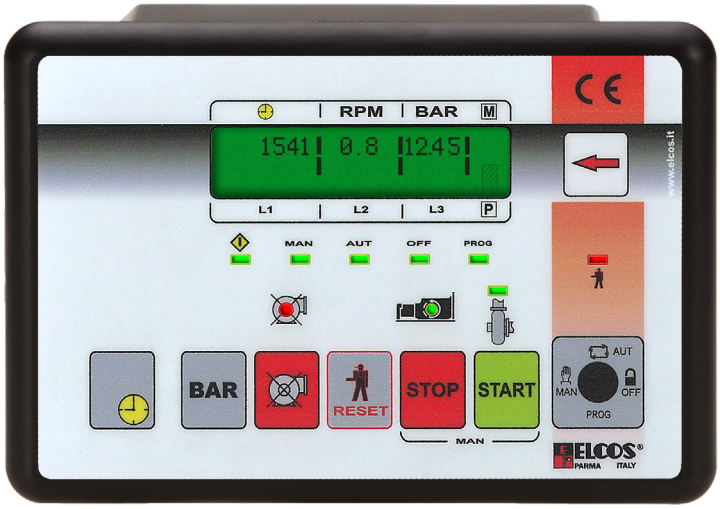
COMBINED CONTROL UNIT FOR CONTROLLING AN INDEPENDENT GENERATOR SET AND IRRIGATION MOTOR PUMP TYPE CEM-120

This monitors and controls a generator set and an irrigation motor pump and allows connection of the generator contactor.

USER INSTRUCTION MANUAL



Complete with display to display the INSTRUMENTS:

- pump water pressure gauge
- three ammeters
- three voltmeters
- frequency meter
- wattmeter (1)
- varmeter (1)
- voltammeter (1)
- power factor meter
- kilowatt-hour
- fuel level indicator
- battery voltmeter
- water and oil thermometer
- oil pressure gauge
- total hour meter
- partial hour meter
- start-up counter
- failure to start counter
- tachometer

GENERATOR

(1) TOTAL AND PER PHASE

- Pump water pressure control.
- Switching off of pump water protection device.
- Automatic monitoring of faults with messages on the display.
- Texts in 6 languages: Italian, English, French, German, Spanish and Portuguese.
- Remote control (start-up and stop).
- Management of glow plug preheating.
- Clock for programming the starting or stopping of the machine.
- Indication of preventive maintenance operations.
- Programmable weekly self-test.
- Inputs for fully programmable available fault.
- Possibility to start the generator set with battery with low charge.
- Three-phase voltmeter check - minimum, maximum voltage, asymmetry and incorrect phase sequence of the generator.
- Fault log (the data of the last 100 faults that occurred are collected).

COMMUNICATION MODES OF THE CEM-120

- Serial port RS232.
- GSM Modem (optional), possibility to display, with a mobile phone, the instruments of the control unit, control starting and stopping and notify with an SMS message when the generator set is in alarm condition.

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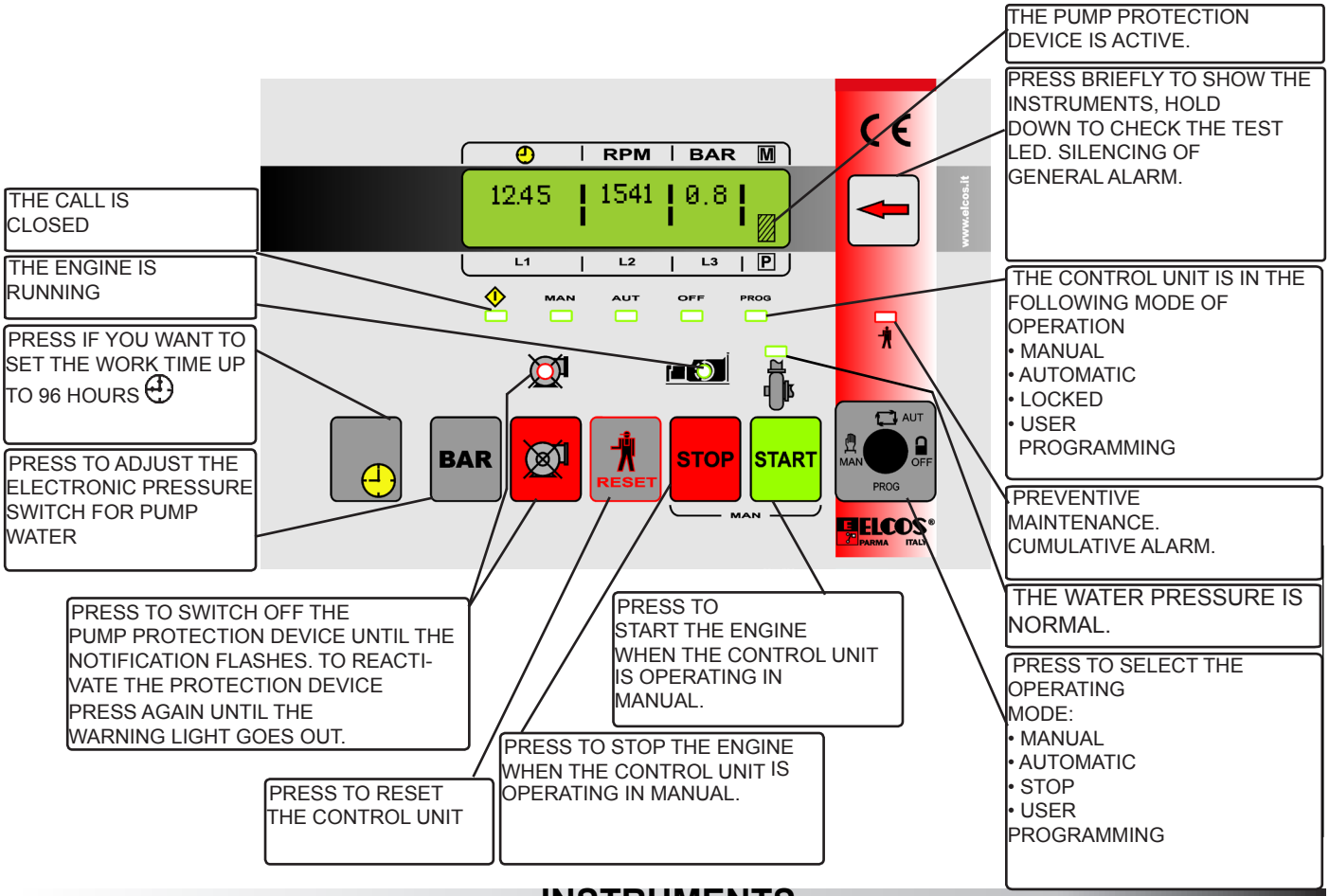
BRIEF INSTRUCTIONS

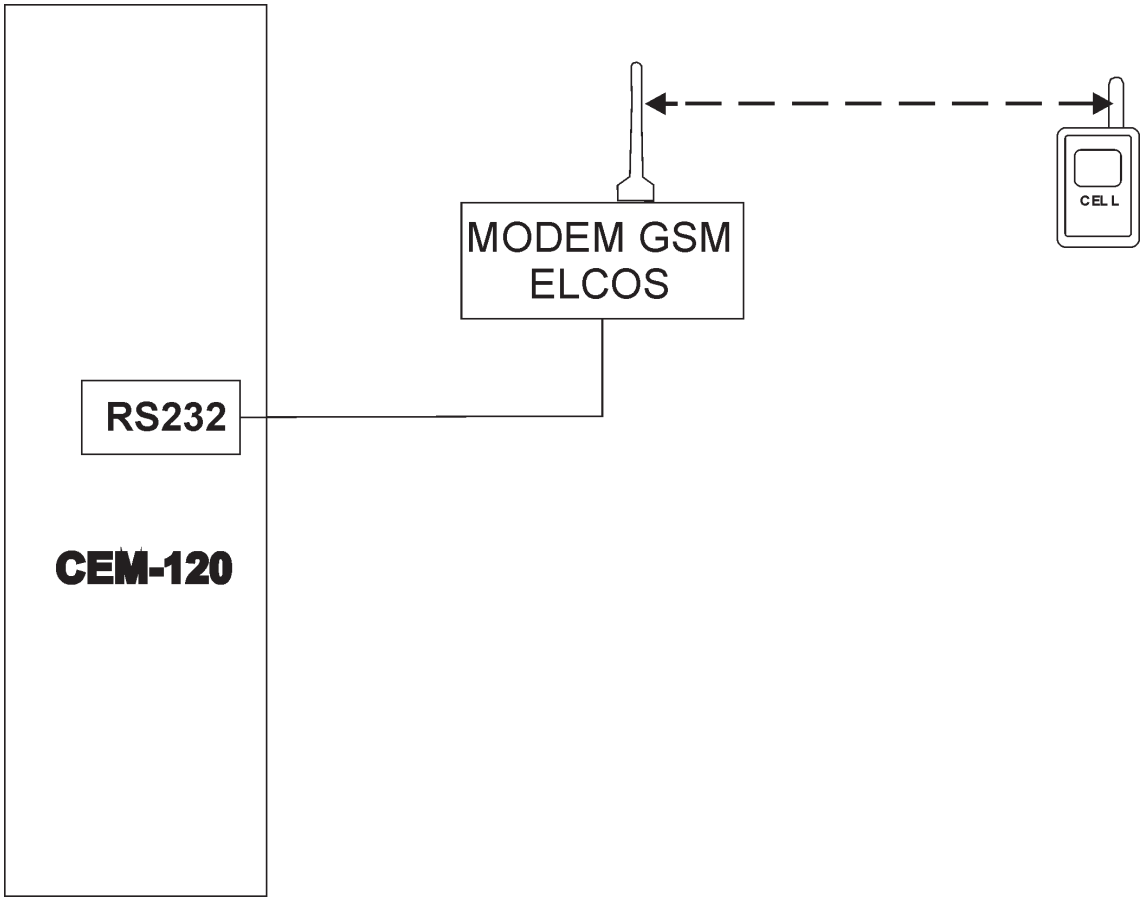


INSTRUMENTS

With the engine running the instruments are indicated.
In the event of a fault, instead of the measurement, the display indicates the message of the fault that has occurred.

• WATER PRESSURE GAUGE OF PUMP	From 0to 21 bar.
• THREE AMMETERS OF GENERATOR	Compatible with the current transformer of type 30/5, 40/5, 50/5, 60/5, 80/5, 100/5, 150/5, 200/5, 250/5, 300/5, 400/5, 500/5, 600/5, 800/5, 1000/5, 1200/5, 1500/5, 2000/5. Maximum reading of 2000 A or 110% of the full-scale current of the chosen transformer.
• THREE VOLTMETERS OF GENERATOR • LINE VOLTAGES • STAR VOLTAGES	For single-phase or three-phase voltages of nominal value from 10 up to 500 V~.
• FREQUENCY METER OF GENERATOR	From 45 Hz to 85 Hz for alternating voltages with amplitude greater than 30 V~.
• WATTMETER • VARMETER • VOLTAMMETER • POWER FACTOR METER • KILOWATT-HOUR	Displays the apparent power up to 1500KVA.
• LEVEL INDICATOR FOR FUEL	Displays the percentage of fuel in the tank.
• BATTERY VOLTMETER	For voltages between 9 and 38 Volt.
• THERMOMETER FOR WATER AND OIL	Displays the engine oil and water temperature up to 140°C.
• OIL PRESSURE GAUGE	Displays the engine oil pressure up to 9 bar.
• TOTAL HOUR METER	With five digits and maximum reading of 59999 (hours and minutes).
• PARTIAL HOUR METER	With four digits and maximum reading of 9999 (hours and minutes), the hours indicated are set to zero at the next start-up of the G.S.
• START-UP COUNTER	Displays the number of start-ups up to 65535.
• COUNTER OF FAILURES TO START	Displays the number of FAILURES TO START up to 9999.
• TACHOMETER	Displays the number of engine revs up to 8500 rpm.

COMMUNICATION MODES OF THE CONTROL UNIT



HISTORY AND REVISIONS		

OPERATION

SELECTION OF FUNCTIONS

MAN AUT OFF PROG  The function selected with the button is indicated by the relevant warning light.

MANUAL

The controls of the control unit are enabled.

Start-up with button START stop with button STOP (a tap on the button is sufficient).

PROTECTION DEVICES

The protection function in manual mode of the machine can be programmed in two ways:

· Only display of the fault that has occurred WITHOUT STOP of the engine. The generator overfrequency fault is programmed with engine stop; it is not possible to program it without engine stop.

· Display of the fault that has occurred WITH ENGINE STOP (the control unit is programmed this way).

AUTOMATIC

On closing of the call contact, once the START-UP DELAY TIME AFTER CLOSING OF THE CALL has elapsed, the control unit operates the glow plugs (if preset) and then starts the engine. With normal generator voltage, and after the GENERATOR CONNECTION TO POWER USER DELAY has elapsed, the generator contactor closes (contact 73-74). During operation, the machine is protected from any faults. On opening of the call contact, once the DELAY AFTER CALL OPENING has elapsed, the generator contactor opens. The COOLING TIME allows and facilitates cooling of the engine before it is stopped.

WEEKLY AUTOMATIC TEST

ENABLED WITH CONTROL UNIT IN AUTOMATIC MODE (for programming, see page 8 of the TECHNICAL PROGRAMMING SETTINGS manual). The engine is started and stays running for the WEEKLY TEST DURATION time (programmed to 3 minutes); if a call occurs, the generator contactor closes.

This test will be automatically repeated every week precisely on the day and at the time that it was programmed. During the automatic test cycle, the following is displayed on the display

WEEKLY AUTOMATIC TEST.

STOPPING THE ENGINE DURING THE TEST

Press button STOP

If the engine remains stopped for a few days a week, we advise extending the duration of the weekly test to charge the battery through the battery charging alternator.

STOPPING THE WEEKLY TEST: the weekly test is stopped when a fault is displayed on the display.

OFF

By pressing button  until led OFF comes on.

The engine cannot be started in any way, and if it is running it is stopped.

PREHEATING OF GLOW PLUGS

- During preheating, the following is indicated on the display PREHEATING OF GLOW PLUGS .

- In manual mode with button START (a tap on the button is sufficient).
- In automatic mode, this is activated automatically before start-up.

The duration of the preheating action can be set, the preheating action ceases before the beginning of start-up. The preheating control is factory disabled since it has been programmed to zero seconds.

START-UP

- IN MANUAL MODE WITH BUTTON START .
- In **automatic** mode, on closing of the call contact and after the START-UP DELAY AFTER THE CALL time has elapsed. To facilitate starting, a special circuit determines a sequence of programmable start-ups (programmed to 4 START-UPS): in the number of start-ups, in the duration of the pause and of the start-up.

FAILURE TO START

If the whole series of attempts is unable to start the engine, at the end of this cycle, the display will display FAILURE TO START and the stop signal will be activated.

DETECTION OF ENGINE RUNNING

This is obtained with measurement of the residual frequency and voltage of the generator and from measurement of the voltage and frequency of the battery charging alternator (PERMANENT MAGNET or PRE-EXCITATION).

As an alternative to the battery charging alternator, a pick-up can be used.

Once it has been detected, it disables the starter motor and lights up the led .

STOP

- In manual mode with button START (a tap on the button is sufficient).
- In automatic mode, on opening the call contact or by intervention of the protection devices.

Stopping can take place in two ways:

• With electromagnet de-energized with engine running and energized with it stopping, remaining in this state during the STOPPING TIME (programmed to 20 sec.) after detecting that the engine has stopped.

• With electromagnet or solenoid valve energized with engine running and de-energized with engine stopping, remaining in this state even with engine stopped.

OPERATION

GENERATOR SET PROTECTION DEVICES

The occurrence of the fault is displayed, can cause the engine to stop and activates the general alarm; see basic table in the TECHNICAL PROGRAMMING SETTINGS manual on page 10.

DISPLAY OF FAULT

With the engine running, the instruments are indicated.
In the event of a fault, instead of the measurement, the display indicates the message of the fault that has occurred and the led flashes .

HOW TO SEE THE INSTRUMENTS AGAIN

The reading of the measurements can be accessed by pressing, for 1 second, button .
The display will resume displaying the previous fault 10 seconds after the button was last pressed.

FAULT RESET

When button RESET is pressed, the protection devices and all the locked functions are reactivated.

GENERAL ALARM

This can be obtained by fitting a buzzer to be connected to the terminal provided.
It can be set to come on continuously or for a fixed time.

When button is pressed the general alarm is silenced.
Before starting automatically, the engine activates the general alarm intermittently for 8 seconds, followed by a pause of 3 seconds.
This function can be switched off: see the TECHNICAL PROGRAMMING SETTINGS manual on page 15.

PREVENTIVE MAINTENANCE

When preventive maintenance operations have to be carried out, the intermittent flashing led comes on and the maintenance number appears.
The schedule for maintenance operations and the procedure for resetting an expired maintenance operation can be programmed by the manufacturer of the machine.

EMERGENCY STOP

This can be obtained in any operating condition; one or more (latching) buttons can be installed.
The stop is immediate, enables the general alarm and EMERGENCY STOP is displayed on the display.

Do not use the emergency button combined with a stopping system that is not energized in run mode.

FAILURE TO STOP

This intervenes if, 60 seconds after the stop command, the engine running signal is detected. On the display, you will read failure to stop.

POSSIBILITY TO START THE MACHINE WITH BATTERY WITH LOW CHARGE

(WITH CONTROL UNIT IN AUTOMATIC MODE)

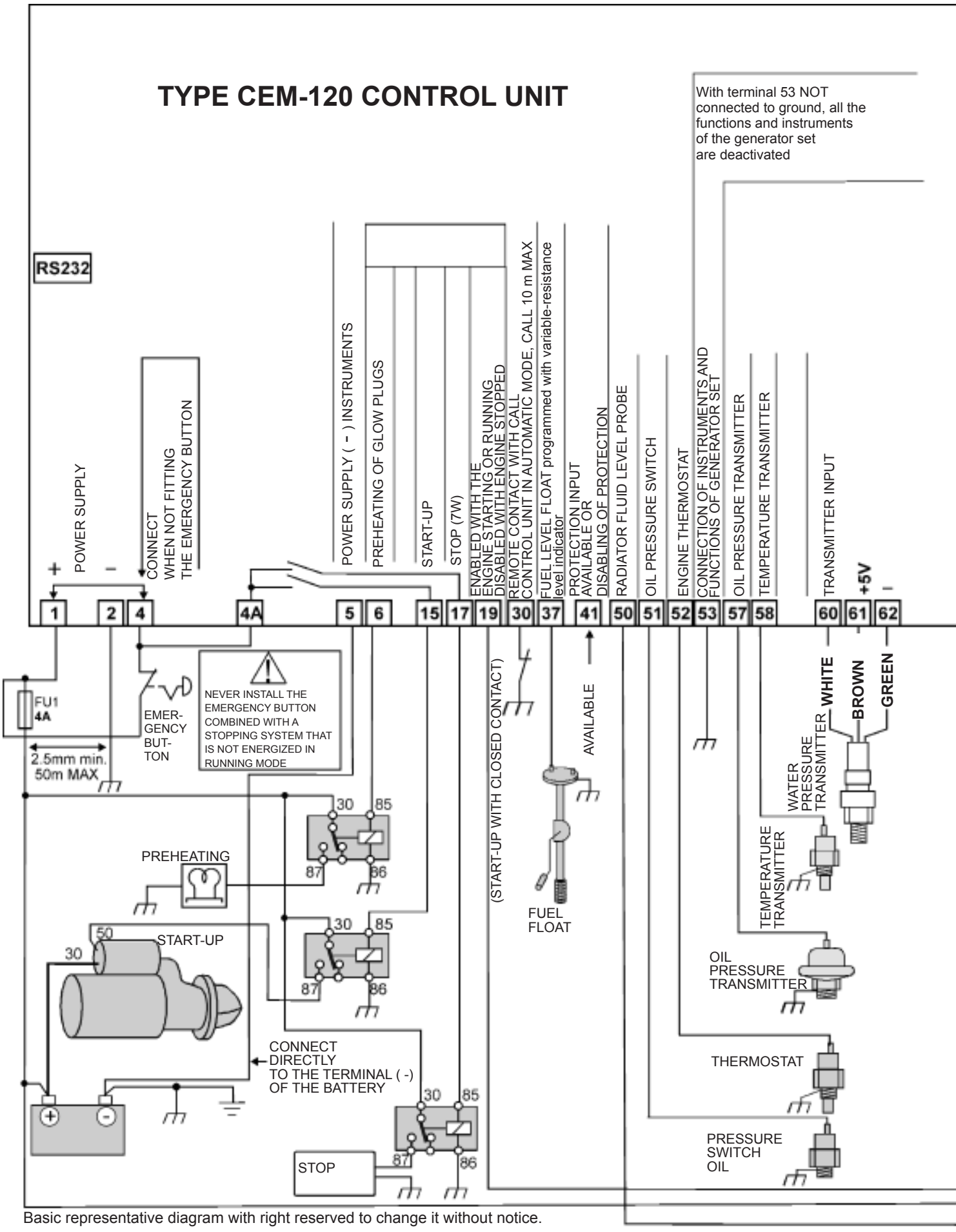
Starts or stops the generator set depending on the voltage measured on the battery terminals.
Before starting automatically, the generator set activates the general alarm intermittently for 8 seconds, followed by a pause of 3 seconds.

When the voltage measured on the battery is lower than the minimum threshold, the engine starts.
When the voltage exceeds the maximum threshold after the intervention delay the engine stops. To change the programming setting of the thresholds and of the delay, see basic table of the TECHNICAL PROGRAMMING SETTINGS manual on page 10.

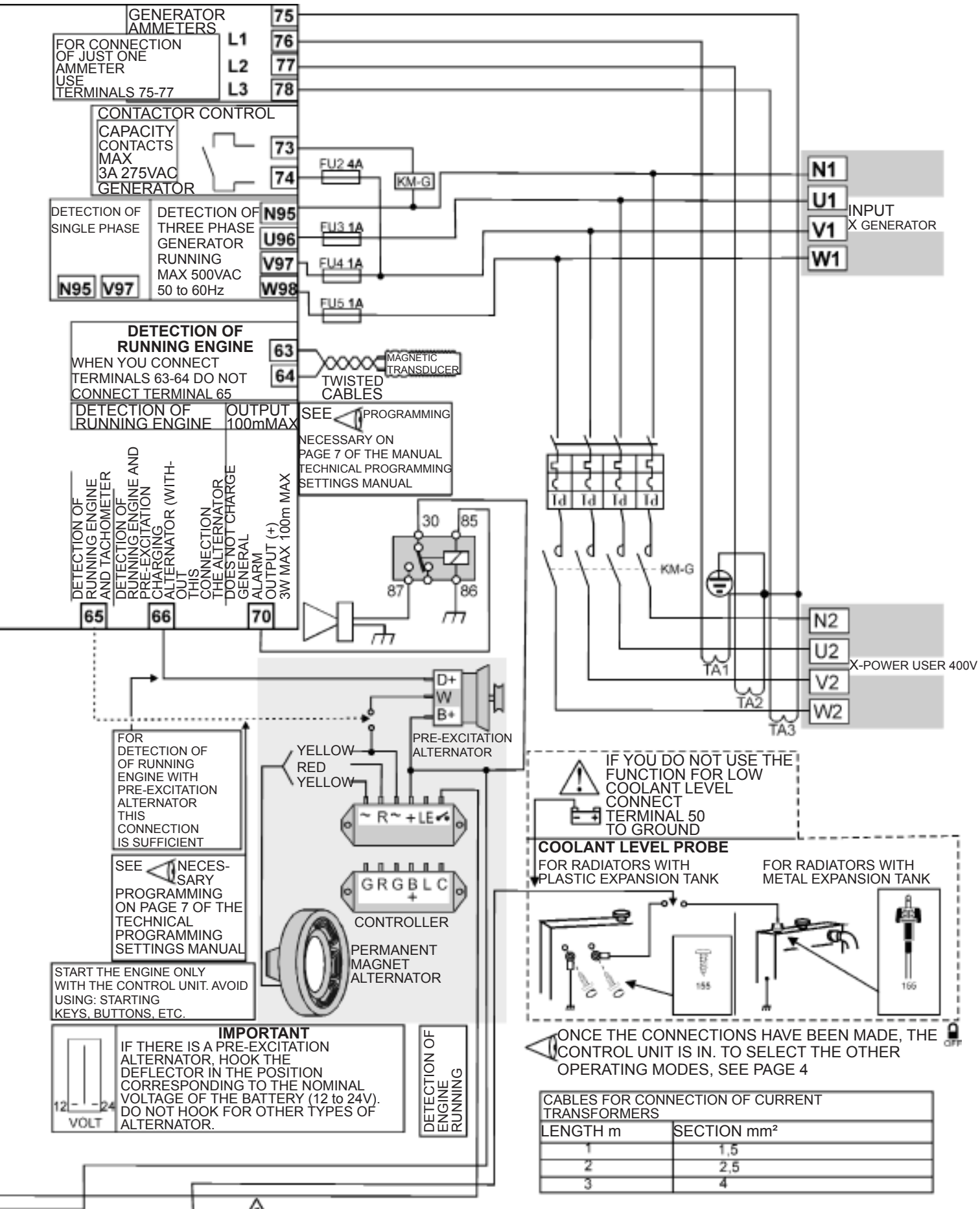
GENERATOR VOLTMETER RELAY INSIDE THE CONTROL UNIT

Checks the voltages of the generator set. Intervenes in the event of: no voltage, undervoltage, overvoltage, asymmetrical voltages and incorrect phase sequence.
On measurement of the voltage on the three phases of the running generator set with values within the set limits, after the GENERATOR CONNECTION TO POWER USER delay (programmed to 7 sec.), the generator contactor closes.
When the voltage increases or decreases, thereby coming outside the range of normality, the generator contactor becomes de-energized.

CONNECTION DIAGRAM



Basic representative diagram with right reserved to change it without notice.



CABLES FOR CONNECTION OF CURRENT TRANSFORMERS	
LENGTH m	SECTION mm²
1	1,5
2	2,5
3	4

FOR PROTECTION DEVICES AGAINST OVERCURRENTS OF THE ELECTRICAL EQUIPMENT AT BATTERY VOLTAGE, REFER TO STANDARDS IEC 44-5 (EN 60204)

ADJUSTMENT OF ELECTRONIC PRESSURE SWITCH (TRANSMITTER) FOR PUMP WATER

Controls the pressure of the system and replaces the conventional pressure switch.

PUMP PROTECTION

No ADJUSTMENT IS REQUIRED.

The pump protection device is enabled when the PUMP PROTECTION ACTIVE warning light [P] comes on after the water pressure has remained steady for 2 consecutive minutes, and in any case 10 minutes after the engine started.
The protection device intervenes 5 seconds after the pressure increases or lowers by **two bar**, stops the engine, and the display indicates:

OVERPRESSURE PUMP WATER
or
LOW WATER PRESSURE

Insufficient pump water pressure **(subpressure)**

It is possible to change the **two bar** of pressure lowering (subpressure), by pressing button **BAR**.
This change is deleted when the engine is stopped.

The OVERPRESSURE remains set to **two bar**, this value is added to the working pressure (for example, working pressure 9 bar, overpressure 11 bar)

Press to set the subpressure value. **BAR** WORK PRES 10 SUBPRESSURE 08 Press to select the working pressure.

TIMER

Enabled with the engine running, and, if necessary, allows the pump to be operated for a settable time (maximum 96 hours), at the end of which it is stopped and the display will show the notification END OF WORKING TIME.

Set the work time by pressing button  until you reach the required value on the display WORKING TIME – – : – –.
When you release the button, the timer automatically begins working, and displays the remaining work time.

RESETTING OF THE SET TIME

You can reset the set time in two ways:

- hold down button  until set to zero.

- stop the engine with the stop button **STOP**.

SWITCHING OFF OF PUMP PROTECTION DEVICE
(ENABLED WITH ENGINE RUNNING)

Button  switches off the pump protection device:
- switching off is obtained by holding it down for at least 3 consecutive seconds; the function is indicated by the two intermittent notifications.
- this switching off is deleted by pressing the button again,  or by stopping the engine with button **STOP**.

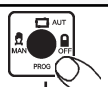
CONTROL OF CONNECTION OF ELECTRONIC PRESSURE SWITCH (TRANSMITTER) FOR PUMP WATER

The control is always active.

The intervention is indicated by the relevant notifications PRESSURE TRANSM. UNCONNECTED  flashing warning light and stops the engine after 2 seconds.

To switch off the intervention, press button  SWITCHING OFF OF PUMP PROTECTION DEVICE.

USER PROGRAMMING



ACCESS TO PROGRAMMING MODE

Press to select

TECHNICAL PROGRAMMING PROG

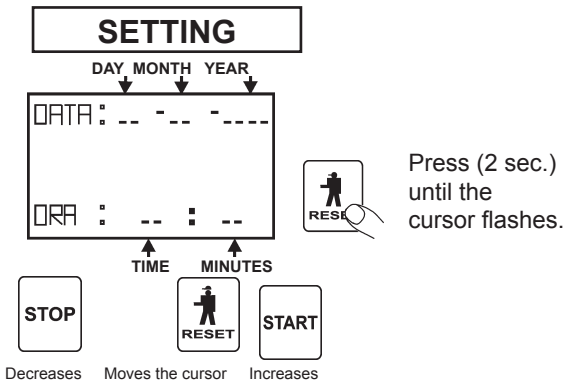
USER PROGRAMMING

PRESS TO DISPLAY THE REQUIRED PROGRAMMING

- CALENDAR CLOCK ADJUSTMENT
- SELECT LANGUAGE
- WEEKLY AUTOMATIC TEST
- DAILY START TIMER
- DAILY STOP TIMER
- TELEPHONE 1
- TELEPHONE 2
- TELEPHONE 3

CALENDAR CLOCK ADJUSTMENT

ADJUSTMENT IS RECOMMENDED.
The time and date are used when the fault log events are displayed.



Press (2 sec.) until the cursor flashes.

If the power is cut off the setting of the calendar clock must be repeated.

CHOICE OF LANGUAGE. The preset language is Italian; the selectable languages are: ENGLISH-FRENCH-GERMAN-SPANISH-PORTUGUESE.

SELECT LANGUAGE → Press to display.

Decreases STOP START Increases → Press to select.

ENGLISH → Press and wait for PROGRAMMED to be written

WEEKLY AUTOMATIC TEST. When the WEEKLY AUTOMATIC TEST ON programming is finished, with control unit in automatic mode, the generator set executes the test cycle.

WEEKLY AUTOMATIC TEST → Press to display.

ENGAGED / OFF → STOP START → Press to select.

Factory programming setting: OFF → Press and wait for PROGRAMMED to be written.

THE TIMER Allows you to program the operation or stopping of the generator set

SET THE CALENDAR CLOCK.

OK TO START SIGNAL. Operation is as in automatic mode.

DAILY START TIMER → Press to display.

Example: FROM , 12:15 / TO , 15:20 → STOP START → Press when the arrow is next to the times to be changed.

FROM , 12:15 / TO , 15:20 → Press and wait for PROGRAMMED to be written

STOP. Stops the start-up or running of the machine.

DAILY STOP TIMER → Press to display.

Example: FROM , 23:00 / TO , 07:30 → STOP START → Press when the arrow is next to the times to be changed.

FROM , 23:00 / TO , 07:30 → Press and wait for PROGRAMMED to be written

Programming of telephone numbers of users to be informed when the machine is in alarm condition.
Refer to "Sending SMS messages" in the MODEM manual.

Cursor → TELEPHONE 1 → Press to display.

TELEPHONE 1 / 333 ← No. of user

Press to move the cursor. STOP START Press to write the number.

Mobile phone number: TELEPHONE 1 / 333123456 → Press and wait for the system to write PROGRAMMED.

OR 1 - 2

NOTICES

This only monitors and controls a generator set. It is built for flush-mounting only on an electric switchboard and to be connected to other components (fuses, overload switch, etc.) that the installer will have prepared in order to complete the system.

Warning: Parts that are live at dangerous voltage

The control unit may be accessed only by suitably trained staff put in charge for the purpose. No maintenance operations may be carried out when the system is not disconnected from the generator and from the battery. Making an exception to the above, only suitably trained staff put in charge for the purpose may carry out the following operations on the live system:

- visual inspection of the connections and of the identification marks of the instrument;
- measurement of the voltage and/or current values;
- programming of the functions.

These operations must in any case be carried out using equipment that ensures appropriate electrical protection.

Warning:
Strictly comply with the following advice

- Connect following the wiring diagram shown on page 6-7.
- All work on the genset must be carried out with the engine stopped and with terminal 50 of the starter motor disconnected.
- Check that the consumption of the connected appliances is compatible with the described technical characteristics.
- Install so as to always allow adequate heat disposal.
- Always install in a position that is lower than other appliances that produce or dissipate heat.
- Handle and connect without mechanically stressing the electronic board.
- Do not allow pieces of copper wire or other metal residues to fall onto the control unit.
- Never disconnect the battery terminals with the engine running.
- Strictly avoid using a battery charger for emergency starting; you could damage the control unit.
- To protect the safety of people and equipment, before connecting an external battery charger, disconnect the terminals of the electrical system from the battery poles.

THIS CONTROL UNIT IS NOT SUITABLE FOR OPERATING IN THE FOLLOWING CONDITIONS:

- Where the ambient temperature exceeds the limits specified in the technical sheet.
- Where the air temperature and pressure variations are so rapid as to produce exceptional condensation.
- Where there is a high level of pollution caused by dust, smoke, vapours, salts and corrosive or radioactive particles.
- Where there is a high level of heat radiation from the sun, ovens or the like.
- Where attacks from mould or small animals are possible.
- Where there is a risk of fire or explosion.
- Where hard knocks or vibrations can be transmitted to the control unit.
- Where the control unit is protected by barriers or enclosures with degree of protection lower than IP40.

ELECTROMAGNETIC COMPATIBILITY

This control unit works correctly only if it is inserted in systems that are in line with the regulations for the CE marking; in fact, it is in line with the immunity requirements of standard EN61326-1, but this does not rule out malfunctioning in extreme cases that can occur in particular situations. It is the installer's job to ascertain whether there are disturbance levels higher than those provided for by the regulations.

OPERATION AND MAINTENANCE

We recommend that the following maintenance operations be carried out weekly:

- checking of the operation of the notifications;
- checking of the condition of the batteries;
- checking of the tightness of the conductors and the condition of the terminals.

UNLESS WE HAVE ISSUED A WRITTEN DECLARATION TO THE CONTRARY, THIS CONTROL UNIT IS NOT SUITABLE FOR USE AS A CRITICAL COMPONENT IN EQUIPMENT OR SYSTEMS ON WHICH THE LIFE OF PEOPLE AND OTHER LIVING BEINGS DEPENDS.

YOUR ELECTRICAL TECHNICIAN CAN ASK US ANY QUESTIONS ABOUT THIS CONTROL UNIT BY CONSULTING ONE OF OUR TECHNICIANS BY PHONE

TECHNICAL DATA

Battery power supply	12 Vdc and 24 Vdc
Supply voltage	8 to 32V
Consumption with stopped engine (STAND BY)	4mA at 12V, 3 mA at 24V
Consumption with stopped engine with modem connected (STAND BY)	85mA at 12V, 45mA at 24V
Consumption with stopped engine and pressed emergency button	190 mA at 12V, 110 mA at 24V
Maximum consumption	265 mA at 12V, 150 mA at 24V
Suitable for generators with nominal voltage of	220 to 450 Vac ± 10%; frequency 50 to 60Hz
Rated insulation voltage: - Terminal board at genset voltage - Terminal board at battery voltage	 500V 32V
Maximum load on outputs	15 (start-up) 3W, 17 (stop) 7W, 19 (key) 3W, 6 (glow plugs) 3W, 70 (general alarm) 3W.
Timer	1' to 96h
Rear degree of protection	IP00
Front degree of protection	IP64
Temperature limits	-20 to +50°C
Weight	430 g
Dimensions (LxHxD) mm	157x109x74
Hole mm	88x137
Hour meter	5 digits
Precision of instruments: oil pressure gauge, water thermometer, fuel level, pump water pressure gauge	2%
Generator voltmeter	Max 476V, precision ±1% measurement range 10 to 253 Vac (neutral phase) 18 to 476 Vac (phase-phase)
Nominal current of generator ammeter	5 A
Generator ammeter	Max 2400 A, precision ±1% measurement range 0.02 (20mA) to 6 A
Frequency meter	precision ±0.1 Hz frequency range 45 to 85Hz
Precision of voltammeter and power factor meter	± 2%
Precision of wattmeter, varmeter and kilowatt-hour	± 4%
Tachometer	Max 4000 RPM precision ± 10 RPM
Pump water pressure gauge	0 to 21 bar
PUMP WATER PRESSURE TRANSMITTER: • MAXIMUM ALLOWED PRESSURE • WITH PRESSURE 4 to 14 bar differential • WITH PRESSURE 1 to 4 bar differential	 21 bar 2 bar 1 bar
Serial communication parameters	9600 baud, 8 data bits, 1 stop bits; parity EVEN

DATA FOR ORDERING

Type CEM-120 code 00242297

SUPPLIED ACCESSORIES

- MUCEM-120 KIT	CODE 40804483
- WITH CABLE TPA 200	“ 40500254
- PUMP WATER PRESSURE TRANSMITTER TYPE TPA-200	CODE 70500255
- NIPPLE F1/4” GAS -M3/8”GAS	CODE 70190241