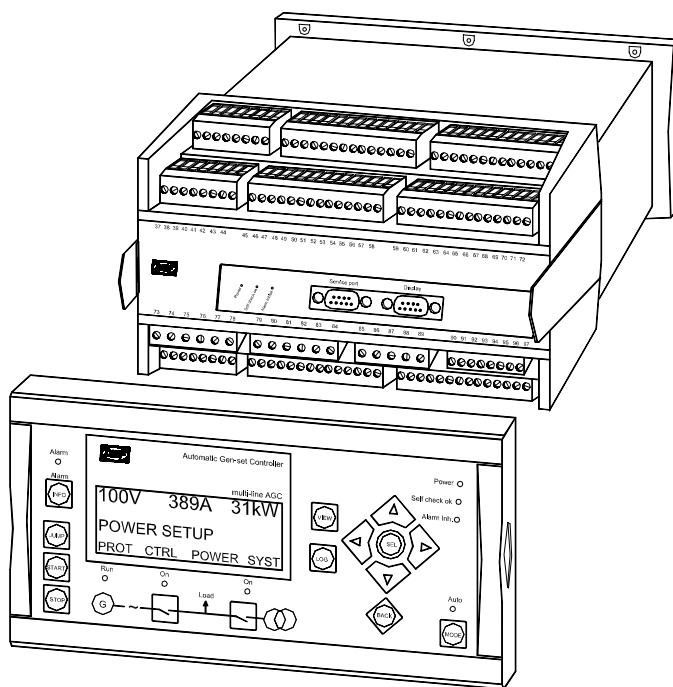# Operator's Manual

Automatic Gen-set Controller

4189340380B (UK)
SW version 2.1X.X

- *Display readings*

- *Push-button functions*

- *Alarm handling*

- *Log list*

Table of contents

1. About this document

General purpose

This document is the Operator's Manual for DEIF's Automatic Gen-set Controller, the AGC. The document mainly includes general product information, display readings, push-button and LED functions, alarm handling descriptions and presentation of the log list.

The general purpose is to give the operator important information to be used in the daily operation of the unit.

> ⚠ **Please make sure to read this handbook before working with the multi-line 2 controller and the gen-set to be controlled. Failure to do this could result in damage to the equipment or human injury.**

Intended users

This Operator's Manual is mainly intended for the daily user. On the basis of this document the operator will be able to carry out simple procedures such as start/stop and control of the generator set.

Contents/overall structure

The document is divided into chapters, and in order to make the structure simple and easy to use, each chapter will begin from the top of a new page.

2. Warnings and legal information

Legal information and responsibility

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the generator set controlled by the unit, the company responsible for the installation or the operation of the set must be contacted.

> **The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.**

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

> ⚠ **Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.**

Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

Notes

> ⓘ **The notes provide general information which will be helpful for the reader to bear in mind.**

Warning

> ⚠ **The warnings indicate a potentially dangerous situation which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.**
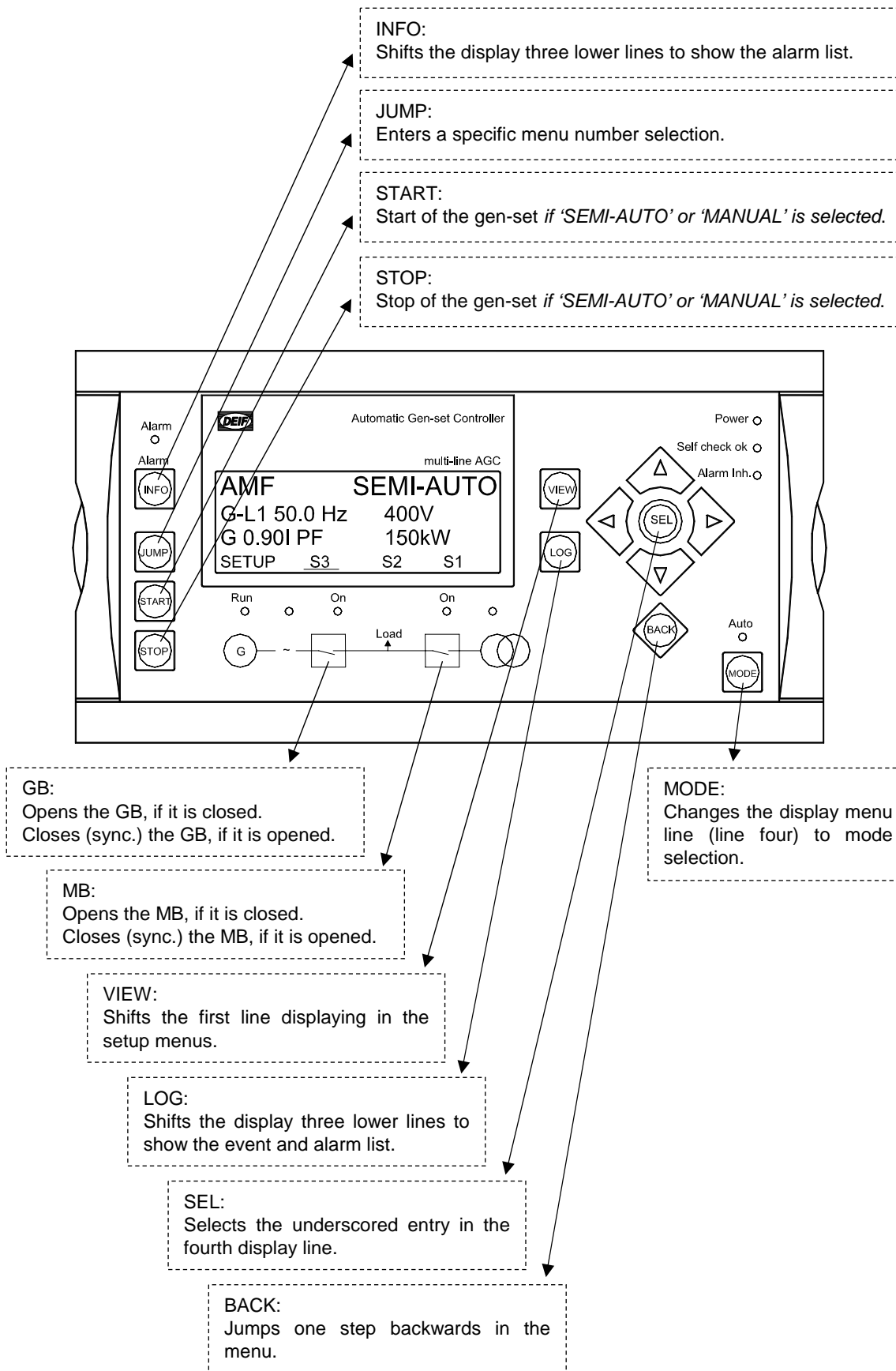
3. Display push-buttons and LEDs

Push-button functions

The display unit holds a number of push-button functions which are presented below.

INFO: Shifts the display 3 lower lines to show the alarm list.

JUMP: Enters a specific menu number selection. All settings have a specific number attached to them. The JUMP button enables the user to select and display any setting without having to navigate through the menus (see later).

VIEW: Shifts the first line displaying in the setup menus.

LOG: Shifts the display 3 lower lines to show the event and alarm list. The list holds 150 events.

◁ :   Moves the cursor left for manoeuvring in the menus.

△ :   Increases the value of the selected set point (in the setup menu). In the setup menu, this button function is used for scrolling the second line displaying of generator values.

SEL: Is used to select the underscored entry in the fourth line of the display.

▽ :   Decreases the value of the selected set point (in the setup menu). In the setup menu, this button function is used for scrolling the second line displaying of generator values.

▷ :   Moves the cursor right for manoeuvring in the menus.

BACK: Jumps one step backwards in the menu (to previous display or to the entry window).

START: Start of the gen-set *if 'SEMI-AUTO' or 'MANUAL' is selected*.

STOP: Stop of the gen-set *if 'SEMI-AUTO' or 'MANUAL' is selected*.

(GB) ON: Manual activation of close and open breaker sequence *if 'SEMI-AUTO' is selected*.

(MB) ON: Manual activation of close breaker and open breaker sequence *if 'SEMI-AUTO' is selected*.

MODE: Changes the menu line (line 4) in the display to mode selection.

The push-buttons are placed as follows:

INFO:
Shifts the display three lower lines to show the alarm list.

JUMP:
Enters a specific menu number selection.

START:
Start of the gen-set *if 'SEMI-AUTO' or 'MANUAL' is selected.*

STOP:
Stop of the gen-set *if 'SEMI-AUTO' or 'MANUAL' is selected.*

GB:
Opens the GB, if it is closed.
Closes (sync.) the GB, if it is opened.

MB:
Opens the MB, if it is closed.
Closes (sync.) the MB, if it is opened.

VIEW:
Shifts the first line displaying in the setup menus.

LOG:
Shifts the display three lower lines to show the event and alarm list.

SEL:
Selects the underscored entry in the fourth display line.

BACK:
Jumps one step backwards in the menu.

MODE:
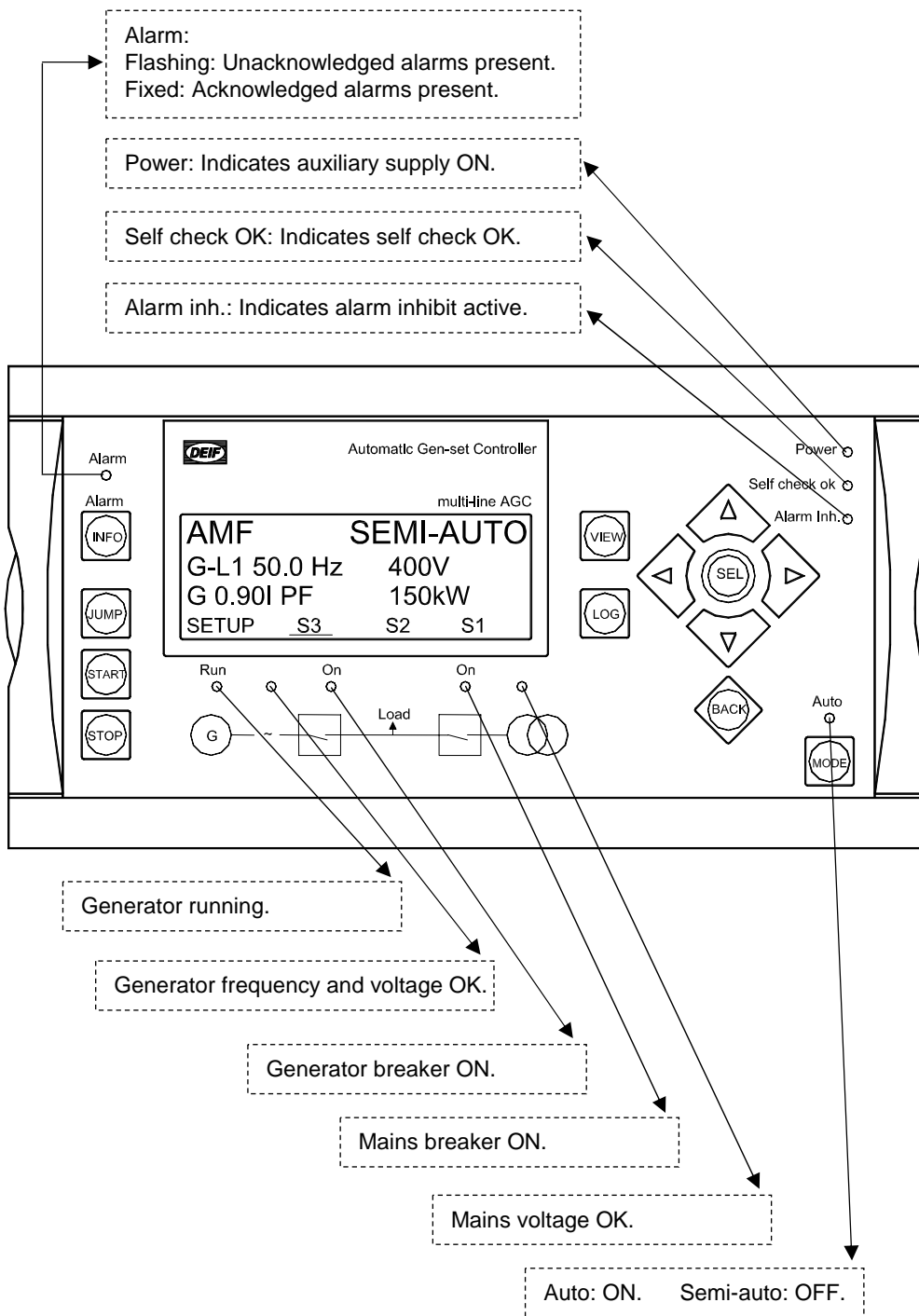Changes the display menu line (line four) to mode selection.

LED functions

The display unit holds 10 LED functions. The colour is green or red or a combination in different situations.

Alarm: LED flashing indicates that unacknowledged alarms are present.
                    LED fixed light indicates that ALL alarms are acknowledged, but some are still present.

Power: LED indicates that the auxiliary supply is switched on.

Self check OK: LED indicates that the unit is OK.

Alarm inh.:   LED fixed light indicates that the AGC does not receive a running signal. The inhibit lamp will be switched OFF, when the run status timer in menu 6151 is timed out or the 'Alarm inhibit input' terminal 23 is disabled.

Run: LED indicates that the generator is running.

(Gen.) OK: LED green light indicates that the voltage/frequency is present and OK.

(GB) ON: LED indicates that the generator breaker is closed.

(MB) ON: LED indicates that the mains breaker is closed.

(Mains) OK: LED is green, if the mains is present and OK.
                    LED is red at a mains failure.
                    LED is flashing green when the mains returns during the 'mains OK delay' time.

Auto: LED indicates that auto mode is selected.

The display LEDs are indicating as follows:

Alarm:
Flashing: Unacknowledged alarms present.
Fixed: Acknowledged alarms present.

Power: Indicates auxiliary supply ON.

Self check OK: Indicates self check OK.

Alarm inh.: Indicates alarm inhibit active.

Alarm

Alarm

INFO

JUMP

START

STOP

DEIF   Automatic Gen-set Controller

multi-line AGC

AMF   SEMI-AUTO
G-L1 50.0 Hz   400V
G 0.90l PF   150kW
SETUP   S3   S2   S1

VIEW

LOG

Power

Self check ok

Alarm Inh.

SEL

BACK

Auto

MODE

Run   On   On

G   ~   Load

Generator running.

Generator frequency and voltage OK.

Generator breaker ON.

Mains breaker ON.

Mains voltage OK.

Auto: ON.   Semi-auto: OFF.

4. Display and menu structure

LCD display

The display is a backlit LCD text display containing 4 lines with 20 characters in each line. There is no control of the display light intensity (no dimmer). Basically, all measured and calculated values can be read in the display. These may be selected via the PC utility software (USW).

(i)   **For selection of values, see the Designer's Reference Handbook.**

Menu structure

The display includes two menu systems which can be used without password entry:

> *View menu system*
> This is the commonly used menu system. 15 windows are configurable and can be entered by using the arrow push-buttons.

> *Setup menu system* **(not commonly used by the operator)**
> This menu system is used for setting up the unit, and if the operator needs detailed information that is not available in the view menu system.
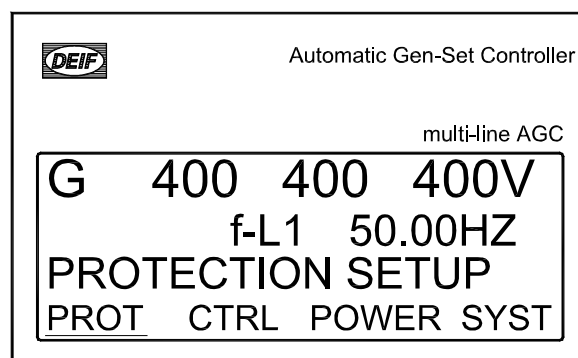> Changing of parameter settings is password protected.

Entry window

When the unit is powered up, an entry window appears. The entry window is the turning point in the menu structure and as such the gateway to the other menus. It can always be reached by pushing the BACK push-button 3 times.

(i)   **The event and alarm list will appear at power up, if an alarm is present.**

```
┌─────────────────────────────┐
│ DEIF        Automatic Gen-Set Controller │
│                             │
│                  multi-line AGC │
│ ┌─────────────────────────┐ │
│ │ G   400  400  400V      │ │
│ │       f-L1  50.00HZ     │ │
│ │ PROTECTION SETUP        │ │
│ │ PROT  CTRL  POWER SYST  │ │
│ └─────────────────────────┘ │
└─────────────────────────────┘
```

View menu

The view menus (V1, V2 and V3) are the daily use menus for the operator.

First display line   *Second and third display lines*
Operational status or measurements   Measurements relating to operational status

```
┌─────────────────────────────────────────┐
│  DEIF          Automatic Gen-Set Controller │
│                                           │
│                          multi-line AGC    │
│  G    440    438    440V                  │
│  G-L1 50Hz          440V                  │
│  G-L1 50Hz          440V                  │
│  SETUP   V3    V2    V1                   │
└─────────────────────────────────────────┘
```

Fourth display line
Selection of setup and view menus
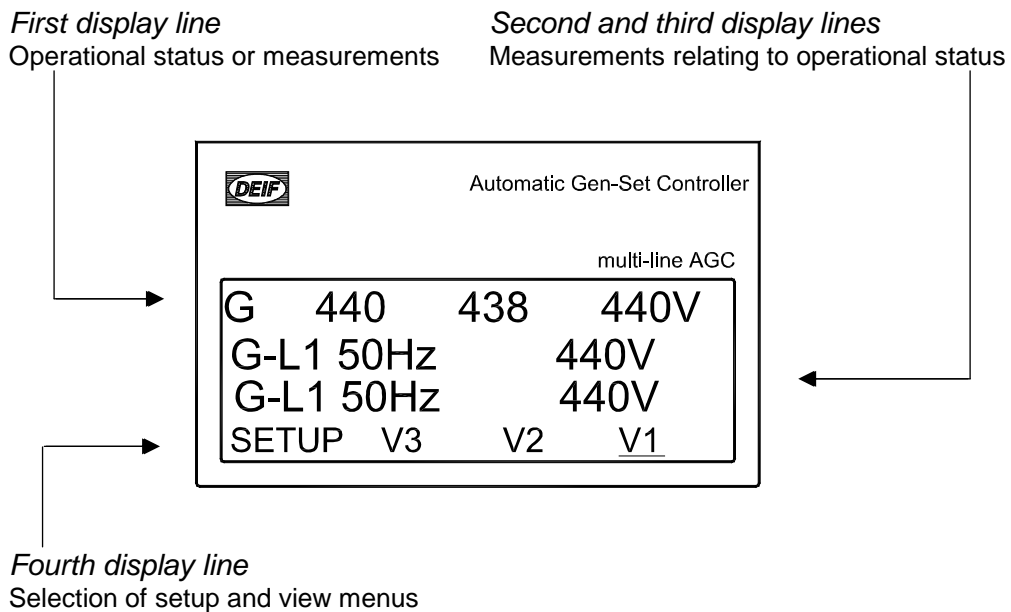
In the view menus various measured values are on display.

View menu navigation

The readings etc. are all selected by moving the cursor (fourth display line (note the underscore on V1 on the drawing above - this is the cursor)):

The cursor is moved using the ◁ and ▷ push-buttons on the right side of the display.

View window 1

Display of measured values according to the selections made during configuration.

🛈 **For detailed information about configuration, see the Designer's Reference Handbook.**

V1 contains up to 15 different windows which can be selected using the △ and ▽ push-buttons located on the right hand side of the display.

Windows	V1
View 1	Manual selection with key UP or key DOWN push-buttons.
View 2	
View 3	
View 4	
View 5	
View 6	
View 7	
View 8	
View 9	
View 10	
View 11	
View 12	
View 13	
View 14	
View 15	

View window 2

Display of measured values according to the selections made during configuration.

Display V2 follows the selection in V1 as follows:

1: View 1: (Start prepare)
2: View 2: (Synchronising)
3: View 3: (Ramp up/down)
4: View 4:
5: View 5: (Default (when none of the above are in operation))

Windows	V 2	V 3
View 1	Changes automatically between the 5 first views:	Changes automatically between the 5 first views:
View 2		
View 3		
View 4	1. View 1 (Start prepare)	1. View 1 (Start prepare)
View 5	2. View 2 (Sync.)	2. View 2 (Sync.)
	3. View 3 (Ramp up/down)	3. View 3 (Ramp up/down)
	4. View 4	4. View 4
	5. View 5 (Default*)	5. View 5 (Default*)
	No manual selection.	No manual selection.
	All three lines show measuring values.	Line 1 shows the text 1…5 (above). Line 2 and line 3 show measurements.

* The default window is automatically selected after the ramping up when the gen-set is in normal operation, e.g. fixed power mode.

View window 3

Display of measured values according to the selections made during configuration.

The V3 display changes with running modes:

First display line indicates running status of the unit. The messages shown in the table in the end of this chapter can be displayed.

Second and third display lines display measured values.

Fourth display line displays the selection line.

Display V3 follows the selection in V1 as follows:

1: View 1: (Start prepare)
2: View 2: (Synchronising)
3: View 3: (Ramp up/down)
4: View 4:
5: View 5: (Default* (when none of the above are in operation))

Windows	V 2	V 3
View 1	Changes automatically between the 5 first views:	Changes automatically between the 5 first views:
View 2		
View 3		
View 4	1. View 1 (Start prepare)	1. View 1 (Start prepare)
View 5	2. View 2 (Sync.)	2. View 2 (Sync.)
	3. View 3 (Ramp up/down)	3. View 3 (Ramp up/down)
	4. View 4	4. View 4
	5. View 5 (Default*)	5. View 5 (Default*)
	No manual selection.	No manual selection.
	All three lines show measuring values.	Line 1 shows the text 1…5 (above). Line 2 and line 3 show measurements.

* *The default window is automatically selected after the ramping up when the gen-set is in normal operation, e.g. fixed power mode.*
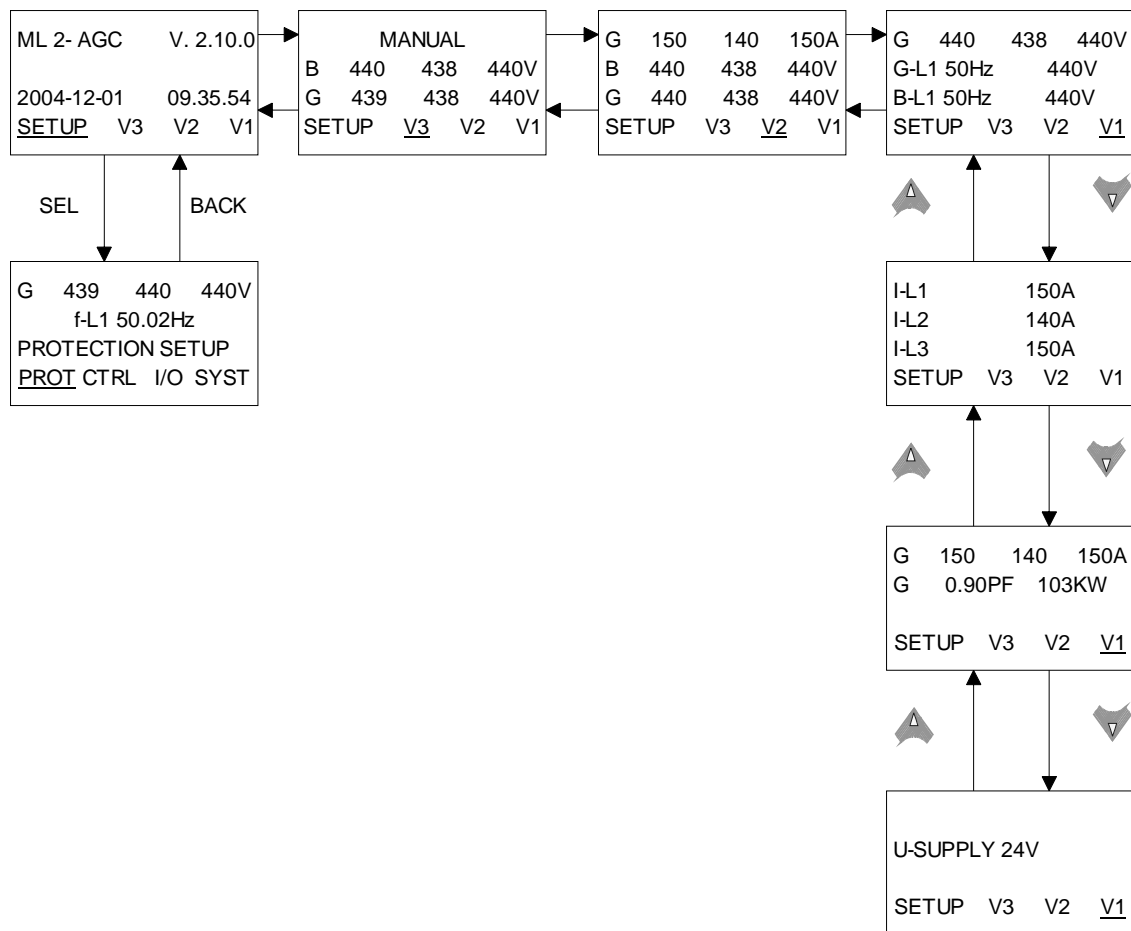
Status line text

This table explains the different messages.

Status text	Condition	Comment
BLOCK		
Simple TEST	The TEST is activated. The gen-set will be started, but it is not allowed to close the generator breaker.	
Load TEST	The TEST is activated. The gen-set will be started, and the generator breaker will be synchronised/closed.	The test will be parallel to mains.
ISLAND MANUAL		
ISLAND SEMI-AUTO		
ISLAND AUTO		
AMF MANUAL		
AMF SEMI-AUTO		
AMF AUTO		
FIXED MANUAL		
FIXED SEMI-AUTO		
FIXED AUTO	If the gen-set is stopped, or if it is running and no other action takes place.	
Peak shave MANUAL		
Peak shave SEMI-AUTO		
Peak shave AUTO		
LTO MANUAL		
LTO SEMI-AUTO		
LTO AUTO		
MPE MANUAL		
MPE SEMI-AUTO		
MPE AUTO		
Fire pump	If the configurable input is active.	
Display locked	If the 'access lock' input is activated, and the user tries to activate one of the blocked keys.	
GB tripped externally	If some external equipment has tripped the breaker, this info. will be shown.	An external trip is logged in the event log.
MB tripped externally	If some external equipment has tripped the breaker, this info. will be shown.	An external trip is logged in the event log.
Power derate	If the 'power derate' function is activated and the nominal power set point has been decreased, the text will appear.	
Idle run	If the 'idle run' function is active. To inform the user that the gen-set will not stop until a timer has expired.	
Compensation frequency	Compensation is active.	To inform the user that there is a reason why the frequency is not at the nominal setting.
Starting DG(s) ##	In power management applications it will be displayed which gen-set ID that will be started.	Requires option G5.
Start gen-set ####s	When the start gen-set set point in peak shaving is exceeded, the text is shown with the countdown of the timer.	
Stop gen-set ####s	When the stop gen-set set point in peak shaving is exceeded, the text is shown with the countdown of the timer.	

View menu example

The following is an example of a configured view menu system. In this example 4 of 15 windows have been configured in view 1.

```
ML 2- AGC      V. 2.10.0          MANUAL                G    150    140    150A        G    440    438    440V
                                B   440    438   440V     B    440    438   440V       G-L1 50Hz        440V
2004-12-01     09.35.54         G   439    438   440V     G    440    438   440V       B-L1 50Hz        440V
SETUP    V3   V2   V1           SETUP   V3   V2   V1      SETUP   V3   V2   V1          SETUP   V3   V2   V1
```

SEL   BACK

```
G    439    440    440V
     f-L1 50.02Hz
PROTECTION SETUP
PROT CTRL  I/O  SYST
```

```
I-L1              150A
I-L2              140A
I-L3              150A
SETUP    V3    V2    V1
```

```
G    150    140    150A
G    0.90PF    103KW

SETUP    V3    V2    V1
```

```
U-SUPPLY 24V

SETUP    V3    V2    V1
```

Mode menu

If the MODE push-button is pushed, a selection of possible running modes appears in the fourth display line.

Using the ◁ and ▷ push-buttons moves the <u>cursor</u>, and the appropriate mode can be selected by pressing the SEL button:

Mode	Description
SEMI	- The display push-buttons (START, STOP, GB ON, GB OFF) are active and can be used by the operator. - The regulators are also active, i.e. the speed control will bring the generator to nominal speed upon start. - When pushing a breaker button for closing, the AGC will synchronise (if allowed) the breaker. When the breaker closes, the controls stop.
TEST	- The unit will start the generator, carry out the test sequence (predefined time period) and stop the generator again. Subsequently, the generator will return to AUTO or SEMI-AUTO mode. The mains breaker will remain closed, and the generator breaker will remain open. NOTE: The test running can be selected to be parallel to the mains and take load to a predefined value.
AUTO	- The unit will automatically carry out the control type selected (AMF, fixed power etc.). - The display control push-buttons (START, STOP, GB ON, GB OFF) are disabled. - If the selected running mode is fixed power, mains power export, load take over or island, timer start/stop (week watch) or binary input, then start/stop can be used.
MAN	- The display push-buttons (START, STOP) are active and can be used by the operator. - The regulators are not active, i.e. speed (and voltage) control has to take place using binary inputs for UP and DOWN control. - The breakers will at no time be able to open or close.
BLOCK	- The unit will not be able to start. BLOCK mode can be selected during standstill and the password is needed to go away from block mode. If the BLOCK mode is selected while the gen-set is running, the mode will have no effect until the gen-set is stopped. To select another mode after the BLOCK mode, the password must be entered.

To return to the other display functions from MODE selection, press the BACK push-button.

5.   Alarm handling and log list

When an alarm occurs, the unit will automatically go to the alarm list for display of the alarm.

If reading of the alarms is not desired, use the BACK push-button to exit the alarm list.

If you decide to enter the alarm list later, use the INFO push-button to jump directly to the alarm list reading.

The alarm list contains both acknowledged and unacknowledged alarms provided that they are still active, meaning that the alarm condition is still present. Once an alarm is acknowledged, and the condition has disappeared, the alarm will no longer be displayed in the alarm list.

This means that if there are no alarms, the alarm list will be empty.

```
G        0        0        0 V
1230  Gen  low-volt  1
UN-ACK     |     2 Alarm(s)
ACK              FIRST  LAST
```

This display example indicates an unacknowledged alarm. The display can show only one alarm at a time. Therefore, all other alarms are hidden.

To see the other alarms, use the △ and ▽ push-buttons to scroll in the display.

To acknowledge an alarm, place the cursor (underscore) under 'ACK' and then press SEL.

To jump to the first (oldest) or the last (youngest) alarm, place the cursor under the selection (FIRST or LAST) and press SEL.

Log list

The log list contains up to 150 events and/or historical alarms.

An event is e.g. closing of breaker and starting of engine. An alarm is e.g. overcurrent or high cooling water temperature.

To enter the log list, press LOG.

To scroll up and down in the list, use the △ and ▽ push-buttons.

It is also possible to go to the first (oldest) logging or the last (youngest) logging by placing the cursor (underscore) under the selection (move the cursor using the ◁ and ▷ push-buttons) and press the SEL push-button.

DEIF A/S reserves the right to change any of the above