ENGINE PROTECTION AND CONTROL UNIT

DIP-337

Performs control and protection functions for a diesel engine. Connect the protection and control unit to an external starter key. Enables manual adjustment of the engine rpm and stopping if a fault occurs.

USER'S MANUAL

ELCOS® srl
Tel. +39 0521/772021 Fax +39 0521/270218
E-mail: info@elcos.it - https://www.elcos.it

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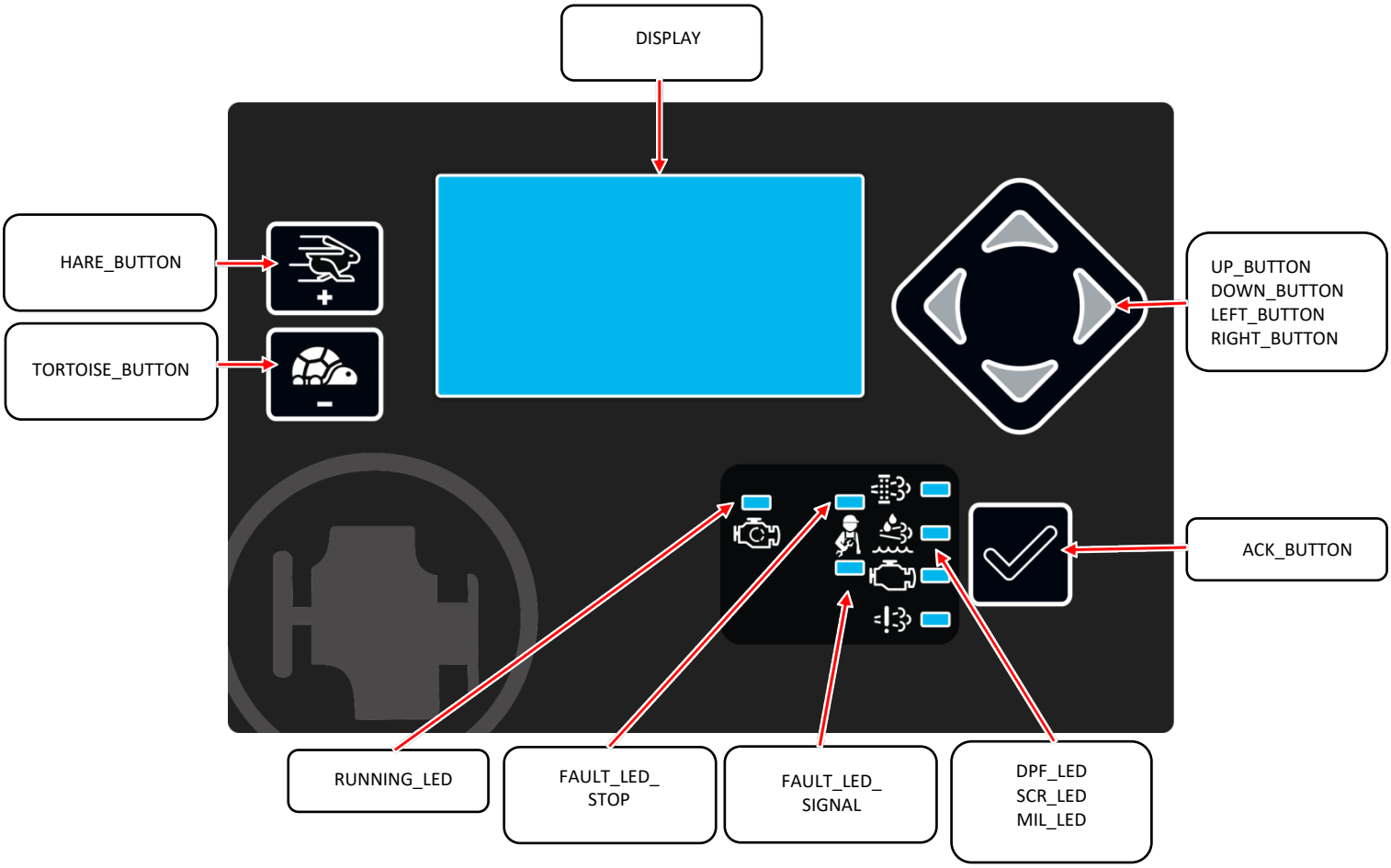
CHRONOLOGY OF MANUAL REVISIONS

Date	Revision	Description	Page
10/12/2021	1.00	First revision.	
04/02/2022	2.00	Added management of electronic stage III engines	

INSTRUCTIONS IN BRIEF



UP_, DOWN_, RIGHT_ and LEFT_BUTTON..... Used to browse display menus. They silence the alarm.

HARE_, TORTOISE_BUTTON..... To accelerate and decelerate the engine. When the control unit is on, the buttons are always enabled, even when the engine is stopped.

ACK_BUTTON ..... Confirms the action.

STOP_FAULT_LED ..... Flashing light points to the presence of a fault that causes a stop; steady light indicates a RED STOP fault active in the ECU.

SIGNAL_FAULT_LED..... Signals the presence of a fault that does not cause a stop; steady light indicates an AMBER WARNING fault active in the ECU.

RUNNING_LED..... Running engine detected by the control unit.

SCR_LED ..... Indicates SCR system faults.

DPF_LED ..... Indicates DPF system faults.

MIL_LED ..... Indicates an engine derate due to a problem with the SCR or DPF.

EXH_LED..... Indicates faults on the regeneration system for the anti-pollution systems.

GENERAL DESCRIPTION

The unit makes it possible to start and stop a diesel engine via an externally connected starter key. Through the front buttons, it can manage a linear actuator used to vary the diesel engine's rpm.
If a fault occurs, the control unit stops the engine. It can stop either with solenoid valve or electromagnet.
It can work with engines fitted with CAN Bus SAE J1939 protocol ECUs.
Functions can be managed easily thanks to the messages displayed. Pop-up messages highlight statuses in progress and display in text form the faults or pre-alarms triggered that could stop the engine.

INSTRUMENTS

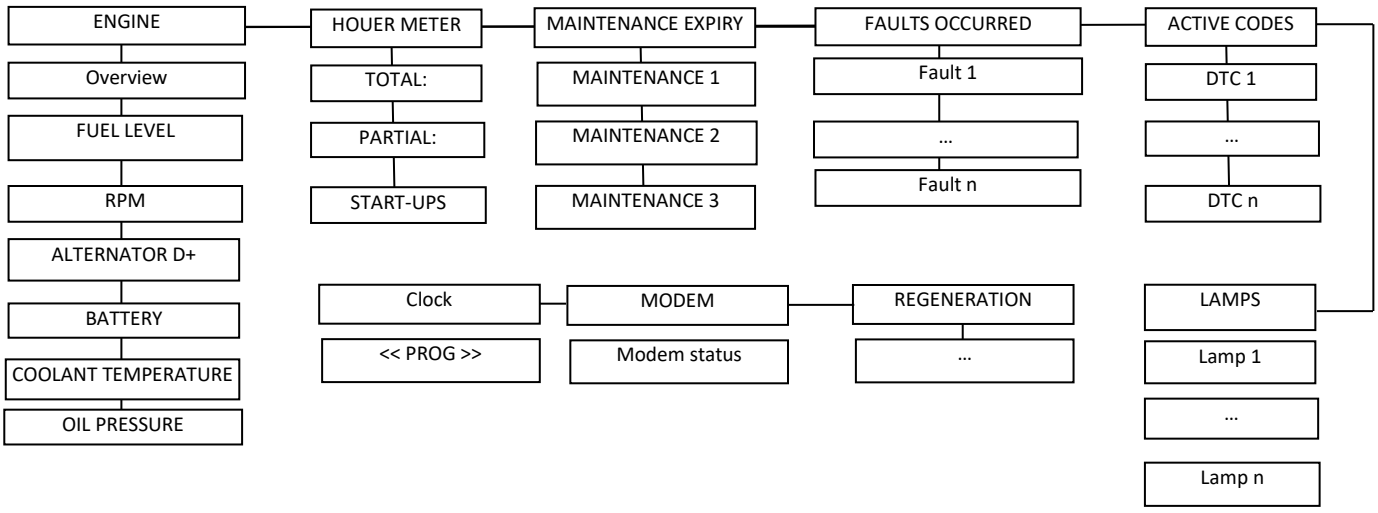
The control unit has a backlit 128 x 64 dot graphic display. It can display multiple instruments and provides access to the programming mode.
It is used to view the following instruments:

- Tank fuel level [%].
- Engine tachometer [RPM].
- Engine temperature in [°C] or [°F] (the instrument is disabled by default).
- Engine oil pressure in [bar], [kPa] or [psi] (the instrument is disabled by default).
- Battery voltage [V].
- D+ voltage (pre-excitation alternator) [V].
- Total hour-meter [hh:mm].
- Partial hour-meter [hh:mm].
- Start-ups count [n].
- Maintenance expirations.
- Calendar clock.

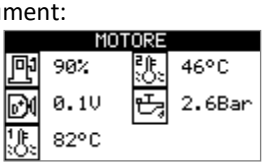
In the event of a fault, the display presents the relevant fault message. If the fault stops the engine, the STOP_FAULT_LED lights up; if the fault is only a pre-alarm, the SIGNAL_FAULT_LED lights up.

NAVIGATION

The instruments are collected in uniform groups, as shown below:



To move between instrument groups, use the RIGHT_BUTTON and the LEFT_BUTTON. To move between instruments inside a group, use the UP_BUTTON and DOWN_BUTTON. If an instrument is disabled or inactive, it is not displayed.
E.g.:
Engine, overview and details instrument:

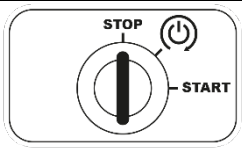
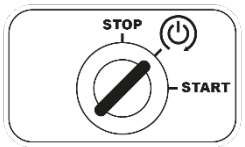
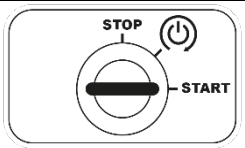


OPERATION

STARTER KEY (to be installed externally)

Used to:

- **Switch on the control unit.** When the key is moved to the first position, the unit will turn on, run an LED light test and check for the presence of any faults.
- **Start the engine.** After turning on the unit, moving the key to the second position will start the engine. If faults are causing a stop, the unit will not excite the diesel solenoid valve.
- **Stop the engine.** When the engine is running, moving the key to the zero position will stop the engine.

STARTER KEY	
	• Rest • Manual stop • Fault reset
	• Control unit power supply • LED light test • Settings • Glow plug activation
	• Engine start-up

ENGINE PROTECTIONS

Engine protections are enabled 20 seconds after the end of the start-up impulse and, in any case, 1 minute after the key has been moved to the first position. When protections are enabled, the message "ACTIVE PROTECTIONS" will appear briefly on the display. Faults of the engine protection probes are indicated by the **ALARM** LED, which lights up red if the fault causes a stop of the engine and yellow if the fault does not cause a stop.
See list of engine faults or alarms.

EMERGENCY STOP

This is available in all operating modes. It is possible to install (hook mount) one or more buttons. Stopping is immediate, without engine deceleration; it activates the general alarm and the related message is displayed.

 Do not use the emergency button in combination with a stopping system that is not energized while running.

STOPPING SYSTEMS

Stopping can be achieved in two ways:

- With the solenoid valve or electromagnet energized when the engine is running and de-energized when the engine is stopped (default setting).
- With the electromagnet de-energized when engine is running and energized when it is stopped, remaining in this condition for the entire [STOPPING TIME] after engine not running has been detected.
- For ECU-managed engines with electronic injection system, removal of the ignition signal causes the stop.

GLOW PLUG PREHEATING

Activation of the glow plug output is adjustable — from a minimum of 0 seconds (command off) to a maximum of 60 seconds. The operator can start the engine once activation has finished. Glow plug post-heating can also be managed, i.e. maintaining output live for a set amount of time, even after the engine has been started (see section on programming).

GENERAL ALARM

The general alarm can be obtained by installing a signal at the appropriate alarm terminal. It can be programmed so that it is always on or remains on for a specific amount of time. It trips whenever the control unit detects a fault. Pressing one of the arrows silences the alarm.

ENGINE RUNNING DETECTION

Engine running is detected by the voltage and by the frequency of the battery charger alternator (permanent or pre-excitation magnets). As an alternative to the charging alternator, it is possible to use a magnetic (variable reluctance) pick-up. In engines managed by an injection control unit, the detection is based on the engine rpm transmitted by the control unit.
Engine running sources are adjustable (thresholds and times) and can be disabled. Once detected, the RUNNING_LED lights up.

TACHOMETER CALIBRATION

To calibrate the tachometer, access the programming mode ENGINE > ALTERNATOR CHARGES > ALTERNATOR W > CALIBRATION. If pick-up is being used in place of the charger alternator to detect the engine RPM, calibration is under the following menu ENGINE > PICK-UP > CALIBRATION.
There is no need to calibrate the tachometer in engines managed by the injection control unit because the RPM is read via the CAN Bus line.

PREVENTIVE MAINTENANCE

To make maintenance to the engine unit as easy as possible, three scheduled maintenance programs can be set up. When the event occurs, a fault is enabled that indicates that the programmed expiry has been reached; these signals cannot be cancelled in the same way as other faults, but must be restored individually. It is possible to program a stop at the maintenance due date.
Programmed expiries can be associated with:

- MOTOR HOURS: motor running hours.
- RUNNING HOURS: hours of operation of the control unit. See MENU>DATA>DEVICE>Time TIME ON
- CALENDAR

The message displayed can be personalised.
To ease maintenance, it is possible to insert the date the system was commissioned under MENU> MAINTENANCE> COMMISSIONING; this is displayed under the DATA>INFO section in the programming menus.

ENGINE

It can manage conventional engines or engines managed by an electronic injection control unit that supports the CAN BusJ1939 protocol. Conventional engines managed are:

- DIESEL

In diesel engines, the function-output GLOW PLUGS (glow plug) is used to pilot the engine's PREHEATING and POST-HEATING (pre-heating and post-heating, respectively).

- PETROL

In petrol engines, the function-output PETROL STARTER is used; this activates during even-numbered start-up attempts (2, 4, etc.).

ENGINE RPM MANAGEMENT

Two function-outputs are available for conventional engines: ACCELERATE and DECELERATES (accelerate and decelerate, respectively). Outputs K1 and K2 can be associated with such function-outputs and pilot the VAR ELCOS device or other devices. The speed variations are obtained through impulses followed by pauses.
In electronic injection engines, relevant commands are sent via CAN BUS to obtain the variation.

The variation of the rpm can be managed in the following ways:

- **KEYS**

In KEYS mode, the operator can press the HARE_BUTTON or TORTOISE_BUTTON to manually accelerate or decelerate the engine until it reaches the desired rpm.

- **SETPOINT**

In SETPOINT mode, the operator can press the HARE_BUTTON; this causes the control unit to accelerate the engine until it reaches the set reference speed (SETPOINT) in a specific programmable time.

By pressing the TORTOISE_BUTTON the control unit decelerates the engine until the minimum is reached.
Reference RPMs can be programmed from the menu ENGINE RPM MANAGEMENT > SETPOINT.

- **ENGINE SPEED 1-2**

In ENGINE SPEED 1-2 mode, pressing the TORTOISE_BUTTON will activate the function-output ENGINE SPEED 1-2, which remains in the excited state until the HARE_BUTTON is pressed. After starting the engine with the key, the function-output gets excited. Power to this function-output is cut when the key is moved to OFF or if a fault stops the engine.

PROGRAMMABLE INPUTS

The activation parameters of inputs 30, 41, 42, 51 and 52 are fully programmable for the closing delay or CLOSING DELAY, opening delay or OPENING DELAY, and type of cut-in or INTERVENTION (ACTIVE CLOSED or ACTIVE OPEN- active closed and active open, respectively); the inputs recognise closing towards the negative pole (ground). The input can be addressed to a function-input or associated with a fault or FAULT. In the second case, FAULT TEXT, ACTIVATION, STOP and MEMORY (fault text, activation, stop and storage, respectively) can also be programmed.
If several inputs are associated with a function-input, the latter will be active when at least one input is active.
Following is the complete list of the functions-input:

FUNCTION-INPUT	BRIEF DESCRIPTION
-----	No association.
FAULT	Input associated with a fault
OIL PRESSURE SWITCH	Engine oil pressure switch input.
ENGINE THERMOSTAT	Engine thermostat input.
CONTACT W FUEL	No fuel contact input
LOW FUEL PRESS	Fuel pressure switch input
REMOTE HARE	Remotes the LEPRE button
REMOTE TURTLE	Remotes the TORTOISE button
PROTECTION INHIBITION	Inhibits the engine protections
FAULT RESET	The faults are restored
LIMIT TORQUE/POWER	Limits the torque/power of SCANIA engines

See the programming table for factory settings.

PROGRAMMABLE OUTPUTS

Outputs 6, 19 and 70 are 'positive closing' RELAYS. Output 15 is a RELAY closing on terminal 4A. Outputs K1, K2 and K3 are RELAYS closing on COM. FUNCTION-OUTPUT functions and "FAULTS" faults can be associated with each output. The output is activated (the corresponding relay is closed) when the function-output or associated faults are active.
Following is the full list:

FUNCTION-OUTPUT	BRIEF DESCRIPTION
----	Not active
"KEY"	Positive before the start-ups; remains positive for the period the engine is running and deactivates after the engine has turned off.
"GLOW PLUGS"	Manages pre-heating glow plugs.
"GENERAL ALARM"	Positive if a general alarm is active; deactivates when silenced.
"PETROL STARTER"	Petrol engine STARTER management; activated during EVEN-NUMBERED start-ups in the sequence.
"ENGINE SPEED 1-2"	The output activates when the TORTOISE_BUTTON is pressed and deactivates when the HARE_BUTTON is pressed.
"FAULTS CAUSING STOP"	Faults causing stops have occurred.
"FAULTS WITHOUT STOP"	Faults not causing stops have occurred.
"NO ALARMS"	No faults present.
"ENGINE RUNNING"	Activates the output and signals that the engine is actually running.
"ENGINE ON DELAYED"	Signal activated after the engine starts running and engine protections are active.
"ACCELERATE"	Active when the engine is accelerated
"DECELERATES"	Active when the engine is decelerated
"ACTUATOR ENABLING"	Active when the engine is accelerated or decelerated
MODEM POWER SUPPLY	Supplies the GSM modem when the control unit is active; turns it off when it goes into standby mode

See the programming table for factory settings.

ECU-EQUIPPED ENGINES

When an ECU-equipped engine is used, the control unit dialogues with it in order to:

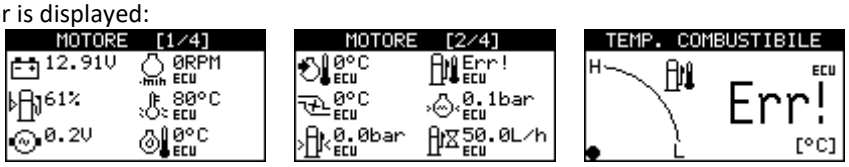
- Adjust the engine rpm
- Gather the values read (temperature, RPM, pressures, etc.)
- Gather active engine fault codes.

The control unit supports different types of engines, selected via the parameter in MENU > ENGINE ECU > ENGINE TYPE

ENGINE TYPE	SUPPORTED ENGINES
NO CAN BUS	Conventional engines without engine ECU
SAE J1939 GENERIC	Generic engine with ECU compliant with standard SAE J1939
JOHN DEERE	JOHN DEERE 4000, 6000
PERKINS 110X/220X	110X, 220X
SCANIA	Scania Stage 3 variable speed engines
SCANIA G.E.	Scania Stage 3 fixed speed engines
KOHLER	2504TCR
DEUTZ EMR2/EMR3	Engines equipped with control units EMR2, EMR3
FPT NEF/CURSOR	NEF45, NEF67, CURSOR
VM R756 IE3	R756 IE3
YANMAR	3NTV88F
HATZ	3H50T
KOHLER STAGE V	Kohler KDI 2504TCR Kohler KDI 1903TCR Kohler KDI 3404TCR
FPT DM1 STAGE V	FPT engines with BOSCH MD1CS069 engine ECU
YANMAR STAGE V	Yanmar 4TNV98CT
DEUTZ STAGE V	Deutz TD 2.9 L4 Deutz TD 3.6 L4

ECU READINGS

If the ECU reads an instrument, it is indicated; in the example, the battery voltage, level of fuel and D+ voltage are read by the control unit.
If an engine instrument is disabled in the ECU, it is not displayed.
If in error status, the error is displayed:

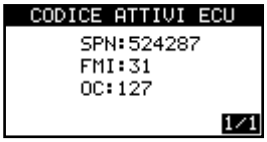


The instrument can be disabled and greyed out even if the ECU returns a correct value.
The summary table is provided below:

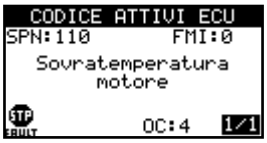
Symbol	Parameter	Source	UM
	RPM	ECU: spn 190	RPM
	Engine temperature	ECU: spn 110	°C/°F
	Oil pressure	ECU: spn 100	BAR/kPa
	Fuel level	In Float switch	%
	Battery Voltage	Voltmeter	V
	Alternator voltage	Voltmeter	V
	Intake temperature	ECU: spn 105	°C/°F
	Instant consumption	ECU: spn 183	l/h
	Fuel temperature	ECU: spn 174	°C/°F
	Engine torque	ECU: spn 513	%
	Engine load	ECU: spn 92	%
	Intercooler temperature	ECU: spn 52	°C/°F

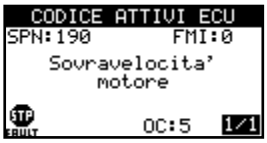
FAULT CODES ACTIVE

The ACTIVE CODES instrument group shows faults detected by the engine's ECU. The LEDs do not flash but are steady-on, in line with the RED STOP and AMBER WARNING signals of the DM1 message. The representation is as follows:



Some ECU faults are translated:





In this case, the icon on the lower left corner indicates the status of the RED STOP and AMBER WARNING signals sent by the DM1 command. Fault translations are:

SPN	FMI	FAULT
100	1	Low engine oil pressure
110	0	Engine overtemperature
190	0	Engine overspeed
111	1	Low coolant level
4781	15	Performance limit 50%
4781	16	Performance limit 70%
5838	31	Impeded EGR valve

The faults will be cleared by turning the key to the 0 position. NO-MEMORY faults reset autonomously when the fault event deactivates.

RPM MANAGEMENT FOR SCANIA FIXED SPEED ENGINES

Mode KEYS

Turning the key to START will start the engine at idle speed. Pressing the HARE button for 3 seconds will bring the speed to 1380 RPM; quick presses of the HARE button will increase the RPM by a value that can be set via the parameter STEP up to a speed of 1680 RPM. Pressing the HARE button again for 3 seconds will increase the speed to 1720 RPM; with quick presses, the speed can be taken to a maximum of 1920 RPM. The TURTLE button behaves in the same way for deceleration.
Turning the key to STOP will stop the engine.
Switching from the 1500 RPM range to the 1800 RPM range and vice versa is possible at any time by holding down the HARE and TURTLE buttons for 3 seconds.

Mode SETPOINT

Turning the key to START will start the engine at idle speed. Pressing the HARE button for 3 seconds will bring the speed to the setpoint value set with the parameters SPEED and RPM OFFSET. A press of the TURTLE button will bring the engine to idle speed.
Turning the key to STOP will stop the engine.

RPM MANAGEMENT FOR SCANIA VARIABLE SPEED ENGINES

The adjustment mode cannot be selected for these engines.
Turning the key to START will start the engine at idle speed. Pressing the HARE and TURTLE buttons will accelerate or decelerate the engine by an amount set via the parameter STEP at the intervals of time set in the parameter TIME ECU-EQUIPPED ENGINES
When an ECU-equipped engine is used, the control unit dialogues with it in order to:

- Adjust the engine rpm
- Gather the values read (temperature, RPM, pressures, etc.)
- Gather active engine fault codes.

Manages emissions reduction devices such as the DPF (Diesel Particulate Filter) and SCR (Selective Catalytic Reduction).
The control unit supports the emissions reduction system for KOHLER KDI 1903, KDI 2504 and KDI 3404 engines only.

DPF

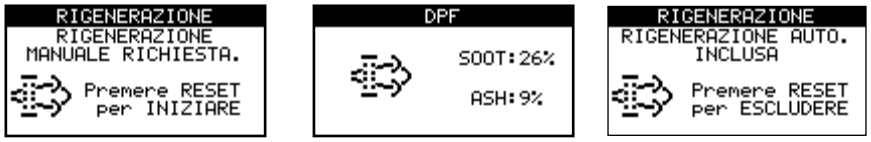
DPF regeneration operations can be handled on the control unit panel and you have the option to see the related information. Management of the DPF can be excluded.

DPF LAMPS

The DPF LAMPS instrument group shows DPF statuses. Here are a few examples:

REGENERATION

The REGENERATION instrument group lets you activate/interrupt manual regeneration, enable/disable automatic regeneration, and display soot and ash levels:



DPF LED

The DPF LED displays the most important statuses:

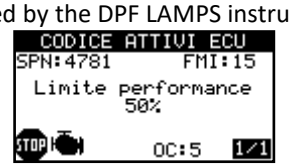
- ON
  MANUAL or SERVICE regeneration request
- FLASHING
  Forced regeneration in progress

DPF REGENERATION

There are several DPF regeneration modes:

- AUTOMATIC REGENERATION
  This is set off automatically and periodically by the engine ECU and ends only when conditions are suitable (temperature at the exhaust, engine speed, etc.) for a sufficient period of time. There are two ways to disable and enable automatic regeneration:
  1. Go to the AUTOMATIC REGENERATION instrument and press the ACK_BUTTON.
  2. Technical programming.

  If a high temperature at exhaust is occurring, the warning may appear in the DPF LAMPS instrument. No signal by the LEDs.
- FORCED REGENERATION
  Must be performed under required engine conditions (load, speed, etc.) and a consent has to be given to start it. A steady-on DPF_LED and the corresponding DPF_LAMP indicate a forced regeneration request. To start and stop the regeneration, go to the REGENERATION instrument and hold down the ACK_BUTTON. You can interrupt a regeneration always by pressing the ACK_BUTTON. The LED stays on during the entire DPF regeneration phase. If the regeneration request is ignored or several regenerations are interrupted, the particulate build-up level in the DPF increases and stifles engine performance. This is indicated by the DPF LAMPS instrument and corresponding fault:



- SERVICE REGENERATION
  When the particulate build-up level exceeds a certain threshold, a service regeneration is requested via a steady-on ENGINE_LED and DPF_LED. In this case, there is a significant drop in engine performance and service regeneration is required with use of a diagnostic instrument.

SCR

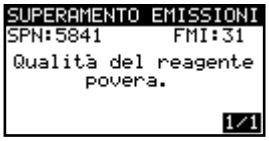
The control unit indicates that the SCR system is malfunctioning or being tampered with and shows the related engine derating

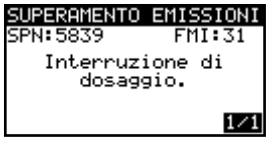
levels (inducement). The alert system was activated for the following reasons:

- Reagent level low
- Reagent quality poor
- Reagent dosing interrupted
- Malfunction of EGR valve
- Tampering with the monitoring system of the SCR.

DM32

The DM32 instrument group shows faults when exhaust gas emission levels are exceeded:



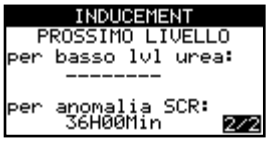


The codes are displayed as SPN and FMI; some are translated as per the table below:

SPN	FMI	TEXT
5842	31	NOx control system tampering.
5841	31	Poor reagent quality
5839	31	Dosing interrupted
5838	31	EGR valve clogged

SCR

The SCR instrument group consists of two instruments: reagent status and INDUCEMENT status



SCR LED

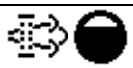
A flashing SCR_LED indicates faults at the SCR system.

MIL LED

The MIL LED turns on when there is an engine derate due to the DPF or SCR.

SIGNAL LAMPS FOR FPT STAGE V ENGINES

The instrument LAMPS displays the information sent by the engine ECU via a steady or flashing symbol and a message. The table shows all the signals managed by the control unit, the likely corresponding fault, and any signalling via the LEDs on the control unit.

Symbol	Flash	Signal	Fault	Led	Flash
	Steady	Engine overtemperature prealarm	Overtemperature prealarm detected by ECU		
	Steady	Engine overtemperature	Overtemperature detected by ECU		
	Steady	LOW OIL PRESSURE	Low oil pressure detected by ECU		
	Steady	Frase_PreriscaldoCandTxt			
	Steady	WATER IN FUEL	Water in fuel		
	Steady	Air Filter clogged	Air Filter clogged		
	Steady	Fuel Pre-filter clogged	Fuel Pre-filter clogged		
	Steady	Fuel Filter clogged	Fuel Filter clogged		
	Steady	Automatic regeneration request		DPF_LED	Steady
		Medium level regeneration request		DPF_LED	Slow
		Manual regeneration in progress		DPF_LED	Fast
	Slow	Automatic regeneration request		DPF_LED	Steady
		High level regeneration request		DPF_LED	Slow
	Fast	SERVICE regeneration request		DPF_LED	Slow
	Steady	Automatic regeneration in progress		DPF_LED	Steady
	Steady	Automatic regeneration inhibited		EXH_LED	Steady
		Manual regeneration inhibited		EXH_LED	Slow
	Steady	Low idle increase Level 1			
		Low idle increase Level 2			
	Steady	EGR/DPF Inducement First Level		MIL_LED	Steady
		Technical Error First Level			
		DEF Level Inducement Level 1			
		DEF Quality Inducement Level 1			
	Steady	EGR/DPF Inducement Second Level		MIL_LED	Slow
		Technical Error Second Level			
		DEF Level Inducement Level 2			
		DEF Quality Inducement Level 2			
	Steady	EGR/DPF Inducement Final Level		MIL_LED	Fast
		Technical Error Final Level			
		DEF Level Inducement Level 3			
		DEF Quality Inducement Level 3			
		Engine oil change required			

MANAGEMENT OF EMISSIONS REDUCTION DEVICES FOR FPT STAGE V ENGINES

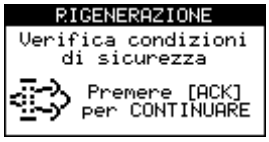
The control unit supports the emissions reduction system for FPT Stage V4 engines equipped with MD1 engine control unit.
Regeneration operations for the catalytic converter can be handled on the control unit panel and you have the option to see the related information.

REGENERATION

There are several regeneration modes:

- AUTOMATIC REGENERATION
  This is set off automatically and periodically by the engine ECU and ends only when conditions are suitable (temperature at the exhaust, engine speed, etc.) for a sufficient period of time. There is the possibility to enable/disable automatic regeneration via the parameter in MENU > ENGINE ECU > FPT S5 PARAMETERS > AUTOM. REGENERATION.
  You can follow the status of the automatic regeneration through the signals in the instrument LAMPS.

- MANUAL REGENERATION
  Must be performed under required engine conditions (load, speed, etc.) and a consent has to be given to start it. There is the possibility to enable/disable manual regeneration via the parameter in MENU > ENGINE ECU > FPT S5 PARAMETERS > MANUAL REGENERATION.
  When the engine ECU signals the request for manual regeneration, the instrument REGENERATION activates, prompting the operator to give the consent to start the procedure – after having checked that the engine is in a safe condition – through a press of the ACK_BUTTON for 3 seconds.
  You can interrupt a regeneration always by pressing the ACK_BUTTON for 3 seconds.



You can follow the status of the manual regeneration through the signals in the instrument LAMPS.

OIL COUNTER RESET FOR FPT STAGE V ENGINES

The engine ECU relies on counters to track the quality of the engine oil based on the time since the last change, the specific use, and the number of regenerations made.
Once a certain threshold is exceeded, the ECU gives a signal to change the oil, displayed in the instrument LAMPS.
After changing the engine oil, theses counters have to be reset to inform the ECU of the change; the reset must be carried out with the engine off, option SERVICE enabled (MENU > SERVICE), and the key in position 1.
These conditions will activate the instrument OIL COUNTER RESET, prompting the operator to reset the counters with a press of the ACK_BUTTON for 3 seconds.

SIGNAL LAMPS FOR YANMAR STAGE V ENGINES

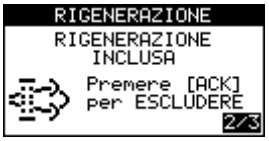
The instrument LAMPS displays the information sent by the engine ECU via a steady or flashing symbol and a message. The table shows all the managed signals and any signalling via the LEDs on the control unit. The flashing is managed by the engine ECU and, as a result, indicated as flashing of the symbol and LED.

Symbol	Signal	Led
	MANUAL REGENERATION NEEDED!	LED_DPF
	Manual regeneration inhibited	
	Exhaust system temperature too high.	
	Regeneration acknowledge OK	
	Tampering of Nox control system	LED_EXH
	Engine breakdown	LED_MIL
	Engine breakdown	

MANAGEMENT OF EMISSIONS REDUCTION DEVICES FOR YANMAR STAGE V ENGINES

The instrument REGENERATION allows managing the regeneration procedure for the particulate filter (DPF); the instrument can be enabled/disabled via the parameter in MENU > ENGINE ECU > YANM. S5 PARAMETERS > MANUAL REGENERATION.
The particulate build-up level in the DPF determines the type of regeneration requested:

- PASSIVE & ASSIST REGENERATION
  This takes place automatically; no operator intervention is required. The engine ECU sends no signal.
- RESET REGENERATION
  This is set off automatically and periodically by the engine ECU and ends only when conditions are suitable (temperature at the exhaust, engine speed, etc.) for a sufficient period of time. If the engine is located in an environment where a high temperature at the exhaust is not advisable, this regeneration can be excluded via the instrument REGENERATION.



  During regeneration, the engine ECU sends the necessary signals, displayed in the instrument LAMPS
- STATIONARY REGENERATION (MANUAL)
  When the particulate level in the DPF exceeds a certain threshold (10 g/L), the engine ECU sends a Stationary regeneration (Manual) request, which must be carried out under required engine conditions:
  - engine at idle speed
  - parking switch active
  - No active alarm
  - Water temperature above 60°C

  To start this regeneration, the operator must press the ACK_BUTTON for a few seconds; the instrument REGENERATION also displays the status of the parking switch.

The Stationary regeneration can be interrupted by deactivating the parking switch, turning the engine off, or disabling the regeneration just like for the Reset regeneration.
If the Stationary regeneration request is ignored or several regenerations are interrupted, the particulate build-up level in the DPF increases and stifles engine performance.

- LIMP HOME REGENERATION (SERVICE)
  When the particulate build-up level in the DPF reaches 12 g/L, significant engine derating occurs. In this case, the engine has to be unblocked by Yanmar Service.

SIGNAL LAMPS FOR DEUTZ STAGE V ENGINES

The instrument LAMPS displays the information sent by the engine ECU via a steady or flashing symbol and a message. The table shows all the managed signals and any signalling via the LEDs on the control unit.

Symbol	Flash	Signal	Led	Flash
	Steady	RADIATOR FAULT		
	Steady	Low engine oil pressure		
	Steady	Manual regeneration in progress	LED_DPF	Steady
	Slow	MANUAL REGENERATION NEEDED!	LED_DPF	Slow
	Fast	SERVICE regeneration in progress	LED_DPF	Fast
	Steady	Exhaust system temperature too high.		
	Steady	Manual regeneration inhibited		
		INHIBIT SWITCH ACTIVE		
		ENGINE NOT IN IDLE		
		SIGNAL OF STATIONARY MISSING		
		SYSTEM FAULT ACTIVE		
		TEMPORARY LOCKOUT		
		SERVICE TOOL NEEDED		
		ENGINE NOT WARMED UP		
	Steady	Tampering of Nox control system	LED_EXH	Steady
	Steady	Engine performance limitation	LED_MIL	Steady
	Steady	SERVICE regeneration needed.	LED_MIL	Slow

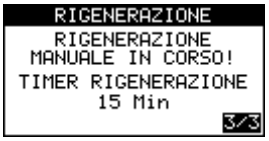
The instrument REGENERATION allows managing the regeneration procedure for the particulate filter (DPF); the instrument can be enabled/disabled via the parameter in MENU > ENGINE ECU > DEUTZ S5 PARAMETERS > MANUAL REGENERATION.
The particulate build-up level in the DPF determines the type of regeneration requested:

- NORMAL MODE
  In this phase, the particulate build-up level in the DPF is low and, therefore, no regeneration takes place. The engine ECU sends no signal.
- REGENERATION HEAT MODE.
  This is set off automatically and periodically by the engine ECU and ends only when conditions are suitable (temperature at the exhaust, engine speed, etc.) for a sufficient period of time. If the engine is located in an environment where a high temperature at the exhaust is not advisable, the regeneration can be excluded via the parameter in MENU > ENGINE ECU > DEUTZ S5 PARAMETERS > AUTOM. REGENERATION.
- STANDSTILL REGENERATION (MANUAL)
  When the particulate level in the DPF exceeds a certain threshold, the engine ECU sends a Standstill regeneration (Manual) request, which must be carried out under required engine conditions:
  - engine at minimum speed and load.
  - parking switch closed
  - No active alarm
  - Warm engine (in particular, coolant and exhaust gas temperatures must be high)

  To start this regeneration, the operator must press the ACK_BUTTON in order to send the parking switch closed signal to the engine ECU.

With the switch closed, the regeneration can also be started with a press of the ACK_BUTTON:

With regeneration in progress, the REGENERATION TIMER is displayed, indicating the time remaining to the end of the regeneration, sent by the engine ECU



To interrupt the Standstill regeneration, set the parking switch on OPEN.
If the Standstill regeneration request is ignored or several regenerations are interrupted, the particulate build-up level in the DPF increases and stifles engine performance.

- SERVICE REGENERATION
  When the particulate build-up level in the DPF rises to the point of exceeding a certain threshold, significant engine derating occurs. In this case, the engine has to be unblocked by Deutz Service.

SERIAL PORTS

The control unit has 3 serial ports: RS232, RS485 and USB 2.0.

1. RS232: Used to connect the control unit:
    - to a personal computer, for setting parameters with the ZW-SMART software
    - to a personal computer, for updating the FW with the ZW-UPG software
    - for querying with protocol MOD Bus RTU,
    - to the Ethernet interface
    - to GSM modem for text message management.
2. RS485: Can be used:
    - for querying with protocol MOD Bus RTU,
3. USB 2.0: Provides a virtual serial port. It is used:
    - to connect the unit to a PC, for setting parameters with the ZW-SMART software
    - to connect the unit to a personal computer, for updating the FW with the ZW-UPG software
    - for querying with protocol MOD Bus RTU,

GSM MODEM

The GSM RB900 PRO modem can be connected to the RS232 port to communicate with the control unit remotely via SMS text messaging in order to:

- Check the status of the engine.
- Be notified if the control unit is in alarm status.
- Reset faults.
- Reset maintenance intervals.
- Program telephone numbers in the phone book.

The modem can be enabled via the parameter in MENU > MODEM > FUNCTION; the supply must be connected to one of the programmable outputs on the control unit, properly configured with the function MODEM POWER SUPPLY.
You can program the control unit to send notifications to up to 5 numbers in the phone book via the parameters in: MENU > MODEM > TELEPHONE 1 / TELEPHONE 2 / TELEPHONE 3/ TELEPHONE 4/ TELEPHONE 5

PROCEDURE TO DISABLE THE PIN

After purchasing a SIM Card from a mobile operator, regardless of the contract the customer has chosen, the PIN must be disabled. To do so, insert the SIM card into a normal mobile phone for personal use; turn on the phone and enter the PIN provided by the operator. Look through the mobile phone's menu to find the procedure to deactivate the PIN. Follow the deactivation procedure, so that when the SIM card is turned on again in the future, the PIN will not be requested. Turn off the cellphone and extract the SIM Card. Make sure the control unit is off and then insert the SIM card in the slot.

COMMISSIONING

To make sure the area surrounding the control unit is covered by signal, check the icon on the display. Place the antenna vertically using its magnetic support and at the point of maximum signal strength.

FAULT NOTIFICATION

When a fault occurs, the control unit will sequentially send the text message (only once) to all the telephone numbers stored in the phone book.

START AND STOP NOTIFICATION

If the parameter in MENU > MODEM > SEND START STOP is enabled, as soon as the engine starts up or stops, the control unit will sequentially send a notification message (only once) to all the telephone numbers stored in the phone book.

SMS COMMANDS

The following is the list of commands that can be sent to the control unit:

Numerical code	Text code	Description
001	STATUS1	ENGINE status request: THE ENGINE is RUNNING. COUNTER=00:24 NO FAULTS FUEL=100% ENGINE PRESSURE=8.9Bar ENGINE TEMPERATURE=91°C RPM=0 BATTERY=12.9V
051	SERVICE1	Resets the scheduled maintenance MAINTENANCE 1
052	SERVICE2	Resets the scheduled maintenance MAINTENANCE 2
053	SERVICE3	Resets the scheduled maintenance MAINTENANCE 3
007	RESET	Resets the device
1#[number]	T1#[number]	The telephone number of field *[number]* will be stored in the assigned phone book position, overwriting the current number (add the country code before the number). Do not add spaces before or after the number. To cancel a number, send the field *[number]* made up of only spaces.
2#[number]	T2#[number]	
3#[number]	T3#[number]	
4#[number]	T4#[number]	
5#[number]	T5#[number]	
101	TT1	The telephone number that sent the message will be stored in the assigned phone book position, overwriting the current number.
102	TT2	
103	TT3	
104	TT4	
105	TT5	
200	ECHO NUM	Answers with the list of telephone numbers stored in the phone book. Phone book: T1#+393245566741 T2#---- T3#+393245566741 T4#---- T5#+393487763267

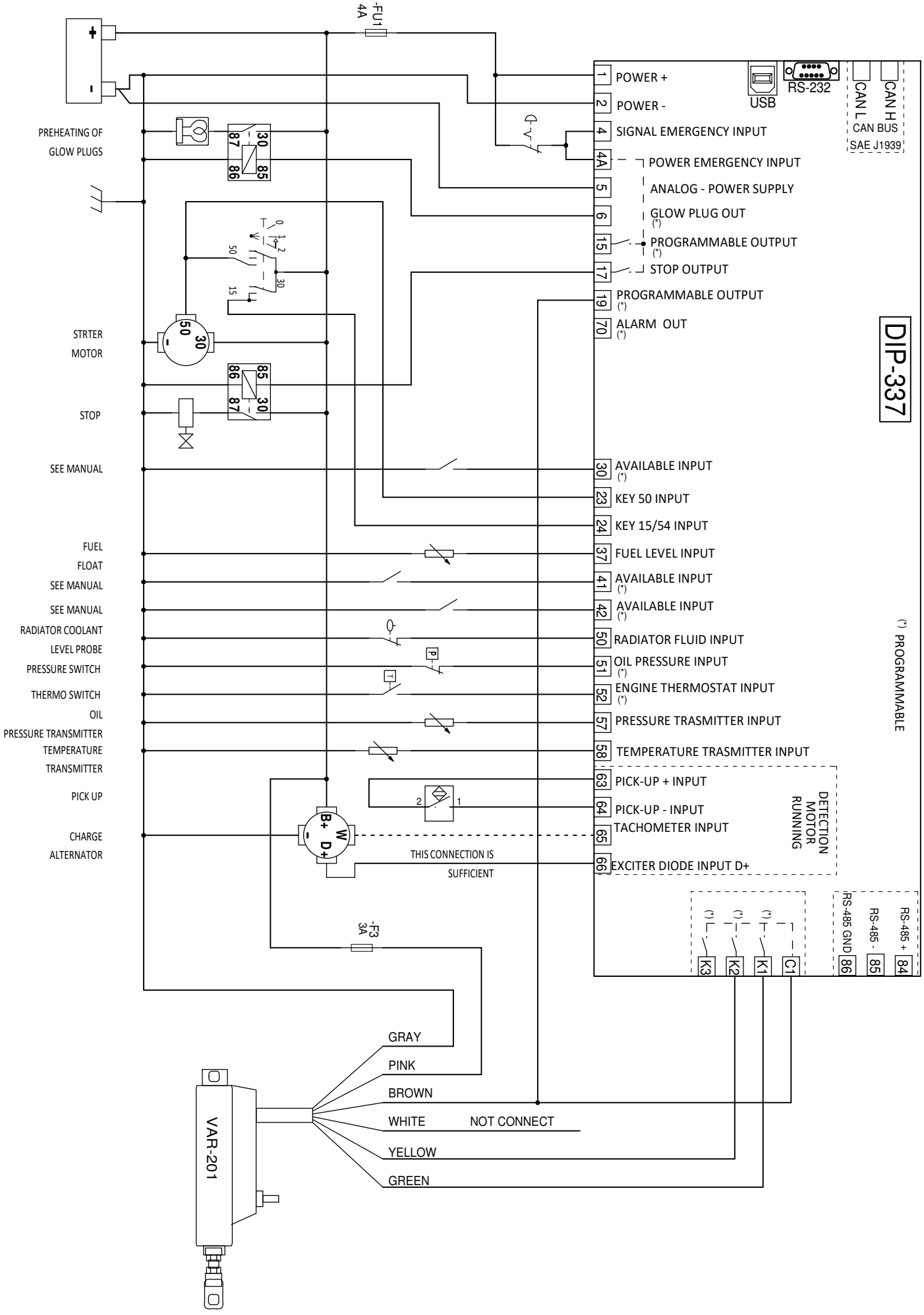
FAULTS

FAULT	SOURCE	ACTIVATION	MEMORY	STOP	"DECELERATION"	"COOLING"	Occurs when:
----	-	-	-	-	-	-	Unlinked fault
"LOW OIL PRESSURE" < Low engine oil pressure >	CONTACT OIL PRESSURE SWITCH	ENGINE PROTECTIONS ACTIVE	YES	YES	NO	NO	The oil pressure is lower than the pressure switch threshold and its contact is closed to ground.
"LOW OIL PRESS PREAL." < Low oil pressure warning by transmitter >	LOW OIL PRESSURE TRANSMITTER	ENGINE PROTECTIONS ACTIVE	NO	PRG	NO	NO	The oil pressure is lower than the unit's set threshold.
"OIL PRESSURE SWITCH" < Oil pressure switch fault >	CONTACT OIL PRESSURE SWITCH	WITH ENGINE STOPPED	YES	YES	NO	NO	The contact is open with engine stopped (the function can be disabled); this allows checking the integrity of the connection.
"OVERTEMPERATURE" < Engine overtemperature >	CONTACT THERMOSTAT	ALWAYS ACTIVE	YES	YES	YES	YES	The temperature is higher than the thermostat threshold and its contact is closed to ground.
"OVERTEMP. WARNING" < Overtemp. engine warning by transmitter >	TEMPERATURE TRANSMITTER	ALWAYS ACTIVE	YES	PRG	YES	YES	The temperature has exceeded the unit's set threshold.
"LOW FUEL PRESS" < LOW FUEL PRESS >	FUEL PRESSURE SWITCH	ENGINE PROTECTIONS ACTIVE	YES	YES	NO	NO	The fuel pressure is lower than the pressure switch threshold and the contact is closed to ground.
"FUEL RESERVE" < Fuel reserve >	FUEL FLOAT	ALWAYS ACTIVE	NO	NO	NO	NO	The fuel level is lower than the set threshold. Resets when the level rises above the threshold.
"NO FUEL" < Fuel finished >	FUEL FLOAT	ALWAYS ACTIVE	YES	PRG	YES	YES	The fuel level is lower than the set threshold. Or the function-input CONTACT W FUEL cuts in when the float switch contact is closed to ground.
"LOW RADIATOR LEVEL" < Low coolant level >	RADIATOR LEVEL	ALWAYS ACTIVE	YES	YES	YES	NO	The coolant has dropped below the minimum level.
"ALTERNATOR CHARGES" < Charging alternator fault >	ALTERNATOR	ENGINE PROTECTIONS ACTIVE	YES	YES	YES	YES	The alternator is not charging the battery or problem in the electrical system.
"EMERGENCY" < Engine stop Emergency pressed >	EMERGENCY BUTTON	ALWAYS ACTIVE	YES	YES	NO	NO	The emergency button is pressed.
FAULT IN i <FAULT Ini> (30, 41, 42, 51, 52)	CORRESPONDING INPUT	PRG	PRG	PRG	PRG	PRG	See programming.
"BATTERY UNDERVOLTAGE" < Battery undervoltage >	BATTERY	ALWAYS ACTIVE	YES	PRG	YES	YES	The battery voltage is lower than the set threshold.
"BATTERY OVERVOLTAGE" < Battery overvoltage >	BATTERY	ALWAYS ACTIVE	YES	PRG	YES	YES	The battery voltage is higher than the set threshold.
"UNDERSPEED" < Engine Underspeed >	ALTERNATOR "W" OR PICK-UP	WHEN THRESHOLD REACHED	YES	PRG	NO	NO	The engine speed is lower than the set threshold.
"OVERSPEED" < Engine overspeed >	ALTERNATOR "W" OR PICK-UP	ALWAYS ACTIVE	YES	PRG	NO	NO	The engine speed is higher than the set threshold.
"PICK UP DISCONNECTED" < PickUp interrupted>	PICK-UP	ENGINE STOPPED	YES	YES	YES	NO	The pick-up is interrupted or problem with the electrical system.
"PICKUP FAULT" < PickUp interrupted >	PICK-UP	ENGINE PROTECTIONS ACTIVE	YES	YES	YES	NO	Pick-up operation is not correct.
MAINTENANCE i < MAINTENANCE i.> (1,2,3)	STANDARD	ALWAYS ACTIVE	YES	PRG	NO	NO	See programming

"OIL PRESSURE TABLE" < Incorrect pressure oil transm. calibration table >	-	ALWAYS ACTIVE	YES	NO	NO	NO	The CUSTOM oil pressure transmitter calibration table is incorrect.
"INCORRECT TEMP. TABLE" < Engine temperature transm. error table >	-	ALWAYS ACTIVE	YES	NO	NO	NO	The CUSTOM engine temperature transmitter calibration table is incorrect.
"FLOAT TABLE" < Incorrect fuel float calibration table >	-	ALWAYS ACTIVE	YES	NO	NO	NO	The CUSTOM fuel float calibration table is incorrect.
"TEMP. TRASM. DISCON." < Engine temperature transmitter interrupted >	TEMPERATURE TRANSMITTER	ALWAYS ACTIVE	NO	NO	NO	NO	The temperature transmitter is interrupted or malfunctioning.
"PRES. TRASM. DISCON." < Pressure oil transmitter interrupted >	LOW OIL PRESSURE TRANSMITTER	ALWAYS ACTIVE	NO	NO	NO	NO	The engine pressure transmitter is interrupted or malfunctioning.
"KEYBOARD ERROR" < Keyboard error >	-	IGNITION	YES	NO	NO	NO	Buttons were pressed in the ignition phase.
"MEMORY ERROR" < Non-volatile memory error >	-	ALWAYS ACTIVE	YES	NO	NO	NO	The non-volatile memory has a fault. To restore the error, switch the control unit off and on.
CAN BUS < CAN BUS comunication error >	ENGINE ECU CONNECTION	CAN BUS ACTIVE	NO	YES	NO	NO	The control uni is not communicating correctly with the ENGINE ECU
Overtemperature prealarm detected by ECU < ECU PREALARM OTEMP. >	ENGINE ECU CONNECTION	CAN BUS ACTIVE ENGINE PROTECTIONS ACTIVE	NO	NO	NO	NO	Engine overtemperature pre-alarm sent by the engine ECU. Active fault only for Stage V engines.
Overtemperature detected by ECU < ECU OVERTEMPERATURE >	ENGINE ECU CONNECTION	CAN BUS ACTIVE ENGINE PROTECTIONS ACTIVE	YES	YES	NO	NO	Engine overtemperature error sent by the engine ECU. Active fault only for Stage V engines.
Low oil pressure detected by ECU < ECU OIL PRESSURE >	ENGINE ECU CONNECTION	CAN BUS ACTIVE ENGINE PROTECTIONS ACTIVE	YES	YES	NO	NO	Low oil pressure error sent by the engine ECU. Active fault only for Stage V engines.
Water in fuel < WATER IN FUEL >	ENGINE ECU CONNECTION	CAN BUS ACTIVE ENGINE PROTECTIONS ACTIVE	YES	NO	NO	NO	Water in fuel error sent by the engine ECU. Active fault only for Stage V engines.
Air Filter clogged < AIR FILTER CLOGGED >	ENGINE ECU CONNECTION	CAN BUS ACTIVE ENGINE PROTECTIONS ACTIVE	YES	NO	NO	NO	Air filter clogged error sent by the engine ECU. Active fault only for Stage V engines.
Fuel Filter clogged < FUEL FILTER CLOGGED >	ENGINE ECU CONNECTION	CAN BUS ACTIVE ENGINE PROTECTIONS ACTIVE	YES	NO	NO	NO	Fuel filter clogged error sent by the engine ECU. Active fault only for Stage V engines.
Fuel Pre-filter clogged < FUEL PREFILTER CLOG >	ENGINE ECU CONNECTION	CAN BUS ACTIVE ENGINE PROTECTIONS ACTIVE	YES	NO	NO	NO	Fuel filter clogged error sent by the engine ECU. Active fault only for Stage V engines.
GSM NO SIM CARD < GSM NO SIM CARD >	MODEM OPTION	ALWAYS ACTIVE	YES	NO	-	-	No SIM card in the control unit.
SIM LOCKED < SIM LOCKED >	MODEM OPTION	ALWAYS ACTIVE	YES	NO	-	-	SIM card PIN was not deactivated.
no telephone number programmed < TELEPHONE NUMBERS >	MODEM OPTION	ALWAYS ACTIVE	YES	NO	-	-	No telephone number in the phone book for SMS text messaging.
Generic MODEM error < GENERIC MODEM ERROR>	MODEM OPTION	ALWAYS ACTIVE	YES	NO	-	-	A generic modem error has occurred. The Modem instrument can provide more detailed information.
No MODEM connection < NO MODEM >	MODEM OPTION	ALWAYS ACTIVE	YES	NO	-	-	No modem connection.

WIRING DIAGRAM

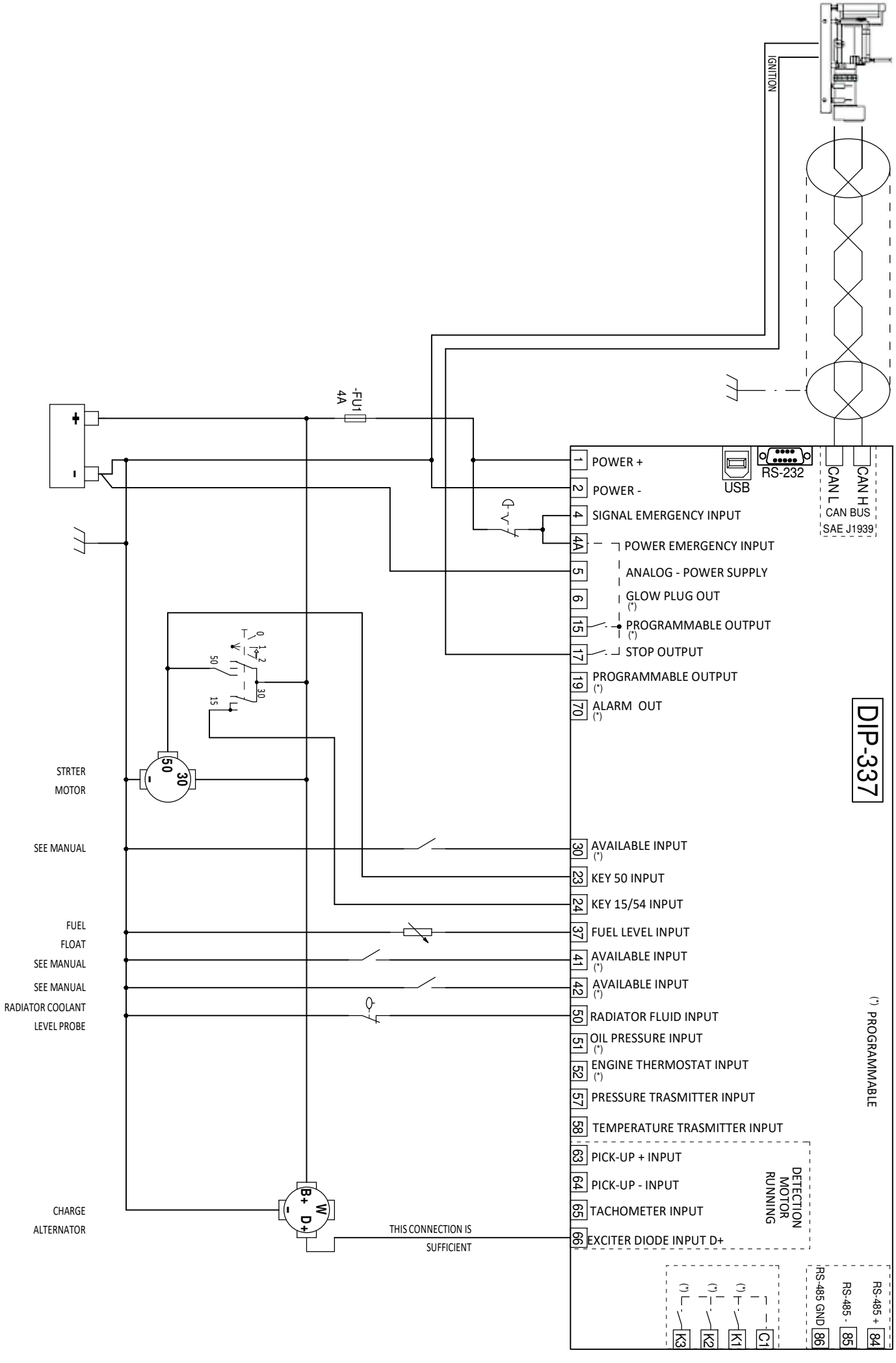
DIAGRAM FOR MECHANICAL MOTORS



Basic scheme subject to change without notice.

WIRING DIAGRAM

DIAGRAM FOR ELECTRONIC MOTORS



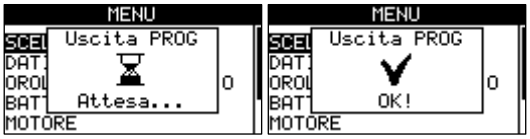
Basic scheme subject to change without notice.

SETTINGS

Programming can be accessed when the engine is not running. Position the key on the first click; go to the <<PROG>> instrument (CLOCK instrument, then press UP_BUTTON), and then press and hold the UP_BUTTON until OK! is displayed. During setting, the FAULT_LED emits two quick flashes.

To move between the menus, use the UP_BUTTON, DOWN_BUTTON, RIGHT_BUTTON, LEFT_BUTTON and select the parameter to be displayed or modified with the RIGHT_BUTTON.
After period of time in settings without any activity, the control unit returns to the operating mode on its own.
To exit programming, move the key to the OFF position or go to the start menu:

Press and hold down the LEFT_BUTTON until OK! is displayed.

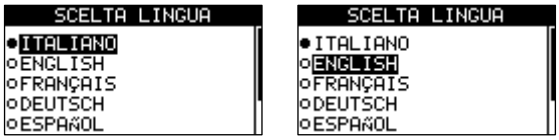


SETTING TYPES

There are multiple types of settings available:

MULTIPLE CHOICE

This allows one parameter to be selected from many, for example the language. The set parameter is the one with the black dot next to it; the selection can be changed using the UP_BUTTON and DOWN_BUTTON.



To confirm the parameter, press the ACK_BUTTON until OK is displayed.

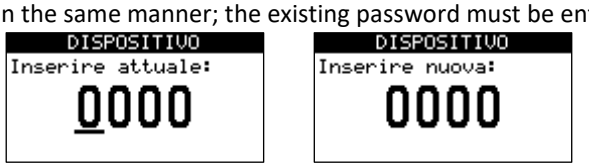
To exit programming, press the LEFT_BUTTON or move the key to the OFF position.

PASSWORD

Access to some menus, or setting of some parameters, requires the entry of a numerical password:

One digit is entered at a time; use the LEFT_BUTTON and RIGHT_BUTTON to move the cursor, and the UP_BUTTON and DOWN_BUTTON to change the digit. To test, use the ACK_BUTTON until the result appears:

It is possible to change the password in the same manner; the existing password must be entered first.



To exit programming, use the TORTOISE_BUTTON or move the key to OFF.

CLOCK/CALENDAR

The current time and date are displayed:

The value shown can be changed using the UP_BUTTON or DOWN_BUTTON. To change selection, use the RIGHT_BUTTON or the LEFT_BUTTON. To exit programming, use the TORTOISE_BUTTON or move the key to OFF. It does not require confirmation. The time is retained by the control unit even when it is not powered, thanks to an internal battery.
If the internal battery is not installed, the following date and time will appear on start-up: 1/01/2019, 00:00.00.

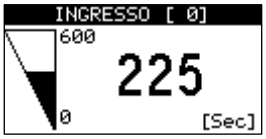
EXCLUSION

A parameter can be enabled or disabled; use the UP_BUTTON or DOWN_BUTTON to change the setting. If the parameter is modified, the text is highlighted.

To set, press the ACK_BUTTON until OK is displayed. To exit programming, press the LEFT_BUTTON or move the key to the OFF position.

VALUE

The settings screen displays the value of the parameter in the centre (highlighted if modified), the unit of measurement at the bottom right, and the details and qualitative indication of the value on the left:



Use the UP_BUTTON or DOWN_BUTTON to modify the value and the ACK_BUTTON to confirm the value:

To exit programming, press the LEFT_BUTTON or move the key to the OFF position. Normally, the set value takes effect only after OK! is displayed. In some settings, the value is modified instantly and retained only if confirmed: an example of this is the LCD contrast setting.

TEXT STRING SETTINGS

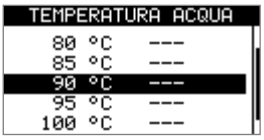
The text to be modified is displayed at the centre, and the available characters at the bottom right. The cursor indicates the character being edited. Use the LEFT_BUTTON and RIGHT_BUTTON to move the cursor, and the UP_BUTTON and DOWN_BUTTON to change the character.

To set, press the ACK_BUTTON until OK is displayed.

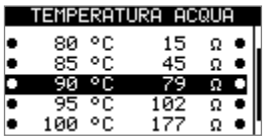
To exit programming, use the TORTOISE_BUTTON or move the key to OFF.

TABLE SETTINGS

In some cases table values must be set, for example for the fuel float sensor. The values are represented in two columns:



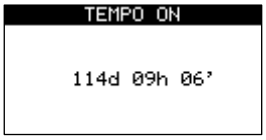
The element being modified is highlighted and flashes. Use the RIGHT_BUTTON to increase the value and the LEFT_BUTTON to decrease it; once the value has been modified, two dots are displayed beside it. To set the entire table, press the ACK_BUTTON until OK is displayed:



To exit programming, use the TORTOISE_BUTTON or move the key to OFF.

TIME

Times can be modified in day/hour/minute format or hour/minute format. Two examples follow:



Use the LEFT_BUTTON and RIGHT_BUTTON to move the selection (flashing value with cursor) and the UP_BUTTON and DOWN_BUTTON to change the value; press the ACK_BUTTON to set the value. To exit programming, use the TORTOISE_BUTTON or move the key to OFF.

CONFIRM ACTION

Some settings require confirmation; for example the factory settings reset "SETUP RESETTING":

To confirm, press the ACK_BUTTON until OK is displayed:

SPECIAL CASES

There are some special types of settings (for example, tachometer calibration "TACHOMETER CALIBRAT."); please see the instructions on the display.

SETTINGS SW

Using the ZW-SMART Software, the control unit can be programmed over the USB Virtual Com Port.

LANGUAGE CHOICE

Parameter	Variable	Factory settings	Range	Notes
LANGUAGE CHOICE	LANGUAGE	ITALIANO	ITALIANO ENGLISH FRANÇAIS DEUTSCH ESPAÑOL PORTUGUÊS CUSTOM	Resetting the language overwrites the text in the programmable faults. A CUSTOM language cannot be selected unless the messages have been programmed with the ZW-SMART software.

DATA

Parameter	Variable		Factory settings	Notes
DATA	RELEASE HW	BOARD A RELEASE HW	Release and HW code of the device.	BOARD A RELEASE HW HW Code:_____40332655 Board:_____1.00 Assembly:_____1.00
		BOARD B RELEASE HW		BOARD B RELEASE HW HW Code:_____40332656 Board:_____1.00 Assembly:_____1.00
		BOARD C RELEASE HW		BOARD C RELEASE HW HW Code:_____40332657 Board:_____1.00 Assembly:_____1.00
	RELEASE FW		Release and FW code of the device.	RELEASE FW FW Code:_____0x302D Boot:_____1.00 App:_____1.03
	INFO		Registration, model, serial number and system commissioning date.	INFO s.n.:_____0000-000165 Type: DIP-337 Mat:_Matricola XXXXXX Avvio:_____00/00/2000
	DEVICE		Number of start ups, total running time and test date	DISPOSITIVO Time:_____0h06'19s Switch ON:_____30 Coll:_____00/00/2000
	RETENTION		Operation information	RETENTION Contaore:_____3:26 Avviamenti:_____0

CALENDAR CLOCK

Parameter	Variable	Factory settings	Range	Notes
CALENDAR CLOCK	DATE AND TIME			Clock/calendar settings.
	FORMAT	ANALOGUE	ANALOGUE DIGITAL	

BATTERY

Parameter	Variable	Factory settings	Range	Notes
ENTER PASSWORD	BATTERY_PSW	"0000"	"0000" – "9999"	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	BATTERY_PSW	"0000"	"0000" – "9999"	Change the password for access to the menu.
BATTERY VOLTAGE		12 V	12 V	Nominal battery voltage; by setting a new value, the undervoltage,

			24 V	overvoltage and engine running D+ thresholds and delays are returned to their defaults.
VOLTMETER BATT.		ON	ON	Displays the starting battery voltage measured between the RED and GREY wires.
			OFF	
BATTERY UNDERVOLTAGE	FAULT	ON	ON	This fault is generated when the battery voltage drops below the set threshold for the whole duration of the cut-in delay. It is always enabled and is stored.
			OFF	
	THRESHOLD	11 V [12 V] 22 V [24 V]	8 ÷ 14 V [12 V] 16 ÷ 28 V [24 V]	
	DELAY	2 sec	1 ÷ 5 sec	
	STOP	OFF	ON	
			OFF	
BATTERY OVERVOLTAGE	FAULT	ON	ON	The fault cuts in when the battery voltage exceeds the set threshold for the whole duration of the cut-in delay. It is always enabled and is stored.
			OFF	
	THRESHOLD	16 V [12 V] 32 V [24 V]	12 ÷ 18 V [12 V] 24 ÷ 36 V [24 V]	
	DELAY	2 sec	1 ÷ 5 sec	
	STOP	ON	ON	
			OFF	

ENGINE

Parameter	Variable		Factory settings	Range	Notes
ENTER PASSWORD	ENGINE_PSW		"0000"	"0000" – "9999"	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	ENGINE_PSW		"0000"	"0000" – "9999"	Change the password for access to the menu.
STOP	"STOPPING SYSTEMS"		ENERGIZ. IN RUN. MODE	ENERGIZ. IN RUN. MODE	Fuel supply system.
				ENERGIZ. IN STOP MODE	
	"STOPPING TIME"		20 sec	0 ÷ 60 sec	Stopping system activation time with engine at a standstill.
GLOW PLUGS	"PREHEATING"		0 sec	0 ÷ 60 sec	Activated before start-up. 0 sec, pre-heating off. Too long a time can damage the glow plugs.
	"POST-HEATING"		0 sec	0 ÷ 60 sec	Enabled throughout engine start-up and for the set time. 0 sec, post-heating off.
OIL PRESSURE CHECK			BEFORE STARTING	WITH ENGINE RUNNING	Checks only the opening of the contact with the engine running.
				BEFORE STARTING	Also checks closing of contact with engine switched off.
RADIATOR LEVEL PROBE			NORMAL OPERATION	NORMAL OPERATION	If there is no liquid, the probe switches off the ground signal.
				REVERSED OPERATION	If there is no liquid, the probe switches on the ground signal.
ENGINE TEMPERATURE	FUNCTION		OFF	OFF	Enables or disables the instrument and its function.
				ON	
	TYPE		TTAO/402	See list ENGINE TRANSDUCERS	Transmitters already entered.
	TABLE	25 °C	----	0 ÷ 3000 ohm	Custom interpolation table which associates the resistance values with the temperature values. Associate at least two values. A fault will be generated if only one value, or else non-monotonic values, are entered.
		50 °C	----		
		70 °C	----		
		80 °C	----		
		85 °C	----		
		90 °C	----		
		95 °C	----		
		100 °C	----		
		120 °C	----		
		130 °C	----		
	OVERTEMP. WARNING	FAULT	"OFF"	OFF	The fault cuts in when the temperature read by the transmitter exceeds the set threshold. It is always enabled and is stored.
				ON	
		THRESHOLD	100 °C	70 ÷ 140 °C	
		STOP	"OFF"	ON	
				OFF	
OIL PRESSURE	FUNCTION		"OFF"	OFF	Enables or disables the instrument and its function.
				ON	
	TYPE		TPO/403	See list	Transmitters already entered.
	TABLE	0 bar	----	0 ÷ 360 ohm	Custom interpolation table which associates the resistance values with the pressure values. Associate at least two values. A fault will be generated if only one value, or else non-monotonic values, are entered.
		1 bar	----		
		2 bar	----		
		3 bar	----		
		4 bar	----		

		5 bar	----		
		6 bar	----		
		7 bar	----		
		8 bar	----		
		9 bar	----		
	LOW OIL PRESS PREAL.	FAULT	OFF	ON	This fault is generated when the pressure falls below the set threshold for the whole duration of the cut-in delay. It is always enabled and is stored.
				OFF	
		THRESHOLD	0,5 bar	0 ÷ 6,0 bar	
		DELAY	1 sec	1 ÷ 5 sec	
		STOP	OFF	ON	
				OFF	
FUEL LEVEL	FUNCTION		ON	OFF	Enables or disables the instrument and its function.
				ON	
	TYPE		VEGLIA	See list	Transmitters already entered.
	TABLE	0 %	----	0 ÷ 360 ohm	Custom interpolation table which associates the resistance values with the fuel percentage values. Associate at least two values. A fault will be generated if only one value, or else non-monotonic values, are entered.
		10 %	----		
		20 %	----		
		30 %	----		
		40 %	----		
		50 %	----		
		60 %	----		
		70 %	----		
		80 %	----		
		90 %	----		
		100 %	----		
	FUEL RESERVE	THRESHOLD	10 %	0 ÷ 100 %	
	NO FUEL	FAULT	ON	ON	Levels that define faults/alarms.
				OFF	
		INPUT	W	W	
				PERCENTAGE	
		THRESHOLD	1 %	0 ÷ 100 %	
		DELAY	3 sec	0 ÷ 60 sec	
		STOP	ON	ON	
				OFF	
ALTERNATOR CHARGES	ALTERNATOR D+	FUNCTION	ON	ON	Includes full management of D+.
				OFF	
		THRESHOLD	7 V [12 V] 14 V [24 V]	3 ÷ 24 [V]	Assessment threshold for engine running detection.
		FAULT	ON	ON	Includes D+ in the charging alternator fault assessment.
				OFF	
		ENGINE RUNNING	ON	ON	Includes D+ in the engine running assessment.
				OFF	
		PRE-EXCITATION	ON	ON	Pre-excitation alternator.
				OFF	
	ALTERNATOR W	FUNCTION	ON	ON	Includes full management of W.
				OFF	
		THRESHOLD	600 RPM	300 ÷ 4000 RPM	Engine running assessment threshold.
		FAULT	ON	ON	Includes W in the charging alternator fault assessment.
				OFF	
		ENGINE RUNNING	ON	ON	Includes W in the engine running assessment and in the RPM displayed.
				OFF	
		CALIBRATION	----	----	Performs RPM calibration.
PICK-UP		FUNCTION	OFF	ON	Includes full management of PICK-UP.
				OFF	
		PICK UP DISCONNECTED	ON	ON	Management of the pick-up's hardware fault.
				OFF	
		THRESHOLD	600 RPM	300 ÷ 4000 RPM	Engine running assessment threshold.
		FAULT	OFF	ON	Enables/disables the fault of the disconnected PICK-UP.
				OFF	
		ENGINE RUNNING PICKUP	"OFF"	ON	Includes PICK-UP in the engine running assessment and in the RPM displayed.
				OFF	
		CALIBRATION	----	----	Performs RPM calibration.
UNDERSPEED		FUNCTION	OFF	ON	UNDERSPEED fault settings
				OFF	
		THRESHOLD	0 RPM	0 ÷ 4000 RPM	
		STOP	OFF	ON	
				OFF	
OVERSPEED		FUNCTION	OFF	ON	OVERSPEED fault settings
				OFF	
		THRESHOLD	4000 RPM	0 ÷ 4000 RPM	
		STOP	OFF	ON	

			"OFF"	
MAXIMUM SPEED	THRESHOLD	4000 RPM	0 ÷ 4000 RPM	The maximum RPM value that the engine can reach. When the engine reaches this value, the control unit does not allow the engine rpm to increase any further.

The control unit has already recorded some values of temperature, pressure and fuel float. The values of the tables already entered in the control unit are given below.

Temperature transmitter tables already entered in the control unit										
Type	25°C	50°C	70°C	80°C	85°C	90°C	95°C	100°C	120°C	130°C
TTAO/402	896 ohm	365 ohm	196 ohm	145 ohm	127 ohm	110 ohm	97 ohm	85 ohm	53 ohm	30 ohm
VDO/120	544 ohm	197 ohm	97 ohm	70 ohm	60 ohm	51 ohm	44 ohm	38 ohm	22 ohm	17 ohm
VDO/150	909 ohm	324 ohm	157 ohm	113 ohm	97 ohm	83 ohm	72 ohm	62 ohm	37 ohm	29 ohm
BERU	4036 ohm	1259 ohm	560 ohm	387 ohm	324 ohm	273 ohm	231 ohm	196 ohm	106 ohm	80 ohm
VEGLIA		708 ohm	399 ohm	245 ohm	210 ohm	175 ohm	153 ohm	130 ohm	75 ohm	59 ohm
JCB/1707	503 ohm	200 ohm	105 ohm	78 ohm	67 ohm	59 ohm	51 ohm	45 ohm		9
LOMBARDINI	927 ohm	322 ohm	155 ohm	112 ohm	96 ohm	83 ohm	71 ohm	62 ohm	36 ohm	29 ohm
F16173	2130 ohm	834 ohm	435 ohm	323 ohm	280 ohm	243 ohm	213 ohm	186 ohm	114 ohm	91 ohm
VSG40028	1896 ohm	813 ohm	387 ohm	275 ohm	234 ohm	199 ohm	171 ohm	145 ohm	80 ohm	64 ohm
DUTG	1232 ohm	579 ohm	294 ohm	159 ohm	142 ohm	126 ohm	109 ohm	92 ohm	56 ohm	35 ohm
DAEWOOD	446 ohm	153 ohm	73 ohm	52 ohm	44 ohm	38 ohm	32 ohm	28 ohm	16 ohm	12 ohm
CUSTOM										

Pressure transmitter tables already entered in the control unit										
Type	0BAR	1BAR	2BAR	3BAR	4BAR	5BAR	6BAR	7BAR	8BAR	9BAR
TPO/403	270 ohm	251 ohm	203 ohm	157 ohm	114 ohm	79 ohm	47 ohm	32 ohm	23 ohm	1 ohm
VDO	10 ohm		50 ohm		85 ohm		119 ohm		152 ohm	
VDO 29/10	9 ohm	38 ohm	57 ohm	77 ohm	99 ohm	114 ohm	134 ohm	149 ohm	164 ohm	180 ohm
LOMBARDINI	10 ohm	31 ohm	52 ohm	71 ohm	90 ohm	107 ohm	124 ohm	140 ohm	156 ohm	170 ohm
[10-180] ohm	10 ohm	27 ohm	44 ohm	61 ohm	78 ohm	95 ohm	112 ohm	129 ohm	146 ohm	163 ohm
[240-33.5] ohm	240 ohm	219 ohm	199 ohm	178 ohm	157 ohm	137 ohm	116 ohm	95 ohm	75 ohm	54 ohm
DD6E	7 ohm	39 ohm	72 ohm	104 ohm	132 ohm	159 ohm	187 ohm	215 ohm	242 ohm	270 ohm
VSG40030	259 ohm	215 ohm	172 ohm	139 ohm	106 ohm	83 ohm	60 ohm	46 ohm	32 ohm	21 ohm
CUSTOM										

Fuel float tables already entered in the control unit		
Type	0%	100%
VEGLIA	300 ohm	0 ohm
VDO	10 ohm	181 ohm
DATCON	240 ohm	37 ohm
[10-180] ohm	10 ohm	180 ohm
[240-33.5] ohm	240 ohm	34 ohm
DUMP	5 ohm	90 ohm
EUROSWITCH	3 ohm	184 ohm
CUSTOM		

GENERAL FUNCTIONS

Parameter	Variable	Factory settings	Range	Notes
ENTER PASSWORD	PSW_FUNCTIONS	"0000"	"0000" – "9999"	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	PSW_FUNCTIONS	"0000"	"0000" – "9999"	Change the password for access to the menu.
ENGINE PROTECTIONS		WITH STOP	WITH STOP	The engine is stopped in the event of a fault.
			WITHOUT STOP	The engine is not stopped even if faults have occurred. Exceptions to this are emergency, overspeed and maintenance with stop. The faults are in any case displayed and the general alarm activates.
GENERAL ALARM	DURATION	9999 sec	0 ÷ 9999 sec	The value 9999 indicates continuous operation with no time limit.

ENGINE RPM MANAGEMENT (mechanical motors only)

Parameter	Variable	Factory settings	Range	Notes
ENTER PASSWORD	PSW_ENGINE_RPM	"0000"	"0000" – "9999"	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	PSW_ENGINE_RPM	"0000"	"0000" – "9999"	Change the password for access to the menu.
RPM VARIATION	FUNCTION	ON	ON	Management of the engine linear actuator RPM VARIATION can be disabled. By excluding this function, the hare and tortoise buttons have no effect and the control unit does not perform the adjustment of the engine rpm.
			OFF	
PUSH DIRECTION	MODE	NORMAL	NORMAL	Enables selection of the accelerator lever's output direction.
			REVERSED	
REV CONTROL	MODE	KEYS	KEYS	The rpm is managed using the front buttons.
			SETPOINT	See parameter SETPOINT.
			ENGINE SPEED 1-2	Manages two speeds through use of an electromagnet fitted on the engine's acceleration lever.
SETPOINT	SPEED	1500 RPM	600 ÷ 4000 RPM	Parameters related to SETPOINT.
	TIME	20 sec	5 ÷ 600 sec	
	TOLERANCE	50 RPM	20 ÷ 150 RPM	
COOLING		0 sec	0 ÷ 600 sec	Delay time between the end of the deceleration and the stop in case of fault.
ACTIVATION TIME		60 ms	20 ÷ 2000 ms	Length of the activation impulse of the ACCELERATE/ DECELERATES function relay during automatic acceleration/deceleration stages
MINIMUM PAUSE TIME		900 ms	20 ÷ 2000 ms	Minimum length of the pause between one impulse and the next

ENGINE ECU

Parameter	Variable	Factory settings		Range	Notes
ENTER PASSWORD	PSW_CAN_BUS	"0000"	"0000" – "9999"	Entering the correct password allows the parameters to be changed.	
CHANGE PASSWORD	PSW_CAN_BUS	"0000"	"0000" – "9999"	Change the password for access to the menu.	
ENGINE TYPE		NO CAN BUS		NO CAN BUS	Conventional mechanical engine
				SAE J1939 GENERIC	Choice of engine type equipped with control unit for electronic control of the injection system (ECM / ECU).
				NO CAN BUS	
				PERKINS 110x/220x	
				SCANIA	
				SCANIA G.E.	
				KOHLER	
				DEUTZ EMR2/EMR3	
				FPT NEF/CURSOR	
				VM R756 IE3	
				YANMAR	
				HATZ	
				KOHLER STAGE V	
				FPT DM1 STAGE V	
				YANMAR STAGE V	
				DEUTZ STAGE V	
START BY CAN BUS (only for electronic engines)		OFF		ON	Used to start the engine via the CAN Bus.
				OFF	
SWITCH-OFF OF INSTR. (only for electronic engines)	FUEL USED	ON		ON	Instruments displayed on the control unit.
				OFF	
	INSTANT. CONSUMPTION	ON		ON	
				OFF	
	FUEL TEMP.	ON		ON	
				OFF	
	TURBO TEMPERATURE	ON		ON	
				OFF	
	OIL TEMPERATURE	ON		ON	
				OFF	
	INTERCOOLER TEMP.	ON		ON	
				OFF	
	INTAKE TEMP.	ON		ON	
				OFF	
	FUEL PRESSURE	ON		ON	
				OFF	

	COOLANT LEVEL	ON		ON	
				OFF	
	COOLANT PRESSURE	ON		ON	
				OFF	
	ENGINE TORQUE	OFF		ON	
				OFF	
	ENGINE LOAD	ON		ON	
				OFF	
	FUEL LEVEL	OFF		ON	
				OFF	
	OIL LEVEL	ON		ON	
				OFF	
ADDRESS (only for electronic engines)		1		1 ÷ 100	Control unit source address.
REV CONTROL (only for electronic engines)	FUNCTION	ON		ON	Sends the speed adjustment command.
				OFF	
	MODE	KEYS		KEYS	The rpm is managed using the front buttons.
				SETPOINT	See parameter SETPOINT.
	SETPOINT	SPEED	1500 RPM	600 ÷ 4000 RPM	Parameters related to SETPOINT.
		TOLERANCE	50 RPM	20 ÷ 150 RPM	
	COOLING	0 sec		0 ÷ 600 sec	Delay time between the end of the deceleration and the stop in case of fault.
	MINIMUM SPEED	800 RPM		600 ÷ 4000 RPM	It is the minimum RPM value that the engine can reach. When the engine reaches this value, the control unit does not allow the engine rpm to decrease any further.
	STEP	20		5 ÷ 500 RPM	Adjust the acceleration and deceleration speed.
	TIME	100		10 ÷ 500 msec	
	SCANIA PARAMETERS	SPEED	1500 RPM	1500	RPM selection for Scania G.E. fixed speed engines
				1800	
		RPM OFFSET	0	-120 ÷ +120 RPM	Offset with respect to fixed RPM for Scania G.E. engines
		TORQUE LIMIT	----	----	Torque/power limit set in Scania engines when function-input LIMIT TORQUE/POWER enabled
				LIM 1	
				LIM 2	
				LIM 1-2	
KOHLER S5 PARAM. (only for Kohler Stage V)	DPF	ON		ON	Enables/disables the instruments for the particulate filter
				OFF	
	SCR	ON		ON	Enables/disables the instruments for the SCR system
				OFF	
	AUTOM. REGENERATION	ON		ON	Enables/disables automatic regeneration of the particulate filter
				OFF	
	INDUCEMENT PARAM.	EUROPEAN LEG.		EUROPEAN LEG.	Selects the type of reference standard
				U.S.A. LEG.	
	REGENERATION SIGNAL	MOMENTARY SIGNAL		MOMENTARY SIGNAL	Selects the type of signal used in the particulate filter regeneration procedure
				SOLID STATE	
FPT S5 PARAMETERS (only for FPT Stage V)	AUTOM. REGENERATION	ON		ON	Enables/disables automatic regeneration of the particulate filter
				OFF	
	MANUAL REGENERATION	ON		ON	Enables/disables forced regeneration of the particulate filter
				OFF	
	LOW IDLE RPM REGEN.	1300		800 ÷ 1300 RPM	Idle speed setpoint during the particulate filter regeneration procedure
	OIL COUNTER RESET	ON		ON	Enables/disables option to reset the engine ECU oil quality-related counters. Function enabled only with engine off with SERVICE enabled.
				OFF	
YANM. S5 PARAMETERS (only for Yanmar Stage V)	MANUAL REGENERATION	ON		ON	Enables/disables forced regeneration of the particulate filter
				OFF	
DEUTZ S5 PARAMETERS (only for Deutz Stage V)	MANUAL REGENERATION	ON		ON	Enables/disables forced regeneration of the particulate filter
				OFF	
	AUTOM. REGENERATION	ON		ON	Enables/disables automatic regeneration of the particulate filter
				OFF	
	REGENERATION SIGNAL	MOMENTARY SIGNAL		MOMENTARY SIGNAL	Selects the type of signal used in the particulate filter regeneration procedure
				SOLID STATE	

MODEM (applies only if the modem is connected to the control unit)

Parameter	Variable	Factory settings	Range	Notes
ENTER PASSWORD	PSW_MODEM	"0000"	"0000" – "9999"	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	PSW_MODEM	"0000"	"0000" – "9999"	Change the password for access to the menu.
FUNCTION		OFF	ON OFF	Enables or disables management of the GSM modem
SMS FROM ALL		ON	ON	The control unit will accept SMS commands from all telephone numbers.
			OFF	The control unit will only accept SMS commands from telephone numbers saved in the directory.
SEND START STOP		OFF	ON OFF	If enabled, it sends a text message every time the engine starts or stops.
CYCLIC MAINTEN. SMS		OFF	ON OFF	If enabled, the scheduled maintenance programs can be reset with a text message command.
FAULT RESET SMS		OFF	ON OFF	If enabled, it is possible to use the "RESET" text message command to reset any errors. Equal to reset using the front buttons.
TELEPHONE 1		" "	**' ' ÷ '9'**	Telephone numbers to which text messages will be sent with the GSM modem.
TELEPHONE 2		" "	**' ' ÷ '9'**	
TELEPHONE 3		" "	**' ' ÷ '9'**	
TELEPHONE 4		" "	**' ' ÷ '9'**	
TELEPHONE 5		" "	**' ' ÷ '9'**	

INPUT/OUTPUT

Parameter		Factory settings	Range	Notes
ENTER PASSWORD	PSW_IN_OUT	"0000"	"0000" – "9999"	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	PSW_IN_OUT	"0000"	"0000" – "9999"	Change the password for access to the menu.
PROGRAMM. INPUTS				Menu
PROGRAMMABLE OUTPUTS				Menu

PROGRAMM. INPUTS

Parameter	Variable	Factory settings	Range	Notes
INPUT 30 INPUT 41 INPUT 42 INPUT 51 INPUT 52	TYPE	See the table below	FAULT "FUNCTION"	Identifies whether the input is associated to a function or fault.
FUNCTION (visible if TYPE = FUNCTION)		See the table below	See the full list of functions-input.	Identifies the function associated to the input.
CLOSING DELAY		0 sec	0 ÷ 9999 sec	Delay occurring upon activation.
OPENING DELAY,		0 sec	0 ÷ 9999 sec	Delay occurring upon deactivation.
INTERVENTION		ACTIVE CLOSED	ACTIVE CLOSED ACTIVE OPEN	The input is active if it is open or closed to common.
STOP (visible if TYPE = FAULT)		WITH STOP	WITH STOP WITHOUT STOP	Programming enabled if TYPE = FAULT Set the moment of activation, storing, the type of alarm and the text for the fault.
DECELERATION (visible if TYPE = FAULT)		WITH DECELERATION	WITH DECELERATION NO DECELERATION	
COOLING (visible if TYPE = FAULT)		NO COOLING	WITH COOLING NO COOLING	
ACTIVATION (visible if TYPE = FAULT)		ALWAYS ACTIVE	ALWAYS ACTIVE ACTIVE RUNNING	
MEMORY (visible if TYPE = FAULT)		NOT STORED	NOT STORED STORED	
FAULT TEXT (visible if TYPE = FAULT		FAULT INPUT i	'0' ÷ '9',' ','A' ÷ 'Z'	

The factory settings for the inputs are the following:

TERMINAL	FUNCTION
[30]	----
[41]	CONTACT W FUEL
[42]	----
[51]	OIL PRESSURE SWITCH
[52]	ENGINE THERMOSTAT

For FUNCTIONS, refer to the section PROGRAMMABLE INPUTS.

PROGRAMMABLE OUTPUTS

Parameter	Range	Notes
FUNCTION-OUTPUT	---- OUTPUT 6 OUTPUT 15 OUTPUT 19 OUTPUT 70 OUTPUT K1 OUTPUT K2 OUTPUT K3	The FUNCTION indicated by the parameter is associated with the specified output: the output is active when the associated function is also active.
FAULTS	---- OUTPUT 6 OUTPUT 15 OUTPUT 19 OUTPUT 70 OUTPUT K1 OUTPUT K2 OUTPUT K3	The FAULT indicated by the parameter is associated with the specified output: the output is active when the associated fault is also active.

For the list of functions, refer to the section PROGRAMMABLE OUTPUTS; for the list of faults, refer to the section FAULTS.
Programming default values are as follows:

Parameter	DEFAULT
GLOW PLUGS	OUTPUT 6
----	OUTPUT 15
KEY	OUTPUT 19
GENERAL ALARM	OUTPUT 70
ACCELERATE	OUTPUT K1
DECELERATES	OUTPUT K2
ACTUATOR ENABLING	OUTPUT K3

SERIAL PORTS

Parameter	Variable	Factory settings	Range	Notes
ENTER PASSWORD	SERIALS_PSW	"0000"	"0000" – "9999"	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	SERIALS_PSW	"0000"	"0000" – "9999"	Change the password for access to the menu.
USB VCP	ADDRESS	1	1 ÷ 32	Address of the control unit with MOD Bus RTU Slave protocol.
	PROTOCOL	MOD BUS	MOD BUS CLI	Data exchange protocol
RS232	ADDRESS	1	1 ÷ 32	Communication parameters
	BAUDRATE	9600	1200 ÷ 115200	
	PARAMETERS	E,8,1	E,8,1 N,8,1 O,8,1	
RS485	ADDRESS	1	1 ÷ 32	Communication parameters
	BAUDRATE	9600	1200 ÷ 115200	
	PARAMETERS	E,8,1	E,8,1 N,8,1 O,8,1	

DEVICE

Parameter	Variable	Factory settings	Range	Notes

ENTER PASSWORD	PSW_DEVICE	“0000”	“0000” – “9999”	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	PSW_DEVICE	“0000”	“0000” – “9999”	Change the password for access to the menu.
STAND-BY	FUNCTION	"ON"	"ON"	Enables or disables the unit’s power saving mode or Stand-By.
			"OFF"	
	STANDBY TIME	30 sec	1 ÷ 1800 sec	This is how long the unit takes to time out to power saving Stand-By mode and turn off.
DISPLAY	LCD CONTRAST	50 %	0 ÷ 100 %	Display contrast
	BRIGHTNESS	100 %	0 ÷ 100 %	Display brightness
SETUP RESETTING				Restore the default settings.
CONT. UNIT SWITCH-ONS		0	0 ÷ 65535	Number of control unit start ups
UNIT OF MEASURE	"TEMPERATURE"	°C	°C	Unit of measurement displayed for the TEMPERATURE measurement instruments.
			°F	
	"PRESSURE"	bar	bar	Unit of measurement displayed for the PRESSURE measurement instruments.
			kPa	
			psi	

MAINTENANCE

Parameter	Variable	Factory settings	Range	Notes
ENTER PASSWORD	PSW_MAINTENANCE	“0000”	“0000” – “9999”	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	PSW_MAINTENANCE	“0000”	“0000” – “9999”	Change the password for access to the menu.
MAINTENANCE 1 MAINTENANCE 2 MAINTENANCE 3	MODE	----	----	Scheduled maintenance activation mode
			MOTOR HOURS	
			RUNNING HOURS	
			CALENDAR	
	EXPIRY	----	MOTOR HOURS RUNNING HOURS DATE Depending on the mode.	Indicates the data regarding the next scheduled maintenance expiry.
	MAINTENANCE TEXT	“MAINTENANCE 1”(2,3)	‘0’ ÷ ‘9’,‘ ’,‘A’ ÷ ‘Z’	Text displayed
	STOP	"OFF"	"ON"	Allows stopping the engine.
			"OFF"	
	RESET			Resets the expired maintenance.
COMMISSIONING	Data:	00/00/0000	CLOCK/CALENDAR	System commissioning date.

RESETTING OPERATIONS

Parameter		Default	Range	Notes
ENTER PASSWORD	PSW_RESETS	“0000”	“0000” ÷ “9999”	Entering the correct password allows the parameters to be changed.
CHANGE PASSWORD	PSW_RESETS	“0000”	“0000” ÷ “9999”	Change the password for access to the menu.
MODIFY HOUR METER			0h 0’ ÷ 65535h 59’	Used to modify the operating hour intervals. The hour intervals for periodical maintenance must be re-set.
START-UPS				Resets the engine start-up counter.
FUEL USED				Resets the litres of consumed fuel; valid only with a CAN Bus connection.

SERVICE (electronic engines only)

Parameter	Variable	Factory settings	Range	Notes
SERVICE		OFF	ON	With KEY in position 1, the engine ECU is kept active even when faults that cause the engine to stop occur
			OFF	

REPLACING THE CONTROL UNIT

Before replacing the control unit, we advise you to transfer all the technical settings to a personal computer and save them in an archive file. This operation can be performed using the ZW-SMART software, which can be requested from Elcos or downloaded from the website www.elcos.it.

TECHNICAL SPECIFICATIONS

Power supply			
Suitable for batteries		12Vdc	24Vdc
Operating range		8–48Vdc	
Absorption with engine not running		280mA@12Vdc	175mA@24Vdc
Absorption with key in zero position		15mA@12Vdc	8mA@24Vdc
Voltage dip on battery power supply		From 10Vdc to 0Vdc for 15ms	
Digital inputs [30], [41], [42], [51], [52]			
Type of input		Negative	
Maximum current supplied		1mA	
Voltage threshold for low signal		≤ 0.7Vdc	
Voltage threshold for high signal		≥ 1.2Vdc	
Digital inputs [23], [24]			
Type of input		Positive	
Maximum input current		0.6mA@48Vdc	
Voltage threshold for low signal		≤ 1.8Vdc	
Voltage threshold for high signal		≥ 2.3Vdc	
Terminal input [65]			
AC voltage		5.5–65Vac	
Measurement range		50 to 1500Hz	
Pick-up input terminals [63-64]			
AC voltage		1.5–15Vac	
Measurement range		300 to 15000Hz	
Minimum pick-up impedance		>400ohm	
Digital outputs			
Type of output		Positive (battery voltage)	
[6], [19], [70]		Type	BATT+ [1]
		Maximum load	0.25A
[15]		Type	Power emergency input [4A]
		Maximum load	0.25A
[17]		Type	Power emergency input [4A]
		Maximum load	1.5A
Outputs K1, K2, K3			
Type of output		Clean contact with shared COM	
Maximum applicable voltage		48Vdc, 65Vac	
Maximum load		3 A (AC1)	
Engine instruments			
Oil pressure	0–360ohm	0.0 ÷ 9.0BAR	0–900kPa
Temperature	0–3000ohm	0–140 °C	0 to 284°F
Fuel level	0–360ohm	0–100%	
Accuracy (pressure gauge, thermometer, fuel level)		± 2%	
Lines of communication			
RS232 (no optoisolator)	Baud-rate	1200 ÷ 115200 bps	
	Parity	None/even	
RS485 (optoisolated)	Baud-rate	1200 ÷ 115200 bps	
	Parity	None/even	
USB 2.0 (Micro USB-B)	Interface	Not isolated. Maximum cable length 3 m.	
CAN Bus (no optoisolator)	Baud-rate	250kbps	
	Protocol	SAE J1939	
Environmental conditions			
Operating temperature		-20 to 60 °C	
Storage temperature		-20 to 60 °C	
Relative humidity		≤ 80%	
Protection class			
Back		IP 20	
Front		IP 54	
Container			
Weight		480g	
Dimensions (LxHxD)		157x109x74mm	
Perforations		137x88mm	
Material		PC/ABS V0	
Terminals			
Screw		M3	
Max. section		2.5mm^2	
Installation			
Wall-mounted			
Nuts	Thread	M4	
	Tightening torque	1.0 ÷ 1.5 Nm	

WARNING

The control unit performs command and control functions for a diesel engine. It is designed for installation on board the machine.

Attention: carefully observe the following recommendations

- Operations must be performed with the engine stopped and the engine connector unplugged.
- Check that the consumption of the connected equipment is in line with the described technical specifications.
- The installation must always guarantee adequate dissipation of heat.
- Always install the device at a lower position than any other devices that produce or dissipate heat.
- If necessary, replace the fuses only with the same type as the original fuse.
- Never disconnect the battery terminals while the engine is running.
- Strictly avoid using a battery charger for emergency start-up; this could damage the control unit.
- To safeguard people and equipment, always disconnect the electrical system terminals from the battery poles before connecting an external battery charger.

Device sensitive to electrostatic discharge

Do not open the device unless precautions to avoid electrostatic discharges have been taken.

This control unit is not suitable for operation under the following conditions:

- Where the room temperatures exceeds the limits specified in the technical data sheet;
- Where abrupt shifts in temperature and air pressure produce exceptional condensation;
- Where there is high pollution caused by dust, fumes, vapour, salts and corrosive or radioactive particles;
- Where there is high heat radiation due to direct sunlight, ovens or similar;
- Where mould or pests can be present;
- Where there is a risk of fire or explosion;
- Where strong shocks or vibrations can be transmitted to the control unit.

Operation and maintenance

We recommend the following maintenance on a weekly basis:

- Checking the signals;
- Checking the battery status;
- Checking the wires are connected firmly and the condition of the terminals.

Electromagnetic Compatibility

This control unit will only work if it is installed in systems that comply with regulations for CE marking. It complies with immunity requirements specified in EN61326-1, however, this does not rule out the possibility that malfunction could occur in extreme cases occurring in specific situations. The installer is responsible for checking that the level of perturbation does not exceed that specified in standards.

Note on connecting the control and safety devices to the panel

IN THE ABSENCE OF OUR WRITTEN DECLARATION ATTESTING TO THE CONTRARY, THIS UNIT IS NOT SUITABLE FOR INSTALLATION AS A CRITICAL COMPONENT IN EQUIPMENT OR SYSTEMS VITAL TO THE LIFE OF PEOPLE AND OTHER LIVING THINGS.

Any application which differs from what is indicated in this manual must be authorised by the manufacturer.

INFORMATION FOR ORDERING

Type	Item Code
DIP-337	00026615

STANDARD ACCESSORIES

Type	Item Code
Connector kit MU DIP-337	40804438

ACCESSORIES AVAILABLE ON REQUEST

Type		Item Code
AST-015/00	Rod electrode, including accessories	40241012
E-25	Screw electrodes, including accessories	40190115
VAR-201 12V	Linear actuators	00571547
VAR-201 24V	Linear actuators	00571548
ZW-SMART	Programming software	00070212

DOCUMENTATION ON REQUEST

Downloadable from the website www.elcos.it/en

List of MOD Bus DIP-337 addresses

CONFORMITY

CE