mecc alte

POWER FROM WITHIN

DC250 CONTROLLER

SMARTECH
A DIVISION OF MECC ALTE

USER MANUAL

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Table of Contents

1 Foreword

This manual must be kept with care and must always be available for quick reference. The manual must be carefully read and understood in every paragraph by the people who must use the DC250 and who will carry out the normal and periodic maintenance. If the manual is lost or damaged, request a copy from the installer or manufacturer, providing the model, device code, serial number, and year of construction.

2 Safety information

Insufficient knowledge and/or failure to apply safety rules causes accidents during normal operation and/or during maintenance. To avoid accidents, before conducting any operation, read, understand, and follow the precautions and warnings contained in this manual.

This manual uses the following indications:

ATTENTION! It alerts you to a potentially dangerous situation that can cause injury, damage, or malfunction. It also describes the necessary precautions to avoid the danger.

INFORMATION! This indication provides information, clarifications, or clarifications useful for conducting the operation in progress.

3 Maintenance and cleaning.

Only qualified personnel can take care of the maintenance of the DC250, in compliance with the regulations in force, to avoid damage to people or things.

Clean the front panel only with a soft cloth, do not use abrasive products, liquid detergents, or solvents.

4 Information on disposal.

INFORMATION! on the disposal of old electrical and electronic equipment (valid for European countries that have adopted separate collection systems).

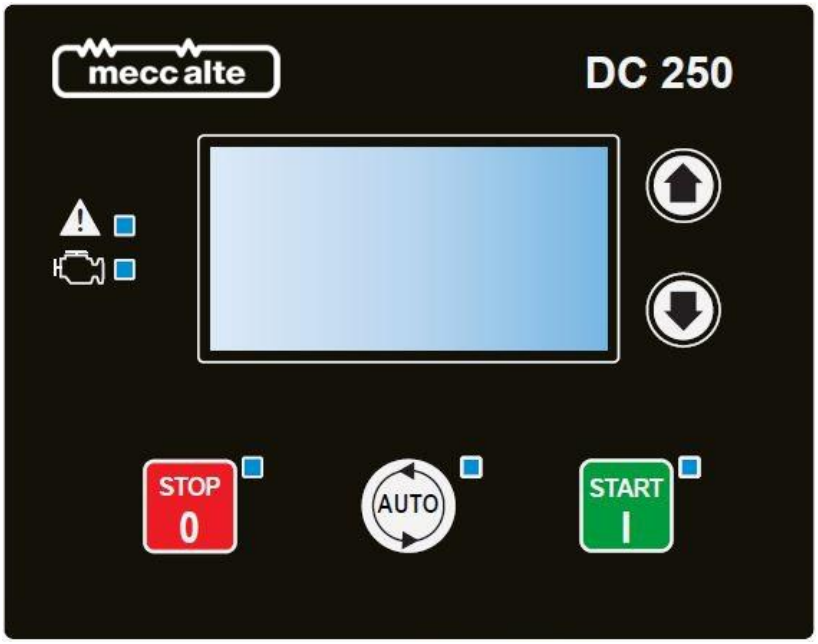
Do not dispose products with a crossed-out wheeled bin symbol with normal household waste. Recycle old electrical and electronic products at a special facility capable of treating these products and disposing of their components. To find out where and how to deliver these products to the place closest to you, contact the appropriate municipal office. Appropriate recycling and disposal help to conserve nature and prevent harmful effects on health and the environment.

5 Definitions

- **ECU** (“Engine Control Unit”): it identifies the electronic engine control unit, which controls the engine operations.
- **CANBUS**: communication interface for the control and diagnostics of the engines equipped with SAE J1939 or MTU MDEC interface.
- **ENGINE**: it identifies a combustion engine (diesel). It can drive a generator, or directly a mechanical load. In the electronic version, it is equipped with an ECU: in this case DC250 can be connected to the ECU via CANBUS.
- **GENERATOR**: driven by the engine, it generates an alternating electrical voltage, which is then converted into a direct voltage (DC). This voltage powers the electrical loads.
- **PMG** (“Permanent Magnets Generator”): it is a type of generator where there is no excitation control system, DC250 can indirectly control the voltage by the engine speed.
- **GENSET** (“Generator Set”): it is the set of engine and generator.
- **LOADS**: it identifies the electrical loads powered by the generator, or the mechanical loads driven by the engine.
- **GCB**: circuit breaker that connects the generator to the electrical loads.
- **CLUTCH**: mechanical device that connects the engine to the mechanical users.
- **AUTO-START**: application where the generator supplies generic electrical loads.
- **DRIVE**: application without the generator: the engine drives the mechanical loads.
- **LIGHTING TOWER**: application focused on the management of groups of lights, powered by the generator.
- **SHUTDOWN**: it indicates an anomaly that makes it impossible for the engine or the GENSET to function. DC250 immediately disconnects the loads from the engine/generator and stops the engine without conducting the cooling cycle
- **DEACTIVATION**: it indicates an anomaly that makes it impossible for the generator set to operate, but which is not dangerous for the engine. DC250 immediately disconnects the loads from the engine/generator, performs the engine cooling cycle (if it is in AUTO mode) and finally stops the engine.
- **PRE-ALARM**: it indicates an anomaly that requires an operator's manoeuvre, but which does not require the disconnection of the loads from the engine/generator or the shutdown of the engine.

6 Main functions

6.1 Front panel



6.2 Signalling lamps

Lamp switched off	Lamp switched off	Lamp blinking
☐	▣	⧈

STOP 0 ☐	▣	It indicates that the operating mode is OFF/RESET.
	⧈	It indicates that you are accessing PROGRAMMING.
	☐	DC250 is in another operating mode.
AUTO ☐	▣	It indicates that the operating mode is AUTO.
	☐	DC250 is in another operating mode.
START I ☐	▣	It indicates that the operating mode is MAN.
	⧈	Indicates that the operating mode is MAN and that the protected start mode is active.
	☐	DC250 is in another operating mode.
⚠ ☐	▣	It indicates that at least one shutdown or one deactivation is active.
	⧈	It indicates that at least one pre-alarm is active.
	☐	There are no anomalies.
☐	▣	Engine running.
	⧈	Engine running, but the generator voltage (or the engine speed) is out of tolerance.
	☐	Engine stopped.

6.3 Multifunction display

6.3.1 LCD backlight

DC250 manages the backlight lamp, switching it off if you do not press any button within a configurable time (P.0492). To turn it back on, just press any button. It is possible to disable the automatic switch off by setting parameter P.0492 to zero.

During the cranking phase of the engine, DC250 automatically turns off the lamp to reduce the consumption of DC250, to make more autonomy available in case of critical conditions of the starter battery. Using parameter P.0493, it is possible to force the lamp to always be on when the engine is running.

6.3.2 Contrast regulation

For a correct visualization of the display according to the ambient temperature conditions, it may be necessary to manually adjust the contrast:

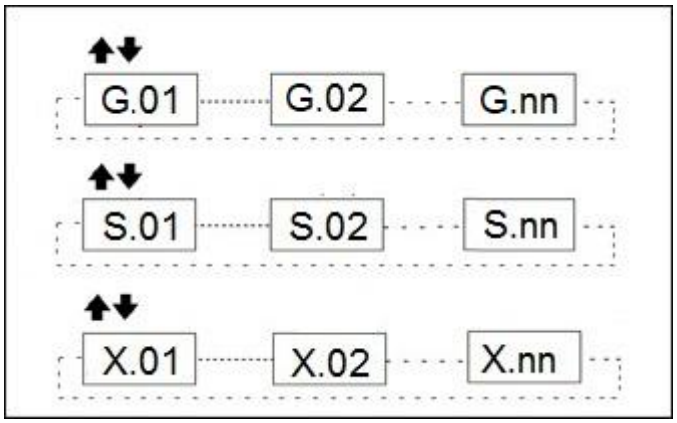
- Press the AUTO + ▼ buttons in sequence to decrease the contrast (lighten).
- Press the AUTO + ▲ buttons in sequence to increase the contrast (darken).

6.3.3 Navigating between modes

The display has different viewing modes, each made up of different pages:

Mode	Icon	Description	Page identifier
PROGRAMMING		Programming	P. XX
STATUS		Status information	S. XX
MEASURES		Engine and generator measurements.	G. XX
HISTORY LOGS		History logs	H. XX

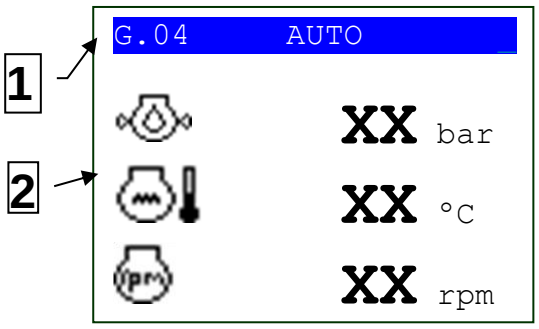
Pressing the ▲ button for at least one second opens the mode selection menu (a window with icons that identify the available modes). With the ▲ and ▼ buttons you can scroll through the list (the icon of the selected mode is in reverse). By keeping the ▼ button pressed for at least one second, DC250 shows the selected mode.



To view the pages within the selected mode, use the ▲ and ▼ buttons.

6.3.4 Structure of the display area

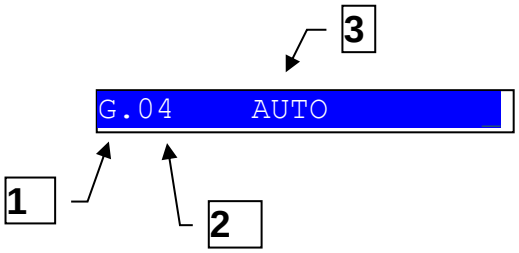
LEGEND:
1 – Status bar
2 – Data area



6.3.5 Top status bar

The top status bar contains information about navigation and status.

LEGEND:
1 – Mode identifier.
2 – Page identifier.
3 – DC250 operating mode.



The mode identifier (1), together with the page identifier (2) allows you to unambiguously identify and refer to a display page. The manuals reference the pages always with the previous combination.

The DC250 operating mode can be OFF, MAN or AUTO. It does not change as pages change.

On the right side, a key icon may appear if:

- A digital input is disabling the front panel commands.
- A digital input is forcing the DC250 operating mode (OFF/RESET, MAN, AUTO), and therefore you cannot use the STOP, MAN and AUTO buttons.

ATTENTION! the "@" symbol may also appear on the right to indicate that DC250 is modifying the non-volatile memory: do not disconnect the DC250 power supply when this symbol is visible, otherwise you risk losing the contents of the memory itself.

6.4 Display modes

6.4.1 Parameters' programming (P.XX)

This paragraph describes the general structure of the programming function and the operating procedure that allows you to view and/or modify the parameters by acting directly from the DC250 keyboard.

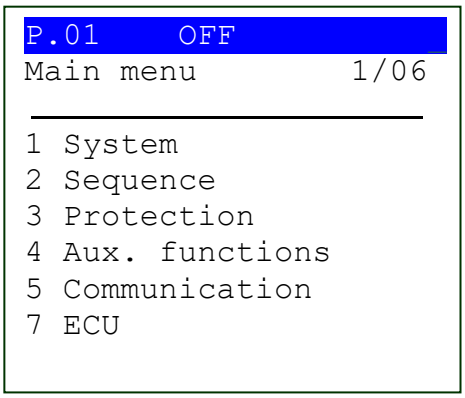
WARNING! incorrect programming of one or more parameters can cause malfunctions or damage to things and/or people. Only qualified personnel can manage parameters' changes. Parameters can be password protected (see par. **Error! Reference source not found.**).

INFORMATION! You can modify the parameters using the DC250 keyboard only if DC250 is in OFF/RESET mode with the engine stopped.

6.4.1.1 Accessing the programming menu

To access the pages allowing parameters configuration, keep the STOP and AUTO buttons pressed for at least one second.

6.4.1.2 Menu selection

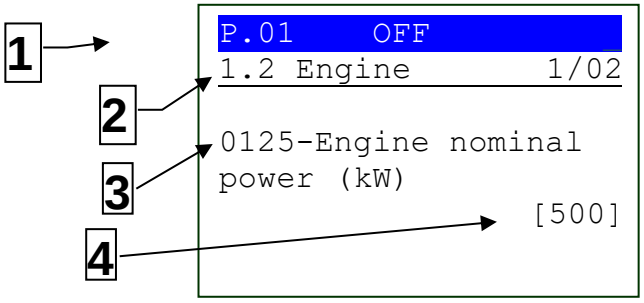


The second line always shows the name of the current menu, followed by the index of the selected submenu with respect to the number of items in the menu. The following lines show the submenus. DC250 highlights the selected submenu in REVERSE. Using the ▲ and ▼ buttons, you can scroll the menus respectively towards the lower and upper index items, in a cyclical way (i.e., pressing ▲ from the first item switches to the last and vice versa).

By pressing the AUTO button, you enter the selected submenu, by pressing the STOP button you exit the menu (returning to the previous menu or exiting programming if you were already in the main menu).

6.4.1.3 Parameters organization

LEGEND:
1 – Status bar
2 – Current menu
3 – Current parameter
4 – Parameter's value



Entering a menu that has no further submenus, DC250 displays the first parameter contained in the menu (see previous figure).

The second line always shows the name of the current menu ("1.2 Engine" in the example). On the right it shows a pair of numbers ("1/02" in the example): the first is the index of the current parameter in the menu, the second indicates the number of parameters in the menu.

Each parameter is associated with a four-digit numeric code ("P.0125" in the example). The fourth and fifth lines show both the numeric code and the description (in English) of the parameter.

The sixth line shows, between square brackets, the current value of the parameter. If DC250 encloses the value in the "<>" symbols, it means that the parameter is password protected and the operator cannot change it.

6.4.1.4 Selecting a parameter

Using the ▼ and ▲ buttons, you can scroll the menu respectively towards the upper and lower index items, in a cyclical way (i.e., pressing ▲ from the first item switches to the last and vice versa). Press the AUTO button to activate the parameter modification procedure (see next paragraph), press the STOP button to exit the menu (returning to the previous menu).

6.4.1.5 Modifying a parameter

You can modify a parameter only if DC250 shows its value between square brackets; if it encloses the value between “<>” symbols, you cannot modify it. In this case, you need to set an appropriate password.

If you have access to the parameter, press the AUTO button: the square brackets that enclose the value start flashing, indicating that the modification phase is in progress. To confirm the new value, press the AUTO button; to abort the modification and return to the original value, just hold down the STOP button for at least one second.

6.4.1.6 Modifying a string parameter

The display highlights (in reverse) the character currently selected in the string. The ▲ ▼ buttons act on the selected character (moving to the next/previous one in the ASCII table or to the one that follows/precedes it by ten positions pressing also AUTO), while the STOP and START buttons allow you to select a single character.

6.4.1.7 Exiting the programming menu

To exit the programming menu, press the STOP button to go back through the menus to the main one and then press it again to exit programming. At the next access to programming, DC250 will show the main menu.

6.4.1.8 Protection passwords

Using three different password levels, you may limit the access to parameter programming. The password levels are (listed in order of priority):

- Manufacturer password (maker).
- Installer password (system).
- End user password (user).

DC250 protects each parameter with one of these passwords. Only the manufacturer can modify a parameter protected by the manufacturer level. The manufacturer and the installer can modify a parameter protected by the installer level. The manufacturer, the installer, and the user can modify a parameter associated with the user level.

The operator who must modify a parameter must first be recognized by DC250 as “manufacturer”, “installer” or “user” by typing the appropriate password in parameter P.0000 (menu “1.1.1 - Authentication", path " 1. System\1.1 Security\1.1.1. Authentication”).

After this operation, the operator will be able to modify the parameters, limited to those he has access to. The entered code will remain stored in P.0000 for 10 minutes from the end of programming. After this time, DC250 automatically resets it, and the operator must type it again to access programming.

If you lose a password, you can reconfigure it by logging in with a higher-level password. In case of loss of the “manufacturer” password, contact Mecc Alte.

6.4.2 Status information (S.XX)

In this mode, DC250 provides information about the system status. It is possible to scroll through the different pages using the navigation buttons ▲ and ▼.

6.4.2.1 S.01 STATUS

This page displays system status information. It contains:

- The DC250 operating mode:
  - : OFF/RESET.
  - : MAN.
  - : AUTO.
- The status of the working sequence of the engine:
  - : engine stopped.
  - : glow plug preheating (DIESEL engines).
  - : fuel solenoid opening.
  - : cranking.
  - : delay between starting attempts.
  - : engine running at idle speed.
  - : delay before supply.
  - : engine running.
  - : cooling down.
  - : stopping.
- The status of the generator voltage (absent, low, high) (not for DRIVE application).
  - : no voltage.
  - : voltage present but out of tolerance (low).
  - : voltage present but out of tolerance (high)
  - : voltage present and in tolerance.
- The status of the loads:
  - AUTO-START application:
    - : GCB circuit breaker closed.
    - : GCB circuit breaker open.
    - : GCB circuit breaker closing.

- : GCB circuit breaker opening.

- DRIVE application:
  - : clutch engaged.
  - : clutch disengaged.
- LIGHTING TOWER application:
  - : at least one group of lights on.
  - : all groups of lights are off.

- The presence of any inhibitions for the connection of loads to the engine/generator:
  - : connection inhibited by contact or because the engine is running to recharge the starter battery.
  - : starting inhibited by command received from the communication ports.

DC250 can also shows a time associated with this information; for example, during the cooling cycle of the engine, the time remaining until the end of that cycle.

6.4.2.2 S.02 DC250

This page shows DC250 specific information:

- Date/time (blinking if not valid).
- Unique alphanumeric identifier (ID Code)
- Software code and version.

6.4.2.3 S.03 COMMUNICATION

This page displays the communication status on the communication interfaces of DC250 (USB, RS485 and CAN BUS).

- USB and RS485: the following icons show the communication status:
  - : communication in progress.
  - : communication not in progress.
- CAN BUS: the status can be:
  - ERROR-ACTIVE: normal operation.
  - ERROR-PASSIVE: errors, but the communication is still in progress.
  - BUS-OFF: DC250 disconnected from the bus due to errors.

DC250 shows the instant counters of transmission/reception errors and the maximum values they have reached. To reset the maximum values (and at the same time force the exit from the BUS-OFF state) you need to:

- Keep the ▼ button pressed: DC250 highlights the counters.
- Press the ▲ and ▼ buttons for five seconds.

6.4.2.4 S.04 DIGITAL INPUTS

This page shows the status of:

- Physical digital inputs.
- Analog inputs used as digital (dashes if not used as digital).
- Virtual digital inputs.

Keep the ▼ button pressed, to change the visualization mode of the inputs:

- LOGICAL STATE: shows the logic level of the input (active or inactive) used in the management of the operating sequence.
- PHISICAL STATE: shows the electrical level (active or inactive, or high or low) present on the input; it can be opposite with respect to the corresponding logical state. Shown in reverse.

6.4.2.5 S.05 DIGITAL OUTPUTS

This page displays the status of the digital outputs. Keep the ▼ button pressed, to change the visualization mode of the outputs:

- LOGICAL STATE: shows the logic level of the outputs (active or inactive) used in the management of the operating sequence.
- STATO FISICO: shows the electrical level (active or inactive, or high or low) present on the output; it can be opposite with respect to the corresponding logical state. Shown in reverse.

6.4.2.6 S.06 ANALOGUE INPUTS

This page displays the electrical measurement of the analogue inputs:

- T.13, T.14, T.15: displays the measured voltage and the corresponding Ω.
- T.09, T.12, T.16: displays the measured voltage.

6.4.2.7 S.07 GENERATOR VOLTAGE REGULATION

This page shows the relevant quantities for regulating the generator voltage:

- The desired voltage. This is the instantaneous reference value, ramping from the real voltage supplied by the generator to the rated voltage (P.0102), with the ramp configured by P.9672.
- The real voltage supplied by the generator.
- The correction command (percentage): DC250 converts it into a speed request (rpm) with parameters P.0713 and P.0714, then sends it to the engine ECU.

The page is not visible for DRIVE applications. DC250 hides it also if the operator has disabled the voltage control loop (P.9673 and P.9674 both at zero).

6.4.3 Generator and engine measurements (G.XX)

In this mode, DC250 shows in a complete way the measurements made on the electrical lines of the generator (if present) and on the various sensors of the engine. It is possible to scroll through the different pages using the navigation buttons ▲ and ▼.

6.4.3.1 G.01 SINGLE LINE DIAGRAM

This page displays the single-line diagram of the system. The diagram differs according to the application, and includes:

- The following measures (if available):
  - The engine rotation speed.
  - The DC voltage of the generator (not for DRIVE application).
  - The DC current of the generator (not for DRIVE application).
  - The power supplied by the generator (not for DRIVE application).
- The engine status is common to all applications, DC250 shows it with the following icons:
  - Stopped.
  - Preheating glow plugs.
  - Opening fuel solenoid.
  - Cranking.
  - Running at idle speed.
  - Running.
  - Cooling down.
  - Stopping (shown also in case of fail to stop).

  Below the icon, when needed, DC250 shows the time remaining until the status change (for example during the engine cooling cycle).
- DC250 shows the status of the generator in the AUTO-START and LIGHTING TOWER applications. The symbol is “empty” with the generator stopped, “empty and flashing” with the generator running but not in the tolerance window, and “full” when the generator is able to deliver.

- AUTO-START
  -  The circuit breaker icon shows:
    - The open/close status.
    - The discrepancy between the actual state of the circuit breaker and the relative command (in this case the two contact points of the circuit breaker flash).
  -  DC250 uses the “full” symbol with loads powered by the generator.
- DRIVE:
  -  The clutch symbol (engaged/disengaged).
  -  The pump symbol identifies a generic mechanical load.
- LIGHTING TOWER:
  - Displays the lamps depending on the configured control outputs:
    -  group of lights switched off.
    -  waiting before switching on a group of lights.
    -  group of lights switched on.
    -  waiting before switching off a group of lights.

6.4.3.2 G.02 ANOMALIES

DC250 automatically shows this page in case of a new anomaly. For each anomaly, it shows:

- A letter which identifies the type:
  - “A”: shutdown.
  - “D”: deactivation.
  - “W”: pre-alarm.
- A three-digit numeric code that uniquely identifies the anomaly. This code flashes if the operator has not yet recognized the anomaly.
- A symbol that identifies the anomaly, for a complete list see the technical manual.

Each anomaly uses two lines of the LCD display. The anomaly shown above is the most recent in chronological order. If there is not enough space to view all the anomalies, DC250 shows only the most recent. To see the others, you need to:

- Press and hold the ▼ button for one second: DC250 selects the first anomaly.
- Use the ▲ ▼ buttons to scroll through all the anomalies.
- When finished, press, and hold the ▲ button for one second.

Anomalies may require showing additional information. For example, anomalies 198 and 199 (cumulative pre-alarms/shutdowns received via CAN BUS from the engine electronic control units) also require the display of the individual diagnostic codes. DC250 shows the additional information relating to anomalies on the last three lines of the display. In case of two or more anomalies, to view the additional information it is necessary to:

- Press and hold the ▼ button for one second.
- Use the ▲ ▼ buttons to select the anomaly.

6.4.3.3 G.03 ENERGY

This page is not visible for the DRIVE application. DC250 also hides it if the operator did not configure the characteristic ratio of the measurement shunt.

Displays the active energy meters (partial and total) managed by DC250 when the generator supplies the loads. DC250 counts active energy only if positive (not in case of an energy inversion). From this page it is possible to reset the partial counter:

- Press and hold the ▼ button for one second: DC250 highlights the counter.
- Press the ▲ and ▼ buttons for five seconds.
- Press and hold the ▲ button to deselect the counter.

Attention: if you configured a password in parameter P.0001 (“user” protection level), you will not be able to reset the counter until you enter this password (login) in parameter P.0000 (“Access code”).

6.4.3.4 G.04 ENGINE 1

It contains the fundamental quantities for the engine management:

-  : Lube oil pressure (bar).
-  : Coolant temperature (°C).
-  : Rotation speed (rpm).

DC250 replaces the not available measures with dashes.

6.4.3.5 G.05 ENGINE 2

It contains other quantities for the engine management:

-  : Starting battery voltage (V) (measured by DC250).
-  : Fuel level in the daily tank (%).
-  : Selected ECU.

DC250 replaces the not available measures with dashes.

6.4.3.6 G.06 ENGINE AUX

It contains other quantities for the engine management, when DC250 acquires them using its analogue inputs. If DC250 acquires them through the CAN BUS connection, it displays them on other pages. DC250 automatically hides this page if none of the following measures are available:

- Rotation speed from magnetic pick-up sensor (terminals T.24…T.25).
- Rotation speed from W sensor (terminal T.26).
- Coolant level (functions AIF.1210 o AIF.1211 for the configuration of the analogue inputs).
- Lube oil temperature (functions AIF.1100 o AIF.1101 for the configuration of the analogue inputs).
- Lube oil level (functions AIF.1200 o AIF.1201 for the configuration of the analogue inputs).

DC250 hides the not available measures.

6.4.3.7 G.07 COUNTERS

This page contains various counters (managed by DC250) concerning the engine:

- : cranks counter (clearable).
- : running hours (clearable).
- T: running hours (total, not clearable).

You can reset the first two counters (individually):

- Keep the ▼ button pressed for one second: DC250 highlights one of the counters.
- Use the ▲ and ▼ buttons to select the counter you want to reset.
- Press the ▲ and ▼ buttons for five seconds.
- Press and hold the ▲ button to deselect the counters.

6.4.3.8 G.08 MAINTENANCE

This page shows the counter for the remaining hours to the next maintenance , managed by DC250 (not resettable). If no maintenance interval is set, it is not visible. Otherwise, DC250 shows it negative if the configured interval has already expired.

6.4.3.9 G.09 FUEL PUMP

DC250 hides this page if the operator did not configure any digital output with the DOF.1032 function ("Fuel pump").

It shows the following information:

- The fuel pump command mode:
  - : MAN-OFF.
  - : MAN-ON.
  - : AUTO.
- The fuel level in the daily tank (only if DC250 controls the pump according to an analogue level). DC250 displays it with a horizontally filled bar, which also graphically shows the pump start/stop thresholds
- Activation requests for the pump, depending on the fuel level:
  - Start required.
  - Stop required.
  - In hysteresis.
- The actual status of the pump, eventually with the time remaining before the next change of status:
  - : pump off.
  - : pump on.

From this page, you can manually select the control mode of the pump:

- Press and hold the ▼ button: DC250 will highlight in reverse the icons identifying the current mode.
- Use the ▲ and ▼ buttons to select the desired mode.
- Confirm by keeping the ▼ button pressed or cancel the change by keeping the ▲ button pressed.

6.4.3.10 G.10 DASHBOARD

This page, as indicated by the name, shows all standard lights (lamps) activated by the ECU. This is information acquired via CAN BUS. If none of this information is available, the page is not visible. The lamps displayed are:

- SPN 1081 ("WAIT TO START LAMP"). It is necessary to wait for the ECU to finish the preliminary operations before starting the engine.
- SPN 624 ("AMBER WARNING LAMP") and SPN3040 ("FLASH AMBER WARNING LAMP"). The ECU signals the presence of a diagnostic code (therefore of a problem) which now does not prevent its operation
- SPN 623 ("RED STOP LAMP") and SPN3039 ("FLASH RED STOP LAMP"). The ECU signals the presence of a diagnostic code (therefore a problem) that prevents its operation

-  SPN 1213 (“MALFUNCTION INDICATOR LAMP”) and 3038 (“FLASH MALFUNCTION INDICATOR LAMP”). Indicates that the engine emissions system has a malfunction or is working outside standard operating conditions. It can be solid or flashing

-  SPN 3697 (“DIESEL PARTICULATE FILTER LAMP COMMAND”) and 6915 (“SCR SYSTEM CLEANING LAMP COMMAND”). The ECU requires the regeneration of the particulate filter (or the cleaning of the SCR system). It is solid if the quantity of particulate in the filter is above the “regeneration request” threshold but below the pre-alarm threshold. It becomes flashing if it is above the pre-alarm threshold

-  SPN 3703 (“DIESEL PARTICULATE FILTER ACTIVE REGENERATION INHIBITED DUE TO INHIBIT SWITCH”) and 6918 (“SCR SYSTEM CLEANING INHIBITED DUE TO INHIBIT SWITCH”). Indicates that an explicit command inhibits the regeneration of the particulate filter (or the cleaning of the SCR system). It is solid (it is a state, not an anomaly). However, if the condition persists for a long time and the level of soot in the filter becomes extremely high, the ECU activates a diagnostic code with a red lamp and stops the engine: in this case the icon becomes fixed or flashing, like the red lamp

-  SPN 3698 (“EXHAUST SYSTEM HIGH TEMPERATURE LAMP COMMAND”). Signals an elevated temperature (real or possible) in the emissions management system (probably because regeneration is in progress or about to start): the ECU could apply a reduction in engine performance (derating). It is solid.

-  SPN 5245 (“AFTERTREATMENT DIESEL EXHAUST FLUID TANK LOW LEVEL INDICATOR”). Indicates a low level of the catalyst liquid tank (DEF - DIESEL EXHAUST FLUID), also called AdBlue. It is solid if the level is below normal, flashing if the low level determines a power derating.

This page also shows all the diagnostic codes activated by the ECU, even if the DC250 is in OFF / RESET.

Note: DC250 forces the visualization of this page every time the ECU activates a lamp.

6.4.3.11 G.11…G.21 CAN BUS

They contain a series of standard information (J1939) acquired via CAN BUS from the ECU. The amount of information available depends on the ECU. DC250 does not display unavailable information. The number of pages displayed therefore depends on the actual information transmitted by the ECU.

6.4.3.12 G.22 EXHAUST GAS THREATMENT

This page relates to the TIER4 (US) and STAGE V (EU) regulations. It is visible only if the ECU connected in CAN BUS transmits information relating to the treatment of the exhaust gases. It shows:

- spn 3701 “Aftertreatment Diesel Particulate Filter Status”.
- spn 3700 “Aftertreatment Diesel Particulate Filter Active Regeneration Status”.
- spn 3699 “Aftertreatment Diesel Particulate Filter Passive Regeneration Status”.
- The status of the manual regeneration of the particulate filter (ECU specific, for example SCANIA).

It also shows any inhibitions that prevent the regeneration of the filter.

Finally, it shows the selected mode with which the DC250 manages the regeneration of the filter:

- Automatic.
- Forced.
- Inhibited.

If the digital inputs do not force this mode, you can manually change it from this page:

- Press and hold the ▼ button for one second: DC250 will highlight the current mode.
- Use the ▲ and ▼ buttons to select the desired mode.
- Press and hold the ▼ button for one second to confirm the new mode, or ▲ for one second to abort the change.

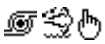
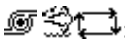
6.4.3.13 G.23…G.27 EXHAUST GAS THREATMENT

This page relates to the TIER4 (US) and STAGE V (EU) regulations. It is visible only if the ECU connected in CAN BUS transmits information relating to the treatment of the exhaust gases. The amount of information available depends on the ECU. DC250 does not show unavailable information. The number of pages displayed therefore depends on the actual information transmitted by the ECU.

6.4.3.14 G.28 ADBLUE PUMP

DC250 hides this page if the operator did not configure any digital output with the DOF.1037 function ("AdBlue pump").

It shows the following information:

- The pump command mode:
  -  : MAN-OFF.
  -  : MAN-ON.
  -  : AUTO.
- The AdBlue fluid level in the daily tank (spn 1761 "Aftertreatment 1 Diesel Exhaust Fluid Tank Volume"). DC250 displays it with a horizontally filled bar, which also graphically shows the pump start/stop thresholds
- Activation requests for the pump, depending on the AdBlue fluid level:
  - Start required.
  - Stop required.
  - In hysteresis.
- The actual status of the pump, eventually with the time remaining before the next change of status:
  -  : pump off.
  -  : pump on.

From this page, you can manually select the control mode of the pump:

- Press and hold the ▼ button: DC250 will highlight in reverse the icons identifying the current mode.
- Use the ▲ and ▼ buttons to select the desired mode.
- Confirm by keeping the ▼ button pressed or cancel the change by keeping the ▲ button pressed.

6.4.3.15 G.29…G.34 CAN BUS

DC250 supports the management of external configuration files that describe the CAN BUS communication with the ECU. These files may include the definition of one or more pages for the display, dedicated to displaying the specific measures/states of that ECU (usually when they do not follow the J1939 standard). For example, if you use the files relating to MAN DATALOGGER, DC250 displays all the measurements acquired by those ECU in a single page.

DC250 provides up to six pages. The configuration file defines the number of measures shown and their description.

6.4.3.16 G.35 EXTERNAL MEASUREMENTS

This page shows the measurements acquired by the analogue inputs configured as AIF.2001 (“Generic sensor page 1”). The operator has the possibility to acquire measurements that are not necessary for the DC250, and to view them on the display.

DC250 shows one measure per row: it shows the text configured for the analogue input (P.4010 for the T.13 input), followed by the measure.

6.4.4 Historical archives (H.XX)

DC250 makes periodic or event-based recordings, partially configurable with the programming parameters. Note: DC250 blocks the recordings if it is in OFF/RESET mode or if any shutdown or deactivation is active.

DC250 shows the historical archives on its display and allows downloading them via PC through the communication ports.

DC250 manages four types of archives:

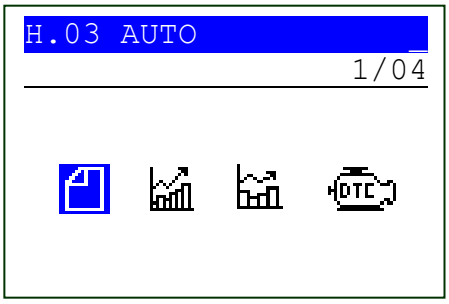
#	Description	Icon	Maximum number of records
1	Events.		64
2	Fast periodical recordings.		42
3	Slow periodical recordings.		64
4	DTC-ECU.		16

To show the archives, you must

- Press the ▲ button for at least one second to display the page for selecting the display mode.
- Select the icon  with buttons ▲ e ▼.
- Press and hold the ▼ button for one second.

After this operation, DC250 shows the page described in the next paragraph.

6.4.4.1 Archive selection



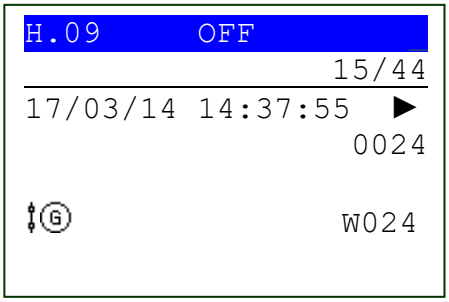
The first row always shows the index of the selected archive and the number of available archives. The following rows shows the icons associated with the available historical archives.

DC250 highlights the selected item (REVERSE). Use the ▲ and ▼ buttons to select the desired historical archive.

Hold down the ▼ button for one second to access the selected archive. To return to this page from the selected archive, hold down the ▲ button for one second.

6.4.4.2 Events pages

To display each event, DC250 uses at least three display pages: if the event displayed is one of the twenty-one most recent anomalies, the pages used become four or five. The pages have the following format:



The second line shows the index of the currently displayed event (15) with respect to the total events stored (44). The third line shows the recording date/time; on the right it also shows two arrows that indicate the availability of other pages on the right and left of the current page for the current event. The following lines show different information based on the selected page.

- The first page displays the numeric code of the event (“0024” in the example) and one or more icons that identify the event (“W024 GCB not open”).
- The second page shows the system states at the recording time: DC250 operating mode, the engine and generator states (the latter not for the DRIVE application).
- The third page shows the status of the GCB circuit breaker or of the clutch at the recording time.
- See the next chapter for the description of pages from fourth to fifth.

The most recent event is the one associated with the highest number. Using the ▲ and ▼ buttons, you can cyclically scan all the recordings.

By holding down the ▼ button for one second, DC250 activates the navigation between the pages related to the single event (the numbers that identify the event and the number of stored events start flashing). At this point, using the ▲ and ▼ buttons, DC250 shows cyclically all the pages of the selected event. To be able to select another event, press and hold the ▲ button for one second.

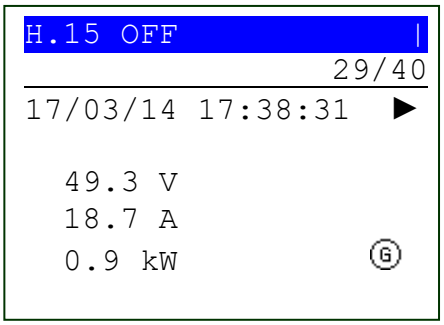
6.4.4.3 Pages for the periodical recordings

With a rhythm configurable through parameters P.0442 (“interval for fast periodical recordings – sec”) and P.0443 (“interval for slow periodical recordings - min") DC250 records the following analogue quantities:

- Starter battery voltage, rotation speed, coolant temperature, oil pressure and fuel level.
- Generator voltage, current and power. **DC250 hides this page for DRIVE applications.**

Each recording is also associated with its own date and time. DC250 replaces unavailable quantities with dashes on the display.

DC250 uses one/two display pages for displaying the information. The pages have the following format:



The second line shows the currently displayed record (29) out of the total of records (40). The third line shows the recording date/time; on the right it also shows two arrows indicating the availability of other pages on the right and on the left of the current page for the current record. The following lines show different information based on the selected page (see above).

The most recent entry is the one associated with the highest number. Using the ▲ and ▼ buttons, you can cyclically scan all the recordings.

Keep the ▼ button pressed to activate the navigation between the pages linked to the single recording (the number that identifies the recording and that of the stored recordings start flashing). At this point, use the ▲ and ▼ buttons to cyclically scan all the available pages. To be able to select another recording, press and hold the ▲ button.

6.4.4.4 Archives for fast periodical recordings

DC250 records in the fast periodical archive with a rhythm configurable through parameter P.0442 (“interval for fast periodical recordings – sec”) and by default equal to 60 seconds. This archive has a capacity of forty-two records. At each subsequent recording, DC250 overwrites the oldest one.

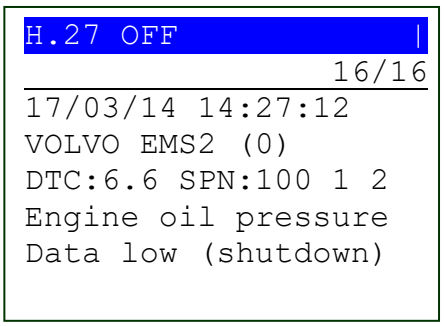
6.4.4.5 Archives for slow periodical recordings

DC250 records in the slow periodical archive with a rhythm configurable through parameter P.0443 (“interval for slow periodical recordings – min”) and by default equal to 30 minutes. This archive has a capacity of sixty-four records. At each subsequent recording, DC250 overwrites the oldest one.

6.4.4.6 Pages for diagnostics codes of ECUs connected in CAN BUS (DTC).

DC250 records the diagnostic codes that the ECU sends on the CAN BUS line. The diagnostic message consists of the DTC and SPN fields, and of the description of the anomaly. This archive has a capacity of sixteen records. At each subsequent recording, DC250 overwrites the oldest one.

DC250 uses just one pages for each diagnostic code.



The second line shows the currently displayed record, with respect to the total number of records (maximum records are sixteen). The third line shows the recording date and time. The fourth line identifies the ECU that activated the diagnostic code. The fifth line shows the diagnostic code:

- DTC (Diagnostic Trouble Code): it is a non-standard diagnostic code, specific to the connected ECU. You can find it in the engine technical manual (in the example, the code “6.6” in the engine technical manual will describe the low oil pressure problem).
- SPN (Suspect Parameter Number): it is a standard numerical code that identifies the part of the engine on which the problem occurred (in the example “100” identifies the measurement of the oil pressure)
- FMI (Fault Mode Identifier): it is a standard numerical code between 0 and 31 that identifies the type of problem (in the example “1” indicates a too low value, such as to require the stop of the engine).
- OC (Occurrence Count): it indicates the number of times the ECU activated this diagnostic code (in example “2”).

In addition, if DC250 knows the combination of the SPN and FMI codes (or the DTC code), it also shows a textual description of the problem.

The most recent entry is the one associated with the highest number. Using the ▲ and ▼ buttons, you can cyclically scan all the recordings.

6.4.4.7 Exiting the historical archives visualization

To exit the archive view, press the ▲ button until you go back to the page allowing selecting the display mode.

7 Principles of operation

7.1 Applications

DC250 can manage three different applications. You can select the application with parameter P.0802 (“Application type”):

- AUTO-START (P.0802 = 0): normal generator set, consisting of an engine, a DC generator and eventually a GCB circuit breaker.
- DRIVE (P.0802 = 11): DC250 is prepared to manage only the engine (there is no DC generator). Instead of the GCB circuit breaker, DC250 can manage a clutch.
- LIGHTING TOWER (P.0802 = 12): normal generator set (consisting of an engine and a DC generator), dedicated to the management of a LIGHTING TOWER. DC250 does not manage the GCB circuit breaker, but instead can manage up to eight commands for switching on and off the various groups of lights.

7.2 Operating mode

DC250 manages three operating modes:

- OFF/RESET: DC250 stops the engine, resets all the anomalies, and allows access the programming to change the parameters
    - AUTO-START: DC250 opens the GCB circuit breaker to disconnect the loads from the generator.
    - DRIVE: DC250 disengages the clutch to disconnect the engine from the loads.
    - LIGHTING TOWER: DC250 switches off all the group of lights.
- MAN: the operator manages starting and stopping of the engine (DC250 does not automatically perform these operations): since the protections are active, however, DC250 can automatically stop the engine (after disconnecting the loads) if needed. The operator cannot access the programming.
    - AUTO-START: the operator manually manages the GCB circuit breaker, but DC250 can automatically open it if needed.
    - DRIVE: the operator manually manages the clutch, but DC250 can automatically disengage it if needed.
    - LIGHTING TOWER: the operator manually manages the groups of lights, but DC250 can automatically switch all of them off if needed.
- AUTO: DC250 fully manages the starting and stopping of the engine, and the management of the GCB circuit breaker, of the clutch, or of the groups of lights (the operator cannot intervene). All protections are enabled. The operator cannot access the programming.

The operator can select the operating mode in three ways:

- Using the DC250's “STOP”, “AUTO” and “START” buttons. The operator must press the button for at least half a second to change the mode. DC250 disables the buttons if at least one of the inputs described in the following point exists and is active (in this case, it shows a key icon the first line of the display).
- Using one or more digital inputs configured with the following functions:
    - DIF.2271 “Remote OFF”.
    - DIF.2272 “Remote MAN”.
    - DIF.2273 “Remote AUTO”.

  The activation of one of these inputs forces the DC250 operating mode, and it is no longer possible to use the buttons on the panel and not even the commands from the communication ports to change it (the first line of the display shows a key icon). When none of these inputs are active, it becomes possible again to use the buttons and commands from the communication ports to change the operating mode.
- By sending Modbus commands through the communication ports.

7.3 Manual commands

7.3.1 Starting the engine

To manually start the engine, the operator must press the START button.

If DC250 is not in MAN, START must be held down for at least half a second: DC250 first forces MAN mode and, if the protected start mode is not enabled, it also activates the engine start sequence.

The protected start mode can be selected with bit two of parameter P.0495. When enabled, the operator cannot switch to MAN and start the engine with a single press of the START button, but must:

- Press START for at least half a second to force the MAN mode. The MAN lamp flashes to indicate that the protected start mode is active.
- Release the START button.
- Press START again to start the engine.

DC250 supports two different manual starts:

- Completely manual (bit one of P.0495 OFF): the start attempt ends when the operator releases the START button (or when the engine starts). The operator must then hold START pressed until the engine starts.
- Semi-automatic (bit one of P.0495 ON): the start attempt ends after P.0210 seconds (or when the engine starts). The operator can then immediately release the START button

7.3.2 Connecting the loads to the generator or to the engine

After starting the engine, the operator can again use the START button to connect the loads to the engine or to the generator (function enabled if bit 6 of parameter P.0495 is OFF):

- AUTO-START: DC250 closes the GCB circuit breaker.
- DRIVE: DC250 engages the clutch.
- LIGHTING TOWER: each time the operator presses the START button, DC250 switches on a group of lights (respecting the configured timings). If the operator holds the START button down for two seconds, DC250 turns on all groups of lights.

7.3.3 Disconnecting the loads from the generator or from the engine

Before stopping the engine, the operator can use the STOP button to disconnect the loads from the engine or generator (function enabled if bit 6 of parameter P.0495 is OFF):

- AUTO-START: DC250 opens the GCB circuit breaker.
- DRIVE: DC250 disengages the clutch.
- LIGHTING TOWER: each time the operator presses the STOP button, DC250 switches off a group of lights (respecting the configured timings). If the operator holds the STOP button down for two seconds, DC250 turns off all groups of lights

7.3.4 Stopping the engine

After disconnecting the loads from the engine or from the generator (if bit 6 of parameter P.0495 is OFF), the operator can stop the engine by pressing the STOP button. If the operator releases the button immediately, DC250 stops the engine but remains in MAN, if it is held down for at least half a second, DC250 switches to OFF/RESET mode.

7.3.5 Silencing the buzzer

When it activates an anomaly, DC250 also activates the buzzer (it will turn off after P.0491 seconds). The operator can turn off the buzzer in advance by pressing any button.

7.3.6 Acknowledging anomalies

When it activates an anomaly, DC250 makes the relative numerical code flashing on the display. The flashing indicates that the operator has not yet acknowledged the problem. Until it is acknowledged, DC250 keeps the anomaly on the display, even if the cause is no longer present. The operator can “acknowledge” the anomalies by pressing any button (after silencing the buzzer): the numeric code on the display stops flashing.

7.3.7 Resetting anomalies

Shutdowns and deactivations require an explicit reset procedure by the operator. Without it, the operator will no longer be able to restart the engine. To reset the anomalies, the operator must force the OFF/RESET mode by pressing the STOP button for half a second.

7.3.8 Manual commands for the fuel pump

See paragraph 0.

7.3.9 Manual commands for the AdBlue fluid pump

See paragraph 6.4.3.14.

7.3.10 Manual command for the particulate filter regeneration

See paragraph 6.4.3.12.

7.3.11 Setting date/time

The operator can change the DC250 date/time using the programming parameters in menu 4.7.1. See paragraph **Error! Reference source not found.**.

7.4 Energy saving mode

This mode is useful for limiting the discharge of the engine starting battery with the system stopped. DC250 turns off and minimizes current consumption. To enable the energy saving mode, set a value other than zero in parameter P.0590 (“Delay before energy saving”).

To activate the energy saving mode you need to:

- Stop the engine.
- Disconnect the communication ports.
- Force DC250 in OFF/RESET mode.

After the time configured in P.0590, DC250 automatically activates energy saving: the LCD display and all the lights go off. You can also manually force this mode by pressing and holding the STOP button for at least five seconds.

You can exit the energy saving mode in two ways:

- By pressing the START button.
- By changing the status of the digital input T.17 (see P.0599).

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