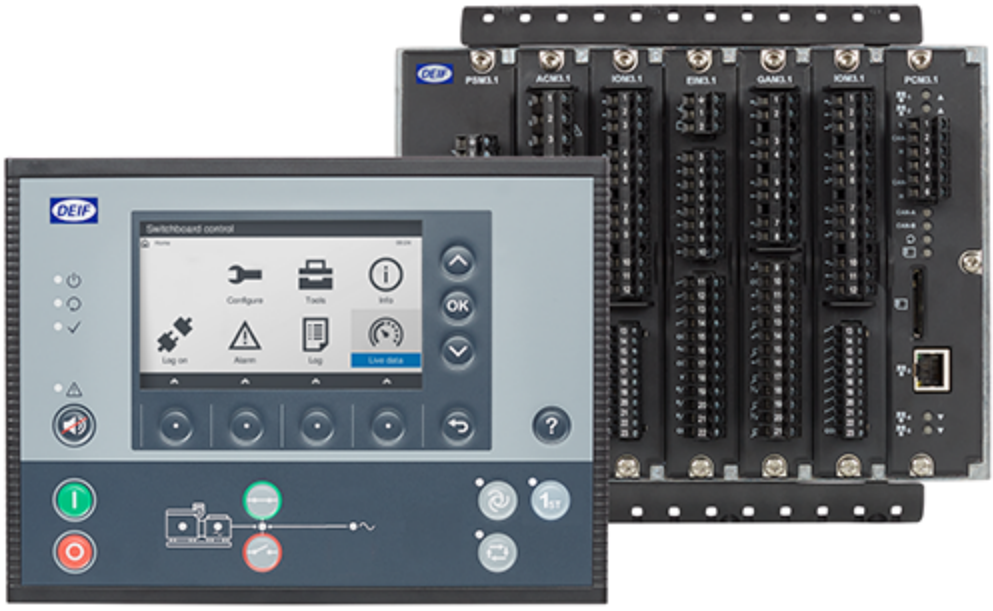
OPERATOR'S MANUAL

PPM 300

Protection and Power Management



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1. About the Operator's manual

1.1 Symbols for general notes

NOTE This highlights general information.

More information
This highlights where you can find more information.

Example

This shows an example.

How to ...
This gives a link to a video for help and guidance.

1.2 Symbols for hazard statements

DANGER!

This highlights dangerous situations.

If the guidelines are not followed, these situations will result in death, serious personal injury, and equipment damage or destruction.

WARNING

This highlights potentially dangerous situations.

If the guidelines are not followed, these situations could result in death, serious personal injury, and equipment damage or destruction.

CAUTION

This highlights low level risk situation.

If the guidelines are not followed, these situations could result in minor or moderate injury.

NOTICE

This highlights an important notice

Make sure to read this information.

1.3 Intended users of the Operator's manual

CAUTION

Read this manual

Read this manual before you operate the system. Failure to do this may result in personal injury and damage to the equipment.

The Operator's manual is primarily intended for the operator that performs daily operations with the controller. The manual includes an overview of the LEDs, buttons and screens, as well as general operator tasks, alarms, and logs.

1.4 Software versions

The information in this document corresponds to the following software versions.

PPM 300 Software versions

Software	Details	Version
PCM APPL	Controller application	1.0.16.x
DU APPL	Display unit application	1.0.16.x
PICUS	PC software	1.0.16.x

1.5 Technical support

Technical documentation

Download the technical documentation from the DEIF website: https://www.deif.com/documentation/

Service and support

DEIF is committed to being available to our customers and partners 24 hours a day, seven days a week, to guarantee the highest levels of service and support.

https://www.deif.com/support

Training

DEIF arranges **training courses** at DEIF offices worldwide.

https://www.deif.com/training

Additional service

DEIF offers **service** with design, commissioning, operating and optimisation.

https://www.deif.com/support/local-office

1.6 Warnings and safety

Safety during installation and operation

When you install and operate the equipment, you may have to work with dangerous currents and voltages. The installation must only be carried out by authorised personnel who understand the risks involved in working with electrical equipment.

DANGER!

Hazardous live currents and voltages

Do not touch any terminals, especially the AC measurement inputs and the relay terminals, as this could lead to injury or death.

Automatic and remote-controlled starts

CAUTION

Automatic genset start

The power management system automatically starts gensets when more power is needed. It can be difficult for an inexperienced operator to predict which gensets will start. In addition, gensets can be started remotely (for example, via an Ethernet connection, or a digital input).

To avoid personal injury, the genset design, the layout, and maintenance procedures must take this into account.

Switchboard control

Under *Switchboard control*, the operator controls and operates the equipment from the switchboard. When *Switchboard control* is activated:

- The controller trips the breaker and/or shuts down the engine, if an alarm situation arises that requires a trip and/or shutdown.
- The controller **does not** respond to a blackout.
- The controller **does not** provide any power management.
- The controller **does not** accept operator commands.
- The controller cannot and **does not** prevent any manual operator actions.

The switchboard design must therefore ensure that the system is sufficiently protected when the controller is under *Switchboard control*.

DANGER!

Manual override of alarm action

Do not use switchboard or manual control to override the alarm action of an active alarm.

An alarm may be active because it is latched, or because the alarm condition is still present. If the alarm action is manually overridden, a latched alarm does NOT provide any protection.

1.7 Legal information

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

Warranty

The rack may only be opened to remove, replace, and/or add a hardware module or the internal battery on PCM3.1. The procedure in the **Installation instructions** must be followed. If the rack is opened for any other reason, and/or the procedure is not followed, then the warranty is void.

If the display unit is opened, then the warranty is void.

Open source software

This product contains open source software licensed under, for example, the GNU General Public License (GNU GPL) and GNU Lesser General Public License (GNU LGPL). The source code for this software can be obtained by contacting DEIF at support@deif.com. DEIF reserves the right to charge for the cost of the service.

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2. Getting started

2.1 About controller operation

The PPM 300 controllers make sure that required power is available and the system is protected for typical marine applications.

Power management system (PMS) control

All controllers normally run under PMS control.

All GENSET or HYBRID controllers normally run in AUTO mode. In this mode, the PMS automatically starts and stops gensets or inverters, according to the power requirements. The PMS also automatically closes and opens the genset or inverter breakers to the busbar, to connect and disconnect the gensets or inverters as needed.

The SHAFT generator, SHORE connection and BUS TIE breaker controllers normally run under PMS control. These controllers do not automatically connect to a shaft generator or shore connection, or automatically close a bus tie breaker. You need to manually start these actions. Once you start the action, the controller automatically follows a pre-programmed sequence.

The GENSET, HYBRID, and EMERGENCY genset controllers can run in either AUTO or a semi-automatic (SEMI) mode. These are both PMS modes. In SEMI mode, you need to manually start or stop the genset or inverter. You also need to manually start the pre-programmed sequence to close or open the genset or inverter breaker to the busbar.

Switchboard control

Each controller can be put under switchboard control. Then you manually control the genset speed and opens and closes the breaker. Switchboard control is useful for troubleshooting, or if you need to override the control system.

Under switchboard control, all the controller functions are disabled, but he controller protections are still active. The controller monitors the operation, and if an alarm condition arises, the controller activates the alarm action.

Buttons and LEDs

You can use the display buttons to operate the system, for example to change modes, select actions to start pre-programmed sequences, change genset priority, and to silence alarms. The buttons to start or stop the genset, or close or open the breakers, are only active in SEMI mode.

You see the status of each part of the system at the display LEDs.

Display screen

From the display screen you can:

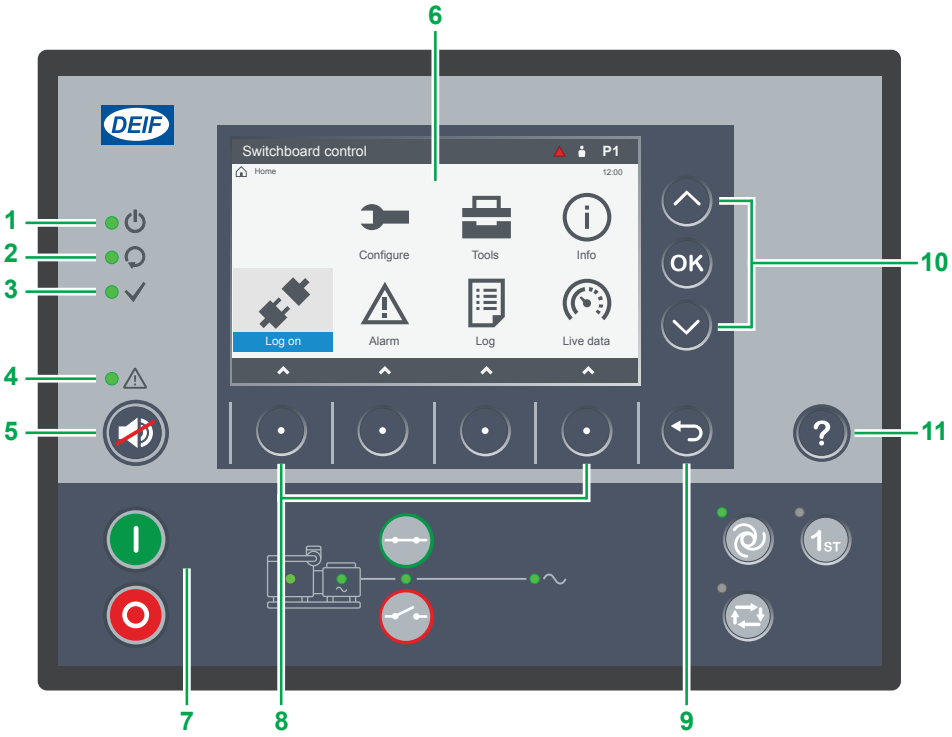
- Monitor system operation.
- Use the soft key buttons and the display screen to log on to the controller to see the alarm lists and logs, and to acknowledge and unlatch alarms.
- See and/or change the controller configuration (some features may not be accessible due to user level permissions).

PICUS

PICUS (Power In Control Utility Software) is the PC programming and monitoring tool, available from DEIF free of charge. You connect a computer with PICUS to the controller (direct connection), and are now able to configure, supervise, send commands and more..

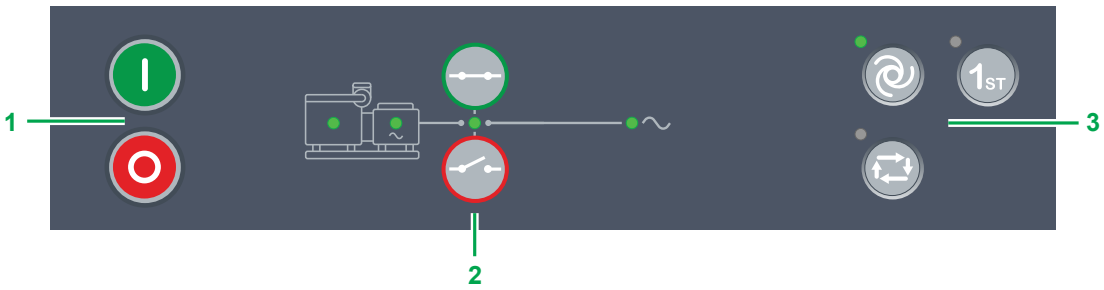
2.2 About the display unit (DU 300)

2.2.1 Display, LEDs, and buttons



No.	Item	Notes	
1	Display unit power	**Off** : Unit not powered.	**Green** : Unit powered.
2	Self-check OK	**Off** : Controller self-check not OK, or no connection to the controller.	**Green** : Controller self-check OK.
3	Ready for operation	**Off** : Controller under switchboard control or an alarm action prevents source from supplying power.	**Green** : Controller not under switchboard control and no alarm action prevents the source from supplying power.
4	Alarm	**Green** : No alarms.	**Green flash** : Only cleared unacknowledged alarms.
		Yellow : Unlatched alarms can be reset.	**Yellow flash** : Unacknowledged latched alarms
		Red : All active alarms acknowledged.	**Red flash** : Unacknowledged alarms.
5	Horn silence	Stop the horn output.	Hold: Change to alarms page.
6	Screen	Shows the feature or page.	
7	Bottom strip	LEDs and buttons for the controller type.	
8	Soft key	Move selection to a column, or select the soft key shown on screen.	
9	Back	Change to previous page.	Hold: Change to home page.
10	Selection on screen	**Up** : Move selection up on the screen.	**Down** : Move selection down on the screen.
		OK : confirm selection on screen.	
11	Help	Change to help page.	Hold: Change to Live data page.

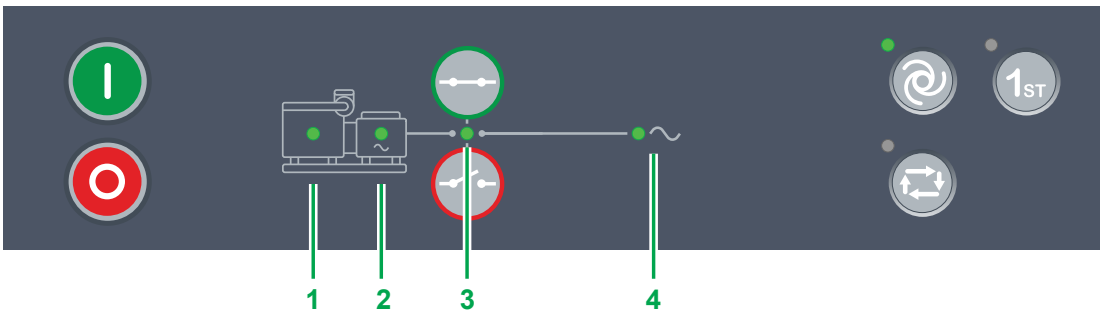
2.2.2 GENSET controller buttons



No.	Item	Notes	
1	Genset	**Start** genset and start sequence. *	**Stop** genset and stop sequence. *
2	Breaker	**Close** breaker : Starts close sequence. *	**Open** breaker : Starts open sequence. *
3	Options	**AUTO mode** : Change to AUTO if possible. *	
		Off : Controller not in AUTO.	**Green** : Controller in AUTO.
		SEMI mode : Change to SEMI if possible.	
		Off : Controller not in SEMI.	**Green** : Controller in SEMI.
		1st: Controller gives the genset first priority in the genset start order in the power management system.	
		Off : Other genset has first priority, or power management system automatically calculates genset priority, or controller under switchboard control.	**Green** : Genset has first priority in the genset start order in the power management system.
		Yellow : Genset is next in the genset start order in the power management system.	

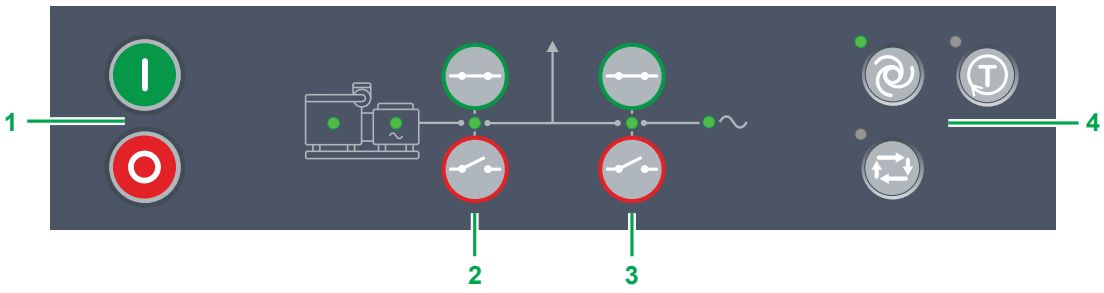
NOTE * Only in SEMI mode. In AUTO or Switchboard the controller ignores the input.

2.2.3 GENSET controller LEDs



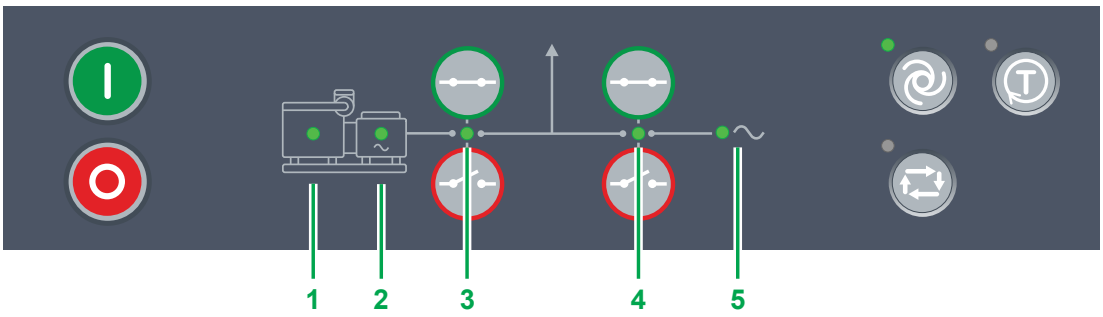
No.	Item	Notes
1	Engine	**Off** : Engine not running or no running feedback.
		Green flash : Engine start sequence initiated.
		Green : Running feedback. Oil pressure, RPM, frequency within configured limits.
2	Generator	**Off** : Generator voltage too low to measure.
		Yellow : Generator voltage and frequency not OK. Cannot close breaker.
		Green flash : Generator voltage and frequency OK, V&Hz OK timer still running. Cannot close breaker.
		Green : Generator voltage and frequency OK, and controller can synchronise and close breaker.
3	Breaker	**Off** : Breaker open
		Green : Breaker closed.
		Yellow : Breaker spring charging (only compact breaker).
		Yellow flash : Synchronising or de-loading breaker.
		Red flash : Any generator breaker trip alarm active.
		Red : Tripped breaker, and trip alarm unacknowledged and/or alarm condition present.
4	Busbar	**Green** : Voltage and frequency OK, and controller can synchronise and close breaker.
		Green flash : Voltage and frequency OK, but V&Hz OK timer running. Controller cannot close breaker.
		Yellow : Voltage and frequency are measurable, but not OK.
		Red : Voltage too low to measure. Controller can close breaker.
		Red flash: Blackout detection timer running and controller checking the busbar.

2.2.4 EMERGENCY genset controller buttons



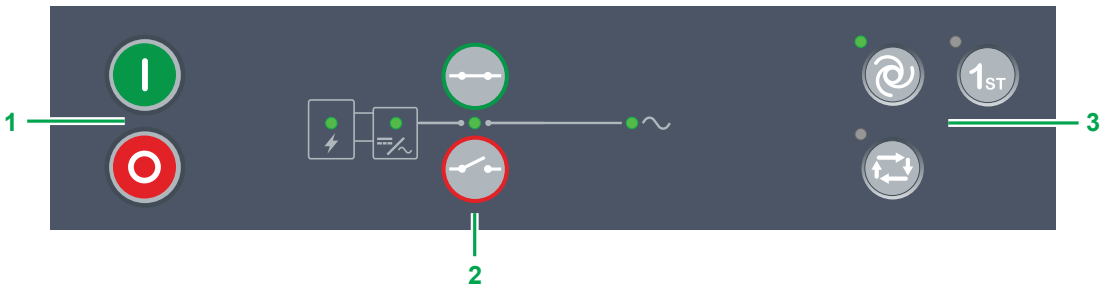
No.	Item	Notes	
1	Genset	**Start** genset and start sequence.	**Stop** genset and stop sequence.
2	Breaker	**Close** breaker : Starts close sequence.	**Open** breaker : Starts open sequence.
3	Tie breaker	**Close** tie breaker : Starts close sequence.	**Open** tie breaker : Starts open sequence.
3	Options	**AUTO mode** : Change to AUTO if possible.	
		Off : Controller not in AUTO.	**Green** : Controller in AUTO.
		SEMI mode : Change to SEMI if possible.	
		Off : Controller not in SEMI.	**Green** : Controller in SEMI.
		Test: Controller gives the genset first priority in the genset start order in the power management system. The actual test depends on the test configuration in the controller.	
		Off : Controller not running a test.	**Green** : Controller is running a test sequence (starts the emergency generator, and synchronises and closes the generator breaker).

2.2.5 EMERGENCY genset controller LEDs



No.	Item	Notes
1	Engine	**Off** : Engine not running or no running feedback.
		Green flash : Engine start sequence initiated.
		Green : Running feedback. Oil pressure, RPM, frequency within configured limits.
2	Generator	**Off** : Generator voltage too low to measure.
		Yellow : Generator voltage and frequency not OK. Cannot close breaker.
		Green flash : Generator voltage and frequency OK, V&Hz OK timer still running. Cannot close breaker.
		Green : Generator voltage and frequency OK, and controller can synchronise and close breaker.
3	Breaker	**Off** : Breaker open
		Green : Breaker closed.
		Yellow flash : Synchronising or de-loading breaker.
		Red flash : Any generator breaker trip alarm active.
		Red : Tripped breaker, and trip alarm unacknowledged and/or alarm condition present.
4	Tie breaker	**Off** : Tie breaker open
		Green : Tie breaker closed.
		Yellow flash : Synchronising or de-loading tie breaker.
		Red flash : Any generator tie breaker trip alarm active.
		Red : Tripped tie breaker, and trip alarm unacknowledged and/or alarm condition present.
5	Busbar	**Green** : Voltage and frequency OK, and controller can synchronise and close breaker.
		Green flash : Voltage and frequency OK, but V&Hz OK timer running. Controller cannot close breaker.
		Yellow : Voltage and frequency are measurable, but not OK.
		Red : Voltage too low to measure. Controller can close breaker.
		Red flash: Blackout detection timer running and controller checking the busbar.

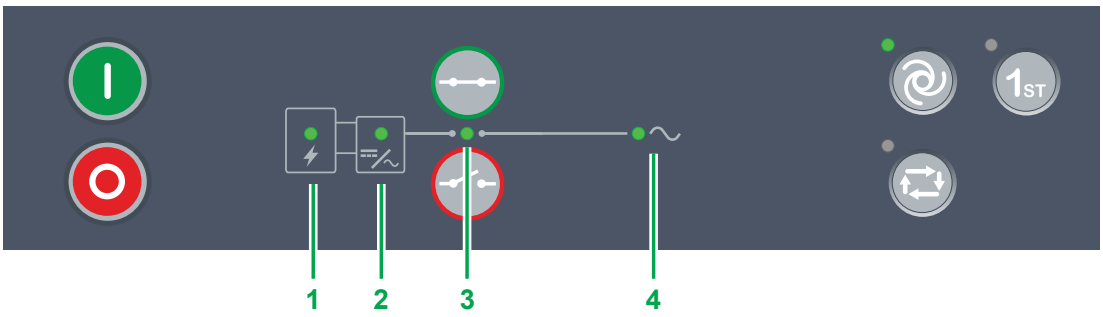
2.2.6 HYBRID controller buttons



No.	Item	Notes	
1	Inverter	**Start** inverter sequence. *	**Stop** inverter sequence. *
2	Breaker	**Close** breaker : Starts close sequence. *	**Open** breaker : Starts open sequence. *
3	Options	**AUTO mode** : Change to AUTO if possible. *	
		Off : Controller not in AUTO.	**Green** : Controller in AUTO.
		SEMI mode : Change to SEMI if possible.	
		Off : Controller not in SEMI.	**Green** : Controller in SEMI.
		1st: Controller gives the inverter first priority in the start order in the power management system.	
		Off : Other genset has first priority, or power management system automatically calculates genset priority, or controller under switchboard control.	**Green** : Inverter has first priority in the start order in the power management system.
		Yellow : Inverter is next in the start order in the power management system.	

NOTE * Only in SEMI mode. In AUTO or Switchboard the controller ignores the input.

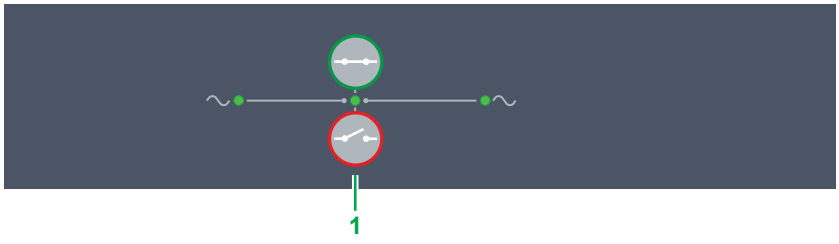
2.2.7 HYBRID controller LEDs



No.	Item	Notes
1	Power source	**Off** : Power source is not ready or no running feedback.
		Green : Power source ready.
2	Inverter	**Off** : Inverter voltage too low to measure.
		Yellow : Inverter voltage and frequency not OK. Cannot close breaker.
		Green flash : Inverter voltage and frequency OK, V&Hz OK timer still running. Cannot close breaker.
		Green : Inverter voltage and frequency OK, and controller can synchronise and close breaker.
3	Breaker	**Off** : Breaker open
		Green : Breaker closed.
		Yellow : Breaker spring charging (only compact breaker).
		Yellow flash : Synchronising or de-loading breaker.
		Red flash : Any inverter breaker trip alarm active.
		Red : Tripped breaker, and trip alarm unacknowledged and/or alarm condition present.
4	Busbar	**Green** : Voltage and frequency OK, and controller can synchronise and close breaker.
		Green flash : Voltage and frequency OK, but V&Hz OK timer running. Controller cannot close breaker.
		Yellow : Voltage and frequency are measurable, but not OK.
		Red : Voltage too low to measure. Controller can close breaker.
		Red flash: Blackout detection timer running and controller checking the busbar.

2.2.8 SHAFT generator controller LEDs and buttons

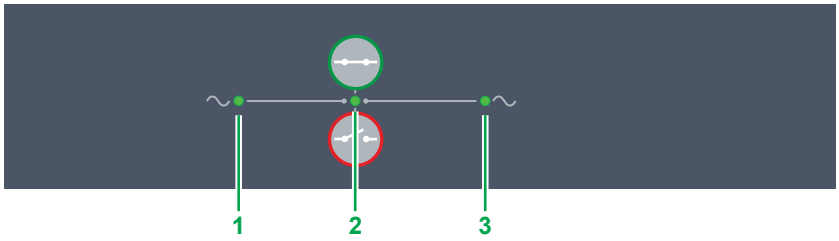
SHAFT generator buttons



No.	Item	Notes	
1	Breaker	**Close** breaker : Starts close sequence. *	**Open** breaker : Starts open sequence. *

NOTE * Under switchboard control the controller ignores the input.

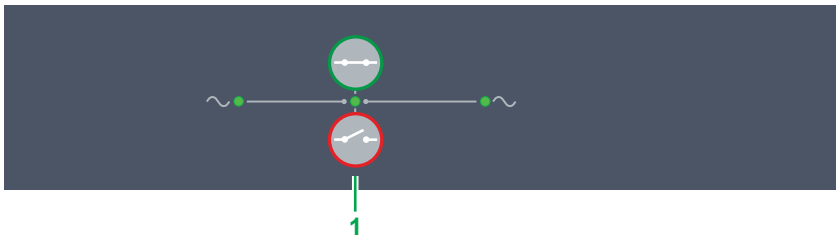
SHAFT generator LEDs



No.	Item	Notes
1	Shaft Generator	**Off** : Generator voltage too low to measure.
		Yellow : Generator voltage and frequency not OK. Cannot close breaker.
		Green flash : Generator voltage and frequency OK, V&Hz OK timer still running. Cannot close breaker.
		Green : Generator voltage and frequency OK, and controller can synchronise and close breaker.
2	Breaker	**Off** : Breaker open
		Green : Breaker closed.
		Yellow flash : Synchronising or de-loading breaker.
		Red flash : Breaker configuration failure, or a position failure.
		Red : Tripped breaker, and trip alarm unacknowledged and/or alarm condition present.
3	Busbar	**Green** : Busbar voltage and frequency OK, and controller can close breaker.
		Green flash : Busbar voltage and frequency OK, but V&Hz OK timer running. Controller cannot close breaker.
		Yellow : Busbar voltage and frequency are measurable, but not OK.
		Red : Busbar voltage too low to measure. Controller can close breaker.
		Red flash: Blackout detection timer running and controller checking the busbar.

2.2.9 SHORE connection controller LEDs and buttons

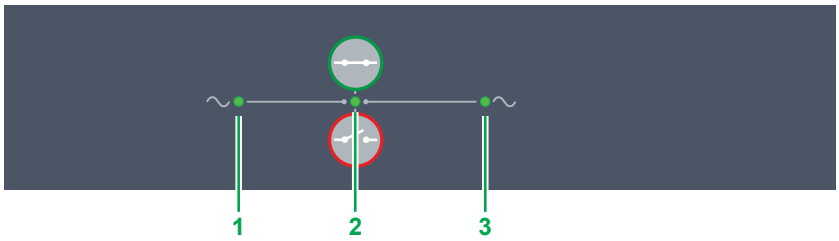
SHORE connection buttons



No.	Item	Notes	
1	Breaker	**Close** breaker : Starts close sequence. *	**Open** breaker : Starts open sequence. *

NOTE * Under switchboard control the controller ignores the input.

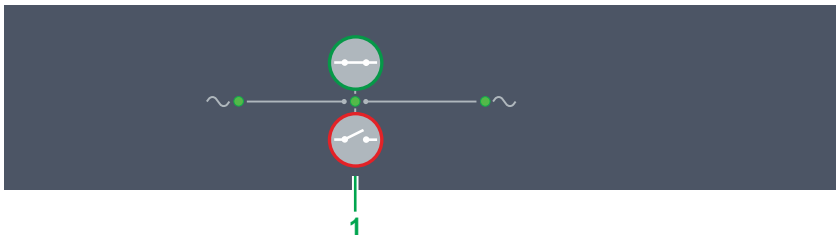
SHORE connection LEDs



No.	Item	Notes
1	Shore connection	**Off** : Connection voltage too low to measure.
		Yellow : Connection voltage and frequency not OK. Cannot close breaker.
		Green flash : Connection voltage and frequency OK, V&Hz OK timer still running. Cannot close breaker.
		Green : Connection voltage and frequency OK, and controller can synchronise and close breaker.
2	Breaker	**Off** : Breaker open
		Green : Breaker closed.
		Yellow flash : Synchronising or de-loading breaker.
		Red flash : Breaker configuration failure, or a position failure.
		Red : Tripped breaker, and trip alarm unacknowledged and/or alarm condition present.
3	Busbar	**Green** : Busbar voltage and frequency OK, and controller can close breaker.
		Green flash : Busbar voltage and frequency OK, but V&Hz OK timer running. Controller cannot close breaker.
		Yellow : Busbar voltage and frequency are measurable, but not OK.
		Red : Busbar voltage too low to measure. Controller can close breaker.
		Red flash: Blackout detection timer running and controller checking the busbar.

2.2.10 BUS TIE breaker controller LEDs and buttons

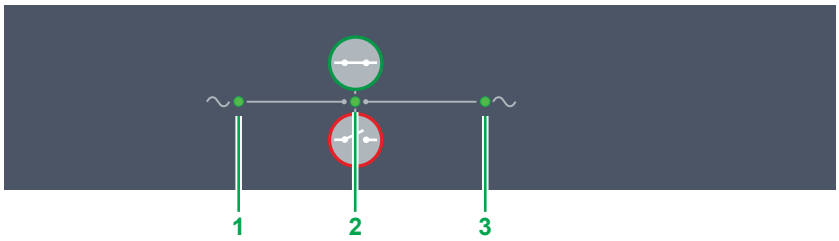
BUS TIE breaker buttons



No.	Item	Notes	
1	Breaker	**Close** breaker : Starts close sequence. *	**Open** breaker : Starts open sequence. *

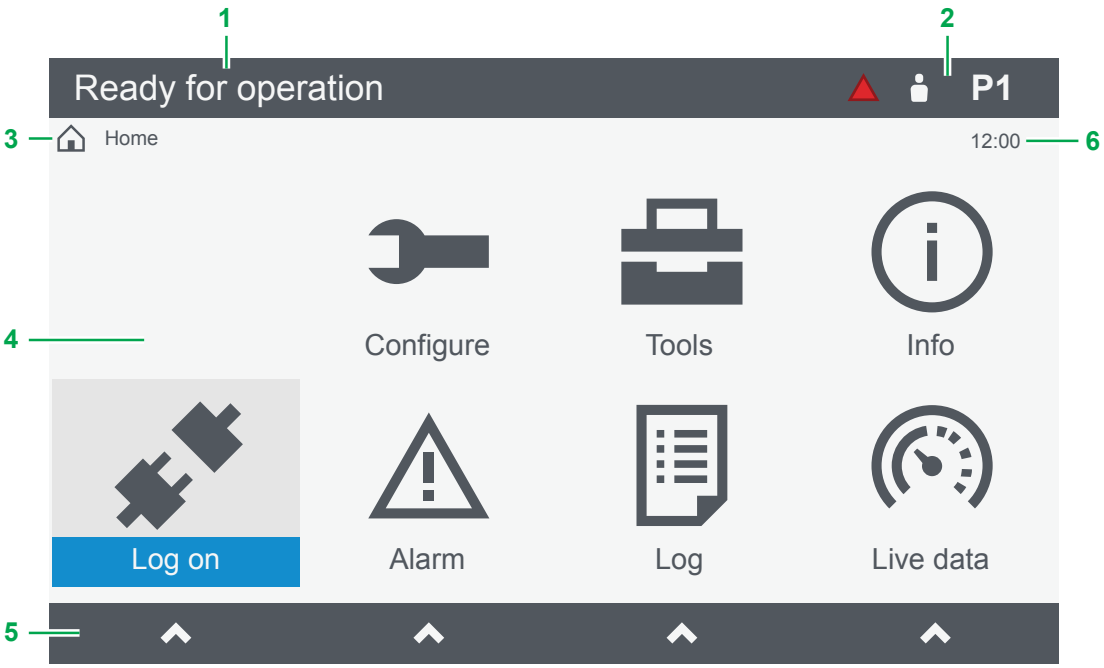
NOTE * Under switchboard control the controller ignores the input.

BUS TIE breaker LEDs



No.	Item	Notes
1	Busbar A	**Green** : Busbar A voltage and frequency OK, and controller can close breaker.
		Green flash : Busbar A voltage and frequency OK, but V&Hz OK timer running. Controller cannot close breaker.
		Yellow : Busbar A voltage and frequency are measurable, but not OK.
		Red : Busbar A voltage too low to measure. Controller can close breaker.
		Red flash: Blackout detection timer running and controller checking busbar A.
2	Bus tie Breaker	**Off** : Bus tie breaker open
		Green : Bus tie breaker closed.
		Yellow flash : Synchronising or de-loading bus tie breaker.
		Red flash : Bus tie breaker configuration failure, or a position failure.
		Red : Tripped bus tie breaker, and trip alarm unacknowledged and/or alarm condition present.
3	Busbar B	**Green** : Busbar A voltage and frequency OK, and controller can close breaker.
		Green flash : Busbar A voltage and frequency OK, but V&Hz OK timer running. Controller cannot close breaker.
		Yellow : Busbar A voltage and frequency are measurable, but not OK.
		Red : Busbar A voltage too low to measure. Controller can close breaker.
		Red flash: Blackout detection timer running and controller checking busbar A.

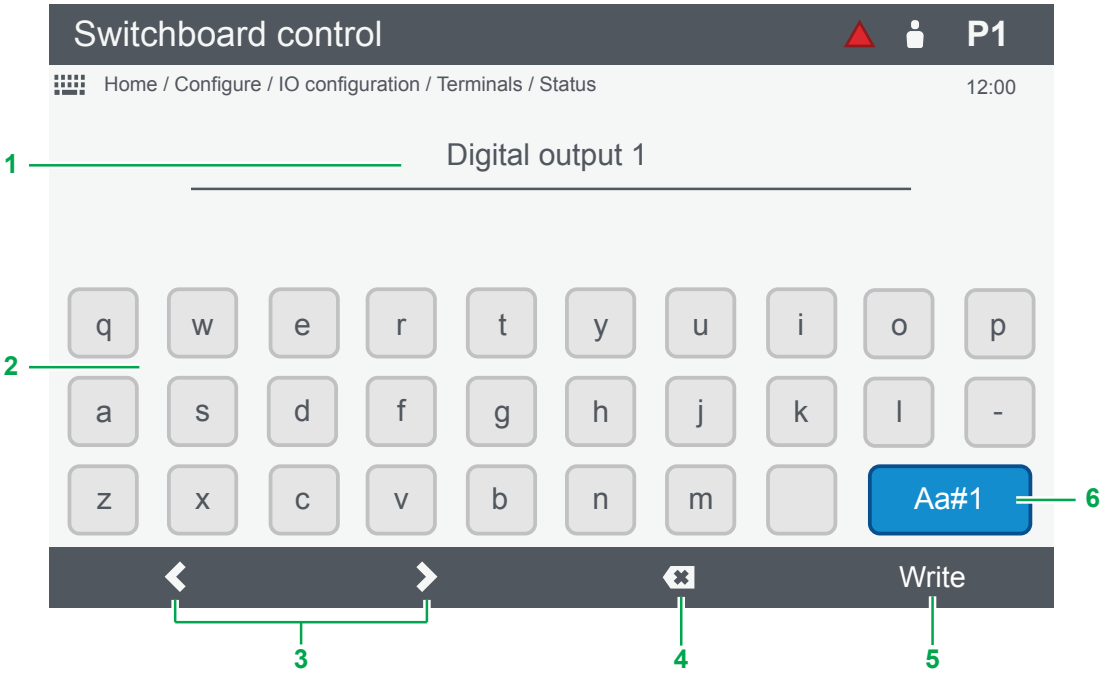
2.2.11 Screen layout



No.	Item	Notes	
1	Status text	Shows the current controller status text. This varies depending on the operation of the controller.	
2	Symbols	Shows information as symbols:	
		Active alarms in system.	**Logged on** user.
		P# shows genset priority (only GENSET controllers).	
3	Path	Shows the path for the selected page.	
4	Page	Shows the menu or page.	
5	Soft keys	Shows the soft keys for the page viewed.	
6	Time	Shows the time from the controller.	

2.2.12 About the virtual keyboard

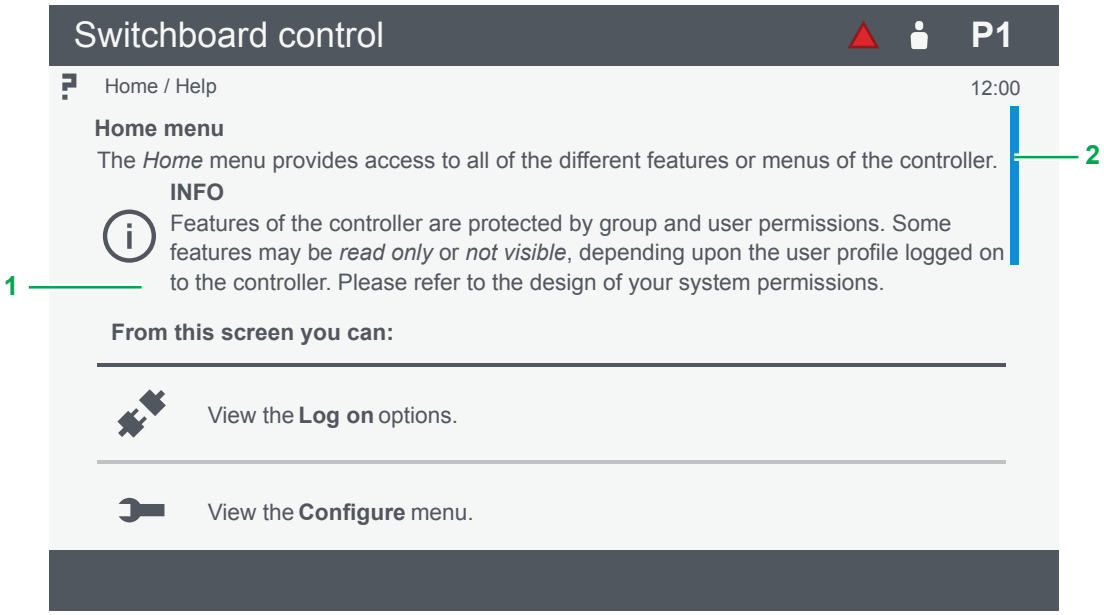
The display unit features several virtual keyboards to enter information or settings.



No.	Item	Notes	
1	Text input	Shows the text, numbers, or value entered.	
2	Virtual keyboard	Shows keyboard layout selected.	
3	Cursor selection	**Move left** cursor selection.	**Move right** cursor selection.
		Use buttons to move up or down:	
		Move up cursor selection.	**Move down** cursor selection.
4	Delete	**Delete** character at selection.	
5	Soft key confirm	Soft key function varies by page selected.	
6	Change keyboard	Changes layout to a different virtual keyboard.	

2.2.13 About the help

View help for any page by selecting **Help** button



No.	Item	Notes	
1	Help information	Shows help information for the page you were viewing. The default help is shown if not help is available for the page.	
2	Scroll	**Scroll up** the page.	**Scroll down** the page.
		Select **Back** to close the help page and return to the previous page.	

3. Operating the system

3.1 GENSET controller basic actions

3.1.1 Introduction to operating the GENSET controllers

Normal operation

The GENSET controllers are normally in AUTO mode. When in AUTO mode, the power management system automatically starts/stops and connects/disconnects the gensets, according to the settings for power requirements and genset priority.

Blackout response

In the case of a blackout:

- The power management system automatically follows the blackout recovery sequence to start the gensets and restore power.
- With a GENSET controller in SEMI mode, the power management system automatically changes the controller to AUTO mode. No operator actions are needed.
- With a GENSET controller under switchboard control, the power management system does not attempt to start or connect that genset. If you want the power management system to start and connect the genset, you must change to PMS control on the switchboard.

3.1.2 Change modes

The GENSET controller can run under PMS control in AUTO or SEMI mode. The controller can also run under switchboard control. The following procedures describe how to change the controller's operating mode and control.

Mode	Procedure
AUTO	To change to AUTO mode from SEMI mode: 1. Operator action: Press  to select AUTO mode. • System response: The LED next to  is green when the controller is in AUTO mode. You cannot change from switchboard control to AUTO mode with the display buttons. You must first change to AUTO/SEMI mode by changing the switchboard control selector to PMS.
SEMI	To change to SEMI mode from AUTO mode: 1. Operator action: Press  to select SEMI mode. • System response: The LED next to  is green when the controller is in SEMI mode. You cannot change from switchboard control to SEMI mode with the display buttons. You must first change to AUTO/SEMI mode by changing the switchboard control selector to PMS control.
Switchboard control	To change to switchboard control, the controller can be in either AUTO or SEMI mode: 1. Operator action: Change the selector on the switchboard to switchboard control. • System response: For safety reasons, whenever there is a **connected** GENSET controller under switchboard control, all the GENSET controllers in AUTO mode are automatically changed to SEMI mode. ◦ The automatic power management functions (automatic genset start/stop, and automatic breaker close/open) are no longer active for any GENSET controllers. ◦ Each controller still trips the breakers and/or stop the genset if an alarm that trips the breakers and/or stops the genset is activated.

NOTICE
Last GENSET SEMI mode change If you change the last GENSET controller that is in AUTO mode to SEMI mode, the power management system cannot automatically start or stop any gensets, or open or close any breakers.

The switchboard equipment is third-party equipment. The switchboard control selector labels may therefore be different from the names used above.

3.1.3 Start the genset

Mode	Procedure
AUTO	When the controller is in AUTO mode, the genset start is controlled automatically and the display buttons are disabled. If the power management system calculates that more power is required, the controller automatically starts the gensets, according to the genset priority order.
SEMI	To start the genset: 1. To start the genset press  once. 2. The controller runs the start sequence. • If everything is OK, the genset starts. • If the genset does not start, the display shows an info message. 3. If **Idle run start** is configured: * • The controller runs the **Idle run start** sequence. ◦ If needed, override the **Idle run start** sequence by pressing  again.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The genset can only be started locally and/or from the switchboard.

NOTE * Idle run may not be allowed for certain maritime classification societies.

The switchboard equipment is third-party equipment. The switchboard might not include a button to start the genset.

3.1.4 Stop the genset

Mode	Procedure
AUTO	When the controller is in AUTO mode, the genset stop is controlled automatically and the display buttons are disabled. If the power management system calculates that power is not required, the controller automatically stop the gensets, according to the genset priority order.
SEMI	The genset breaker must be open to stop the genset. If the genset breaker is not open, press  to open the breaker before stopping the genset. See **Opening the genset breaker** for more information. To stop the genset: 1. To stop the genset press  once. 2. The controller runs the cooldown period. • If needed, override the cooldown time by pressing  again. ◦ **Note:** A genset stop without cooldown time increases the mechanical wear of the genset. The genset may also have problems if it needs to restart immediately. The genset should only be stopped without cooldown time in emergencies. Contact the genset manufacturer for more information. 3. If **Idle run stop** is configured: *

Mode	Procedure
	• The controller runs the **Idle run stop** sequence. ◦ If needed, override the **Idle run stop** sequence by pressing again. 4. If the genset does not stop, the controller activates an alarm.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The genset can only be stopped locally and/or from the switchboard.

NOTE * Idle run may not be allowed for certain maritime classification societies.

The switchboard equipment is third-party equipment. The switchboard might not include a button to stop the genset.

3.1.5 Close the genset breaker

Mode	Procedure
AUTO	When the controller is in AUTO mode, the genset breaker is controlled automatically and the display buttons are disabled. If more power is required, the controller automatically starts the gensets and closes the breakers, according to the genset priority order.
SEMI	The genset must be running to close the genset breaker. If the genset is not running, press to start the genset. See **Start the genset** for more information. To close the breaker: 1. Press to close the genset breaker. a. The power management system synchronises the genset with the busbar (the breaker LED flashes yellow). b. When the genset and busbar are synchronised, the controller closes the breaker. When the breaker is closed, the breaker LED is green. • If the genset and busbar are not synchronised before the synchronisation timer expires, the breaker does not close. The synchronisation failure alarm is activated.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The genset breaker can only be closed from the switchboard.

3.1.6 Open the genset breaker

Mode	Procedure
AUTO	When the controller is in AUTO mode, the genset breaker is controlled automatically and the display buttons are disabled. If power is not required, the controller automatically opens the genset breaker as part of the genset stop sequence.
SEMI	To open the genset breaker: 1. Press to open the genset breaker. a. The power management system calculates if the available power is sufficient after the genset breaker opens. If not, the power management system prevents the genset breaker to open, and the controller display unit shows an info message. b. The power management system de-loads the breaker until the load is less than the de-load open point (the breaker LED flashes yellow). c. The controller opens the genset breaker. The LED is OFF when the breaker is open.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The breaker can only be opened from the switchboard.

3.1.7 Set genset start and stop priority

If you want certain gensets to automatically run as much as possible, and others to run at little as possible, the power management system has a priority order for the gensets. If a genset start is needed, the power management system starts the first non-running genset in the priority order.

You can determine the genset priority manually, or let the power management system do the priority. Press 1ST on a GENSET controller display unit to manually move its genset to the first position in the priority order. The LED next to 1ST lights when a GENSET controller has first priority.

More information
See **Priority page** for more information about how to change the priority for multiple controllers.

3.2 EMERGENCY genset controller basic actions

3.2.1 Introduction to operating the EMERGENCY genset controller

Normal operation

The EMERGENCY genset controller is normally in AUTO mode. During normal operation, apart from emergency genset tests, the emergency genset does not run.

Blackout response

In the case of a blackout:

- The power management system automatically follows the blackout recovery sequence in order to start the gensets and restore power.
- If the gensets do not supply power within the time allowed (default is 30 seconds), the power management system automatically opens the tie breaker, starts the emergency genset and closes the emergency genset breaker.
- With the EMERGENCY genset controller in SEMI mode, the controller automatically changes to AUTO mode. No operator actions are needed.
- With the EMERGENCY genset controller under switchboard control, the power management system does not attempt to start or connect the emergency genset. If you want the power management system to start and connect the emergency genset, you must change to PMS control on the switchboard.

Harbour operation

When harbour operation is active, the emergency genset breaker and the tie breaker are closed. The emergency genset runs, and supplies power as if it were an ordinary diesel genset. The power management system controls the system, and starts and stops the other gensets as needed. When harbour operation is active, the emergency genset is first in the genset priority order, if the EMERGENCY genset controller is in AUTO mode.

3.2.2 Change modes

The EMERGENCY genset controller can run in AUTO or SEMI mode, or under switchboard control. The EMERGENCY genset controller can also run a test sequence (see **Emergency genset test function**).

Mode	Procedure
AUTO	To change to AUTO mode from SEMI mode: 1. Operator action: Press to select AUTO mode. • System response: The LED next to is green when the controller is in AUTO mode.

Mode	Procedure
	You cannot change from switchboard control to AUTO mode with the display unit buttons. You must first change to AUTO/SEMI mode by changing the switchboard control selector to PMS.
SEMI	To change to SEMI mode from AUTO mode: 1. Operator action: Press  to select SEMI mode. • System response: The LED next to  is green when the controller is in SEMI mode. You cannot change from switchboard control to AUTO mode with the display unit buttons. You must first change to AUTO/SEMI mode by changing the switchboard control selector to PMS.
Switchboard control	To change to switchboard control, the controller can be in either AUTO or SEMI mode. To change to switchboard control: 1. Operator action: Change the switchboard control selector (on the switchboard) to switchboard control. • System response: For safety reasons, whenever there is a **connected** EMERGENCY genset controller under switchboard control, all the GENSET controllers in AUTO mode are automatically changed to SEMI mode. ◦ The automatic power management functions (automatic genset start or stop, and automatic breaker close and open) are no longer active for any GENSET controllers. ◦ Each controller still trips the breakers and/or stop the genset if an alarm that trips the breakers and/or stops the genset is activated.

NOTICE

Last GENSET SEMI mode change

If you change the last GENSET controller that is in AUTO mode to SEMI mode, the power management system cannot automatically start or stop any gensets, or open or close any breakers.

NOTE The switchboard equipment is third-party equipment. The switchboard control selector labels may therefore be different from the names used above.

3.2.3 Start the emergency genset

Mode	Procedure
AUTO	When the controller is in AUTO mode, the emergency genset start is controlled automatically, and the display unit buttons are disabled.
SEMI	To start the emergency genset: 1. To start the emergency genset press  once. 2. The controller runs the start sequence. • If everything is OK, the emergency genset starts. • If the emergency enset does not start, the display shows an info message. 3. If **Idle run start** is configured: * • The controller runs the **Idle run start** sequence. ◦ If needed, override the **Idle run start** sequence by pressing  again.
Switchboard control	When the controller is under switchboard control, the display unit buttons are disabled. The genset can only be started locally and/or from the switchboard.

NOTE * Idle run may not be allowed for certain maritime classification societies.

The switchboard equipment is third-party equipment. The switchboard might not include a button to start the genset.

3.2.4 Stop the emergency genset

Mode	Procedure
AUTO	When the controller is in AUTO mode, the emergency genset stop is controlled automatically and the display unit buttons are disabled. After a blackout, the controller automatically disconnects and stops the emergency genset when there is a stable voltage on the main busbar.
SEMI	The emergency genset breaker must be open to stop the emergency genset. If the emergency genset breaker is not open, press  to open the breaker before stopping the emergency genset. See **Opening the emergency genset breaker** for more information. To stop the genset: 1. To stop the emergency genset with a cooldown time, press  once. • The controller stops the emergency genset after the cooldown time. • If the emergency genset does not stop, the controller activates an alarm. 2. Press  again to skip the cooldown time and stop the emergency genset immediately. • **Note:** A genset stop without cooldown time increases the mechanical wear of the genset. The genset may also have problems if it needs to restart immediately. The genset should only be stopped without cooldown time in emergencies. Contact the genset manufacturer for more information. 3. If **Idle run stop** is configured: * • The controller runs the **Idle run stop** sequence. ◦ If needed, override the **Idle run stop** sequence by pressing  again. 4. If the genset does not stop, the controller activates an alarm.
Switchboard control	When the controller is under switchboard control, the display unit buttons are disabled. The emergency genset can only be stopped locally and/or from the switchboard.

NOTE The switchboard equipment is third-party equipment. The switchboard might not include a button to stop the genset.

3.2.5 Close the emergency genset breaker

The EMERGENCY genset controller display unit has two sets of breaker buttons. The emergency genset breaker buttons are on the left, closest to the genset pictogram.

Mode	Procedure
AUTO	When the controller is in AUTO mode, the emergency genset breaker is controlled automatically, and the display unit buttons are disabled.
SEMI	The emergency genset must be running to close the genset breaker. If the emergency genset is not running, press  to start the emergency genset. See **Starting the emergency genset** for more information. To close the emergency genset breaker: 1. Press  to close the emergency genset breaker. a. The power management system synchronises the emergency genset with the busbar (the breaker LED flashes yellow). b. When the emergency genset and busbar are synchronised, the controller closes the breaker. When the breaker is closed, the breaker LED is green.

Mode	Procedure
	• If the emergency genset and busbar are not synchronised before the synchronisation timer expires, the breaker does not close. The synchronisation failure alarm is activated.
Switchboard control	When the controller is under switchboard control, the display unit buttons are disabled. The emergency genset breaker can only be closed from the switchboard.

3.2.6 Open the emergency genset breaker

The EMERGENCY genset controller display unit has two sets of breaker buttons. The emergency genset breaker buttons are on the left, closest to the genset pictogram.

Mode	Procedure
AUTO	When the controller is in AUTO mode, the emergency genset breaker is controlled automatically, and the display unit buttons are disabled. After a blackout, the controller automatically disconnects and stops the emergency genset when there is a stable voltage on the main busbar.
SEMI	To open the emergency genset breaker: 1. Press  to open the emergency genset breaker. a. The power management system calculates if the available power is sufficient after the emergency genset breaker opens. If not, the power management system prevents the emergency genset breaker to open, and the controller display unit shows an info message. b. The power management system de-loads the emergency genset breaker until the load is less than the de-load open point (the breaker LED flashes yellow). c. The controller opens the genset breaker. The breaker LED is OFF when the breaker is open.
Switchboard control	When the controller is under switchboard control, the display unit buttons are disabled. The emergency genset breaker can only be opened from the switchboard.

3.2.7 Close the tie breaker

The tie breaker is normally closed. This means that the emergency busbar is normally connected to the main busbar. The emergency busbar and main busbar normally act as one busbar.

The tie breaker may be opened and closed automatically for a limited time as part of the test function.

The emergency genset breaker and the tie breaker are both closed for an unlimited time when harbour operation is active.

The EMERGENCY genset controller display unit has two sets of breaker buttons. The tie breaker buttons are on the right.

Mode	Procedure
AUTO	When the controller is in AUTO mode, the tie breaker is controlled automatically, and the display unit buttons are disabled. After a blackout, when stable power is restored on the main busbar, the power management system automatically synchronises to the main busbar and closes the tie breaker.
SEMI	To close the tie breaker: 1. Press  to close the tie breaker. a. The power management system synchronises the emergency busbar and the main busbar (the breaker LED flashes yellow). • For the tie breaker to close, the busbar LED must be green. If a blackout occurred on the main busbar, the EMERGENCY genset controller cannot close the tie breaker until one or more ordinary gensets start and there is stable power on the main busbar.

Mode	Procedure
	b. When the tie breaker is synchronised, the controller closes the tie breaker. When the tie breaker is closed, the breaker LED is green. • If the tie breaker is not synchronised before the synchronisation timer expires, the breaker does not close. The synchronisation failure alarm is activated. • If there is no blackout and the emergency genset breaker is closed, the maximum parallel timer runs when the tie breaker is closed. If harbour operation is not activated, when the timer runs out, the controller tries to open the emergency genset breaker.
Switchboard control	When the controller is under switchboard control, the display unit buttons are disabled. The tie breaker can only be closed from the switchboard.

3.2.8 Open the tie breaker

The tie breaker is normally closed.

As part of the blackout procedure, if power cannot be restored from the gensets within the specified time, the tie breaker opens automatically, and the main busbar is divided from the emergency busbar. The emergency genset then supplies power to the emergency busbar. The main busbar and the emergency busbar run as two independent busbars until stable power is restored on the main busbar.

The EMERGENCY genset controller display unit has two sets of breaker buttons. The tie breaker buttons are on the right.

Mode	Procedure
AUTO	When the controller is in AUTO mode, the tie breaker is controlled automatically, and the display unit buttons are disabled.
SEMI	To open the tie breaker: 1. Press  to open the tie breaker. a. The power management system calculates if the emergency genset can supply the load on the emergency busbar after the tie breaker opens. The power management system also checks if the gensets can supply the load on the main busbar after the tie breaker opens. If not, the power management system prevents the tie breaker to open, and the controller display unit shows an info message. b. The power management system de-loads the tie breaker (the breaker LED flashes yellow). c. When the tie breaker is de-loaded, the controller opens the tie breaker. When the breaker is open, the breaker LED is OFF. • If the tie breaker is not de-loaded before the de-load timer expires, the breaker does not open. The de-load failure alarm is activated. • If the gensets do not have the capacity to supply the load on each busbar, the controller does not open the tie breaker, and displays an info message. d. If there is a blackout on the main busbar, the tie breaker opens without de-loading, to protect the supply to the emergency busbar.
Switchboard control	When the controller is under switchboard control, the display unit buttons are disabled. The tie breaker can only be opened from the switchboard.

3.2.9 Test the emergency genset

To run the emergency genset test sequence:

1. Press  to start the test sequence.
   a. The controller starts the configured test sequence.
   b. When the test sequence is completed, the controller automatically changes to the mode configured in the test sequence.
   c. If a blackout occurs during the test sequence, the EMERGENCY genset controller automatically stops the test sequence, and starts to supply the emergency busbar.

3.2.10 Harbour operation

To start harbour operation:

1. Activate the *Harbour operation* digital input.
   a. If the parameter *Operator confirms harbour operation* is *Enabled*, you must confirm harbour operation from the display unit.
   b. Press the **Allow** 

soft key, then **OK**.
   c. The controller starts the emergency genset, synchronises, and closes the generator breaker. The power management system manages the system with the emergency genset as the first priority genset.

3.3 HYBRID controller basic actions

3.3.1 Introduction to operating the HYBRID controllers

Normal operation

The HYBRID controllers are normally in AUTO mode. When in AUTO mode, the power management system automatically starts/stops and connects/disconnects the inverter, according to the settings for power requirements and priority.

Blackout response

In the case of a blackout:

- The power management system automatically follows the blackout recovery sequence to start the gensets and restore power.
- With a HYBRID controller in SEMI mode, the power management system automatically changes the controller to AUTO mode. No operator actions are needed.
- With a HYBRID controller under switchboard control, the power management system does not attempt to start or connect that inverter. If you want the power management system to start and connect the inverter, you must change to PMS control on the switchboard.

3.3.2 Change modes

The HYBRID controller can run under PMS control in AUTO or SEMI mode. The controller can also run under switchboard control. The following procedures describe how to change the controller's operating mode and control.

Mode	Procedure
AUTO	To change to AUTO mode from SEMI mode: 1. Press  to select AUTO mode. • The LED next to  is green when the controller is in AUTO mode. You cannot change from switchboard control to AUTO mode with the display buttons. You must first change to AUTO/SEMI mode by changing the switchboard control selector to PMS.
SEMI	To change to SEMI mode from AUTO mode: 1. Press  to select SEMI mode. • The LED next to  is green when the controller is in SEMI mode. You cannot change from switchboard control to SEMI mode with the display buttons. You must first change to AUTO/SEMI mode by changing the switchboard control selector to PMS control.
Switchboard control	To change to switchboard control, the controller can be in either AUTO or SEMI mode: 1. Change the selector on the switchboard to switchboard control. • For safety reasons, whenever there is a **connected** GENSET controller under switchboard control, all the GENSET controllers in AUTO mode are automatically changed to SEMI mode.

Mode	Procedure
	◦ The automatic power management functions (automatic genset start/stop, and automatic breaker close/open) are no longer active for any HYBRID controllers. ◦ Each controller still trips the breakers and/or stop the inverter if an alarm that trips the breakers and/or stops the inverter is activated.

NOTICE

Automatic start or stop

If you change the last GENSET controller that is in AUTO mode to SEMI mode, the power management system cannot automatically start or stop any gensets, or open or close any breakers.

The switchboard equipment is third-party equipment. The switchboard control selector labels may therefore be different from the names used above.

3.3.3 Start the inverter

Mode	Procedure
AUTO	When the controller is in AUTO mode, the inverter start is controlled automatically and the display buttons are disabled. If the power management system calculates that more power is required, the controller automatically starts the gensets, according to the genset priority order.
SEMI	The inverter breaker must be in the state configured in the setting for the inverter start sequence. If the inverter breaker is not in the correct state, an information message is shown. To start the inverter: 1. Press  to start the inverter. • The controller runs the start inverter sequence. ◦ If everything is OK, the inverter starts. ◦ If the inverter does not start, the display shows an info message.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The inverter can only be started locally and/or from the switchboard.

The switchboard equipment is third-party equipment. The switchboard might not include a button to start the inverter.

3.3.4 Stop the inverter

Mode	Procedure
AUTO	When the controller is in AUTO mode, the inverter stop is controlled automatically and the display buttons are disabled. If the power management system calculates that power is not required, the controller automatically stop the inverter, according to the PMS priority order.
SEMI	The inverter breaker must be in the state configured in the setting for the inverter stop sequence. If the inverter breaker is not in the correct state, an information message is shown. To stop the inverter: 1. To stop the inverter press  once. • The controller runs the stop inverter sequence. ◦ If everything is OK, the inverter stops. ◦ If the inverter does not stop, the display shows an info message.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The inverter can only be stopped locally and/or from the switchboard.

The switchboard equipment is third-party equipment. The switchboard might not include a button to stop the genset.

3.3.5 Close the inverter breaker

Mode	Procedure
AUTO	When the controller is in AUTO mode, the inverter breaker is controlled automatically and the display buttons are disabled. If more power is required, the controller automatically starts the gensets and closes the breakers, according to the genset priority order.
SEMI	The inverter must be in the state configured in the setting for the inverter breaker close sequence. If the inverter is not in the correct state, an information message is shown. To close the inverter breaker: 1. Press  to close the inverter breaker. • The controller checks the inverter breaker close sequence. ◦ If the inverter breaker close sequence conditions are OK: a. The power management system synchronises the inverter with the busbar (the breaker LED flashes yellow). b. When the inverter and busbar are synchronised, the controller closes the breaker. When the breaker is closed, the breaker LED is green. c. If the inverter and busbar are not synchronised before the synchronisation timer expires, the breaker does not close. The synchronisation failure alarm is activated. ◦ If the inverter breaker close sequence conditions are not OK, an information message is shown.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The inverter breaker can only be closed from the switchboard.

3.3.6 Open the inverter breaker

Mode	Procedure
AUTO	When the controller is in AUTO mode, the inverter breaker is controlled automatically and the display buttons are disabled. If power is not required, the controller automatically opens the inverter breaker as part of the inverter stop sequence.
SEMI	The inverter must be in the state configured in the setting for the inverter breaker open sequence. If the inverter is not in the correct state, an information message is shown. To open the inverter breaker: 1. Press  to open the inverter breaker. • The controller checks the inverter breaker open sequence. ◦ If the conditions are OK: a. The power management system calculates if the available power is sufficient after the inverter breaker opens. If not, the power management system prevents the inverter breaker to open, and the controller display shows an info message. b. The power management system de-loads the breaker until the load is less than the de-load open point (the breaker LED flashes yellow). c. The controller opens the inverter breaker. The LED is OFF when the breaker is open. ◦ If the inverter breaker open sequence conditions are not OK, an information message is shown.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The breaker can only be opened from the switchboard.

3.3.7 Set inverter start and stop priority

If you want certain inverters to automatically run as much as possible, and others to run at little as possible, the power management system has a priority order for the inverters and gensets. If a genset start is needed, the power management system starts the first non-running genset in the priority order.

You can determine the priority manually, or let the power management system do the priority. Press 1ST on a HYBRID controller display to manually move it to the first position in the priority order. The LED next to 1ST lights when a HYBRID controller has first priority.

3.4 SHAFT generator controller basic actions

3.4.1 Introduction to operating the SHAFT generator controller

Normal operation

The SHAFT generator controller normally runs under power management system control.

Blackout response

In the case of a blackout:

- The power management system automatically follows the blackout recovery sequence to start the gensets and restore power.
- If this does not succeed (and auto close is enabled), the power management system attempts to close the shaft generator breaker. No operator actions are needed.
- With the SHAFT generator controller under switchboard control, the power management system does not attempt to connect the shaft generator. If you want the power management system to connect the shaft generator, you must change to PMS control on the switchboard.

Parallel operation

The shaft generator can run in parallel with the diesel gensets to transfer the load, but this is not the normal type of operation.

Power take home function

When the power take home function is active, the diesel gensets supply the power, and the shaft generator is used as a motor.

3.4.2 Close the shaft generator breaker

When you close the shaft generator breaker, the power management system transfers the load from the gensets to the shaft generator. The shaft generator must therefore be running and have enough capacity to take over the genset load.

Control	Procedure
PMS control	To close the shaft generator breaker: 1. Press ⟷ to close the shaft generator breaker. a. The power management system synchronises the busbar with the shaft generator (the breaker LED flashes yellow). b. When the shaft generator and busbar are synchronised, the controller closes the breaker. When the breaker is closed, the breaker LED is green. • If the shaft generator and busbar are not synchronised before the synchronisation timer expires, the breaker does not close. The synchronisation failure alarm is activated. • If the shaft generator does not have the capacity to take over the genset load, the controller does not close the shaft generator breaker, and displays an info message. c. After the shaft generator breaker is closed, the power management system automatically de-loads and opens the genset breakers of all the GENSET controllers in AUTO mode. After the genset cooldown period, the power management system then automatically stops the gensets of all the GENSET controllers in AUTO mode.
Switchboard control	When the controller is under switchboard control, the display unit buttons are disabled. The shaft generator breaker can only be closed from the switchboard.

3.4.3 Open the shaft generator breaker

When you open the shaft generator breaker, the power management system transfers the load from the shaft generator to the gensets. There must therefore be enough gensets available, with enough capacity to take over the shaft generator load.

Control	Procedure
PMS control	To open the shaft generator breaker: 1. Press  to open the shaft generator breaker. a. The power management system calculates if the available power is sufficient after the shaft generator breaker opens. If not, the power management system prevents the shaft generator breaker to open, and the controller display shows an info message. • If GENSET controllers in AUTO mode are ready for operation, but not connected, the power management system starts the gensets to have the required power available. • If the gensets do not have the capacity to take over the shaft generator load, the controller does not open the shaft generator breaker, and displays an info message. b. The power management system de-loads the shaft generator breaker (the breaker LED flashes yellow). c. When the shaft generator breaker is de-loaded, the controller opens the shaft generator breaker. When the breaker is open, the breaker LED is OFF. • If the shaft generator breaker is not de-loaded, the breaker does not open. The de-load failure alarm is activated when the de-load timer expires.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The shaft generator breaker can only be opened from the switchboard.

3.5 SHORE connection controller basic actions

3.5.1 Introduction to operating the SHORE connection controller

Normal operation

The SHORE connection controller normally runs under power management system (PMS) control.

Blackout response

In the case of a blackout:

- The power management system automatically follows the blackout recovery sequence to start the gensets restore power.
- If this does not succeed (and auto close is enabled), the power management system attempts to close the shore connection breaker. No operator actions are needed.
- With the SHORE connection controller under switchboard control, the power management system does not attempt to connect the shore connection. If you want the power management system to connect the shore connection, you must change to PMS control on the switchboard.

Parallel operation

The shore connection can run in parallel with the diesel gensets to transfer the load, but this is not the normal type of operation.

3.5.2 Close the shore connection breaker

When you close the shore connection breaker, the power management system transfers the load from the gensets to the shore connection. The shore connection must therefore be live and have enough capacity to take over the genset load.

Control	Procedure
PMS control	To close the shore connection breaker: 1. Press  to close the shore connection breaker.

Control	Procedure
	a. The power management system synchronises the busbar with the shore connection (the breaker LED flashes yellow). b. When the shore connection and busbar are synchronised, the controller closes the breaker. When the breaker is closed, the breaker LED is green. • If the shore connection and busbar are not synchronised before the synchronisation timer expires, the breaker does not close. The synchronisation failure alarm is activated. • If the shore connection does not have the capacity to take over the genset load, the controller does not close the shore connection breaker, and displays an info message. c. After the shore connection breaker is closed, the power management system automatically de-loads and opens the genset breakers of all the GENSET controllers in AUTO mode. After the genset cooldown period, the power management system then automatically stops the gensets of all the GENSET controllers in AUTO mode.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The shore connection breaker can only be closed from the switchboard.

3.5.3 Open the shore connection breaker

When you open the shore connection breaker, the power management system transfers the load from the shore connection to the gensets. There must therefore be enough gensets available, with enough capacity to take over the shore connection load.

Control	Procedure
PMS control	To open the shore connection breaker: 1. Press  to open the shore connection breaker. a. The power management system calculates if the available power is sufficient after the shore connection breaker opens. If not, the power management system prevents the shore connection breaker to open, and the controller display shows an info message. • If GENSET controllers in AUTO mode are ready for operation, but not connected, the power management system starts and connects the gensets to have the required power available. • If the gensets do not have the capacity to take over the shore connection load, the controller does not open the shore connection breaker, and displays an info message. b. The power management system checks the *Breaker action* parameter value. • **Open shore connection breaker:** The power management system de-loads the shore connection breaker (the breaker LED flashes yellow). • **Trip shore connection breaker:** The power management system checks if the breaker can be opened without de-loading. If the conditions are met, the breaker opens. If the conditions are not met, the controller displays an info message. • **Operator select:** The system opens a Message display, and you must choose to open, trip or cancel the open breaker sequence. ◦ Select *Open*. The power management system de-loads and opens the shore connection breaker. ◦ Select *Trip*. The power management system checks if the breaker can be opened without de-loading. If the conditions are met, the breaker opens. If the conditions are not met, the controller displays an info message. ◦ Select *Cancel*. The sequence stops and the power management system does not attempt to open the shore connection breaker. c. When the shore connection breaker is de-loaded, the controller opens the shore connection breaker. When the breaker is open, the breaker LED is OFF. • If the shore connection breaker is not de-loaded, the breaker does not open. The de-load failure alarm is activated when the de-load timer expires.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The shore connection breaker can only be opened from the switchboard.

3.6 BUS TIE breaker controller basic actions

3.6.1 Introduction to operating the BUS TIE breaker controller

Normal operation

The BUS TIE breaker controller normally runs under power management system (PMS) control.

Blackout response

In the case of a blackout:

- The power management system automatically follows the blackout recovery sequence to restore power.
- If one busbar is live (and auto close is enabled), the power management system attempts to close the tie breaker. No operator actions are needed.
- With the BUS TIE breaker controller under switchboard control, the power management system does not attempt to connect the busbars. If you want the power management system to connect the busbars, you must change to PMS control on the switchboard.

3.6.2 Close the bus tie breaker

When the bus tie breaker is closed, the busbar is reconnected. The reconnected busbar acts as one busbar, and not as two independent busbars.

Control	Procedure
PMS control	To close the bus tie breaker: 1. Press  to close the bus tie breaker. a. The power management system synchronises busbar A and busbar B (the breaker LED flashes yellow). b. When the bus tie breaker is synchronised, the controller closes the bus tie breaker. When the breaker is closed, the breaker LED is green. • If the bus tie breaker is not synchronised before the synchronisation timer expires, the breaker does not close. The synchronisation failure alarm is activated. c. After the bus tie breaker is closed, the power management system may automatically start some gensets and stop others, according to the genset start and stop priority order. Automatic start and stop only applies to the gensets of all the GENSET controllers in AUTO mode.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The bus tie breaker can only be closed from the switchboard.

3.6.3 Open the bus tie breaker

When the bus tie breaker is open, the busbar is divided in two independent busbars (busbar A and busbar B). There must therefore be enough gensets available (on each busbar) to supply the load required (on each busbar) before you can open the bus tie breaker.

Control	Procedure
PMS control	To open the bus tie breaker: 1. Press  to open the bus tie breaker. a. The power management system calculates if the available power on each busbar is sufficient after the bus tie breaker opens. If not, the power management system prevents the bus tie breaker to open, and the controller display shows an info message. • If GENSET controllers in AUTO mode are ready for operation, but not connected, the power management system starts and connects the gensets to have the required power available. b. The power management system de-loads the bus tie breaker (the breaker LED flashes yellow).

Control	Procedure
	c. When the bus tie breaker is de-loaded, the controller opens the bus tie breaker. When the breaker is open, the breaker LED is OFF. • If the bus tie breaker is not de-loaded before the de-load timer expires, the breaker does not open. The de-load failure alarm is activated.
Switchboard control	When the controller is under switchboard control, the display buttons are disabled. The bus tie breaker can only be opened from the switchboard.

3.7 Operator messages

3.7.1 Controller status texts

The controller status texts are shown at the top of the display. The status text shown depends on the type of controller. Not all texts apply for all controller types.

Status text *	Description
-	Cannot read the controller status.
Alarm testing	The alarm test parameter is enabled.
Blackout handling in # s	The remaining time (in seconds) before the emergency genset begins the start procedure to solve a blackout.
Blackout start blocked	“Block blackout start” function is activated, or there is an active short circuit alarm in the section.
BTB in operation	The bus tie breaker is closed.
Busbar OK in # s	The remaining time (in seconds) before the emergency genset begins the stop procedure after a blackout is solved.
Cooldown # s	The remaining time (in seconds) for the genset cooldown.
Crank off	There is no running detection of the genset during the genset start procedure, and the crank is turned off.
Crank on	The crank is activated in order to start the genset.
De-loading GB / TB / SGB / SCB	The controller is de-loading the breaker.
Dividing section	The controller is de-loading the bus tie breaker.
Emergency supply	The emergency genset without regulation is running, and the generator breaker and tie breaker are closed.
Engine running	The emergency genset without regulation is running, and the generator breaker is open.
Engine stopping	The genset is being stopped.
Engine test # s	The remaining time (in seconds) that the EMERGENCY genset controller engine test is still active.
Fixed power	The genset is running and is regulated to a fixed power.
Frequency regulation	The genset is running and is regulated using frequency regulation.
Frequency too high	The genset frequency is too high and must be adjusted to a lower value. The adjustment happens automatically if the controller is under PMS control.
Frequency too low	The genset frequency is too low and must be adjusted to a higher value. The adjustment happens automatically if the controller is under PMS control.
Harbour operation	The emergency genset is operating in harbour operation and supplies power to the busbar as the first priority genset.
Load-dependent stop blocked	Shown when the "Block load-dependent stop" function is activated.
Load sharing	The gensets connected to the busbar shares the load symmetrically.

Status text *	Description
Load sharing (asymmetric)	The genset shares the load with another genset as per asymmetric load sharing parameters.
LTO test # s	The remaining time (in seconds) that the EMERGENCY genset controller load take over test is still active.
Non-connected stop in # s	The remaining time (in seconds) before a genset no longer connected to the busbar starts the genset stop procedure.
Not ready for operation	The controller is not under switchboard control, but it is not ready for operation. For gensets "Start enable" might not be activated, or there are alarms (latched or unacknowledged) blocking the ready status.
Parallel test # s	The remaining time (in seconds) that the EMERGENCY genset controller parallel test is still active.
Precautionary standby	A precautionary genset start alarm or input started the genset.
Ready for operation	All operation conditions are met. Gensets are ready to start and/or breakers are ready to close.
SC in operation	A power supply from the shore connection is available, and the shore connection breaker is closed.
SC in operation (base load)	A power supply from the shore connection is available, and the shore connection breaker is closed. The base load parameter is activated.
SC ready	A power supply from the shore connection is available, and the shore connection breaker is open.
SC ready for ship-to-ship supply	Ship-to-ship supply is activated, and the shore connection breaker is open.
Secured mode active	Secured mode is activated to ensure there is enough power if the largest generator fails.
SG in operation	The shaft generator is producing power, and the shaft generator breaker is closed.
SG in operation (base load)	The shaft generator is producing power, and the shaft generator breaker is closed. The base load parameter is activated.
SG in PTH operation	Power take home is activated, and the shaft generator breaker is closed.
SG not ready	The shaft generator is not ready to provide power to the busbar. There may be alarms blocking the shaft generator breaker from closing.
SG ready for PTH operation	Power take home has been activated, and the shaft generator breaker is open.
SG running	The shaft generator is producing power, and the shaft generator breaker is open.
Ship-to-ship active	Ship-to-ship operation is active and the shore connection breaker is closed.
Starting genset in # s	The remaining time (in seconds) before the genset starts.
Start prepare # s	The timer (in seconds) for the genset start prepare.
Stopping genset in # s	The remaining time (in seconds) before the genset stops.
Switchboard control	The controller is under switchboard control and can only receive commands from the switchboard. Power management is not active.
Synchronising SGB / SCB	The controller is busy synchronising the busbar frequency and voltage to close the breaker.
Synchronising GB	The controller is busy synchronising the genset to the busbar frequency and voltage to close the generator breaker.
Synchronising TB	The controller is busy synchronising the genset to the busbar frequency and voltage to close the tie breaker.
Synchronising sections	The two sections to be connected by a bus tie breaker are being synchronised to close the bus tie breaker.
Waiting for software	A software update is in progress.

NOTE * "# s" represents a timer countdown.

3.7.2 Operator information messages

During operation some operator information messages may be shown. The information shown depends on the type of controller. Not all texts apply for all controller types.

Operator info	Additional information
1st priority not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
Alarm blocking BTB close	A block alarm is active. Clear the alarm before you try to close the bus tie breaker.
Alarm blocking engine start	A block alarm is active. Clear the alarm before you try to start the genset.
Alarm blocking GB close	A block alarm is active. Clear the alarm before you try to close the generator breaker.
Alarm blocking SCB close	A block alarm is active. Clear the alarm before you try to close the shore connection breaker.
Alarm blocking SGB close	A block alarm is active. Clear the alarm before you try to close the shaft generator breaker.
Alarm blocking TB close	A block alarm is active. Clear the alarm before you to close the tie breaker.
Already first priority	The controller is already the first priority controller.
Already selected	The command is already received.
Available power too low	The power source cannot be disconnected, because this overloads the busbar.
Blackout start block activated	The *Block blackout start* function is active.
Blackout start block deactivated	The *Block blackout start* function is not active.
Breaker already closed	The breaker is already closed and cannot be closed again.
Breaker already opened	The breaker is already open and cannot be opened again.
BTB block not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
BTB close blocked	The *Block bus tie breaker close* function is active. An open breaker cannot be closed.
BTB close cancelled	The *BTB close* was cancelled by a *BTB open* command.
BTB close not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
BTB close unblocked	The *Block bus tie breaker close* function is not active.
BTB open cancelled	The *BTB open* was cancelled by a *BTB close* command.
BTB open not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
Busbar A voltage/frequency not OK	The bus tie breaker cannot connect to a dead or unknown state busbar. The bus tie breaker will not close until the busbar state is OK and known.
Busbar B voltage/frequency not OK	The bus tie breaker cannot connect to a dead or unknown state busbar. The bus tie breaker will not close until the busbar state is OK and known.
Busbar V/Hz not OK	The shaft generator cannot be connected to a dead or unknown state busbar while it is in power take home mode. The shaft generator breaker will not close until the busbar state is OK and known.
Confirmation	You can use the display unit to confirm an action.
Engine already running	The engine is already running and cannot be started again.
Engine already stopped	The engine has already stopped and cannot be stopped again.
Engine block not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
Engine is stopping	The command is already received. The controller executes the engine stop procedure.

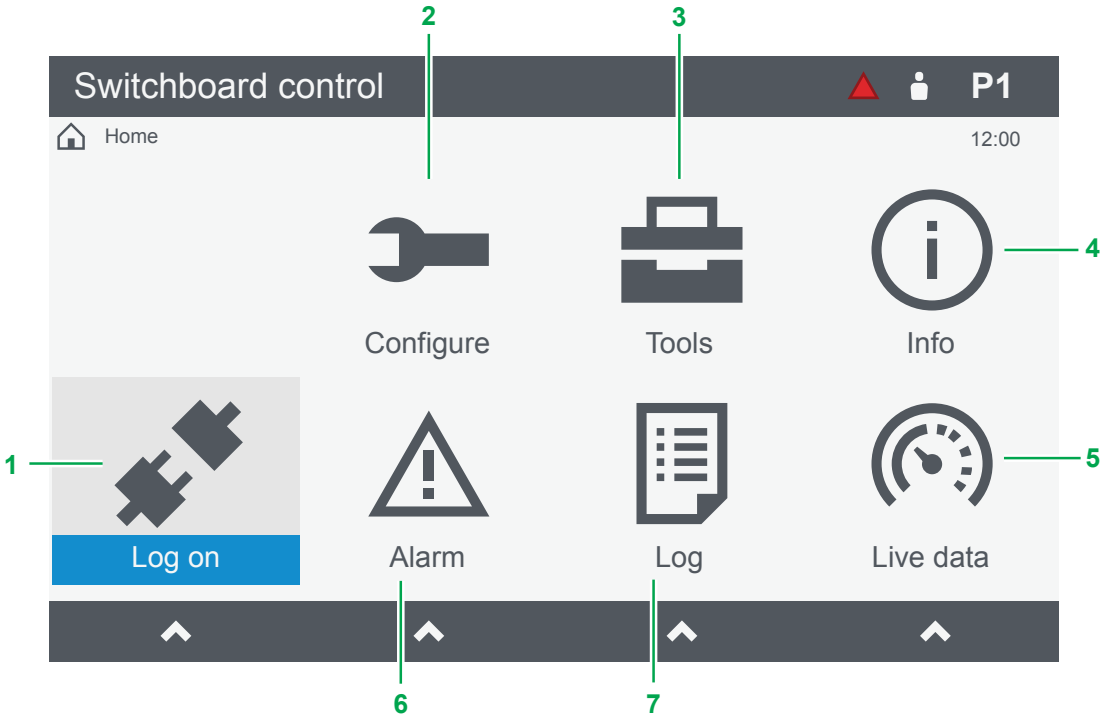
Operator info	Additional information
Engine not ready	The genset cannot start. There might be alarms blocking the ready status.
Engine start and breaker close not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
Engine start blocked	The *Block engine start* function is active. A stopped genset cannot be started.
Engine start not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
Engine start unblocked	The *Block engine start* function is not active.
Engine stop not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
Force all in section to AUTO mode activated	The *Force all controllers in section to AUTO mode* function is active.
Force all in section to SEMI mode activated	The *Force all controllers in section to SEMI mode* function is active.
Force all in section to SWBD control activated	The *Force all controllers in section to SWBD control* function is active.
Force all in section to SWBD control deactivated	The *Force all controllers in section to SWBD mode* function is not active.
GB block not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
GB close blocked	The *Block generator breaker close* function is active. An open breaker cannot be closed.
GB close cancelled	The *GB close* was cancelled by a *GB open* command.
GB close not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
GB close unblocked	The *Block generator breaker close* function is not active.
GB is closed	The *Generator breaker* is closed.
GB is de-loading	The *Generator breaker* is currently de-loading.
GB is open	The *Generator breaker* is open.
GB is synchronising	The *Generator breaker* is synchronising.
GB open and stop not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
GB open cancelled	The *GB open* was cancelled by a *GB close* command.
GB open not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
Genset starting - SG f [Hz]	The PMS starts the first priority genset, due to a shaft generator frequency variation.
Genset synchronising - SG f [Hz]	The PMS synchronises gensets to connect and take over the load, due to a shaft generator frequency variation.
Harbour operation activated	Harbour operation is activated.
Harbour operation deactivated	Harbour operation is deactivated.
Harbour operation not possible in SWBD	Harbour operation is not possible when the EMERGENCY genset controller is under switchboard control.
Harbour operation requested	The *Harbour operation* digital input function is activated. You can use the display unit to allow or reject harbour operation.
Lamp test active	The display unit lamp test is active. You can use the display unit to stop the lamp test.
Load-dependent stop block activated	The *Block load-dependent stop* function is active.

Operator info	Additional information
Load-dependent stop block deactivated	The *Block load-dependent stop* function is not active.
Load on busbar too high	The section cannot change to DG supply, or stay on SG/SC supply, because the load on the busbar is too high for the selected supply.
Load on SC too high (Ship-to-ship)	The shore connection breaker does not open because the load consumed by the receiving ship is too high.
Load on SG too high (PTH)	The shaft generator breaker does not open because the load to drive the propeller is too high.
Mode change locked	It is not possible to change to SEMI or AUTO mode while the controller is under switchboard control.
No genset ready to start	There is no genset in AUTO and Ready for operation to take over the load after the breaker is opened.
Not in SEMI mode	The action cannot be performed unless the controller is in SEMI mode.
Not possible as stand-alone EDG	Harbour operation is not possible for a stand-alone EDG.
Only one genset connected	There is only one genset connected to the busbar. Opening the generator breaker will cause a blackout.
Pitch not zero	The shaft generator breaker cannot open because the *Zero pitch* parameter is set but not activated. Activate *Zero pitch* before you try to open the breaker.
Possible to remove latches	There are acknowledged latched alarms in the alarm list that can be reset.
PTH mode activated	The *Power take home* parameter is activated.
PTH mode activates when breaker is opened	The *Power take home* parameter is activated while the shaft generator breaker is closed. Open the shaft generator breaker to start power take home mode.
PTH mode deactivated	The *Power take home* parameter is deactivated.
PTH mode deactivates when breaker is opened	The *Power take home* parameter is deactivated while the shaft generator breaker is closed. Open the shaft generator breaker to stop power take home mode.
SC Overlap power too high	The power currently handled by the overlap breaker is too high for the DG in first priority. The breaker cannot open.
SCB block not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
SCB close blocked	The *Block shore connection breaker close* function is active. An open breaker cannot be closed.
SCB close cancelled	The *SCB close* was cancelled by an *SCB open* command.
SCB close not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
SCB close unblocked	The *Block shore connection breaker close* function is not active.
SCB open cancelled	The *SCB open* was cancelled by an *SCB close* command.
SCB open not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
Section cannot divide	No power source is available for one of the busbar sections after the bus tie breaker opens. Opening the bus tie breaker will cause a blackout on one of the busbars.
Sections cannot synchronise	The bus tie breaker cannot close while two sections about to be connected are powered by a shaft generator and/or shore connection.
Secured mode activated	The *Secured mode* parameter is enabled, and the *Activate secured mode* function is active.
Secured mode deactivated	The *Secured mode* parameter is not enabled, or the *Activate secured mode* function is not active.

Operator info	Additional information
SGB block not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
SGB close blocked	The *Block shaft generator breaker close* function is active. An open breaker cannot be closed.
SGB close cancelled	The *SGB close* was cancelled by an *SGB open* command.
SGB close not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
SGB close unblocked	The *Block shaft generator breaker close* function is not active.
SGB is closed	The *Shaft generator breaker* is closed.
SGB is de-loading	The *Shaft generator breaker* is de-loading.
SGB is open	The *Shaft generator breaker* is open.
SGB is synchronising	The *Shaft generator breaker* is synchronising.
SGB open cancelled	The *SGB open* was cancelled by an *SGB close* command.
SGB open not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
SG fixed speed activated	The shaft generator *Fixed speed* parameter is configured and enabled.
SG fixed speed deactivated	The shaft generator *Fixed speed* parameter is configured, but not enabled. The shaft generator breaker does not close until it is enabled. Or the *Fixed speed* parameter is disabled.
SG fixed speed not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
SG genset start request	The PMS is starting the first priority genset, due to a shaft generator frequency variation.
SG connect genset(s) request	The PMS is synchronising gensets to connect and take over the load, due to a shaft generator frequency variation.
Start enable not activated	The genset cannot start, because *Start enable* is not activated.
Synchronisation cancelled	The controller has cancelled the synchronisation (for example, if there is a blackout during synchronisation)
TB block not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
TB cannot open, GB is open.	The emergency genset supplies power to the emergency busbar. Opening the tie breaker with the generator breaker open will cause a blackout.
TB close blocked	The *Block tie breaker close* function is active. An open breaker cannot be closed.
TB close cancelled	The *TB close* was cancelled by a *TB open* command.
TB close not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
TB close unblocked	The *Block tie breaker close* function is not active.
TB open cancelled	The *TB open* was cancelled by a *TB close* command.
TB open not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.
Zero pitch activated	The *Zero pitch* function is active.
Zero pitch deactivated	The *Zero pitch* function is not active.
Zero pitch not possible in SWBD	Under switchboard control, operator actions cannot be performed from the controller interfaces.

4. Home

4.1 Home page

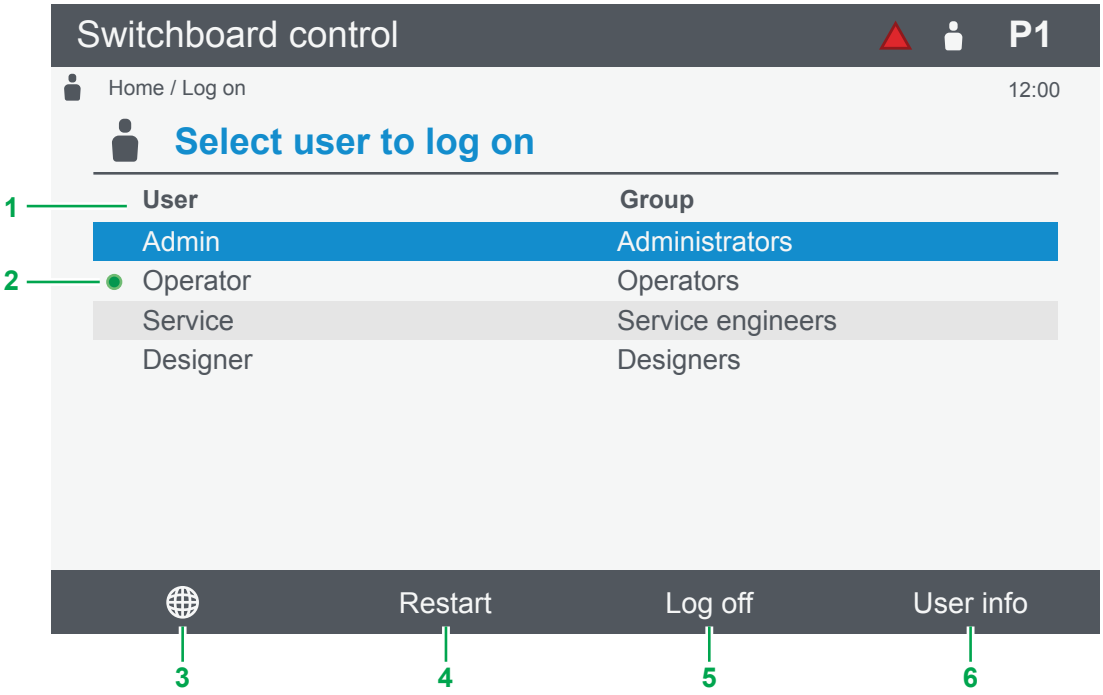


No.	Item	Notes
1	Log on page	**Log on**: Log on as a user or change the logged on user.
2	Configure menu	**Configure**: Select to go to the configure menu.
3	Tools menu	**Tools**: Select to go to the tools menu.
4	Info menu	**Info**: Select to go to the information menu.
5	Live data page	**Live data**: Shows live information from the system.
6	Alarms page	**Alarms**: Shows action alarms present in the system.
7	Log page	**Log**: Shows a list of events recorded during operation.

NOTE Pages and menus can be restricted by group and user permissions.

5. Log on

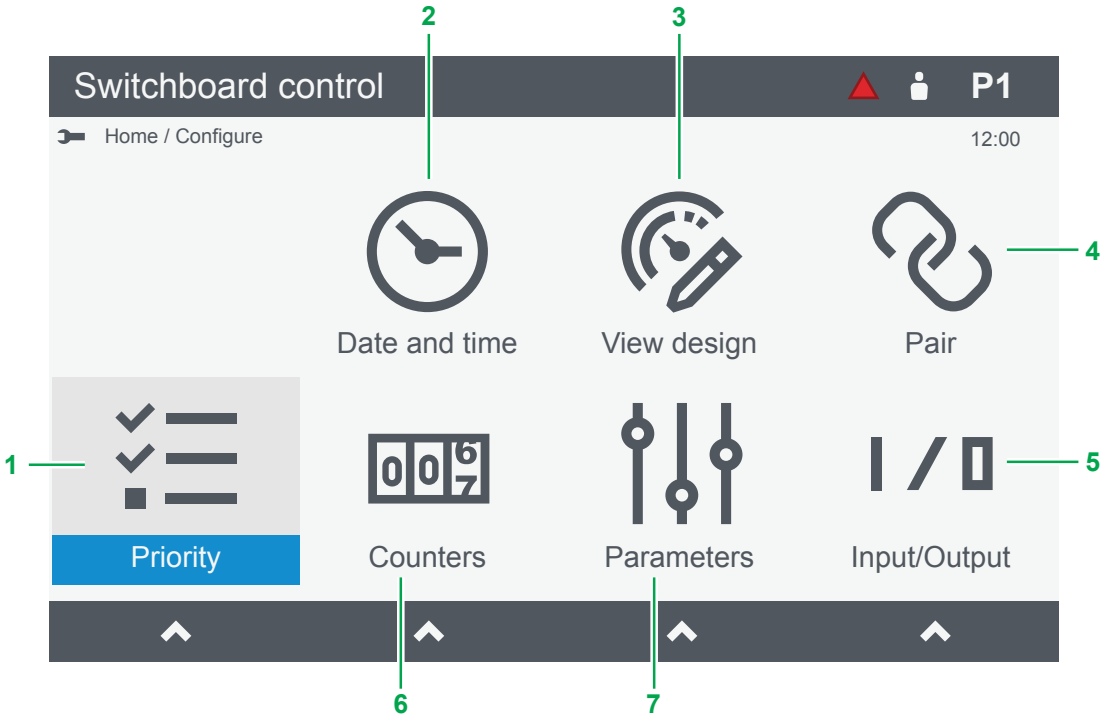
5.1 Log on page



No.	Item	Notes
1	User list	Shows a list of available users on the controller.
2	Logged on user	: Shows the user is currently logged on.
3	Language page	**Language**: Select to go to the language page. This feature is only available if both the controller and the display unit have the necessary language software installed.
4	Restart	**Restart** the display unit.
5	Log off	**Log off** the logged on user and changes to the home page. A user is automatically logged off after 3 minutes of inactivity.
6	User info	**User info**: Shows further information for the selected user.

6. Configure

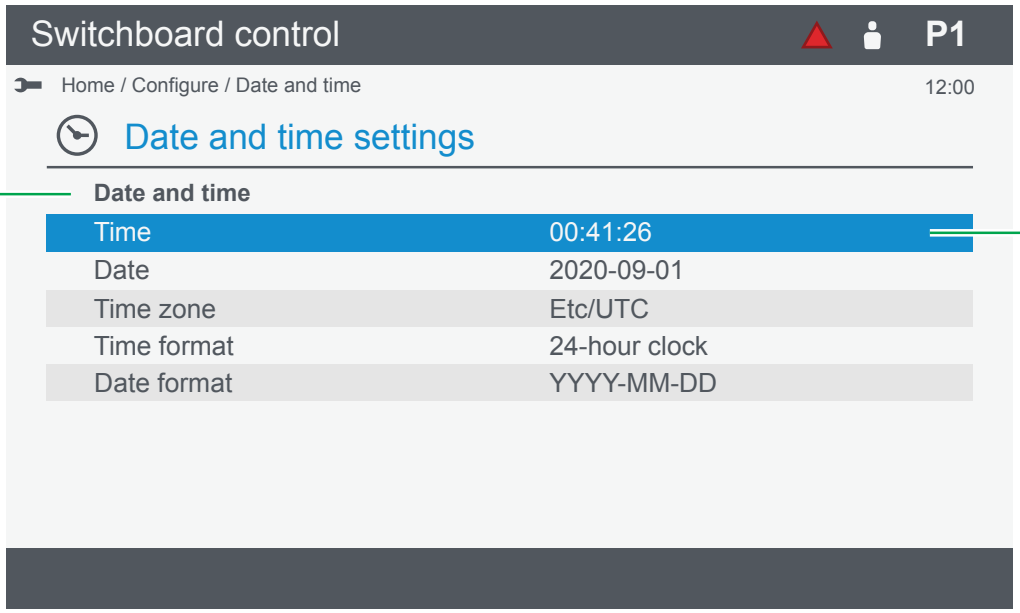
6.1 Configure page



No.	Item	Notes
1	Priority page	**Priority**: Changes the priority of any controller in the system.
2	Date and time page	**Date and time**: Configures the date and time settings.
3	View design page	**View design**: Configures the views shown on the Live data page.
4	Pair page	**Pair**: Changes the controller connected to this display.
5	Input/Output page	**Input/Output**: Configures the hardware modules functions and alarms.
6	Counters page	**Counters**: Configures, views, or resets the counters in the system.
7	Parameters page	**Parameters**: Configures controller settings and alarms.

6.2 Date and time page

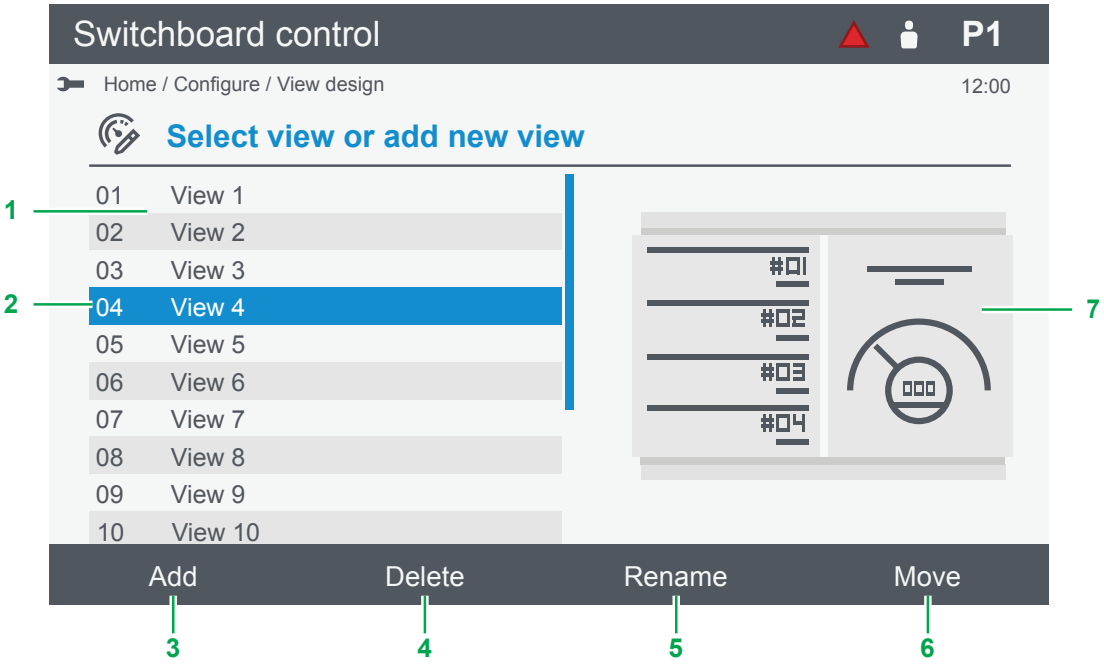
Date and time settings cannot be changed if a network time server (NTP) is configured.



No.	Item	Notes
1	Date and time settings	Shows date, time, time zone, time format, and date format settings. The screen only updates when it is reloaded or the selection is moved.
2	Selected setting	Select OK **OK** to configure the selected setting (requires the correct permissions).

Daylight savings are automatically applied to a selected time zone. Etc/UTC does not apply daylight savings.

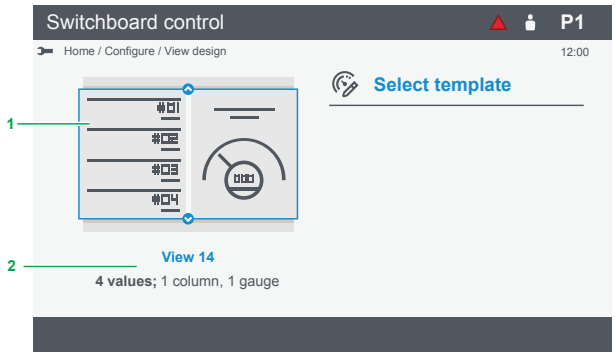
6.3 View design page

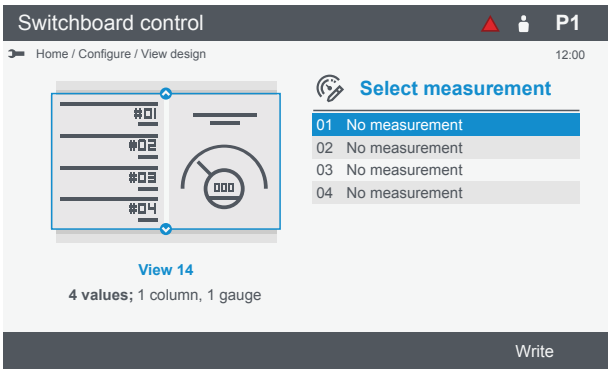


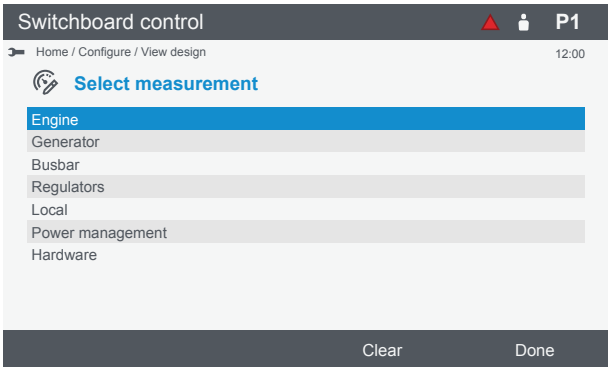
No.	Item	Notes
1	List of views	A list of the views shown on the Live data page for the paired controller.
2	Selected view	Select OK **OK** to configure the selected view.
3	Add	Adds a new view based on a template and configured with measurements.
4	Delete	Deletes the selected view after confirmation.
5	Rename	Renames the selected view. To restore the default name: Delete all characters and write to the controller.
6	Move	Select and move a view in the list.
7	View outline	Shows the selected type of view.

6.3.1 Add or configure a view

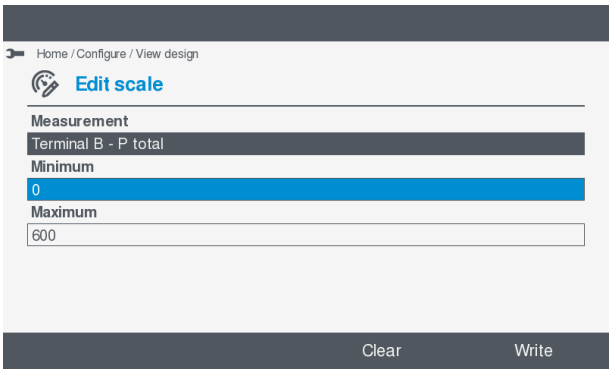
Add a view

1. Select **Add**.
2. Select the template:
   - Summary information is shown under the preview:
   - 

3. Select OK **OK** to display the measurements:
   - 

4. Select a measurement to configure.
   - 

   - Select **Clear** to remove the selected measurement.
   - Select **Done** to confirm the measurement selected.
5. Add further measurements as needed.
6. Select Scale to configure the displayed range if needed.

- 

7. Select **Write** to add the view.

Delete a view

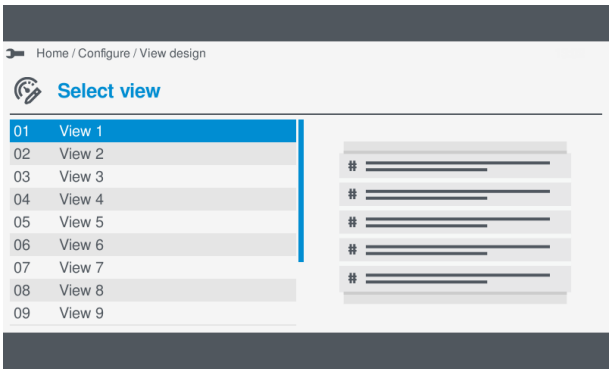
1. Highlight the view to delete.
2. Select **Delete**.
3. Confirm deletion of the view.

Rename view

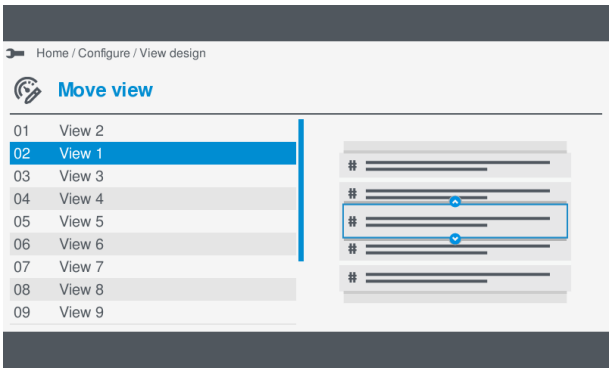
1. Highlight the view to rename.
2. Select **Rename**.
3. Rename the view as required.
4. Select **Write** to update the view.

Move view

1. Select **Move**.

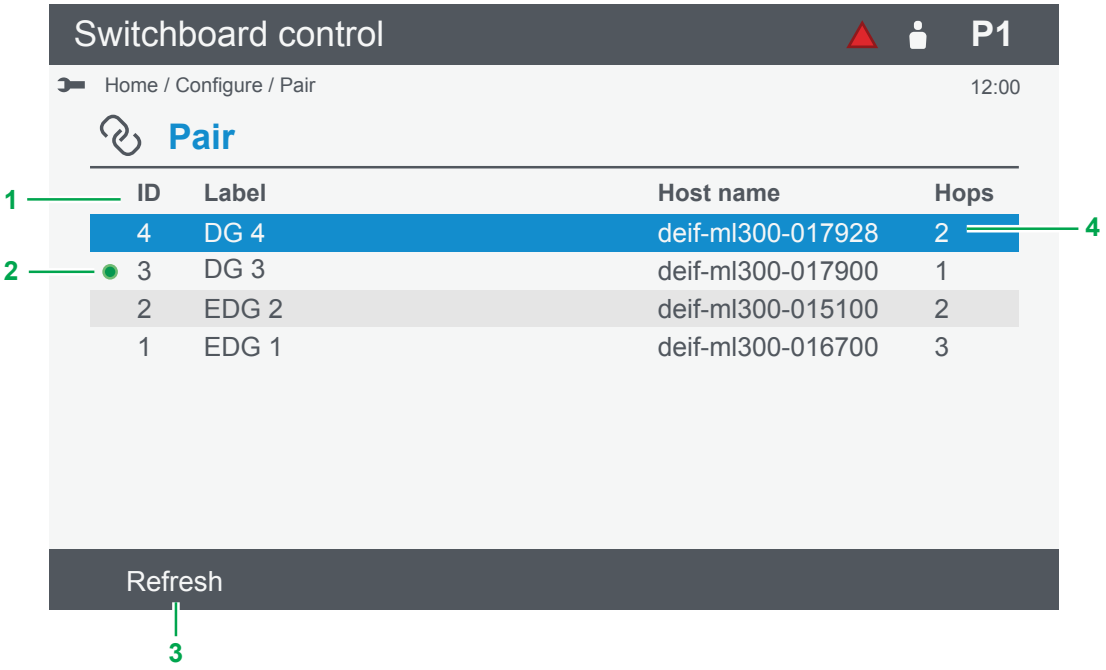
- 

2. Highlight the view to move.
3. Select the view.
4. Move the view up or down.

- 

5. Confirm the new position with OK **OK**.
6. Select **Write** to confirm.

6.4 Pair page



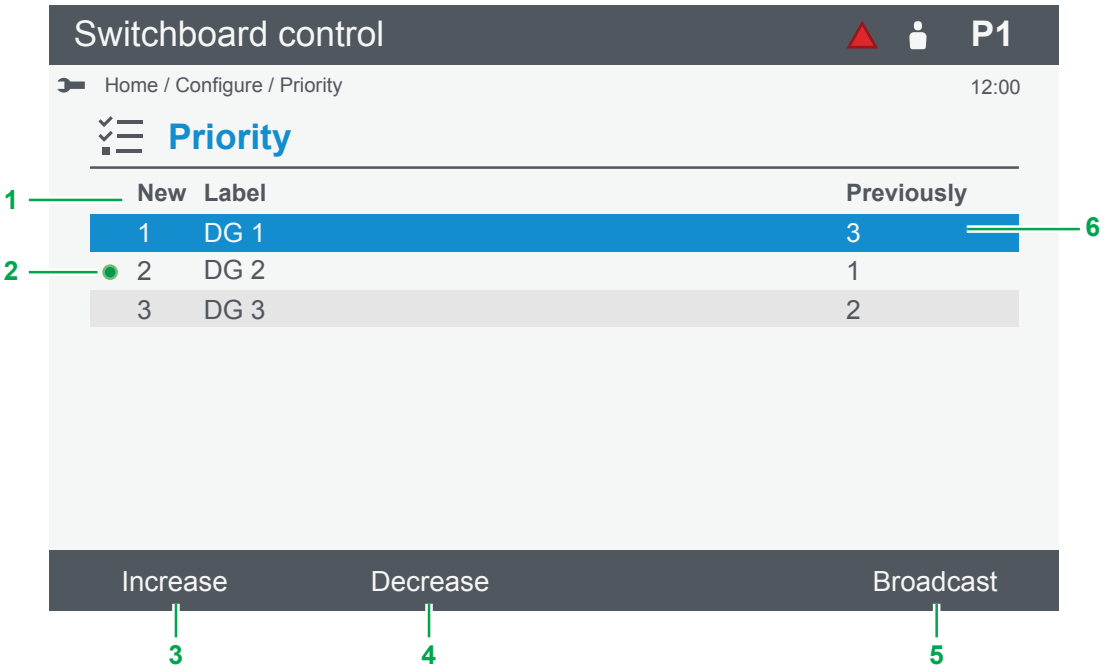
No.	Item	Notes
1	List of available controllers	Shows the list of available controllers you can connect.
		Select OK **OK** to pair to the controller.
2	Connected controller	: Shows the controller currently connected.
3	Refresh	Refresh the list of controllers.
4	Hops	Number of hops (between controllers) from the display. 1 hop: The controller is connected directly to the display.

6.5 Priority page

View the priorities for all the gensets in the system, not just the GENSET controllers. The genset priorities apply to the whole system, not just a section.

The EMERGENCY genset controller is not included in the priority list:

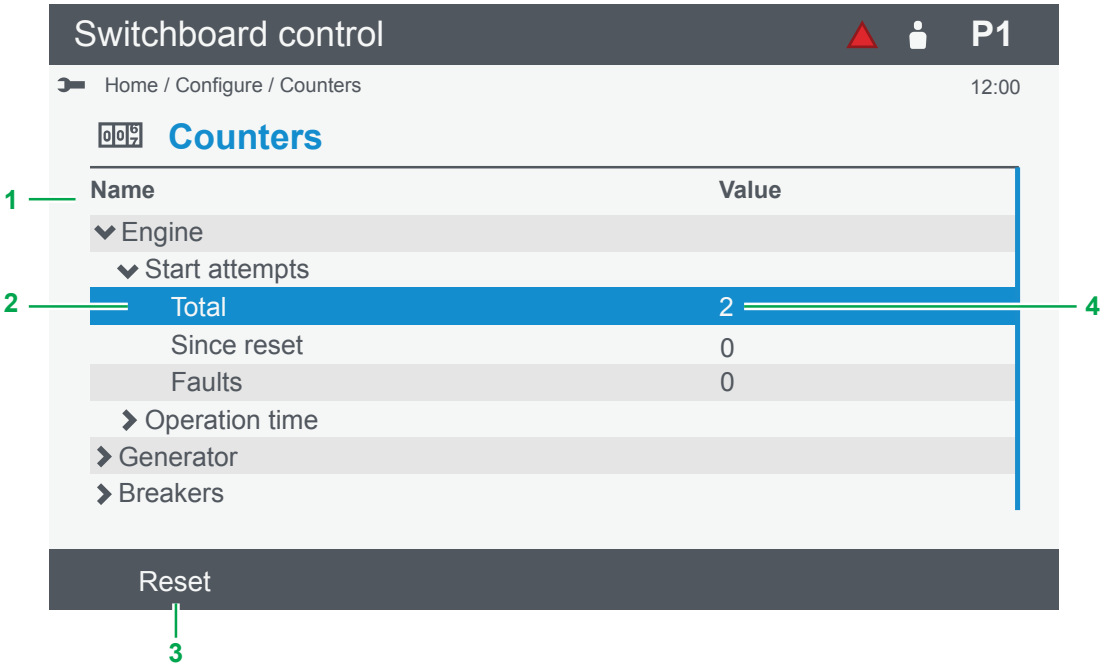
- Normal operation: The emergency genset is not part of the genset priority list.
- Harbour operation: The emergency genset always has first priority.



No.	Item	Notes
1	Priority list	Shows the list of available controllers you can connect.
2	Connected controller	● : Shows the controller currently connected.
3	Increase *	Increases the selected gensets priority.
4	Decrease *	Decreases the selected gensets priority.
5	Broadcast *	Save and broadcast the priority changes to all the GENSET controllers.
6	Previously	The controller priority before starting to edit the priorities on this page.

NOTE * Increase, Decrease, or Broadcast are only available if the genset priority parameter is Manual or Delayed priority shift.

6.6 Counters page

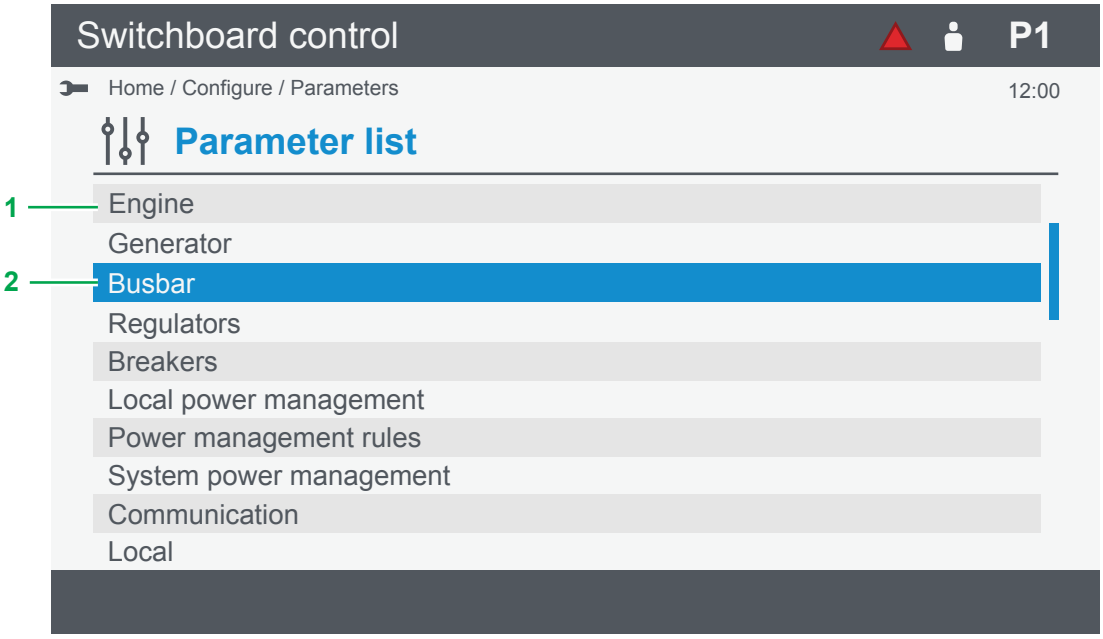


No.	Item	Notes
1	Counters list	Shows the list groups and counters.
2	Highlighted counter	Shows the highlighted counter to view, edit, or reset.
		Select OK **OK** to edit the counter value.
3	Reset	Resets the counter value to 0 (zero).
4	Counter value	Shows the counter value.

6.7 Parameters

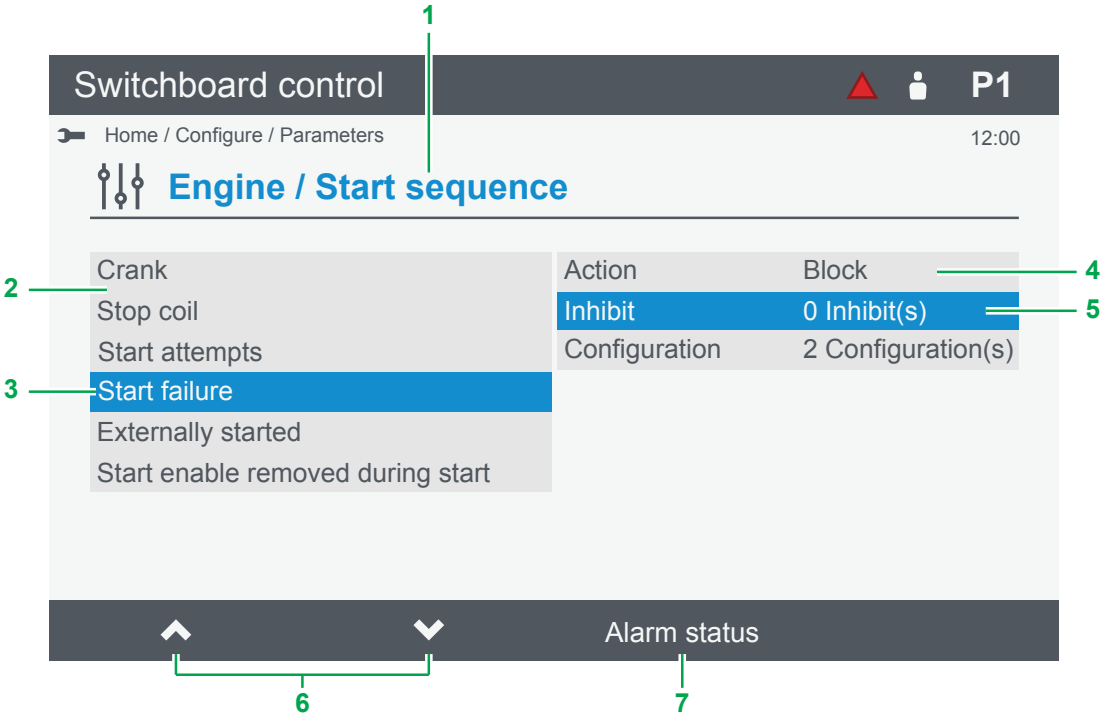
6.7.1 Parameters list page

Parameter settings are organised in groups and sub-groups. Open a group or sub-group to select a parameter to configure.



No.	Item	Notes
1	Parameter list	Shows a list of groups and sub-groups.
2	Selected group or parameter	Select OK **OK** to open the group or select the parameter.

6.7.2 Parameters page



No.	Item	Notes	
1	Parameter group	Shows the path of the parameter setting.	
2	Parameters	Shows a list of the parameters for the selected group.	
3	Selected parameter	Selected parameter shows parameter settings on the right.	
4	Parameter settings	Shows a list of the parameter settings under the selected parameter.	
5	Selected parameter setting	Select OK **OK** to edit the setting.	
6	Parameter selection	**Up**: move parameter selection up.	**Down**: move parameter selection down.
7	Alarm status	Shows information about the alarm, state, and counter.	

6.7.3 Configure a curve

Curves can only be configured if the curve function is assigned in the input/output configuration. When a curve function is assigned, the parameter is shown in the parameter list.

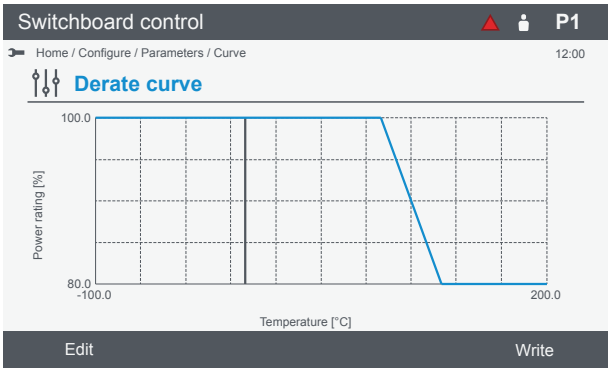
Example

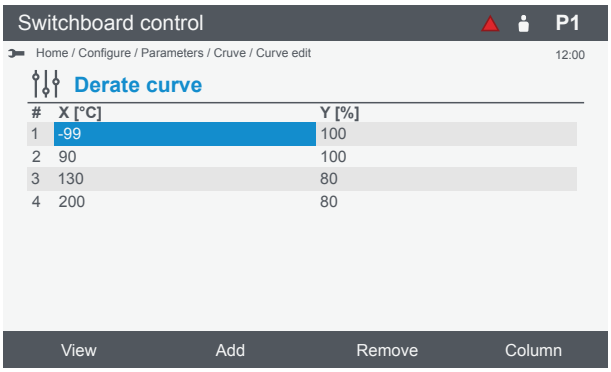
Function assigned to an analogue input (AI):

```
Engine > Power derate > Temperature > Derate 1 temperature
```

Parameter now available under:

```
Engine > Power derate > Temperature > Derate 1
```

1. Select Setup from the parameter page.
   - The curve is shown:
   - 

2. Select Edit to configure the curve settings:
   - 

3. Configure the curve settings:
   - View to display the curve or write the settings.
   - Add a new empty set of coordinates (X,Y), max. 10 sets per curve.
   - Remove a set of coordinates, min. of four sets is required.
   - Column to change between X or Y settings.
   - Select OK **OK** to edit the value.
4. Select View and then Write to save the curve settings.

6.8 Input/output

6.8.1 About input/output

The controller inputs and outputs are configurable but depend on the single-line diagram, parameters, functions and alarms. You can configure digital or analogue inputs and outputs, custom alarms, and use functions.

More information
See the **Data sheet**, or **Hardware characteristics and configuration** in the **Designer's handbook** for more information about the hardware modules and terminals.

Input/output restrictions

Digital input (DI)	
Functions allowed	One or more different functions on same input terminal.
Restrictions	• You cannot use a function already assigned to another digital input (DI). • You cannot use a function assigned and used in CustomLogic.

Digital output (DO)	
Functions allowed	One function on the same terminal.
Restrictions	• Only one function or multiple alarms are allowed to be configured. • You cannot use a function assigned and used in CustomLogic.
Notes	The same function can be assigned to other digital output (DO) terminals.

Analogue input (AI)	
Functions allowed	One or more different functions on the same input terminal.
Restrictions	• Functions must use the same unit of measure. • You cannot use a function already assigned to another analogue input (AI). • The selected functions type can be Analogue input functions (**Analogue functions** or Digital input functions (**Supervised binary input**). • You cannot use both analogue and digital functions on the same terminal.

Analogue output (AO)	
Functions allowed	One function on the same input terminal.
Restrictions	The function must be selected before the Output setup is configured.
Notes	The same function can be assigned to other analogue output (AO) terminals.

Pulse width modulation (PWM)	
Functions allowed	One function on the same input terminal.
Restrictions	The function must be selected before the Output setup is configured.
Notes	The same function can be assigned to other Pulse width modulation (PWM) terminals.

About Analogue inputs

You can use an analogue input:

- As an input for one or more controller **analogue functions**.
- As a supervised input for one or more controller **digital functions**.
- To detect **sensor failure**.
- As the basis for one or more **alarms**.

For each analogue input use, the table below shows which **pages** in the analogue input view you must configure.

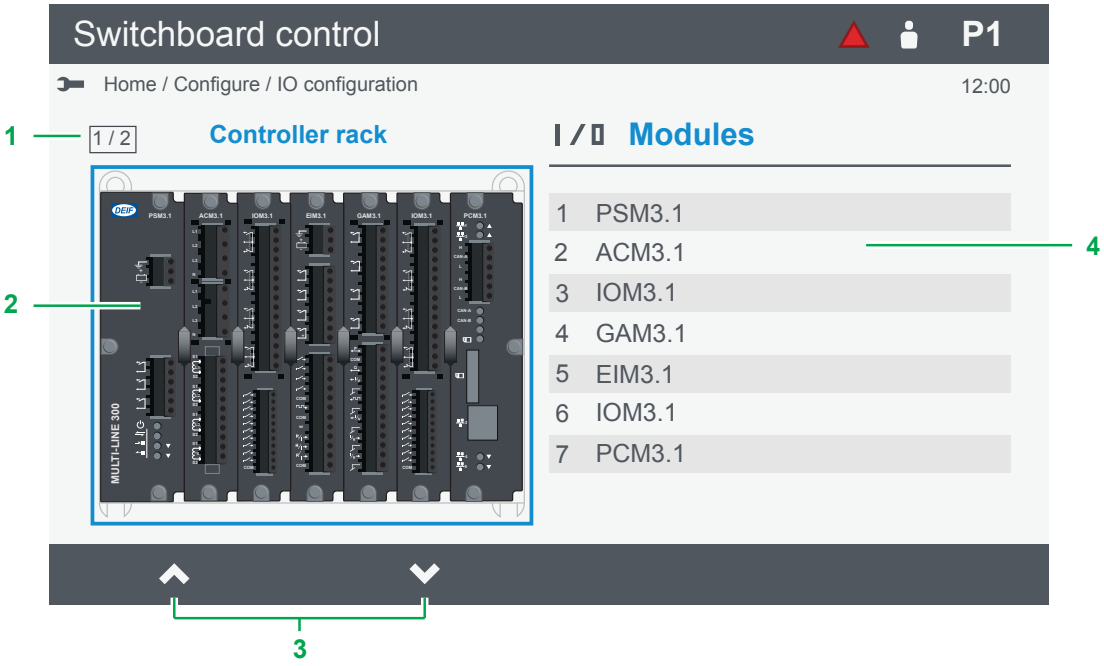
Table 6.1 Configuration for the uses of an analogue input

Use	Functions	Sensor setup	Alarms
Analogue functions	Required	Required	Optional
Digital functions	Required	Required	Optional
Sensor failure	Optional	Required	Optional
Alarms	Optional	Required	Required

More information
See the **Designer's handbook** for more information on specific functions and hardware characteristics.

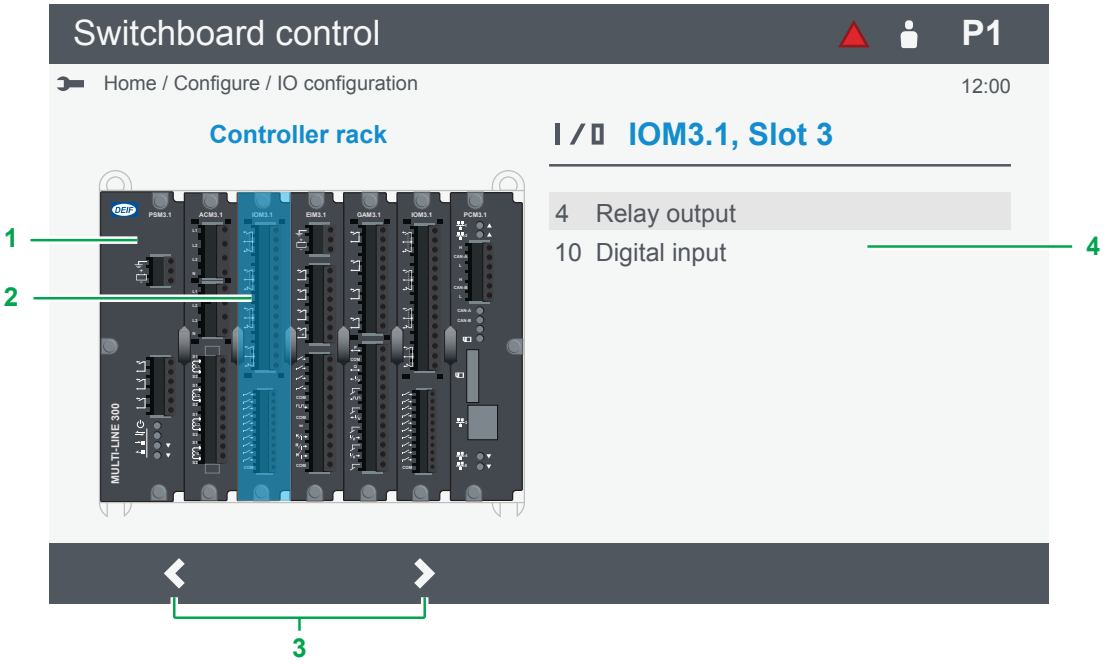
6.8.2 Rack or ECU selection page

The selection is only shown if the system has extension racks or an ECU configured.



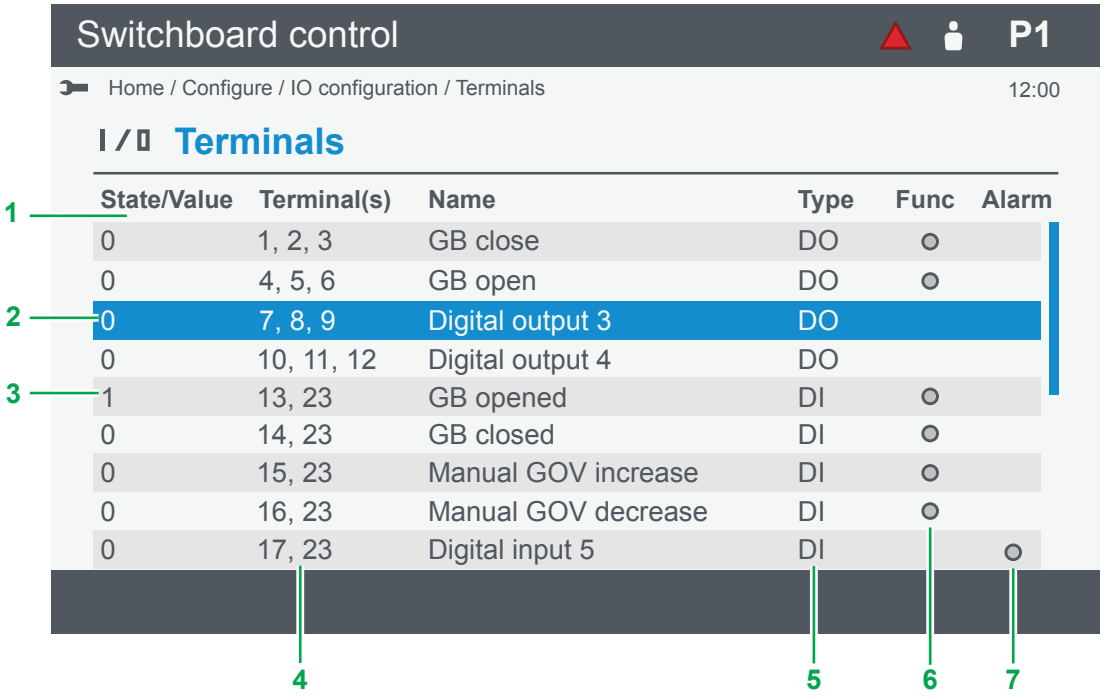
No.	Item	Notes	
1	Rack number	Shows the selected rack number.	
2	Rack or ECU	Shows the selected rack or ECU.	
		Select OK **OK** to confirm the selection.	
3	Rack or ECU selection	**Up**: move selection up.	**Down**: move selection down.
4	I/O modules	Shows the I/O modules installed in the selected rack or the ECU image.	

6.8.3 Module selection page



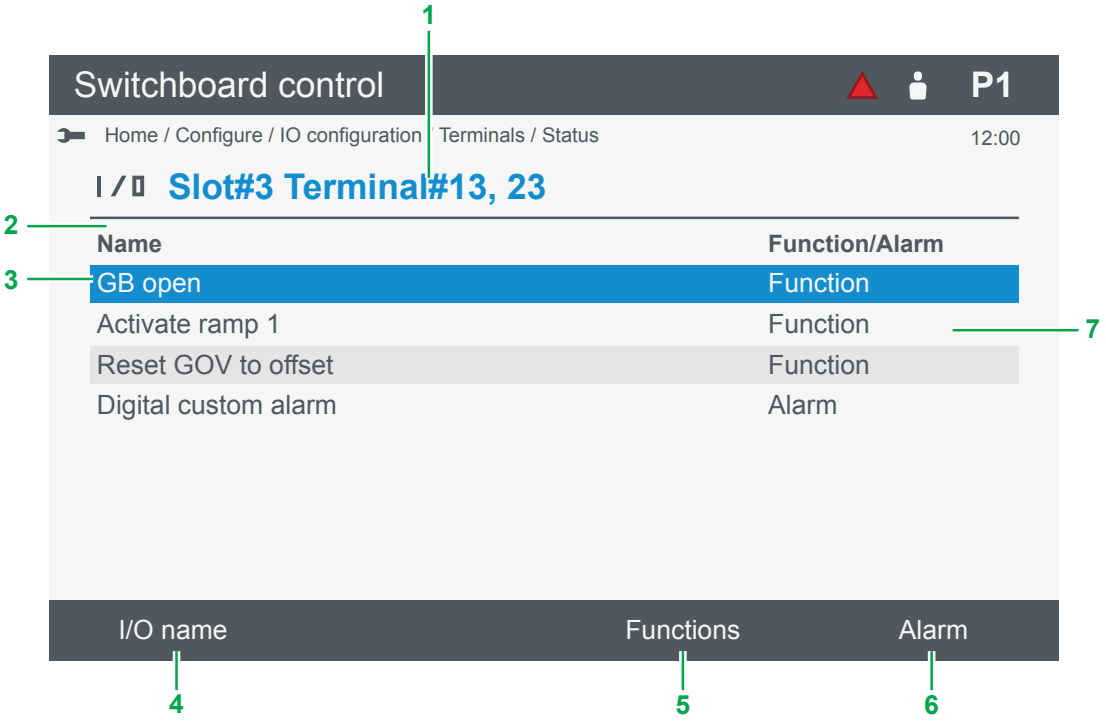
No.	Item	Notes	
1	Rack	Shows the selected rack.	
2	Selected module	Shows the selected module.	
		Select OK **OK** to configure the terminals.	
3	Module selection	**Left**: move module selection left.	**Right**: move module selection right.
4	Terminals	Shows the available terminals in the selected module.	

6.8.4 Terminal selection page



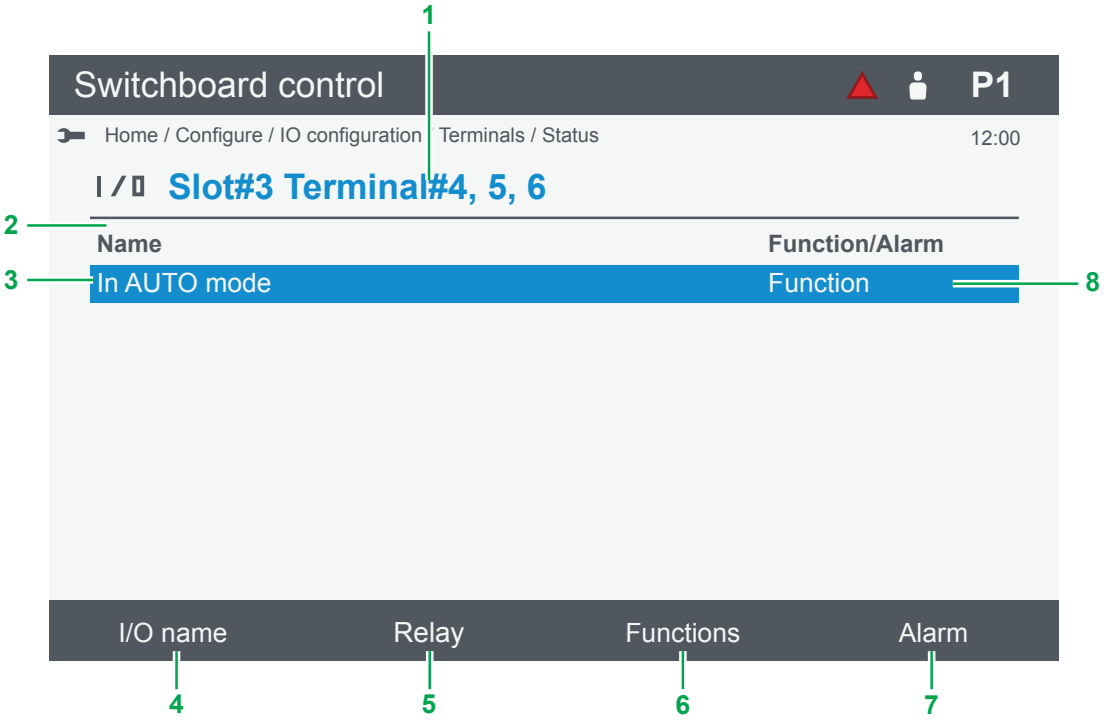
No.	Item	Notes	
1	List of terminals	Shows the terminals for the selected module.	
2	Selected terminal	Shows the terminal selected.	
		Select OK **OK** to configure the terminal.	
3	Terminal state	Shows the state or value for the terminal.	
4	Terminal numbers	Shows the terminal numbers for the connector.	
5	Type	Shows the type of terminal.	
		DI: Digital input	DO: Digital output
		AI: Analogue input	AO: Analogue input
		PWM: Pulse width modulation	
6	Function	○ : Shows there is 1 or more functions assigned.	
7	Alarm	○ : Shows there is 1 or more alarms assigned.	

6.8.5 Digital input (DI) page



No.	Item	Notes
1	Module and terminal selected	Shows the slot number and terminal numbers.
2	Function or alarm list	Shows a list of all configured functions or alarms on this terminal.
3	Selected function or alarm	Select OK **OK** to configure existing setting.
4	I/O name	Views or configures the terminal name.
5	Functions	Views or configures the functions on this terminal.
6	Alarm	Views or configures the alarms on this terminal.
7	Function or alarm	Shows if it is a function or an alarm configured.

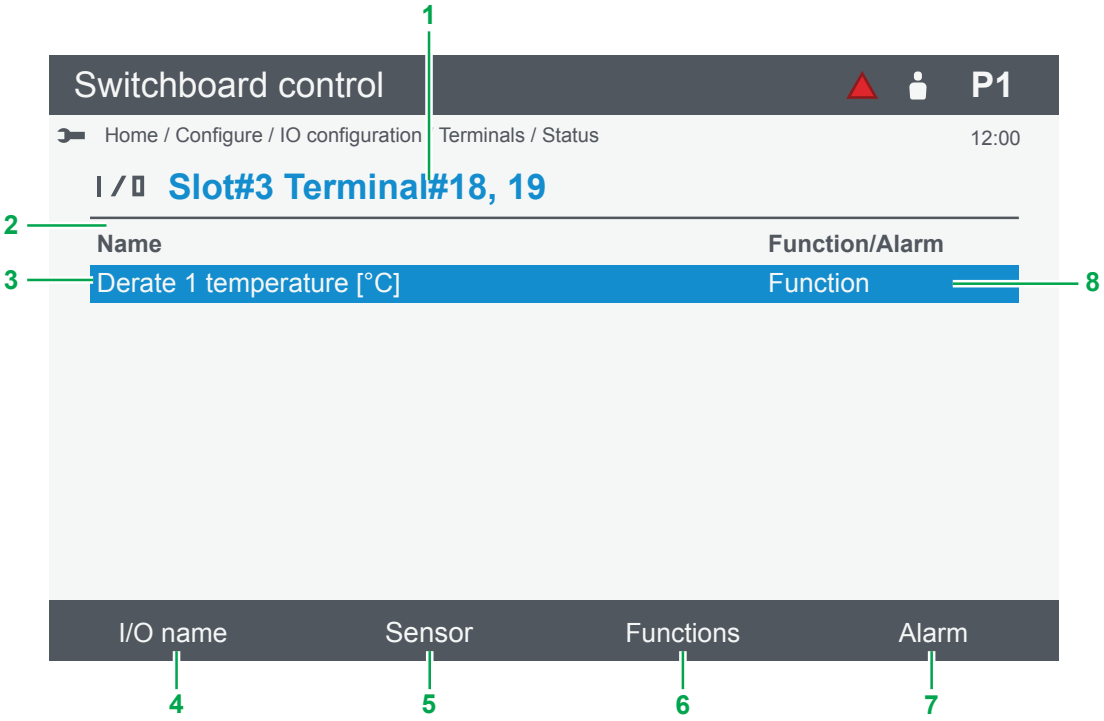
6.8.6 Digital output (DO) page



No.	Item	Notes
1	Module and terminal selected	Shows the slot number and terminal numbers.
2	Function or alarm list *	Shows a list of configured function or alarms on this terminal.
3	Selected function or alarm	Select OK **OK** to configure existing setting.
4	I/O name	Views or configures the terminal name.
5	Relay	Views or configures the relay setting.
6	Functions	View or configure a function on this terminal.
7	Alarm	Views or configures the alarms on this terminal.
8	Function or alarm	Shows if it is a function or an alarm configured.

NOTE * A digital output can only have a function or alarms. You can not configure both a function and alarms on the same terminal.

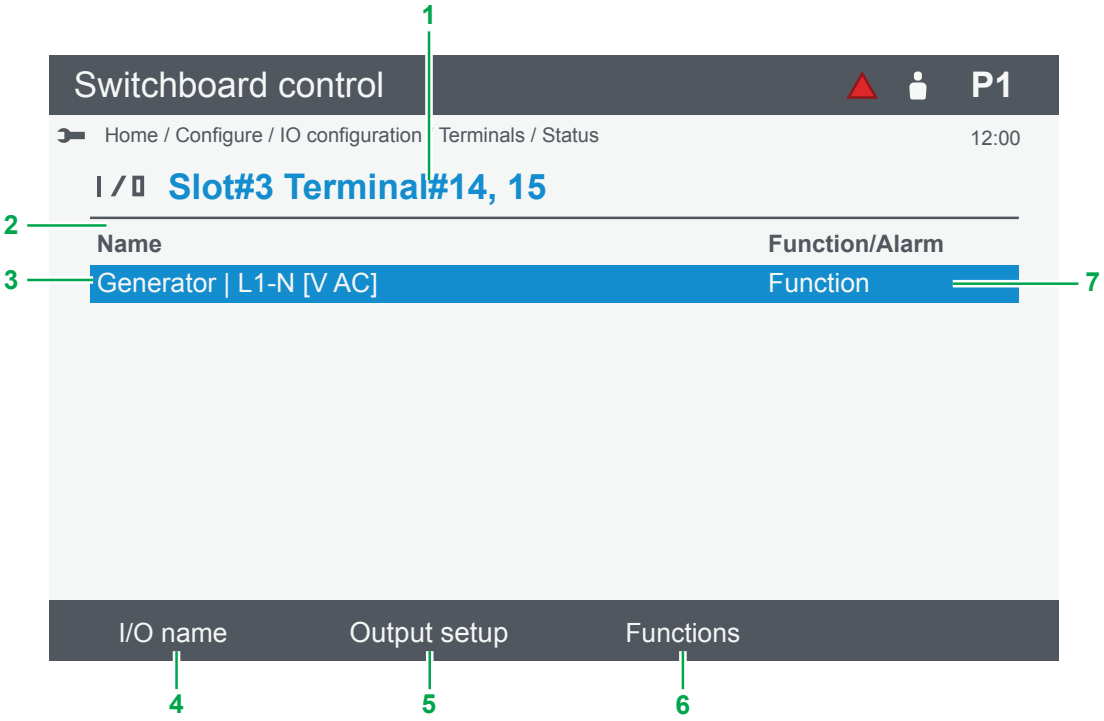
6.8.7 Analogue input (AI) page



No.	Item	Notes
1	Module and terminal selected	Shows the slot number and terminal numbers.
2	Functions or alarms list	Shows a list of all configured functions or alarms on this terminal.
3	Selected function or alarm	Select OK **OK** to configure existing setting.
4	I/O name	Views or configures the terminal name.
5	Sensor *	Views or configures the sensor settings.
6	Functions	Views or configures the functions on this terminal.
7	Alarm	Views or configures the alarms on this terminal.
8	Function or alarm	Shows if it is a function or an alarm configured.

NOTE * Configure any required functions before configuring the sensor settings.

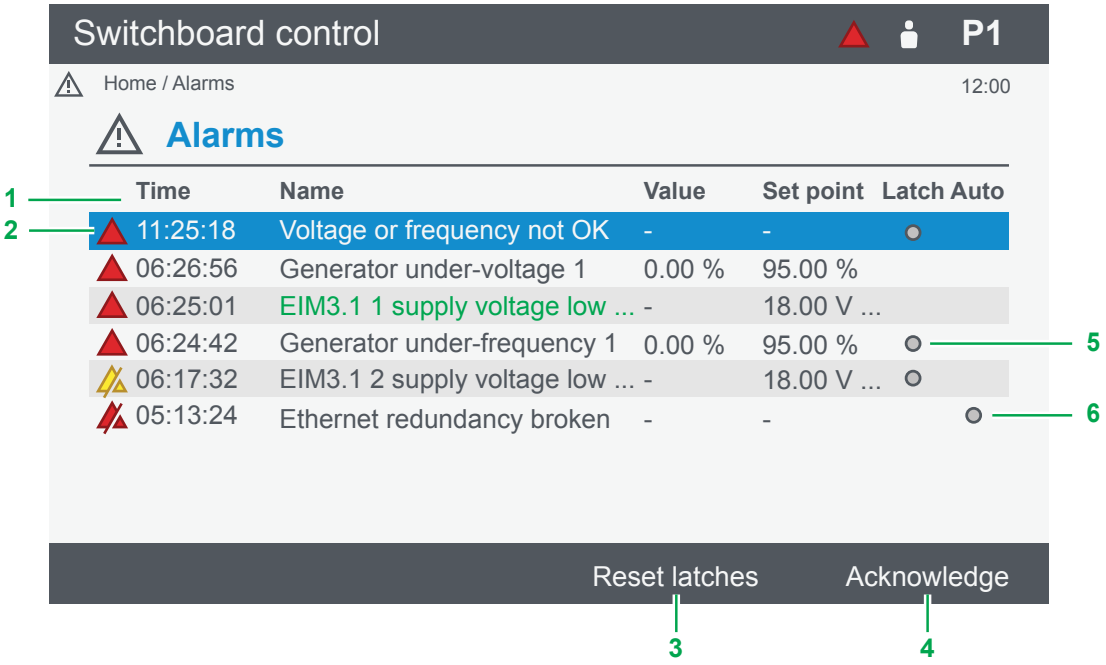
6.8.8 Analogue output (AO or PWM) page



No.	Item	Notes
1	Module and terminal selected	Shows the slot number and terminal numbers.
2	Function list	Shows a list of all configured functions on this terminal.
3	Selected function	Select OK **OK** to configure existing setting.
4	I/O name	Views or configures the terminal name.
5	Output setup	Views or configures the output setup.
6	Functions	Views or configures the functions on this terminal.
7	Function	Shows if a function is configured.

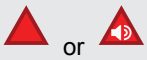
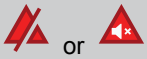
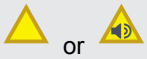
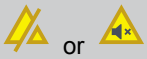
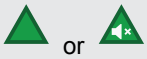
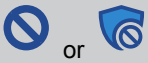
7. Alarms

7.1 Alarms page



No.	Item	Notes
1	List of alarms	Alarm state is shown by the symbol. Test alarms are shown in green.
2	Selected alarm	Select OK **OK** to show further information about the alarm or use the service options. If enabled you can view the Tag value for the alarm.
3	Reset latches	Resets all cleared alarm latches (requires the alarm is acknowledged and the alarm condition has cleared)
4	Acknowledge	Acknowledges an unacknowledged alarm. Acknowledging an alarm does not stop the alarm action (protection) if the alarm condition remains active or the alarm has a latch enabled.
5	Latch	○ : Shows the alarm has a latch enabled. .
6	Auto	○ : Shows the alarm has automatic acknowledge enabled.

7.1.1 Alarm state

Symbol	Alarm condition*	Alarm action**	Acknowledge	Notes
	Active	Active	Unacknowledged	• An alarm condition occurred. • An alarm action is active. • An alarm requires acknowledgement. • An alarm requires action to clear the alarm condition.
	Active	Active	Acknowledged	• An alarm condition occurred. • An alarm action is active. • An alarm is acknowledged. • An alarm requires action to clear the alarm condition.
	Inactive	Active	Unacknowledged	• An alarm condition has cleared. • An alarm action is active. • An alarm requires acknowledgement. • An alarm latch requires reset.
	Inactive	Active	Acknowledged	• An alarm condition has cleared. • An alarm action is active. • An alarm is acknowledged. • An alarm latch requires reset.
	Inactive	Inactive	Unacknowledged	• An alarm condition occurred, but was cleared. • An alarm action is inactive. • An alarm requires acknowledgement.
	Active or Inactive	Inactive	-	• An alarm is shelved for a period of time. • An alarm returns automatically after the period has expired.
	Active or Inactive	Inactive	-	• An alarm is marked *out of service* for an indefinite period. • An alarm does not return automatically and must be returned to service manually.
	Active or inactive	Inactive	-	An alarm is inhibited to occur.

NOTE * Alarm condition is typically where the Set point is exceeded.
** Alarm action (protection) is the configured action taken to protect the situation. When active, this action occurs in the controller.

More information
See **Alarms** in the **Designer's handbook** for more information about how to handle alarms in the system.

7.1.2 Shelved alarms

When alarms are shelved, they are no longer active. Shelved alarms automatically become unshelved when the shelve period expires. You can also unshelve the alarm manually.

Shelve an alarm

1. Select the alarm.
2. On the details page, select Service.
3. Select Shelve.
4. Select the period to shelve the alarm.
5. The alarm is now shelved for the selected period.

- The alarm is marked as shelved (or) in the alarm list.
- The alarm action (protection) is inactive until the alarm is unshelved.

Unshelve an alarm

1. Select the shelved alarm.
2. On the details page, select Service.
3. Select Unshelve.

7.1.3 Remove from service

Alarms are removed from service are no longer active. The alarm remains out of service until it is returned back to service.

Remove an alarm from service

CAUTION
The alarm action (protection) becomes inactive while the alarm is out of service.

You can only remove certain types of alarms from service.

1. Select the alarm.
2. On the details page, select Service.
3. Select Remove from service.
4. The alarm is now removed from service.
   - The alarm is marked as out of service (or) in the alarm list.

Return an alarm to service

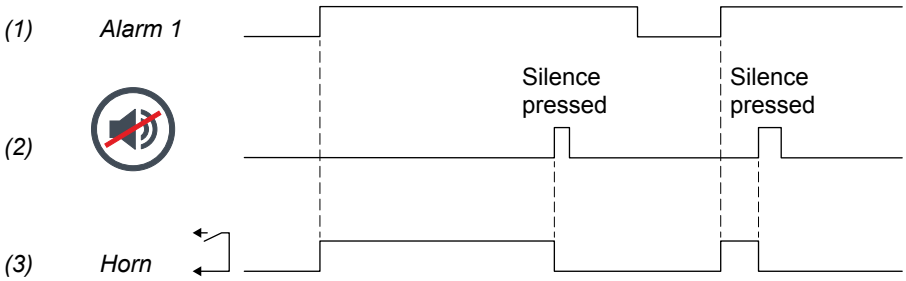
1. Select the alarm.
2. On the details page, select Service.
3. Select Return to service.
4. The alarm is now returned to service.
   - If the alarm condition is still present, the alarm is activated again.

7.1.4 Silence horn

The silence horn button only works if the controller is configured with horn outputs to audible or visual equipment. When an alarm occurs the horn output is activated.

Use the **Silence horn** button to deactivate all horn outputs. The button does not have any other effect on the alarm system. If a new alarm occurs after the button is pressed, the horn output restarts.

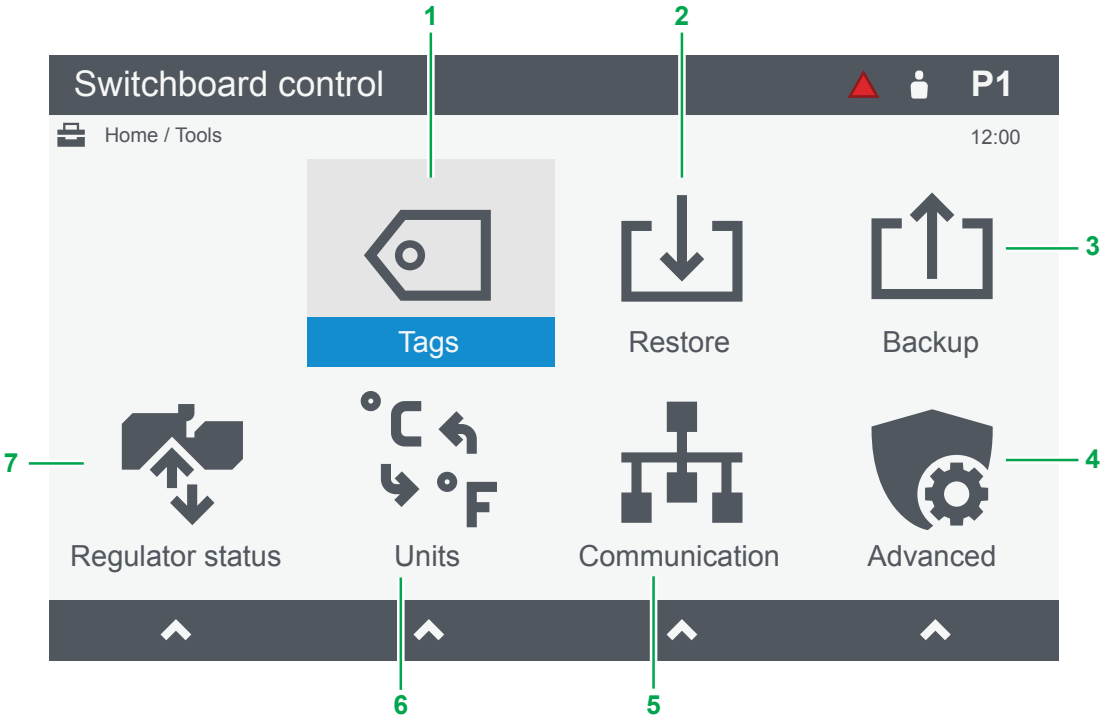
Figure 7.1 Example of the Silence horn button



More information
See **Alarms**, **Horn outputs** in the **Designer's handbook** for more information about these outputs.

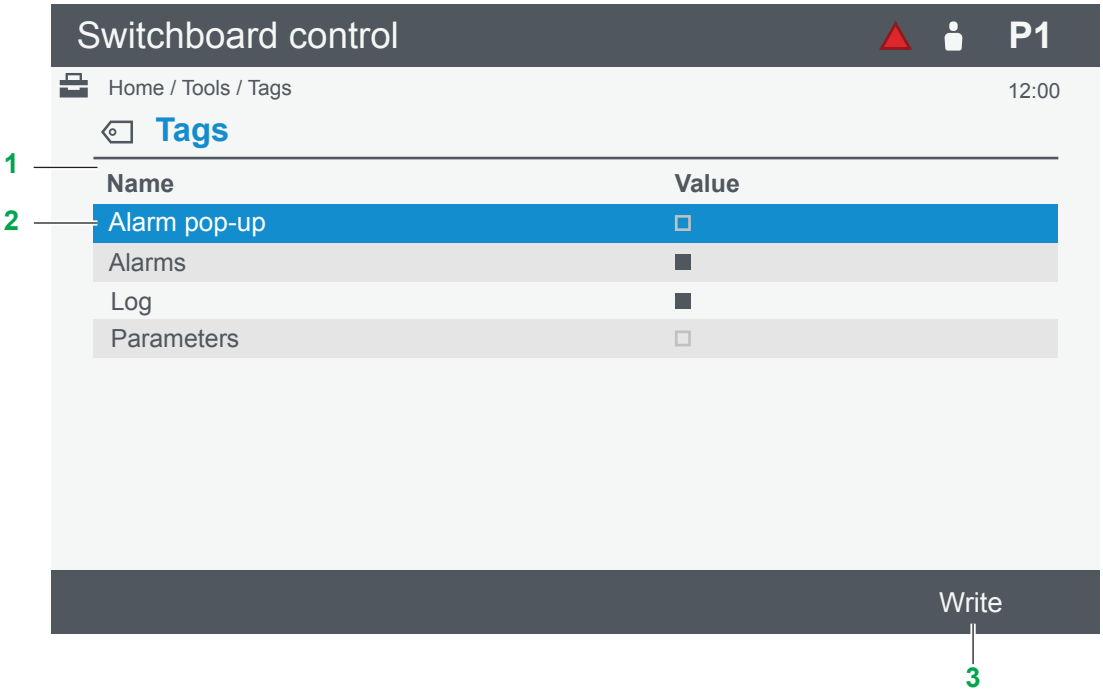
8. Tools

8.1 Tools page



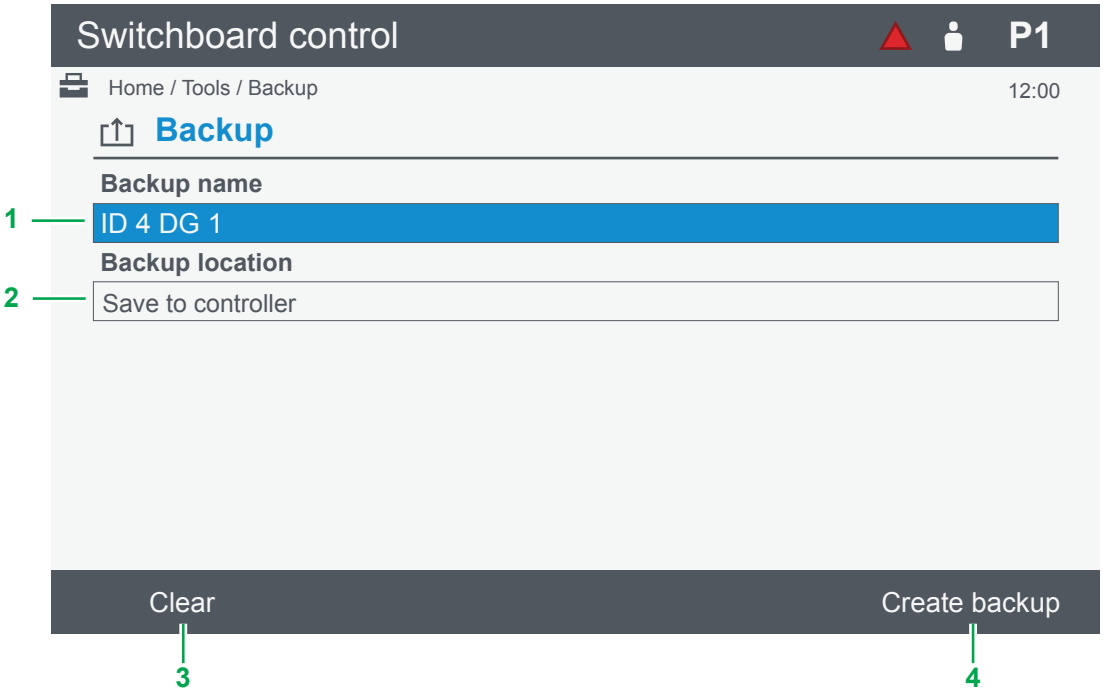
No.	Item	Notes
1	Tags page	**Tags** : Show or hide Tags.
2	Restore page	**Restore** : Restores a backup to the controller.
3	Backup page	**Backup** : Creates a backup of the controller.
4	Advanced menu	**Advanced** : Select to go to the Advanced menu.
5	Communication page	**Communication** : Configures network settings.
6	Units page	**Units** : Configures the units of measure shown.
7	Regulator status page	**Regulator status** : Shows the GOV and AVR status.

8.2 Tags page



No.	Item	Notes	
1	List of tags	Shows a list of areas that tags can be displayed on.	
2	Tag selection	Select OK **OK** to toggle selection.	
		☐ **Not selected** : The tag is not shown.	■ **Selected** : The tag is shown.
3	Write	Write the settings to the controller.	

8.3 Backup page



No.	Item	Notes
1	Backup name	Shows the slot number and terminal numbers. Highlight and select OK **OK** to configure the name.
2	Backup location	Shows the location where the backup is created. Highlight and select OK **OK** to choose the location.
3	Clear	Clears and restores the default Backup name.
4	Create backup	Creates a backup in the selected location (max. 20 backups).

8.4 Restore

8.4.1 Restore restrictions

Controller prerequisites

Before you restore a backup to a controller, the controller must meet these prerequisites:

Controller type	Prerequisites
GENSET controller	1. The breaker must be opened. 2. The engine must be stopped. 3. The controller must be under switchboard control.
EMERGENCY genset controller	
HYBRID controller	1. The breaker must be opened. 2. The inverter must be stopped. 3. The controller must be under switchboard control.
SHAFT generator controller	1. The breaker must be opened. 2. The controller must be under switchboard control.
SHORE connection controller	
BUS TIE breaker controller	

Not compatible backup files

Backup files or folders are not compatible with the current controller configuration if:

- The backup is from a different product type.
- The backup is from a different controller type.
- The backup is from a different controller configuration.
- The backup is from a controller with a different hardware configuration.
- The backup is not supported by the current controller software.

Restore network settings

If you use **Restore IP address (IPv4) and controller ID**, the controller **must** be powered off and powered on before the network settings are restored.

CAUTION

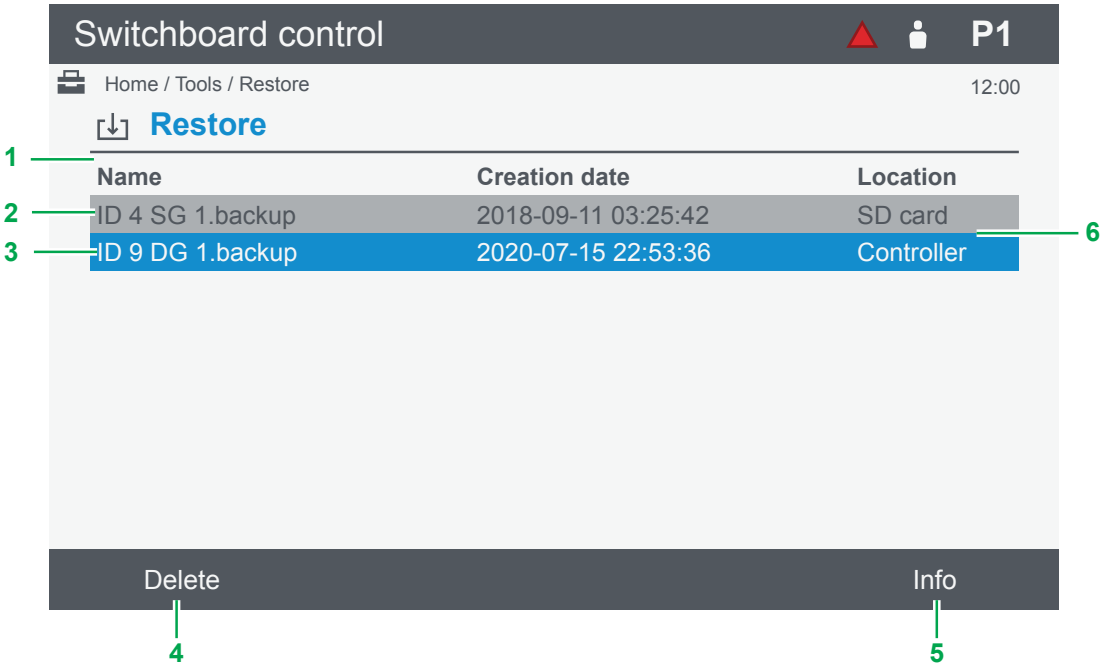
Controller part of system

If the controller is part of the network communication between units, the processor and communication module is also powered off. Make sure this does not affect your system before you power the controller off.

Data not restored

When you restore a backup file or folder to a controller, the event log and alarms are **not** restored.

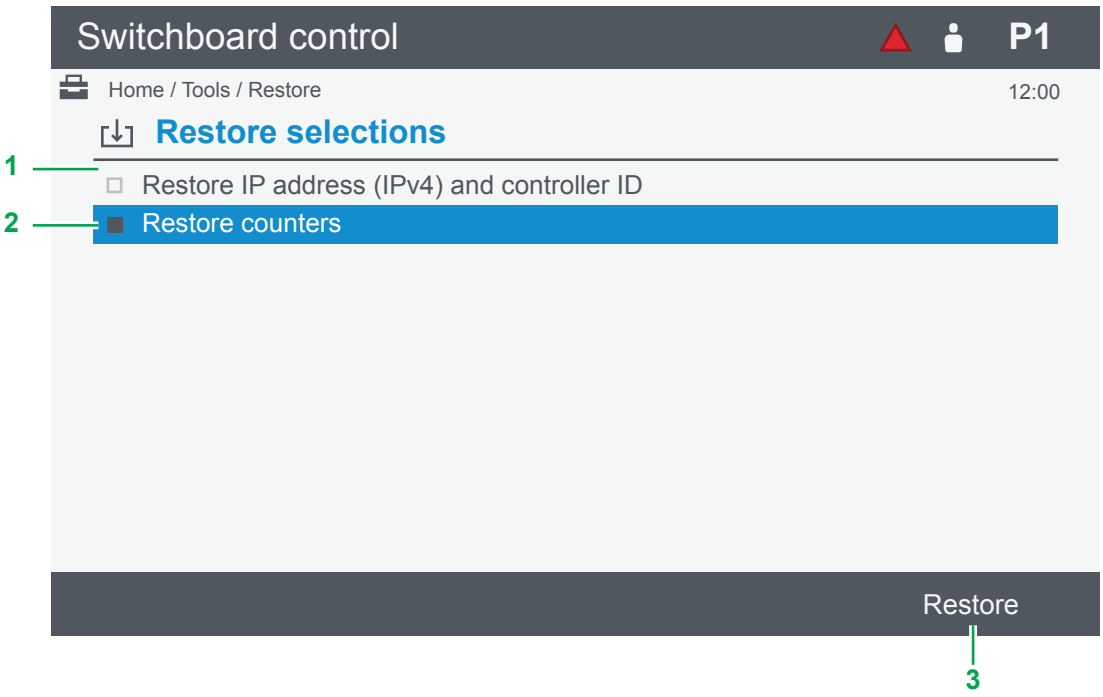
8.4.2 Restore page



No.	Item	Notes
1	List of backups	Shows the backups on the controller or SD card.
2	Not compatible backup *	Shows a not compatible backup in dark grey.
3	Selected backup	Select OK **OK** to choose the restore selections.
4	Delete	Deletes the selected backup.
5	Info	Shows information about the backup.
6	Location	Shows the location where the backup is stored.

NOTE * Backups are not compatible if they are a different product, controller type, controller configuration, hardware, or not supported by the current firmware.

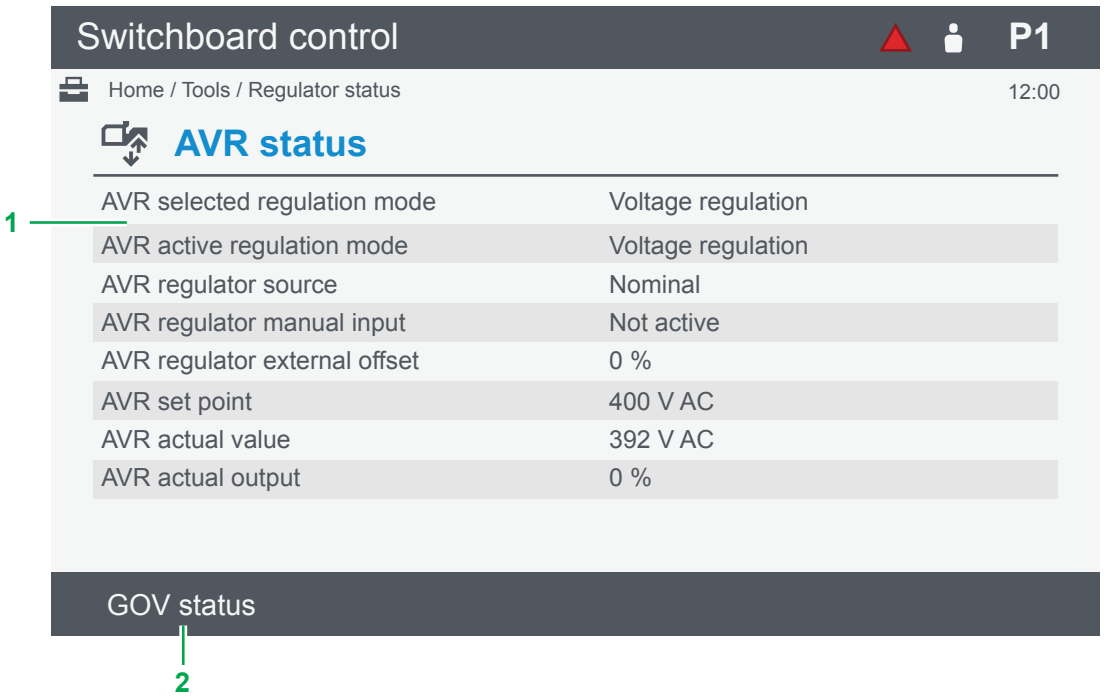
8.4.3 Restore selection page



No.	Item	Notes	
1	List of features	Shows a list of features you can restored.	
2	Feature selection	Select OK **OK** to choose the restore selections.	
		Not selected : The feature is not restored.	**Selected** : The feature is restored.
3	Restore	Restore the selected features.	

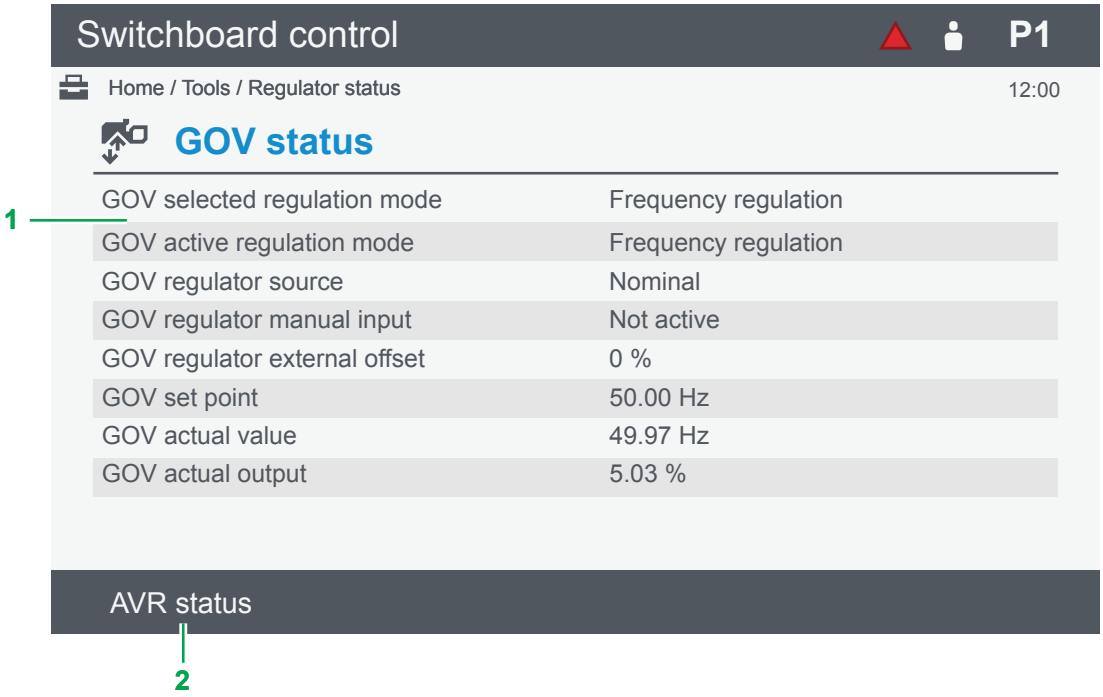
8.5 Regulator status

8.5.1 Regulator status AVR page



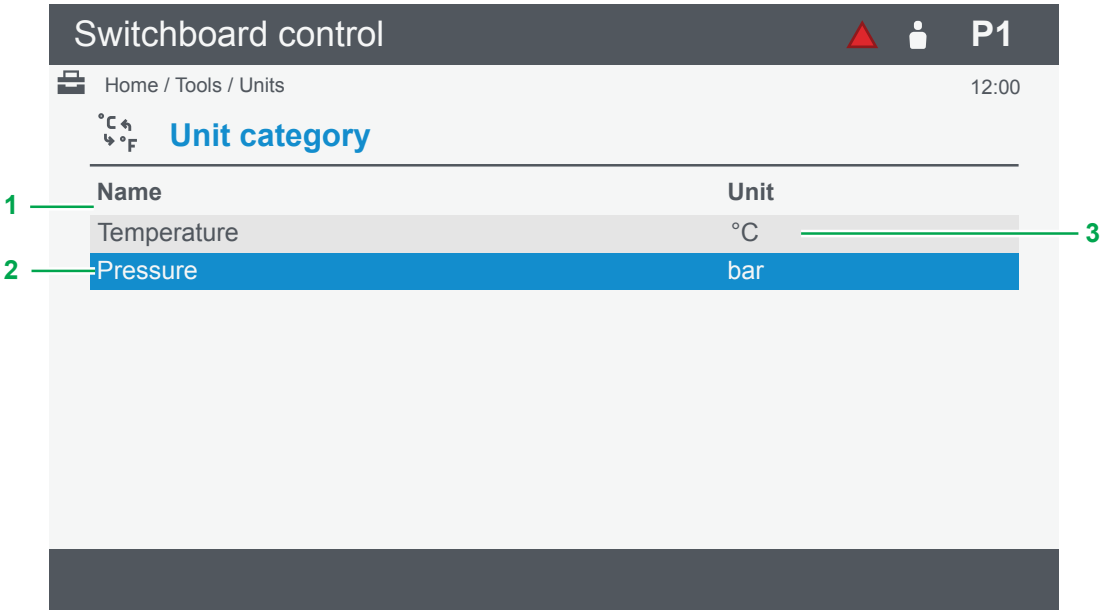
No.	Item	Notes
1	AVR regulation	Shows the status of the AVR regulation.
2	GOV status page	Select to go to the GOV status page.

8.5.2 Regulator status GOV page



No.	Item	Notes
1	GOV regulation	Shows the status of the GOV regulation.
2	AVR status page	Select to go to the AVR status page.

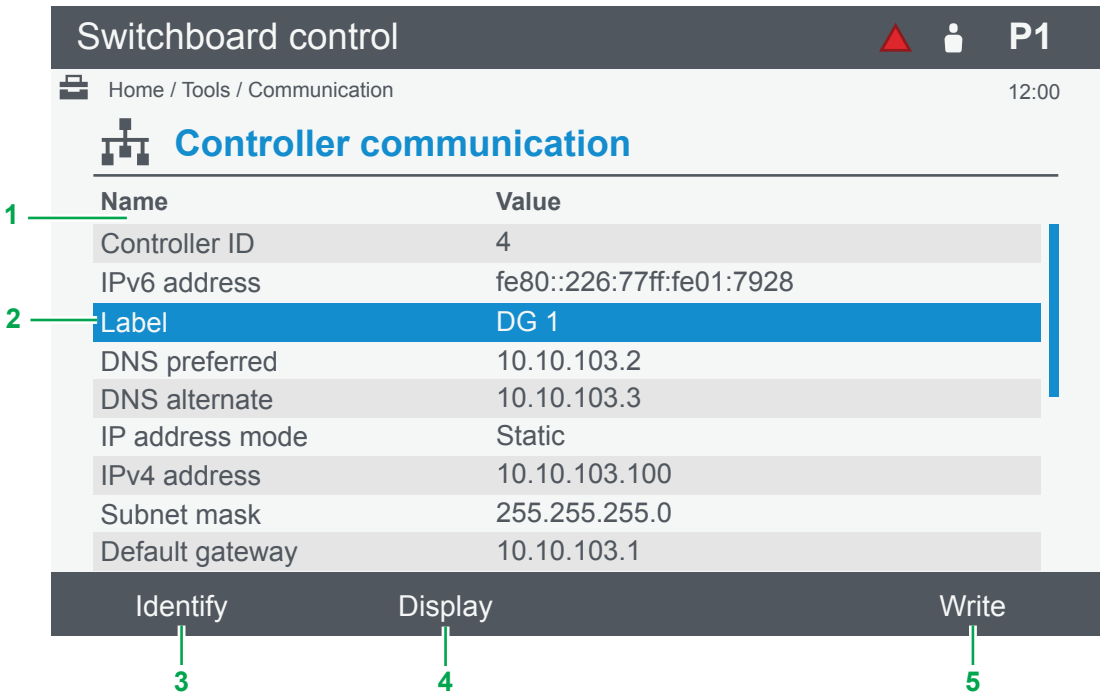
8.6 Units page



No.	Item	Notes
1	Units list	Shows the units you can configure.
2	Selected unit	Select OK **OK** to configure the unit setting.
3	Unit setting	Shows the current unit of measure.

8.7 Communication

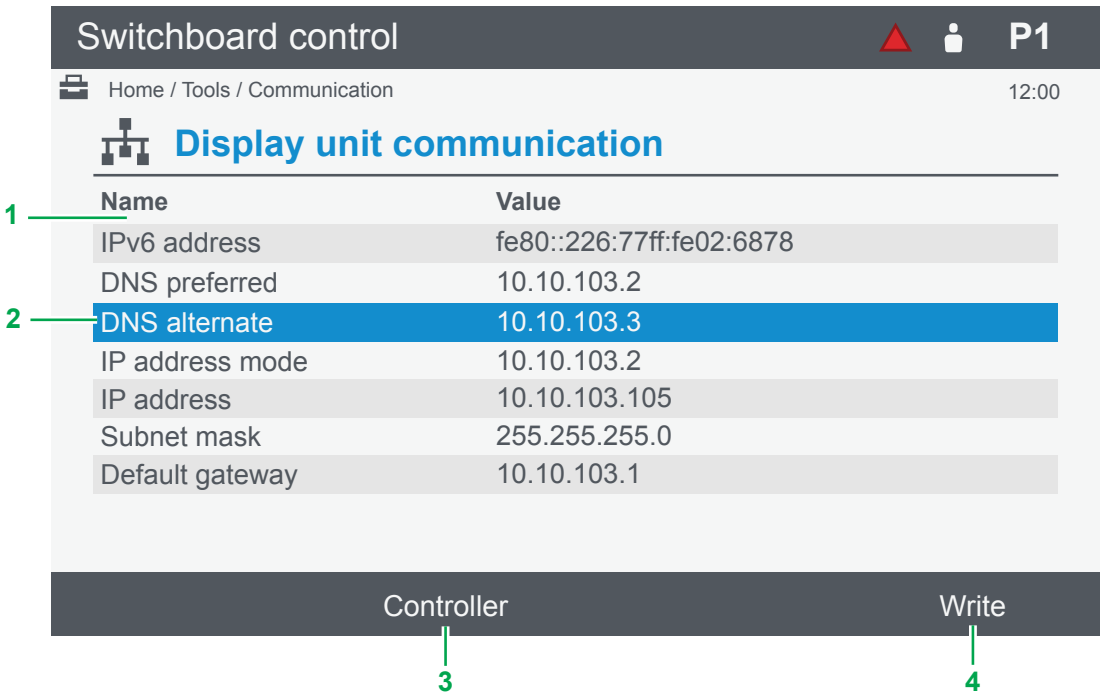
8.7.1 Controller communication page



No.	Item	Notes
1	Controller communication list	Shows the controller communication settings.
2	Selected setting	Select OK **OK** to configure the settings (not all settings are configurable).
3	Identify	Runs the controller rack identification feature. The ⏻ Power status LED on the paired controller flashes.
4	Display page	Select to go to the display communication settings.
5	Write *	Writes the settings to the controller.

NOTE * For changes to communication settings to take effect, all controllers and displays in the same system **must** be powered off and powered on. This must be done by authorised personnel who understand the risks involved in accessing the power supply or installation design. Take extreme care in the enclosure next to the ACM terminals. Ensure the controllers are not running and the controlled breakers are open, before powering off and on controllers and display units.

8.7.2 Display communication page

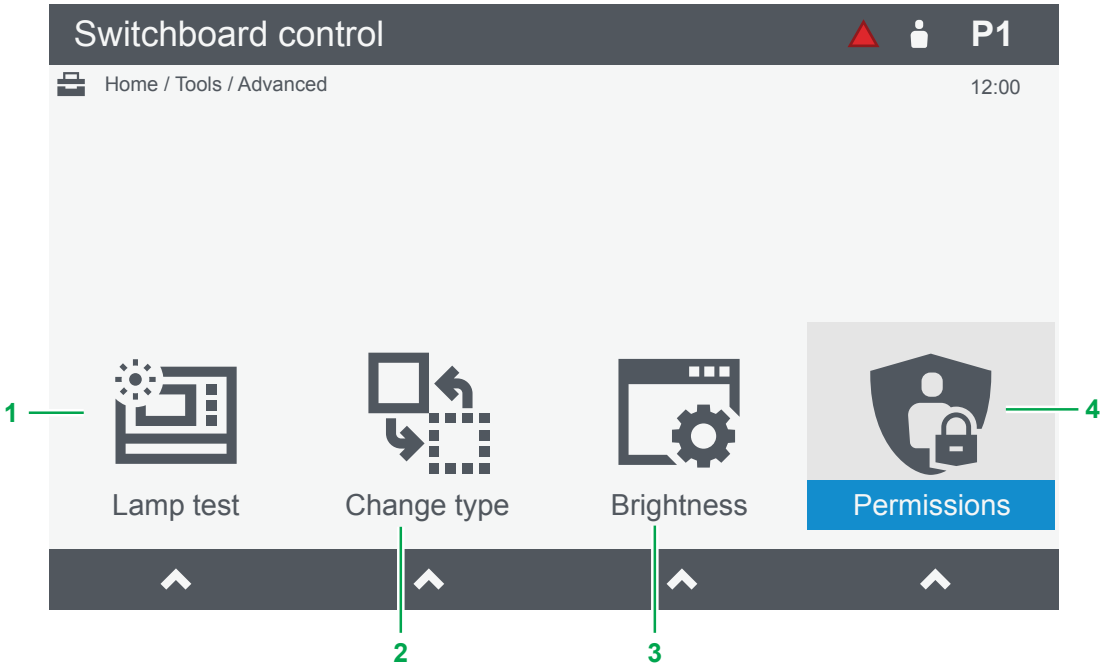


No.	Item	Notes
1	Display communication list	Shows the display communication settings.
2	Selected setting	Select OK **OK** to configure the settings (not all settings are configurable).
3	Controller page	Select to go to the controller communication settings.
4	Write *	Writes the settings to the controller.

NOTE * For changes to communication settings to take effect, all controllers and displays in a system **must** be powered off and powered on. This must be done by authorised personnel who understand the risks involved in accessing the power supply or installation design. Take extreme care in the enclosure next to the ACM terminals. Ensure the controllers are not running and the controlled breakers are open, before powering off and on controllers and display units.

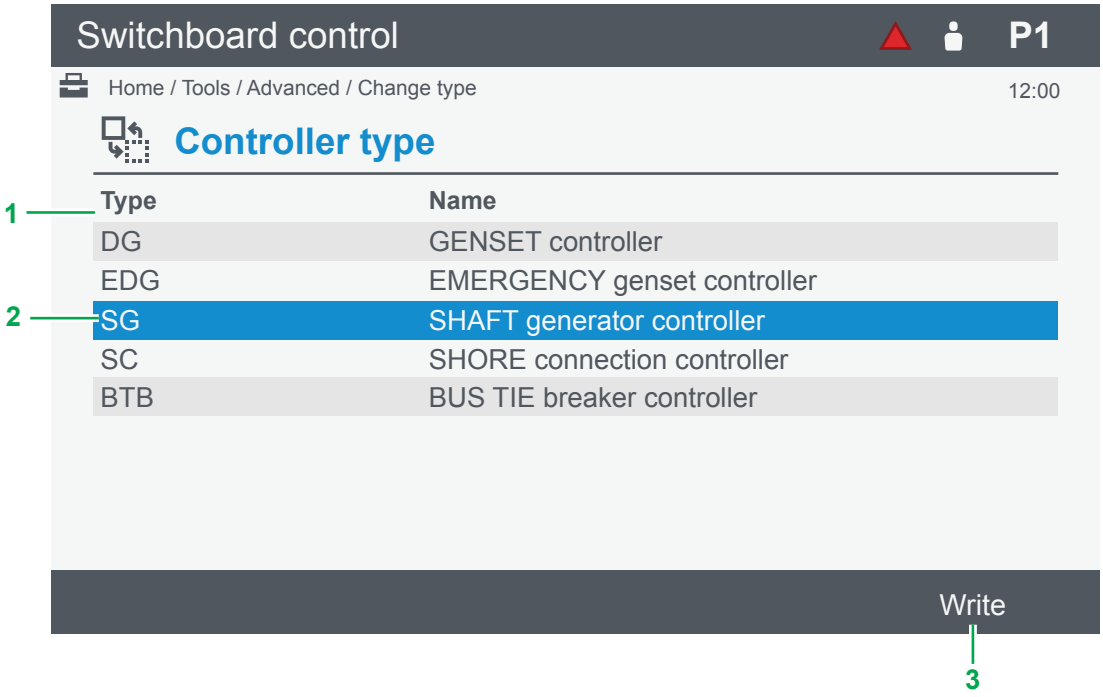
9. Tools - Advanced

9.1 Tools advanced page



No.	Item	Notes
1	Lamp test page	**Lamp test** : Select to run a lamp test of the display LEDs.
2	Change type page	**Change type** : Select to go to the change controller type menu.
3	Brightness menu	**Brightness** : Select to go to the brightness menu.
4	Permissions menu	**Permissions**: Select to go to the permissions menu.

9.2 Controller type page



No.	Item	Notes
1	Controller type list	Shows the controller types available.
2	Selected type	Highlight the controller type to use.
3	Write *	Writes the settings to the controller.

NOTE * The controller type must only be changed if it is safe for commissioning and the prerequisites are followed.

Change controller type

Controller type changes are restricted, depending on the initial controller type. An EMERGENCY genset and GENSET controller, can be changed in the field to any PPM 300 controller type. But a SHAFT generator, SHORE connection and BUS TIE breaker controller can only be changed to one of these three controller types.

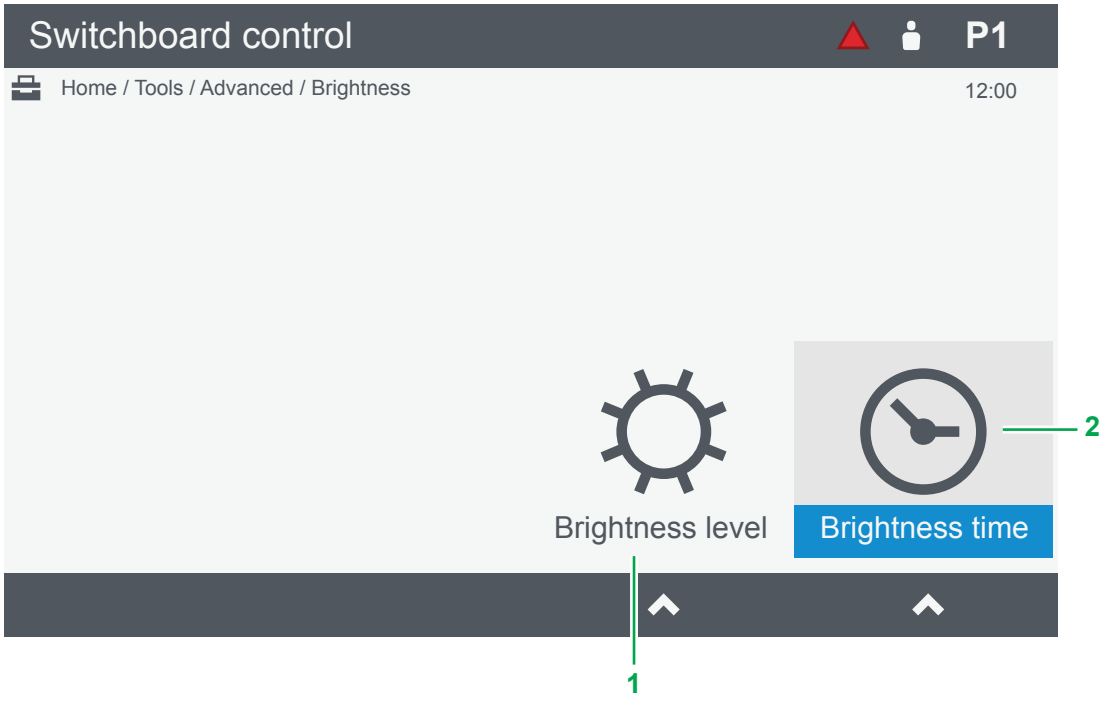
You can only change the controller type if it is safe for commissioning:

1. The engine must be stopped (not applicable to BUS TIE breaker controller).
2. The breaker must be open (for EMERGENCY genset controller, **both** breakers must be open).
3. The controller must be under switchboard control.

OR

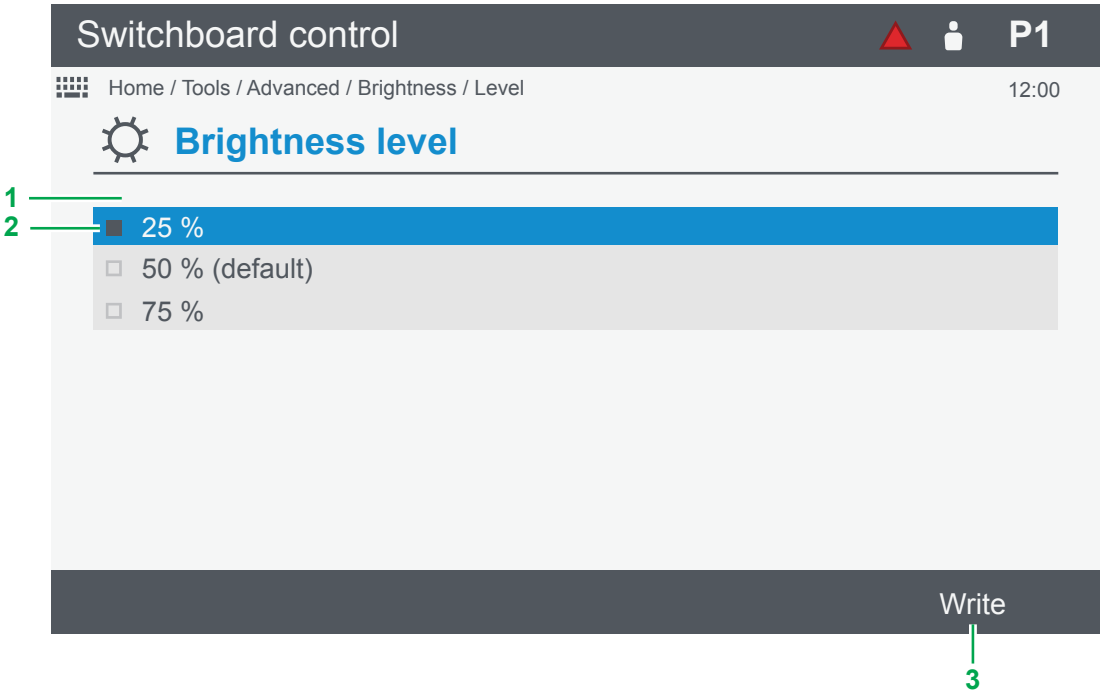
1. The controller is in emulation mode.

9.3 Brightness page



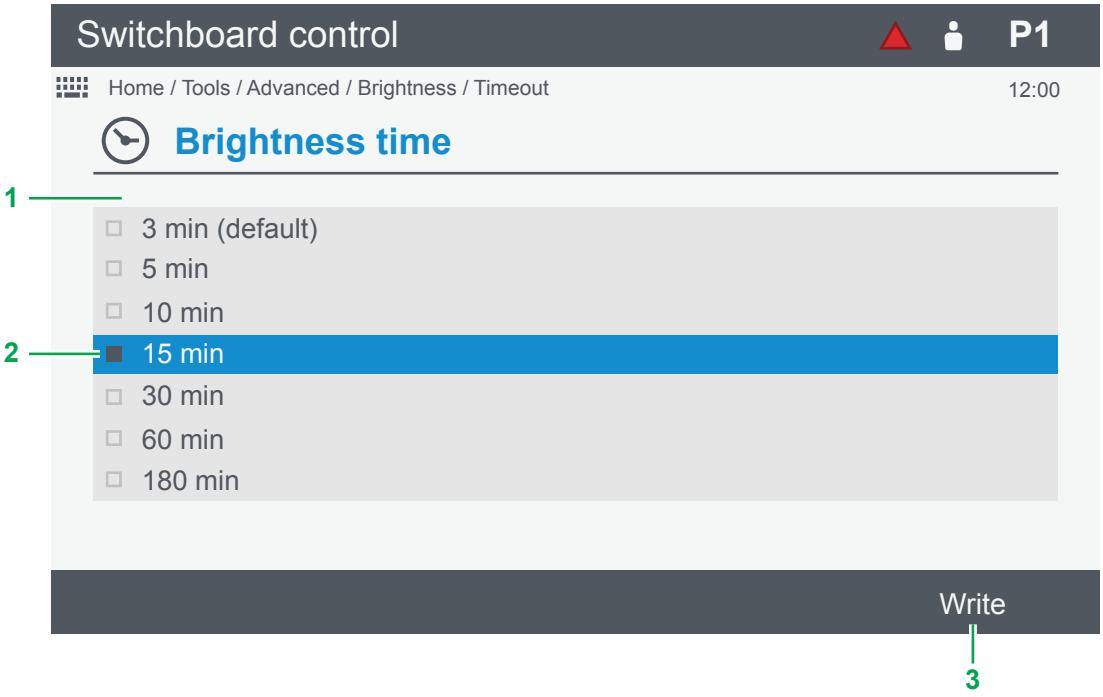
No.	Item	Notes
1	Brightness level page	**Brightness level** : Select to make changes to the brightness level settings.
2	Brightness time page	**Brightness time** : Select to make changes to the brightness time settings.

9.3.1 Brightness level page



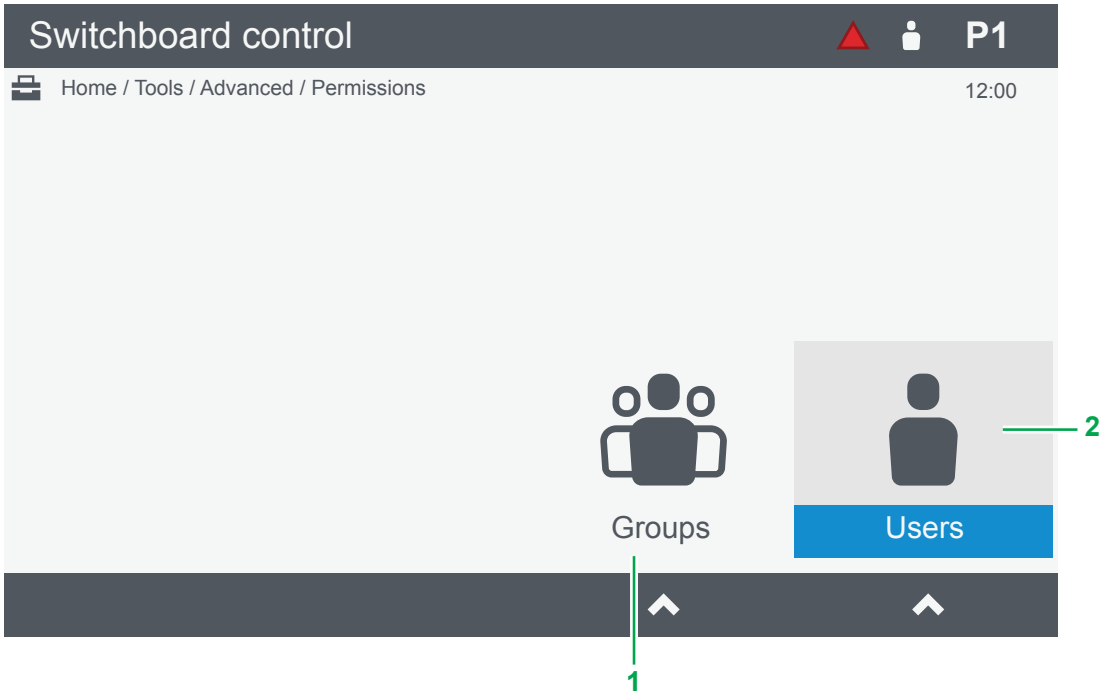
No.	Item	Notes	
1	Brightness level list	Shows a list of the brightness levels in % the display is adjusted to.	
2	Selected level	Select OK **OK** to choose the brightness level:	
		☐ **Not selected** .	■ **Selected** .
3	Write	Writes the setting to the controller.	

9.3.2 Brightness time page



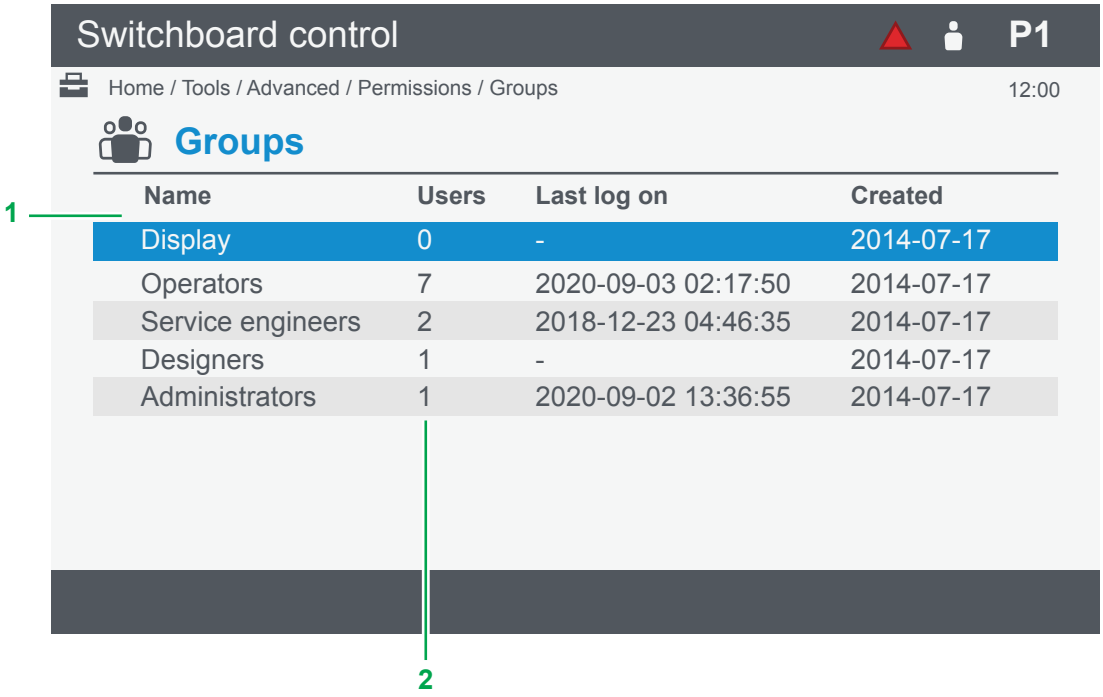
No.	Item	Notes	
1	Brightness time list	Shows a list of times in minutes before the display automatically adjusts the brightness level.	
2	Selected time	Select OK **OK** to choose the brightness time:	
		☐ **Not selected** .	■ **Selected** .
3	Write	Writes the setting to the controller.	

9.4 Permissions page



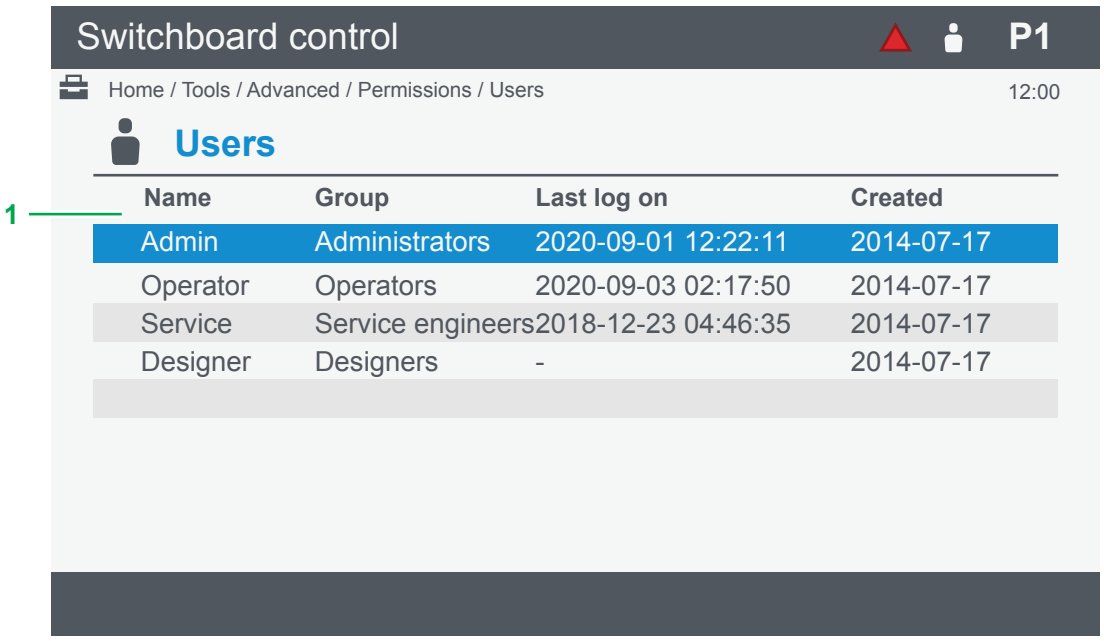
No.	Item	Notes
1	Groups page	**Groups**: Select to make changes to the groups page.
2	Users page	**Users**: Select to make changes to the users page.

9.4.1 Groups page



No.	Item	Notes
1	Groups list	Shows the permission groups. Highlight and select OK **OK** to show more information.
2	Users	Shows how many users are in the group.

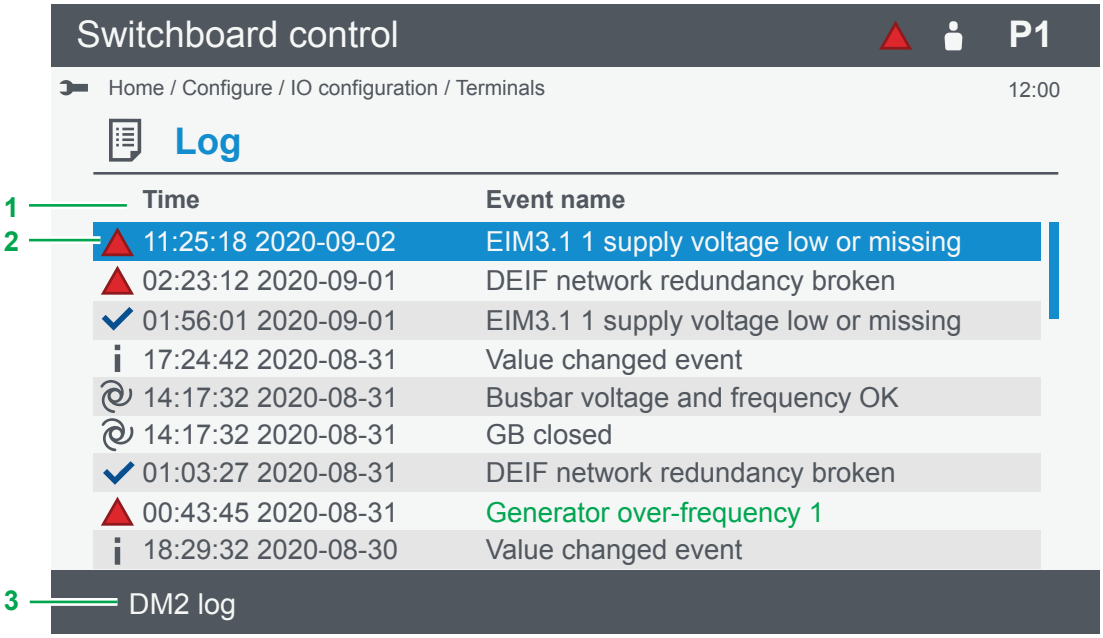
9.4.2 Users page



No.	Item	Notes
1	User list	Shows the users and their group permissions.
		Highlight and select OK **OK** to show more information.

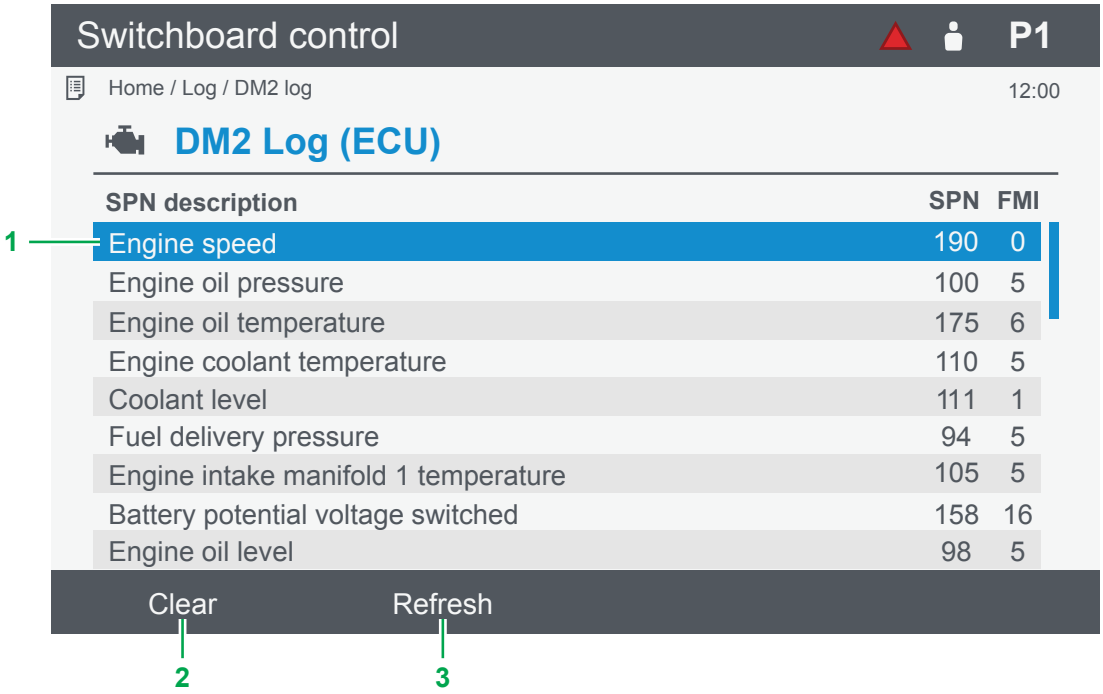
10. Log

10.1 Log page



No.	Item	Notes
1	List of log events	Shows all recorded events in the system. Test alarms are shown in green.
2	Selected event	Select OK **OK** to show further information about the event.
3	DM2 log page	Shows the DM2 log of events if an ECU has been configured.

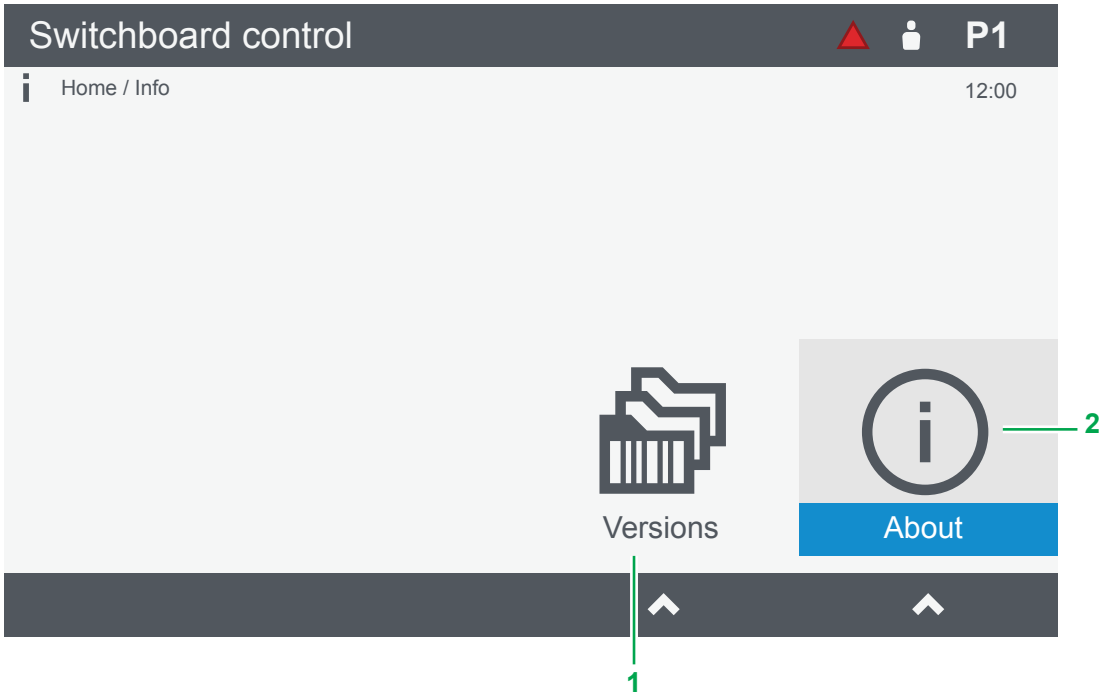
10.2 DM2 Log page



No.	Item	Notes
1	List of DM2 log events	Shows all DM2 events from the ECU.
2	Clear	Clears the log list.
3	Refresh	Reloads the log list.

11. Info

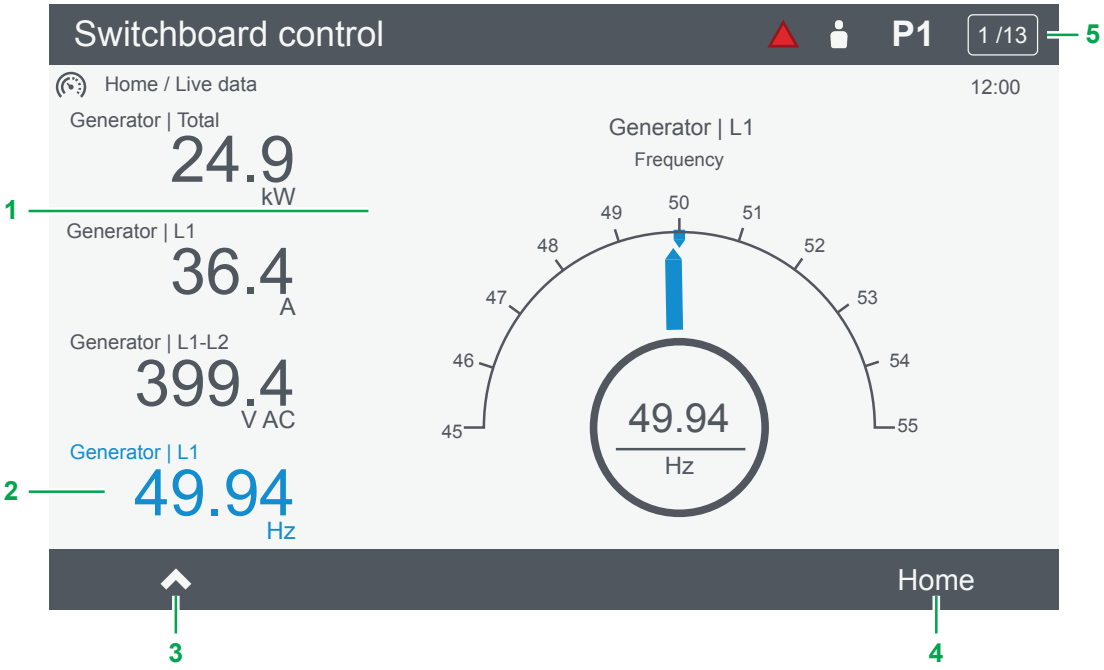
11.1 Info page



No.	Item	Notes
1	Versions page	**Versions** : Shows version information for controller and display, including firmware versions. This information can be helpful for technical support.
2	About page	**About** : Shows information about the controller, including IP address information.

12. Live data

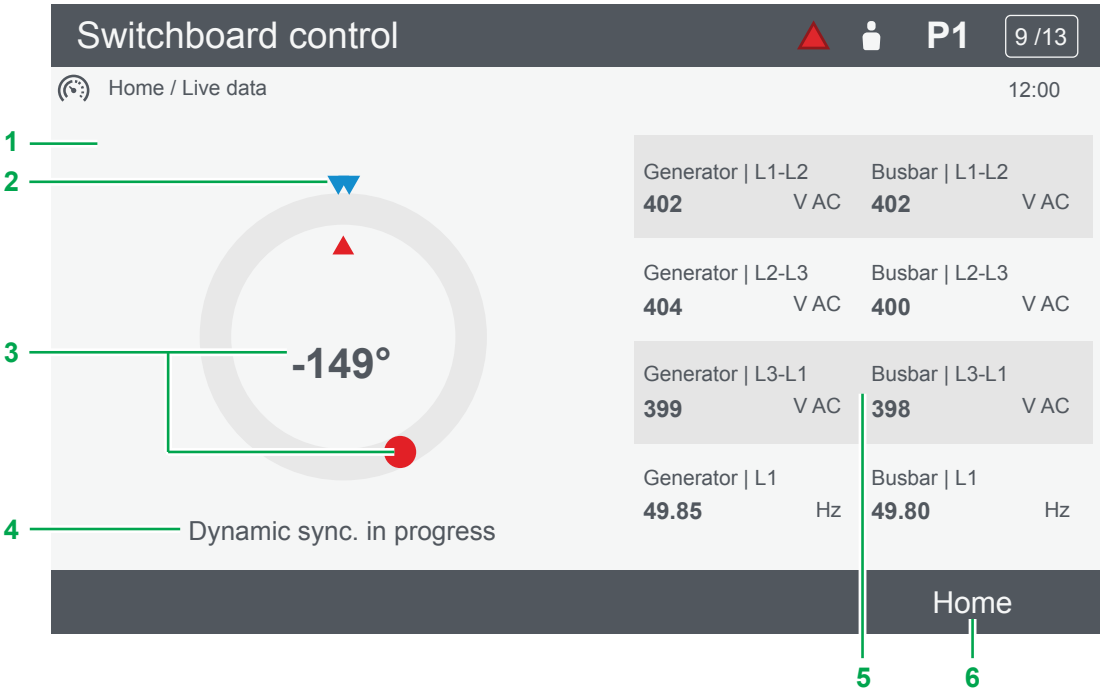
12.1 Live data page



No.	Item	Notes
1	Live data information page	Shows the live data information. *
2	Selected measurement	Shows in blue the selected measurement (only available on some pages).
3	Select measurement	^ : Changes the selected measurement (only available on some pages).
4	Home page	Returns to the home page.
5	Page number	Shows the current page number.

NOTE * Values shown with "--" indicates the values are not available.
Values shown with "Err" indicates there are errors loading the values.

12.2 Visual synchronisation page



No.	Item	Notes
1	Visual synchronisation page	Shows the synchronisation progress and state.
2	Range	Shows the synchronisation window (minimum and maximum).
3	Phase difference	Shows the phase difference between the source and busbar.
4	Synchronisation status	Shows the status of the synchronisation.
5	Source and busbar values	Shows the phase values for the source and busbar.
6	Home page	Returns to the home page.

13. Troubleshooting

13.1 Troubleshooting the system under switchboard control

The exact procedure for operating the system under switchboard control depends on the switchboard design. Follow the guidelines from the switchboard supplier.

Class societies require a certain amount of protections included in the switchboard. For example, there must be a synchronisation check before closing a breaker.

CAUTION

Operate system under switchboard control

You should only operate the system under switchboard control, if you are a trained and experienced operator. Even though the controller protections are active, you can create undesirable conditions during switchboard control. Your actions can also disrupt the power supply.

General information about switchboard control

When you place a controller under switchboard control, it no longer controls the GOV and AVR regulators. All logic for the genset (start and stop) and breaker (open and close) is deactivated. If any other controllers in the system are in AUTO mode, they are changed to SEMI mode. The controller's protections remain active.

CAUTION

Controller protections during switchboard control

During switchboard control, the controller protections respond to alarm situations. However, the controller does not prevent you from creating alarm situations.

How to troubleshoot under switchboard control

1. Make sure there is enough power available for the system. You might need to have extra gensets running.
2. Use the *Switchboard control* switch (on the switchboard) to change the controller to switchboard control.
   - Any GENSET controllers in AUTO mode automatically change to SEMI mode and does not automatically stop or start gensets in response to load changes.
3. Depending on the problem, you can use the switchboard to do a series of actions:
   a. Start the genset.
   b. Use the GOV up and GOV down inputs on the switchboard to control the frequency from the genset.
   c. Do a manual synchronisation and close the breaker.
   d. Manually regulate the load to de-load the breaker, and then open the breaker.
   e. Stop the genset.
4. If you cannot do these actions with the switchboard, the controller can not do them either. You must continue your troubleshooting to find the source of the problem.

13.2 Troubleshooting alarms

The system has many pre-configured and configurable alarm protections. An active alarm has an active alarm protection to protect the system and equipment. Activated alarms require action to resolve the problem in the system.

More information
See Alarms for more information about how to handle alarms.

13.3 Troubleshooting analogue input sensor failures

Alarm range	Analogue input type	Possible root cause
Below range alarm	Current	Wire break High resistance
	Voltage	Wire break Short circuit to ground
	Resistance	Short circuit
Above range alarm	Current	Short circuit
	Voltage	Short circuit to supply
	Resistance	Wire break

13.4 Troubleshooting communication

Problem	Cause	Solution
DEIF network redundancy broken	The system never had a redundant DEIF network connection.	1. Install a redundant DEIF network connection (see **Wiring the communication** in the **Installation instructions**). 2. Disable the DEIF network redundancy alarm. Set the alarm to **Not enabled** in the parameter: `Configure > Parameters > Communication > DEIF network > DEIF network redundancy broken` .
	The existing redundant DEIF network connection is unplugged or damaged.	1. Plug in the Ethernet cable correctly. 2. Replace the Ethernet cable. 3. Make sure the Ethernet cable meets the specifications (see **Hardware, Accessories, Ethernet cable** in the **Data sheet**).
The display unit is stuck on the start screen, displaying the text **DL mode**	• The power supply is too small to fully power the display unit, resulting in an incomplete start up. • The Ethernet cable is loose. • The display unit software is corrupt after an incomplete start up.	1. Check the Ethernet cable. 2. Update the display unit software. 3. Remove the power, wait for at least 10 seconds, then restart the display unit. 4. Ensure that the power supply is sufficient. 5. If the problem persists, contact DEIF.
Pair to controller is lost	Display unit power was disconnected and reconnected.	A pairing section screen is automatically shown on the display unit: 1. Select the controller you wish to pair, and press **OK** OK. 2. You are now prompted to confirm your selection. • Press **OK** OK to confirm. • Press **Back** to cancel.

14. Replace internal battery

14.1 Replace battery in PCM3.1

The controller has a replaceable battery in the PCM3.1 module. A battery failure alarm is activated, when the battery power is low. To replace the battery, you need to remove the PCM module.

The battery in PCM3.1 is a CR2430 3V battery, rated for operation at -40 to 85 °C (-40 to 185 °F). This is **not** a standard CR2430 battery.

NOTICE

Warranty

The manufacturer's warranty will not apply if the rack has been opened by unauthorised persons. However, you are allowed to replace the battery on the PCM3.1 module. To retain the warranty, the battery must be replaced by a qualified person, in accordance with these written instructions.

DANGER!

Hazardous live currents and voltages

Hazardous live currents and voltages may be present in an installed rack. Contact with these could kill you. Only authorised personnel, who understand the precautions needed and the risks involved in working with live electrical equipment, may do this work.

CAUTION

Disrupting control

Working on the rack may disrupt the control of the generator, busbar or connection. Take the necessary precautions.

CAUTION

Protecting equipment: No hot swapping

Disconnect all power supplies before replacing the battery.

Replacing the battery

1. Protect the hardware modules against static discharge.
2. Disconnect all power supplies.
3. Remove the PCM3.1 hardware module from the rack:
   a. Remove the terminal blocks.
   b. Disconnect any Ethernet cables.
   c. Loosen the hardware module faceplate screws with a TX20 screwdriver. Do not force the screws to unscrew completely.
   d. Use pliers to pull the faceplate screws, while carefullly sliding the module out of the rack.
   e. Hold the module by the faceplate. Do **not** touch the PCB..
4. Remove the old battery from the holder.
5. Insert the new battery in the holder (make sure the polarity is correct).
6. Mount the PCM3.1 module in the rack:
   a. Hold the PCM3.1 only by its faceplate.

b. Make sure that the hardware module is the right way up, and slide it back into slot 7.
c. Tighten the screws on the hardware module faceplate with 0.5 N·m (4.4 lb-in) of torque.

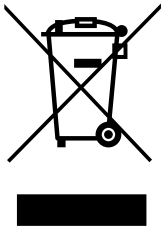
Date and time settings

- After the battery is replaced, the date and time must be set on the controller.
- You can use PICUS to enter the correct date and time settings.

15. End-of-life

15.1 Disposal of waste electrical and electronic equipment

WEEE symbol



All products that are marked with the crossed-out wheeled bin (the WEEE symbol) are electrical and electronic equipment (EEE). EEE contains materials, components and substances that can be dangerous and harmful to people's health and to the environment. Waste electrical and electronic equipment (WEEE) must therefore be disposed of properly. In Europe, the disposal of WEEE is governed by the WEEE directive issued by the European Parliament. DEIF complies with this directive.

You must not dispose of WEEE as unsorted municipal waste. Instead, WEEE must be collected separately, to minimise the load on the environment, and to improve the opportunities to recycle, reuse and/or recover the WEEE. In Europe, local governments are responsible for facilities to receive WEEE. If you need more information on how to dispose of DEIF WEEE, please contact DEIF.