode, the circuit breakers cannot be operated.

The following occurs if operating mode stop is selected when the engine is already shut down:

- Generator set circuit breaker does not close.
- The fuel solenoid relay is not activated.
- Commands for the digital inputs and CAN bus are ignored.
- Display buttons for start disabled, depending on previous operating mode.
- The monitoring of the generator set remains disabled, except for the monitoring that is not dependent on engine speed.

The following occurs if the operating mode stop has been selected when the engine is running

- The circuit breaker in the generator set opens when
  - the instrument panel is at least in application mode {1o}
  - the circuit breaker in the generator set is closed.
- The circuit breaker in the automatic transfer switch closes when
  - the instrument panel is at least in application mode {2oc}
  - the circuit breaker in the generator set is open
  - the circuit breaker in the automatic transfer switch is activated
  - the parameter close MCB in stop mode (close the circuit breaker in the automatic transfer switch in operating mode stop) is set to YES.
- Engine cooling is performed and the indicator lamp for operating mode stop flashes.
- The fuel solenoid relay is deactivated.
- The monitoring of the generator set is disabled, except for the monitoring that is not dependent on engine speed.
- The instrument panel display displays the steps when they are carried out.

The following occurs if the operating mode stop has been selected when the engine implements cooling.

- The cooling is stopped and the engine is turned off.

Note:

If the logic handler function Enable MCB (the circuit breaker in the automatic transfer switch) (parameter 12923) has the value true, the circuit breaker in the automatic transfer switch closes again if it is open in the operating mode stop.

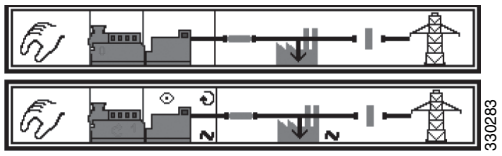
Manual operating mode

In manual operating mode, the engine and the circuit breakers are operated via the display buttons at the bottom of the view.

Any device that can be operated via the display button has a black border, others may not be operated. The line diagrams's lowest line changes according to the application mode.

Line diagram for application mode {0}

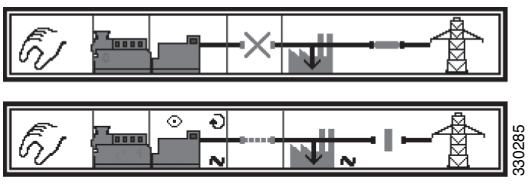
For application mode {0} a display button with a black frame is displayed around the engine to indicate that it is possible to start and stop the engine.

	Example of line diagram
• Start the engine • Shut off the engine	

Line diagram for application mode {1o}

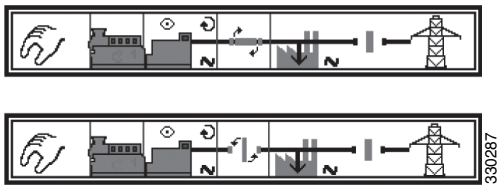
For application mode {1o} display buttons for both the engine and generator set power circuit breaker are displayed with the following functions.

The symbol X indicates that an open command for the circuit breaker has been issued and the closing of the circuit breaker has been blocked. The dotted line indicates no defined status of the circuit breaker.

	Example of line diagram
• Start the engine • Shut off the engine • Open the circuit breaker in the generator set	

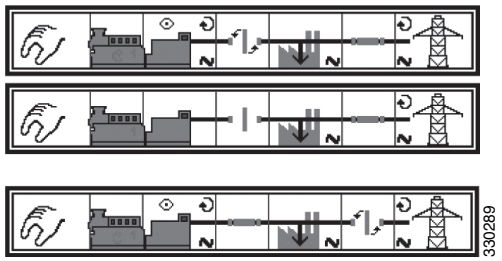
Line diagram for application mode {1oc}

For application mode {1oc} display buttons for both the engine and generator set power circuit breaker are displayed with the following functions.

	Example of line diagram
• Start the engine • Shut off the engine • Open the circuit breaker in the generator set • Close the circuit breaker in the generator set	

Line diagram for application mode {2oc}

For application mode {2oc} display buttons for the engine, the circuit breaker in the generator set and the circuit breaker in the automatic transfer switch are displayed with the following functions:

	Example of line diagram
• Start the engine • Shut off the engine • Open the circuit breaker in the generator set • Close the circuit breaker in the generator set • Open the circuit breaker in the automatic transfer switch • Close the circuit breaker in the automatic transfer switch	

Automatic operating mode

In automatic operating mode, all functions of the motor, circuit breakers in generator sets and automatic transfer switches are operated via a remote start signal, or automatically by the instrument panel, such as during a power failure on the normal electrical power network.

The function of the instrument panel depends on its configuration and the external signals used.

The main features are briefly described as follows.

Starting the engine

Remote engine start

The engine is started with a remote start signal.

A remote start requires that:

- Automatic operating mode is enabled.
- The Start req. in AUTO function is assigned to a digital input via the logic handler and the conditions are met (true).
- The digital input or an external start is activated (logic high signal) or the necessary command interface is set on the interface.
- An alarm of class C or higher is not present.
- The engine is ready for operation.
- Generator set circuit breaker is open.

Power failure

Automatic operation during a power failure on the normal electrical power network.

If the automatic operating mode is enabled, the application mode is {2oc} and a power failure on the normal electrical power network is detected, the engine and the circuit breakers are operated in accordance with the conditions in the table below.

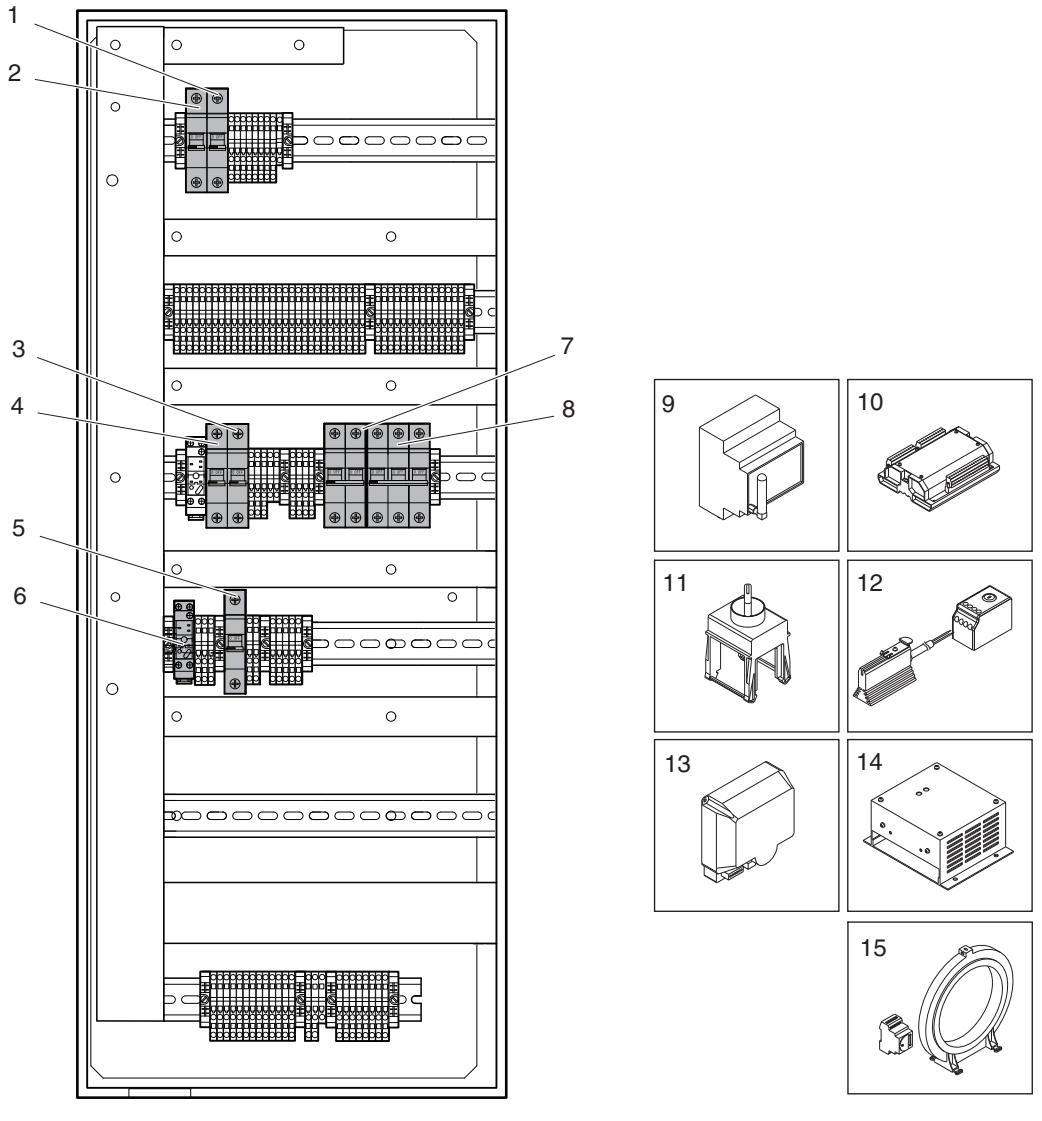
An automatic start require that:

- Automatic operating mode is enabled.
- Application Mode is configured as {2oc}.
- The Emergency power parameter is configured.
- The configured limits for power failure on the normal electrical power network is reached.
- The configured delay times have expired.
- An alarm of class C or higher is not present.
- The engine is ready for operation.

Status before detected power failure on the normal electrical power network			**Measure in order**		
Engine	**Circuit breaker in the generator set**	**Circuit breaker in the automatic transfer switch**	**Engine**	**Circuit breaker in the generator set**	**Circuit breaker in the automatic transfer switch**
0 (switched off)	**0** (opened)	**0** (opened)	**1** (start)	**2** (closes)	
	0 (opened)	**1** (closed)	**1** (start)	**3** (closes)	**2** (opens)
1 (running)	**0** (opened)	**0** (opened)	--	**1** (closes)	
	0 (opened)	**1** (closed)	--	**2** (closes)	**1** (opens)
	1 (closed)	**0** (opened)	--	--	--
	1 (closed)	**1** (closed)	--	**1** (opens)**3** (closes)	**2** (closes)
	1 (closed)	**1** (closed)	--	(remains closed)	**1** (opens)

Components in the central electric unit

The illustration below shows the location of the components inside the central electric unit. The figure shows all options, and the central electric unit ordered can therefore have other equipment.



Pos.	Designation	Description
1	MCB2	Miniature circuit breaker for instrument panel, 10 A
2	MCB1	Miniature circuit breaker for engine control unit, 20 A
3	MCB3	Miniature circuit breaker for coolant heater, 10 A
4	MCB6	Miniature circuit breaker for battery charger, 6 A
5	MCB4	Miniature circuit breaker for instrument panel heating element, 2 A
6	HCR	Relay for engine heater, instrument panel heater element and generator heater
7	MCB	Miniature circuit breakers for load voltage
8	MCB	Miniature circuit breakers for mains voltage

Pos.	Designation	Description
9	Netbiter WS200	Communication unit for remote connection
10	Expansion unit	16 additional inputs and outputs
11	Switch	For changing between 50/60 Hz
12	OH2/FLZ510	Heater element for instrument panel/thermostat
13	Battery charger	For 110 V electrical power network
14	Battery charger	For 220/240 V electrical power network
15	Hobut	Residual current device