

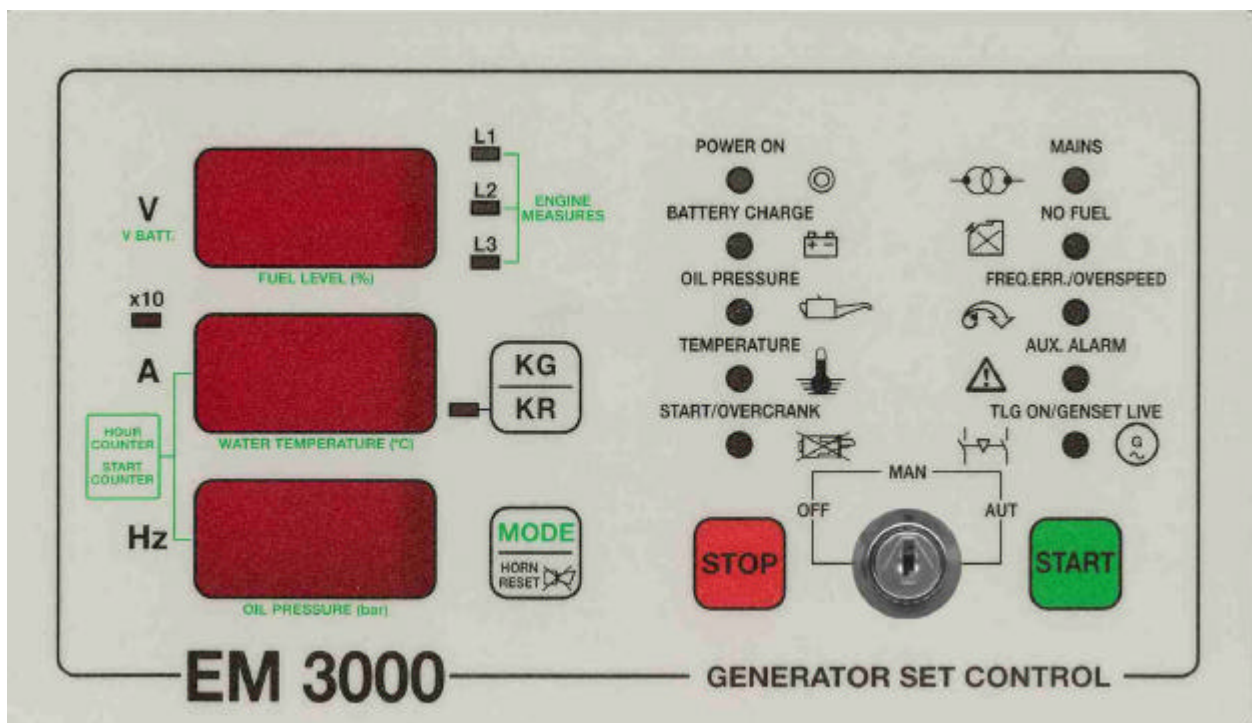
EM 3000

The EM3000 Control Card is a microprocessor device for monitoring and control of Generator Sets, with manual and automatic operation.

Although small sized, it includes all controls, signals and instruments that allow to obtain all type of control features for those Gen Set to which it is applied.

It is particularly suited for manual Gen Sets that can also be started automatically through an external remote control.

Thanks to a three-phase voltage sensor, the simple addition of a few accessories (battery charger, preheating supply circuit and power changeover switch) allows to realize a complete automatic system for emergency Gen Sets.



OPERATION

By means of the proper key operated selector switch, the following modes can be selected:

OFF: engine start is inhibited and control signal for load supply from the mains is given. In case of engine running, turning the selector switch on OFF the engine shutdown sequence is activated.

The OFF position also allows to reset failures that have caused engine shut down.

MANUAL: engine manual start and stop controls are enabled. The Gen Set protections are activated. The starting control signal is automatically disabled when engine running.

AUTOMATIC: automatic start upon mains failure. The engine start is obtained through a cycle of starting attempts, each followed by a pause. In case of starting failure, the control board gives an optical and acoustic signal and the starting sequences interrupted, thus avoiding battery discharge. Upon engine starting, the starter motor is automatically disconnected by the electronic Control Device. Once the rated conditions are reached, the Gen Set is connected to the load. The Gen Set is automatically disconnected from the load.

When the mains return within the normal limits, the Gen Set is automatically disconnected from the load.

The load is then supplied by the mains and the engine is stopped after an adjustable cooling time.

It is possible to start and stop the Gen Set through a remote signal (i.e. when Mains / Gen Set changeover control is external).

CONTROLS

Key operated selector switch for Gen Set operation mode: OFF/MAN/AUT.
Engine start push button.
Engine stop push button.
Acoustic alarm silencing push-button.
Manual control for changeover switch: TLR/TLG.
Command for test cycle (by START/STOP button).

DIGITAL INSTRUMENTS

The Control Card includes the following digital instruments:
Generator voltmeter: Phases L1-L2/L2-L3/L3-L1
Mains voltmeter: Phases L1-L2/L2-L3/L3-L1
Generator ammeter: Phases L1-L2-L3
Generator frequency meter
Battery voltmeter
Start counter
Gen Set hour counter

Optional is possible to add the following measures:
Fuel level gauge
Water thermometer
Oil pressure gauge

OPTICAL SIGNALS AND GEN SET PROTECTIONS

A set of high efficiency light emitting diodes are used for signaling the current status of the Generator Set and for the visualization of alarm intervention. Secondary alarms are represented by their corresponding display code.

Status

- Control board supplied
- Mains live
- Automatic start inhibited by external contact
- Generator live
- Control for supply driven from Generator
- Control for supply driven from Mains
- Failure of battery charger alternator
- Gen Set being started

Alarms without engine shut down

- Fuel reserve
- Pre-alarm for low oil pressure
- Pre-alarm for high engine temperature
- Spare alarm

Alarms with engine shut down

- Low oil pressure
- High engine temperature
- Engine over crank
- Under/over frequency
- Over speed (from generator frequency)
- Low fuel level
- Spare alarm
- Fuel end

Alarm visualized on display

- Belt breakage
- Operating conditions not reached
- Generator under voltage
- Generator over voltage
- Generator under frequency
- Generator over frequency
- Stop failure
- Max current
- Over current gen set (by external signal)

Other LED signals are used to specify the readings selected on the display.

LIST OF THE MAIN SETTABLE PARAMETERS

The settable parameters of the EM3000 Control Card are listed below. Each parameter corresponds to a code number which allows to identify it and to set the corresponding value.

- Minimum Mains 3-phases voltage	0....500 V
- Mains sensor hysteresis	3....50 %0
- Threshold for Generator voltage recognition	0....500 V
- Gen Set connection delay	1....999 s
- Mains return delay	1....999 s
- Time delay for supply from Gen Set	1....20 s
- Engine cool down delay	0....999 s
- Start pulse duration	1....20 s
- Stut-down pulse duration	7....300 s
- Number of starting attempts	1....15
- Generator under frequency threshold	10....60 Hz
- Generator over frequency threshold	52....70 Hz
- Generator under voltage threshold	10....500 V
- Generator over voltage threshold	100. 500 V
- Threshold for Mains max three-phase voltage	100.550 V
- Current transformers ratio	0....6000 /5 A
- Generator periodical test start period	0....999 hours
- Generator periodical test duration	0....60 minutes
- Overspeed threshold	55...99 Hz
- Changeover switching delay	1....55 s
- Generator under/over frequency delay	1....20 s
- Generator under/over voltage delay	5....20 s
- Low oil pressure delay	5....120 s
- Maximum time to reach regime conditions	5....120 s
- Pause time between two starting attempts	2....99 s
- External alarms acquisition delay	5....100 s (x 0.1)
- Frequency recognition starting engine	5....70 Hz
- Selection of energizing/de-energizing stop	0....1

Other parameters are available to personalize the device, in relation to the various applications.

TECHNICAL FEATURES

- Supply voltage: 230 / 400 Vac (other be specified)
- Auxiliary voltage: from 7.5 Vdc to 32 Vdc
- Frequency: 50 Hz or 60 Hz
- Operating temperature: - 20° + 60 °C
- Storage temperature: - 40° + 85 °C
- Input power in MAN or AUT with Gen Set not running: < 0.5 W
- Input power in MAN or AUT with Gen Set running: < 0.75 W
- Dimensions [mm]: 180 (w) x 90 (h) x 60 (d)
- Conforming to CEI -IEC - EN

As standard specifications and designs develop from time to time, always ask to SICES for confirmation of the information given in this publication.