

EMERGENCY AUTOMATIC PANELS FOR GENSET UNITS FITTING DIESEL OR PETROL (For petrol motor please request the relative documentation) LEM-430-435 VERSION

This only controls and commands the genset unit, maintains the charge of the start battery and connects the user to the mains or generator. It has been designed on a wall.

INSTRUCTION AND USER MANUAL



TYPE	CONTACTOR CAPACITY A(Ac1)	Thermal- magnetic circuit breaker ON REQUEST A	
LEM-435/15	30 Three-phase 48 Single-phase	25 40	
LEM-430/30	45	50	Three- phase

COMPLETE WITH DISPLAY TO
SHOW:

- useful signals for generator set management.
- **7 instruments:**
 - mains voltmeter
 - generator voltmeter
 - generator frequency meter
 - total hour meter
 - partial hour meter
 - battery voltmeter
 - fuel level indicator

SIMULTANEOUS READING
OF 3 INSTRUMENTS

- REMOTE SWITCHING MAINS/GENSET
- SINGLE-PHASE VOLTMETRIC MAINS/GENERATOR CONTROL
- AUTOMATIC BATTERY CHARGING (1A)
- AUTOMATIC SUPERVISION OF FAULTS
- GLOW PLUGS CONTROL
- STARTER CONTROL
- REMOTE COMMANDS WITH CONTACTS (STARTUP- STOP - TEST)
- PROGRAMMING OF PARAMETERS MADE EASY BY DIP SWITCHES
- AVAILABLE INPUT FOR ANOMALY
- CLOCK FOR PROGRAMMING THE START UP OR STOPPING OF THE GENSET
- PROGRAMMABLE WEEKLY SELFTEST
- ANOMALY HISTORICAL RECORD (Including data from the last 100 anomalies)

FUNCTIONS ON REQUEST

- THREE-PHASE MAINS VOLTMETRIC CONTROL
- GENERATOR OVERLOAD SWITCH
- PRE-WIRED MALE CONNECTOR

PARMA

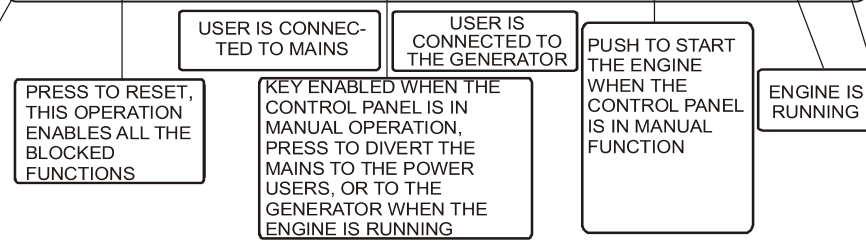


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BRIEF INSTRUCTIONS

RUNNING



INSTRUMENTS

- For single-phase voltage up to 254 V~, three-phase up to 440 V~
 For single-phase voltage up to 254 V~, three-phase up to 440 V~
 From 0 Hz to 85 Hz for alternating voltages with amplitude
 greater than 20 V~.
 With five figures and a maximum reading of 99999.
 With four figures and a maximum reading of 9999. The minutes can
 be read up to 99 hours.
 For voltages between 9 and 38 V= .
 Displays the percentage of fuel present in the tank.

HISTORY AND REVISIONS

Date	Revision LEVEL	Description	Page

Warning: adhere closely to the following advices



- Make sure that the mains and generator conductors are correctly connected to the terminal board.
- Check that the absorption and consumption of the connected equipment are compatible with the described technical characteristics.
- Install in such a way that there is always adequate heat disposal.
- Always install under other equipment which produces or spreads heat.
- The equipment must be earthed via the relevant terminal.
- Handle and connect without mechanically stressing the electronic card.
- Make sure that copper conductor cuttings or other waste material do not fall inside the panel.
- If necessary, the fuses must only be replaced with the same type as the original.
- Never use a battery charger for the emergency start-up; the electronic cards could be damaged.

WARNING: The genset unit will restart automatically, when there is a mains failure or in test mode, or with the remote controls.

To exclude the possibility of sudden or unwanted starts, switch to "OFF" using the button



WARNING! Before performing any technical interventions on the genset unit, for the safety of the operators, terminal "50" of the start motor (start command) must be disconnected, the connections to the unit must be disconnected, the emergency stop button must be pressed and the control panel locked to the "OFF" position.

ELECTROMAGNETIC COMPATIBILITY

This panel functions correctly only if inserted in plants which conform with the CE marking standards; it meets the exemption requirements of the standard EN61326-1 but it cannot be excluded that malfunctions could occur in extreme cases due to particular situations. The installer has the task of checking that the disturbance levels are within the requirements of the standards.

NOTE CONCERNING CONNECTION OF COMMAND AND SAFETY DEVICES TO THE PANEL

With the direct connection of engine protection probes and remote control and command contacts to the panel, particular anomalous situations (earth anomalies or interruption of electrical connections) could block the start-up or provoke its early activation.

To reduce these risks, if he believes it to be necessary, the installer can take on the responsibility of applying that which is described in paragraphs 9.4.2.1 and 9.4.2.2 of standard CEI EN60204-1(CEI 44-5) to the said connections.

UNLESS WE MAKE A WRITTEN DECLARATION STATING THE CONTRARY, THIS PANEL IS NOT SUITABLE FOR USE AS A CRITICAL COMPONENT IN EQUIPMENT OR PLANTS RESPONSIBLE FOR KEEPING PERSONS OR OTHER LIVING BEINGS ALIVE.

Any use which differs from that which is indicated in this instruction and user manual must be authorized by us.

MAINS CONNECTION

The panel connection must be made with the MAINS DISENGAGED and the BATTERY DISCONNECTED, in accordance with the scheme on pages 6-7.

Multi-polar cables with EPR (flame resistant) insulation and scratch proof PVC sleeves must be used, nominal voltage 450/750V.

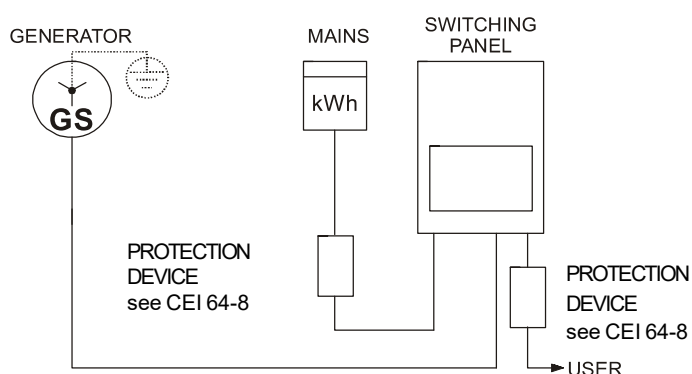
The panel must be connected to the existing earth unit, via a YELLOW/GREEN cable with cpn insulation and with a minimum section of 16 mm².

The panel contains the protection devices of the engine-generator unit (see OPERATION at pages 8-9-10).

The client has the responsibility for installing, on the mains line, the protections against over-currents (fuses or thermo-magnetic switches) and contact voltages (differential), limiting the presumed short circuit current to 10kA.

The electric cabinet has a space for the installation of a protection device against overload currents in the generator set line.

The protections against direct/indirect contacts on the genset unit line, must adhere to the requirements described in the regulation CEI 64-8.



BEFORE SUPPLYING VOLTAGE:

- make sure that the live parts are inaccessible.
- check the earth connection.

Finally, check that the indicators, the block and alarm devices and the remote switch function correctly.

WARNING

THIS ELECTRICAL PANEL IS NOT SUITABLE FOR USE WHERE THE FOLLOWING CONDITIONS ARE PRESENT:

- temperatures, relative humidity values and altitudes which differ from those specified;
- in places where the temperature and pressure variations are so rapid that they produce exceptional condensation inside the panel;
- in places where there are high levels of pollution due to dust, fumes, corrosive or radioactive particles, vapours and salts;
- where there is exposure to high temperature due to solar radiation or furnaces;
- where attacks from mould or small animals are possible;
- in places where there is the risk of fires or explosions;
- subjection to strong vibrations or knocks;
- inside installations where the current throughput or interruption power could be influenced by certain conditions (e.g equipment incorporated in machinery).

RUNNING AND MAINTENANCE

The following maintenance operations should be performed each week:

- automatic start with switching;
- check that indicators function;
- check batteries;
- check that conductors are tight and condition of terminals.



WARNING: DANGEROUS LIVE PARTS

Only assigned and suitably trained personnel are allowed to have access to the inside of the panel.

No operations inside the panel are permitted unless the plant has been disconnected from the mains and from the genset unit.

The phases should be earthed and short-circuited as a safety measure.

Notwithstanding what is stated above, only assigned and trained personnel can have access to the inside equipment when the plant is live, to perform the following operations:

- visual inspection of the equipment;
- visual inspection of the connections and the markings;
- measurement of voltage and/or current values.

These operations must, in any case, be performed using a tool which guarantees the appropriate electrical protection.

CLOCK PROGRAMMING

TO PROGRAMME SELECT THE OFF FUNCTION

CLOCK. Allows generator set operation or stopping to be programmed.

TIME SETTING.  Switching off the power supply (1+ 2-) to the control unit will zero the clock.



Press to display

example



• Increases



• Decreases

Press to set the clock.

STARTING CONSENT. Operation obtained as during mains failure.

ON
↑

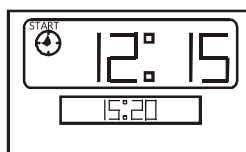


Move DIP switch 10 to ON

Example: starts at 12:15 hrs
stops at 15:20 hrs



Press to display



• Increases



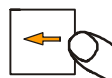
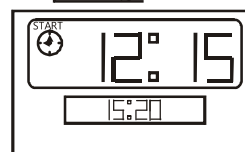
• Decreases

Press when the number flashes

ON
↓



Move DIP switch 10 to OFF



Press and wait until OK is written

STOP. Stops starting or running of generator set.

ON
↑

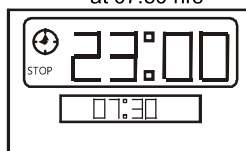


Move DIP switch 10 to ON

Example: stays locked from 23:00 hrs
unlocked at 07:30 hrs



Press to display



• Increases



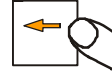
• Decreases

Press, when the number flashes

ON
↓



Move DIP switch 10 to OFF

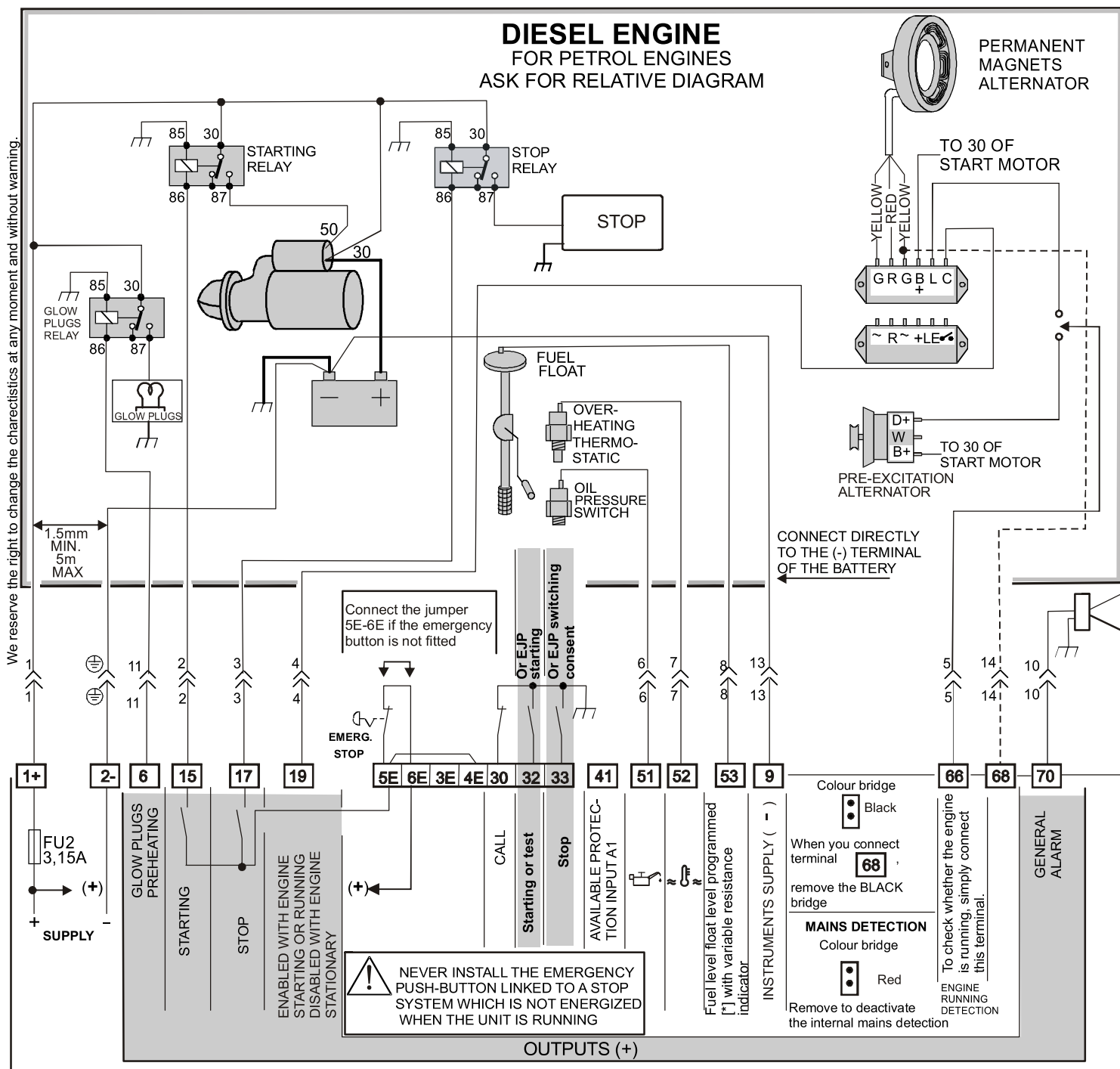


Press and wait until OK is written

WIRING DIAGRAM TO THE THREE-PHASE GENSET UNIT CONTROL PANEL

Having made the connections, the control panel is in **OFF** mode.

To select other operating modes, see page 8.



MAX LOAD OUTPUTS (+) 6 - 17 1A
15 - 19 - 70 3W

	ENGINE TYPE	STOP SYSTEM SELECTION	WEEKLY SELF-TEST	GENERATOR FREQUENCY	MAINS AND GENERATOR VOLTAGE	CHARGE ALTERNATOR (inputs 66 68) In the EXCLUDED position remove the black bridge	GLOW PLUGS CONNECTION TIME STARTUP DELAY AFTER MAINS FAULT	ENGINE COOLING	MAINS ACCEPTANCE	GENERATOR TO POWER USERS CONNECTION DELAY	USE ONLY WITH JOINT A	FUSES FU1 FU2 FU3 ARE MOUNTED ON CARD TYPE SEA-430/10
ON	PETROL	EXCITED IN STOP MODE	ENGAGED	60 Hz	SINGLE-PHASE THREE-PHASE 230V	WARNING INCOMPLETE DETECTION OF ENGINE RUNNING EXCLUDED	15" Mains failure programmable	3"	3"	60"		
		1	2	3	4	5	6	7	8	9	10	
OFF	DIESEL	EXCITED IN DRIVE MODE	EXCLUDED	50 Hz	THREE-PHASE 400V	ENGAGED	2"	120"	40"	7"		

YOUR ELECTRICAL TECHNICIAN CAN ASK US ANYTHING ABOUT
THIS PRODUCT BY TELEPHONING ONE OF OUR TECHNICIANS

OPERATION

FUNCTIONS SELECTION



The function selected using the button is shown on the display.

MANUAL

The control panel commands are enabled.

Starting with key



stopping with key



CONTROL FOR MAINS-GENERATOR CONTACTORS



It is left to the key

By pressing on the key, the load is switched from the mains to the generator and vice versa.

PROTECTIONS

The generator set protection function in manual mode can be programmed in two ways:

- Display only of the fault that has intervened **WITHOUT STOPPING** the engine. The generator overfrequency fault is programmed with stopping of the engine. It cannot be programmed without stopping of the engine.
- Display of the fault that has intervened **WITH ENGINE STOPPING**. (The control panel is programmed in this way)

AUTOMATIC

When a fault occurs on the mains, (detected by the internal voltmetric relay, or by the external call), once the 2 seconds have elapsed, the control unit commands the opening of the mains contactor control, and starts the generator set. With engine running and generator voltage normal and once the **GENERATOR TO POWER USERS CONNECTION DELAY** has elapsed (programmed to 7 sec.) the generator contactor closes. While it is running the generator set is protected from possible faults. When the mains voltage is restored and the **MAINS ACCEPTANCE** time has elapsed (programmed to 40 sec.), the mains contactor closes (after the **GENERATOR-MAINS INTERLOCK** time, programmed to 1,5 sec. not adjustable). The **COOLING TIME** (programmed to 120 sec.) then allows the engine to be cooled easily before it is stopped.

TEST



On pressing key up the lighting , we obtain the engine startup cycle as in automatic, and the power users remain supplied by the mains. If a mains fault occurs during the test, the power unit remains in test mode, positions itself as in automatic operation and commands the closing of the generator contactor.

WEEKLY SELFTEST

ENABLED WITH POWER UNIT IN AUTOMATIC OR TEST MODE is indicated by the display  . If the relative switch is positioned on **TEST ENGAGED** the general alarm is activated intermittently (for 8 sec.). When the general alarm is deactivated, and after a pause of 3 seconds, the engine starts and continues to run for 3 minutes.

This test will be repeated automatically every week on the exact day and at the hour to which the **TEST ENGAGED** switch has been positioned.

STOPPING OF ENGINE DURING THE TEST

Press button



and move to function



UPDATING OF THE HOUR LEAVING THE SWITCH ON TEST ENGAGED

Keep pressed at the same time keys



and



until the icon TEST



starts to flash.

Press key



within 3 sec.

The weekly test cycle is therefore obtained as if the relative switch had been repositioned.

OPERATION

OFF



Press button until the warning led  comes on.

The engine cannot be started in any way and, if running the engine is stopped without carrying out engine cooling. The mains contactor stays closed. The LEDs and the instruments are active.

GLOW PLUGS PREHEATING



- In manual with key that should be kept pressed until the engine has started.
- In automatic, Test and remote control, this is activated automatically before starting. The preheating action ceases during the starting pulse.

STARTER

- If programmed for the STARTER, the function is enabled at every odd starter pulse and is de-energised with the engine running.

STARTING



- In manual mode with button , in Test and with the remote control, it comes on immediately after the GLOW PLUG CONNECTION TIME.
- In automatic mode or if a mains anomaly is detected by the internal voltmeter relay, or an external call, and after the GLOW PLUG CONNECTION time (set to 2 secs; this time is always active, even in systems without glow plugs). To facilitate starting a given circuit leads to a succession of starts: 4 if set for diesel motors, each of 5 seconds with pauses at intervals also of 5 seconds. Otherwise, 15 pulses of 3 seconds each, each with pauses of 5 seconds if set for petrol motors.

STARTING FAILURE

Blocks the start cycle if the motor is not started after the whole succession of pulses.

This is shown by a special symbol  .

STOP

- In **Manual** mode using key  .
- In **Test** mode when the protection systems or the remote controls intervene.
- In **Automatic** mode when the mains power returns, or when the protection systems or remote controls intervene. Stopping for the Diesel engines can occur in two ways:
 - With the solenoid deactivated while the engine is running and activated when stopped. This condition is maintained during the STOP TIME (programmed to 20 seconds) after the engine stopped detection.
 - With solenoid or electro-valve activated while the engine is running and deactivated when stopped, remaining in this condition even when the engine is stationary.
- In PETROL engines, removing the supply from the start system.

DETECTION ENGINE RUNNING

This is obtained with detection (adjustable P1) of the voltage and frequency of the battery charger alternator (PERMANENT MAGNETS or PRE-EXCITATION) and from the frequency and residual voltage of the generator.

When detection has been made, it disconnects the starter motor and lights the LED  .

PROTECTIONS

Memorized with engine stop, they can be divided into three groups:

- always active, for the faults generator undervoltage or overvoltage (indicated by the flashing signal)  (stopping without engine cooling).
- active when engine is running, for OVERHEATING  , UNDERFREQUENCY HZ (flashing) and OVERFREQUENCY ANOMALY  stopping without engine cooling.
- active 10 seconds after the engine running detection for the following anomalies:
 - INSUFFICIENT OIL PRESSURE  and FAULT AT THE BATTERY CHARGING ALTERNATOR  (belt breakage) and A1.

GENERATOR DOES NOT SUPPLY, always active anomaly, does not stop the engine and is indicated by the flashing warning  .

ALARM

Always active, memorised, stops the motor as a result of the fuel empty anomaly  .

RESET

By pressing the key



, the protection devices and all the stopped functions are re-activated.

MAIN ALARM

This can be obtained by mounting an indicator connected to the relevant output.
It is activated continuously.

When key  is pressed, the main alarm is silenced.
It is activated intermittently for 8 seconds, followed by a pause, before beginning the generator set remote start up.

REMOTE CONTROLS START OR TEST, STOP, EMERGENCY EJP FUNCTION

Enabled with control panel in automatic and programmed with switch 10 (see programming joint A page 4).
When the START UP contact closes (terminal 32), EJP START is seen on the display. After the EJP STARTUP DELAY time (programmed to 25 min.) has elapsed, the start up procedure begins.
When the switching contact (terminal 33) closes,  EJP is seen on the display and the operation is as when there is a mains fault.
When the two EJP contacts are opened functioning is as when the mains power returns.

EMERGENCY STOP

The emergency stop can be activated in all working conditions, by mounting one or more click down push-button.
The stop is immediate (without engine cooling), enables the general alarm and  is shown on the display.



Do not use the emergency push-button linked to a stop system that is not energized when the unit is running.

AUTOMATIC BATTERY CHARGER

- Rapid charge via current control
- Intermediate and maintenance charge via voltage control

FIXED LIGHT



OPERATION

Automatic charging takes place at three levels:

- Rapid charging via current control 1A until 13,2V (26,4V) are reached in the battery.
- Intermediate charge via voltage control, until 13,5 V (27V) are reached in the battery.
- Maintenance charge using a very low current value, but sufficient to maintain the voltage value at 13,5 (27 V).

The GREEN LED is lit only when the following conditions happen at the same time:

- mains on;
- battery voltage above the 65% (+/- 10%) of the rated value.

PARTIAL HOUR METER

Press



to select



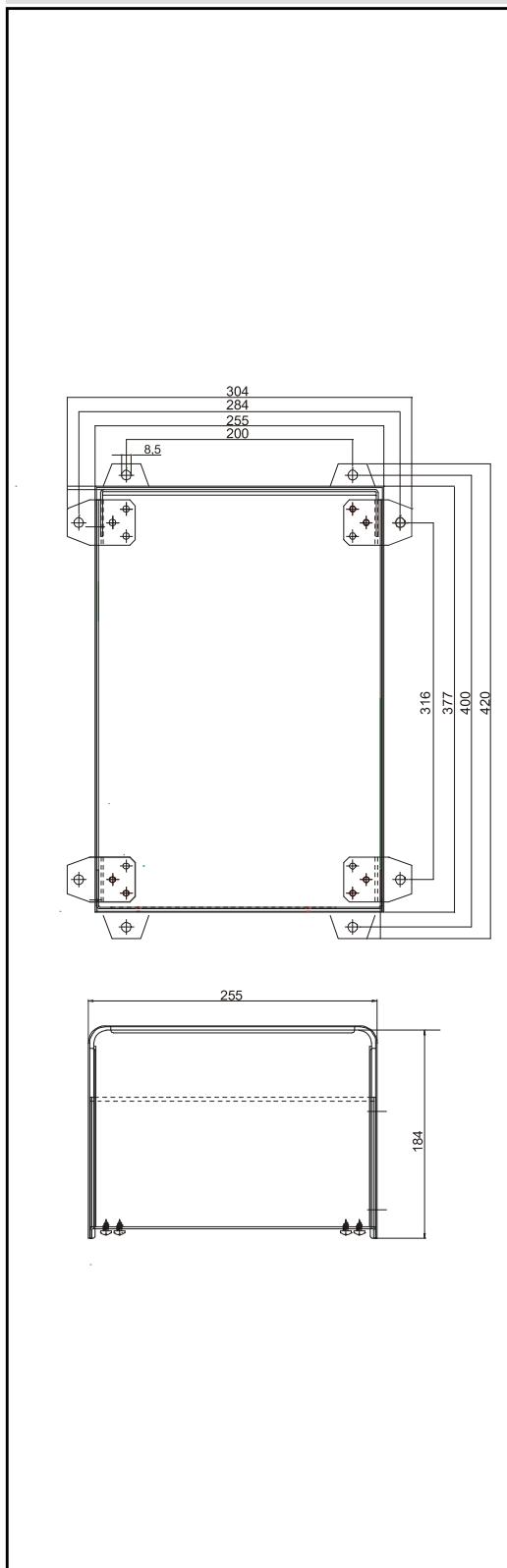
the operating hours and minutes of the last run of the genset unit.

The hours indicated are zero-set the next time the genset unit is started up.

COMPONENTS LIST

DESCRIPTION	TYPE	ELCOS CODE	MANUFACTURER	QUANTITY
Structure	bottom	40750674		1
	cove	40750670		1
ELECTRONIC CARD	SEA-430/10 12 V 24 V	40243025 40243026	ELCOS	1
FUSES HOLDERS	PS 10/E 50.101.001	70450833	WIMEX	2
FUSES	10A	70400306		
TERMINAL BOARDS	CBD16	70421790	CABUR	4 (LEM-430/30) 12 (LEM-435/15)
CONTACTORS	AF16400013 VERSION LEM-435/15	70100825	ABB	2
CONTACTORS	AF26400013 VERSION LEM-430/30	70100826		2
MECHANICAL LOCK	VEM4	70100845		1

DIMENSIONS



TECHNICAL DATA

TYPE	PRP (1)	COP (2)	POWER SUPPLY RATED CURRENT A	CONTACTOR CAPACITY (AC1)	CONTACTORS SHORT DURATION CURRENT
LEM-435/15	15 THREE- PHASE	13,5	22	30	300 A x 1"
	10 SINGLE- PHASE	9	43	48	
LEM-430/30	30	27	43	45	450 A x 1"

Simplified definition of power in accordance with standard ISO8528

(1) PRP (Prime Power)

The PRP is the maximum power that the generator set can supply at variable load during a work cycle for an unlimited number of hours per year. "The Permissible Average Power (Ppp) during a 24-hour cycle must not exceed 70% of the PRP value.

(2) COP (Continuous Power)

The COP is the maximum power that the generator set can supply, for an unlimited number of hours per year, at constant load.

- Rated mains/generator voltage	400 VAC
- Battery supply voltage	12VDC (16VDC MAX)
- Frequency	50±60 Hz
- Absorption with engine running without mains	150 mA at 12V
- Selfabsorption with engine stationary without mains	38 mA at 12V
- Battery charger supply	MAX 1 A
- Heater output	230 VAC MAX 1500 W
- Rated insulation voltage:	
- Mains voltage terminals	400V
- Battery voltage terminals	32V
- Insulation class	Class I
- Hour meter	4 digits
- Frequency meter	0-85 Hz, Precision ±0,1 Hz
- Battery voltmeter	Max 38V, Precision 2%
- Mains voltmeter	Max 440V, Precision ±2%
- Generator Voltmeter	Max 440V, Precision ±2%
- Generator ammeter	Max 60A, Precision ±2%
- Outputs 6-17	MAX 1A
- Outputs 15 - 19 - 70	MAX 3W
- Degree of protection:	
- Accessible sides	IP40
- Wall sides	IP20
- Temperature range	-30 ÷ +40 ° C
- Relative humidity	90% MAX (without condensation of water) at 40°C
- Altitude	MAX 1000 mt a.s.l.
- Functioning of system	in insulation
- Installation conditions	for internal use
- Plant system to which it is connected	TN-IT-TT
- Panel weight:	
- VERSION LEM-435/15	Kg. 6,5
- VERSION LEM-430/30	Kg. 6,5

The protections against direct/indirect contacts on the genset unit line, must adhere to the requirements described in the regulation CEI 64-8

ORDERING DATA

Type	Volt	Code
LEM-435/15	12	00021367
LEM-430/30	12	00021365

SUPPLIED ACCESSORIES

LEM MOUNTING BRACKET KIT	40750689
KIT OF JUMPERS FOR LEM –435/15	40179911
FUSES 5X20	70400106