

# CEM6

Auto-start digital controller



ELECTRONICS







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auto-start digital controller

## GENERAL DESCRIPTION

The CEM6 controller unit is a device able to control de operation, monitoring and protection of a generating set. The controller unit consists of 2 different modules:

1. The VISUALIZATION module
2. The MEASUREMENTS module

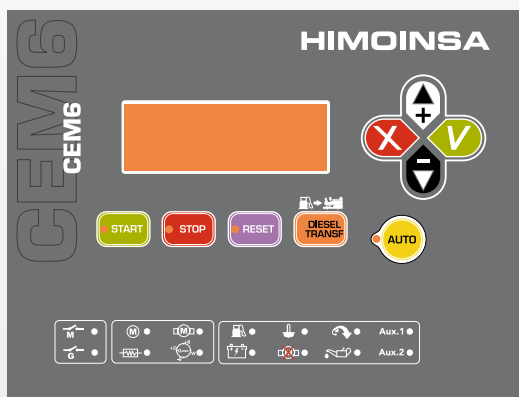
## VISUALIZATION MODULE

Provides information about the status of the device and, at the same time, allows the user to interact with it. It consists on a backlit display and various LEDs for monitoring the status of the controller and buttons that allow the user to control, program and configure the functions of the unit.

## MEASUREMENTS MODULE

Controls and monitors the control board. It is located in the rear part of the panel, in order to reduce the wiring and to avoid electromagnetic disturbances. Every signal, sensor and actuator is connected to this module.

The connexion between the visualization module and the measurements module is made with a CAN communication bus. This feature allows the intercommunion of other modules to the main controller with a scalability warranty.



CEM6 visualization module

## 1. VISUALIZATION MODULE

• **Backlit DISPLAY:** 4 x 20 digits.

• **9 BUTTONS:**

**Only Push Buttons:**

4 Display buttons for MENU and programming: Confirmation (V), Cancellation (X), Up (+), and Down (-).

**Push Buttons with LEDs:**

5 Operation/Command buttons: AUTO, START, STOP, RESET, FUEL Transference.

• **LEDs for alarms and genset status.**

**Engines Status LEDs:**

- Engine started.
- Preheating.
- Engine starting.
- Battery charger alternator status.

**Alarm LEDs:**

- Fuel storage.
- Battery levels.
- High temperature.
- Starting failure.
- Overspeed.
- Low oil pressure.
- Aux 1 (Free to programme).
- Aux 2 (Free to programme).

**Contactors status LEDs:**

- M: mains power supply contactor is on.
- G: Generator set contactor is on.

**Multi-language**



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## 2. MEASUREMENTS MODULE

### Readings of the electric mains supply:

- Phase to neutral voltage.
- Phase to phase voltage.
- Phase amperage.
- Frequency.
- Real, apparent and reactive powers.
- Power factor and cos phi.
- Instant power (kWh) and historical power (day, month, year). With the programming timer option.

### Provides the following engine features information:

#### Engine alarm inputs:

- Fuel reserve.
- Oil pressure.
- Coolant temperature.
- Coolant level.
- Emergency stop (stop button).

#### Analogic engine inputs:

- Fuel level.
- Oil Pressure.
- Coolant Temperature.
- Configurable input (i.e. Oil temperature).
- Battery charger alternator voltage.

#### Configurable inputs; the measurements device has 5 inputs that can be programmed to carry on the following functions:

- Rate change notice.
- Rate change. (CEM6 + CEC6.2)
- Start disabling.
- External start.
- Text (CEM6 + CEC6.2).
- Manual override.
- 3 programmable alarms.
- Parameters auto-programming (S1 - S2)

#### Engine stadistics:

- Number of working hours.
- Number of starts..

#### Controls functions of the engine:

- Pre-heating or Glow Plug.
- Stop.
- Start.
- Coolant heater (CEM6 + CEC6.2).
- Fuel transfer pump.
- Alternator excitation.

#### The measurements module has outputs which allow monitoring of the operative conditions of the controller:

- Engine running (on).
- Control board alarm.
- 3 programmable outputs which monitor the control board alarm conditions or the inputs about the engine data.



PHG6 measurements module

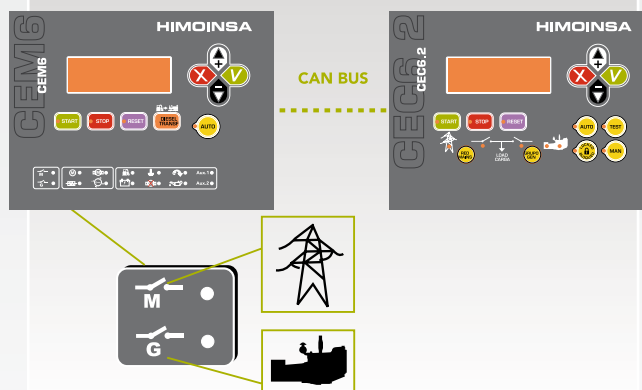
## START OPTION WHEN MAINS VOLTAGE DROPS (CEM6+CEC6.2).

There is an option to convert a generating set with manual start into an automatic one, that works when the mains voltage drops. This Gen-set will run in an emergency situation and provides a continuous power when there is no supply from the mains.

#### In order to do the change, we must add:

- 1- A battery charger to the manual control panel.
- 2- A new switching control panel, made up by a switching control device (CEC6.2) plus the switching equipment (i.e. contactors).

The M & G symbols in the front panel will only be seen "active" when the switching controller is connected. M mains power supply contactor is active, G Generator set contactor is active.





## VARIOUS FUNCTIONS

- Interface CAN/USB. Allows communication with the control panel in local mode making easier parameter programming, alarm configuration, programmable inputs/outputs.
- Interface CAN/RS232 Allows remote communication with the control panel through an analogic modem or a GSM modem.
- Positioning system GPS. Allows through the interface CAN/RS232 to find the exact position of the genset.
- Interface CAN/RS485 allows the communication with the control panels systems who works with protocol MODBUS.
- Interface CAN/LAN has the option to connect the CEM6 controller with a Ethernet net.
- Interface CAN/J1939 allows monitoring of engines which are compatible to this protocol.
- EJP Functions (Standard for French market)
- EJP/T Functions (for French market)
- SRC Functions (Genset start and changeover even with Mains presence through an external signal).
- Preheating functions of the spark plugs.
- Keyboard block Functions.
- Decanting fuel Pump Functions command.
- Remote monitoring functions for control panel status (i.e. Reset status or Automatic Status, etc..)
- Possibility to block all the functions after a pre-defined number of working hours, maintenance or rent.
- Automatic test (weekly or daily).
- External start and Stop.
- Three programmable alarms for different used defined by the user.







## MAIN CONSTRUCTIVE DATA

- Working temperature: min -20°C max 80 °C.
- Voltage supply: min. 8V max. 30V.
- Maximum amperage consume when rest: 100mA.
- Starting output amperage: 70A in transitory regime, 40A during one second. 20 A in regime of stationary work.
- Output amperage when engine stop: (exc./des) 70A in transitory regime, 40A during one second. 20 A in regime of stationary work.
- Pre-heating output amperage: 70A in transitory regime, 40A during one second. 20 A in regime of stationary work max 20A.
- Alarm contact amperage, Engine working 1A
- Max amperage of contactors contact genset/ mains 8 A.
- Genset frequency status: 30-80 hz.
- Pick-up frequency status: 100 Hz at 8 Khz.
- Fuel level resistance: 330 Ohmios.
- Measure Accuracy: 1%.
- Protection rank: IP65 (on control panel).





## QUICK controllers list

	M6	CEM6	CEC6.2	CEA6
 <b>GENERATOR READINGS</b>				
Voltage among phases	x	●	●	●
Voltage among phases and neutral	x	●	●	●
Amperage	x	●	●	●
Frequency	x	●	●	●
Apparent power (kVA)	x	●	●	●
Active power (kW)	x	●	●	●
Reactive power (kVAr)	x	●	●	●
Power factor	x	●	●	●
 <b>MAINS READINGS</b>				
Voltage among phases	x	x	●	●
Voltage among phase and neutral	x	x	●	●
Amperage	x	x	●	●
Frequency	x	x	●	●
Apparent power	x	x	x	●
Active power	x	x	x	●
Reactive power	x	x	x	●
Power factor	x	x	x	●
 <b>ENGINE READINGS</b>				
Coolant temperature	x	● <sup>(1)</sup>	x	● <sup>(1)</sup>
Oil pressure	x	● <sup>(1)</sup>	x	● <sup>(1)</sup>
Fuel level (%)	x	●	x	●
Battery voltage	x	●	x	●
R. P. M.	x	●	x	●
Battery charge alternator voltage	x	●	x	●
 <b>ENGINE PROTECTIONS</b>				
High water temperature	P	P <sup>(2)</sup>	x	P <sup>(2)</sup>
High coolant temperature by sensor	x	A <sup>(3)</sup>	x	A <sup>(3)</sup>
Low engine temperature by sensor	x	A <sup>(5)</sup>	x	A <sup>(5)</sup>
Low oil pressure	P	P <sup>(2)</sup>	x	P <sup>(2)</sup>
Low oil pressure by sensor	x	A <sup>(3)</sup>	x	A <sup>(3)</sup>
Low coolant level	x	P	x	P
Unexpected shutdown	●	●	x	●
Fuel storage	A	A	x	A
Fuel storage by sensor	x	A <sup>(3)</sup>	x	A <sup>(3)</sup>
Stop failure	x	●	x	●
Battery voltage failure	x	A	x	A
Battery charge alternator failure	A	A	x	A
Overspeed	P	P	x	P
Underspeed	X	P	x	P
Start failure	●	●	x	●
Emergency Stop	●	●	●	●
 <b>ALTERNATOR PROTECTIONS</b>				
High frequency	P	P	P <sup>(6)</sup>	P
Low frequency	x	P	P <sup>(6)</sup>	P
High voltage	x	P	P <sup>(6)</sup>	P
Low voltage	x	P	P <sup>(6)</sup>	P
Over amperage	x	P	x	P
Short-circuit	x	P	x	P
Asymmetry among phases	x	P	P <sup>(6)</sup>	P
Incorrect phase sequence	x	P	P <sup>(6)</sup>	P
Inverse power	x	P	x	P
Overload	x	P	x	P
Genset signal droop	x	x	P	x
 <b>COUNTERS</b>				
Total hour counter	x	●	●	●
Partial hour counter	x	●	●	●
Kilowattimeter	x	●	●	●
Starts valid counters	x	●	●	●
Starts failure counters	x	●	●	●
Maintenance	x	●	●	●

- Standard
- x Not included
- <sup>(1)</sup> Optional

NOTE: All the protection are programmable to carry out "warning" or "engine stop with or without cooling."



### COMMUNICATIONS

	M6	CEM6	CEC6.2	CEA6
RS232	x	●	●	●
RS485	x	●	●	●
J1939	x	●	x	●
Modbus	x	●	●	●
CCLAN	x	●	x	●
Software for PC	x	●(4)	●(4)	●(4)
Analogic modem	x	●	●	●
GSM/GPRS modem	x	●	●	●
Remote screen	x	●	x	●
Telesignal		●(8+4)		●(8+4)



### FEATURES

	M6	CEM6	CEC6.2	CEA6
Alarms history		(10) / (●+100)	(10)	(10) / (●+100)
External start	●	●	●	●
Start inhibition	x	●	●	●
Mains failure start	x	●(CEC6.2)	●	●
Start under normative EJP	x	●	x	●
Key start	x	x	x	x
Pre-heating engine control	●	●	x	●
Genset contactor activation	●	●	x	x
Main & Genset contactor activation	x	x	●	●
Fuel transfer control	x	●	x	●
Engine temperature control	x	●	x	●
Manual override		●	x	●
Programmable alarms		●	x	●
Genset start function in test mode		●	x	●
Programmable outputs		●	x	●
Magnetic Pick-up control	x	●	x	●
Multilingual		●	●	●

### SPECIAL FUNCTIONS

Positioning GPS		●		●
Synchronization with mains		●(MPS 5.0)		●(MPS 5.0)
Mains Synchronism		●(MPS 5.0)		●(MPS 5.0)

Note: AS5 + CC2 configuration, will have all CEM6 functionality plus CEC6.2 mains readings.

**A:** Warning. Warning alarm without engine stop

**P:** Alarm with Engine Stop

**(1)** Bulbs installation necessary.

**(2)** Shot protection.

**(3)** Programmable analog. protection. (Depends on bulb installations)

**(4)** Standard when optional of communication is included.

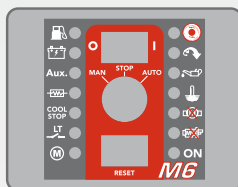
**(5)** Change over activation not allowed before reaching at the temperature level programmed.

**(6)** Only protection with connection to CEM6.

**CEC6.2:** available when the controller CEC6.2 is incorporated to the installation.

**MPS 5.0:** available application when the module MPS 5.0 has been incorporated to the panel.

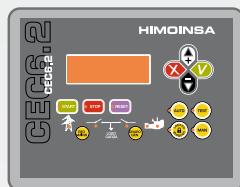
## QUICK control panels list



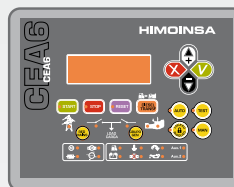
M6



CEM6



CEC6.2



CEA6

### FUNCTIONALITY

- Auto-start (Key Start)
- Auto-start
- Automatic Control Panel Without mains control
- Automatic Control Panel With Mains Control (customer change over contactors)
- Automatic Control Panel With Mains Control (Himoinsa change over contactor with display)
- Automático Mains Failure (wall mounted panel)

### PANEL MODEL

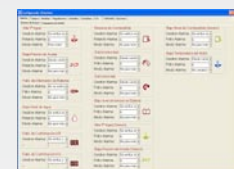
- M6
- M5
- AS5
- AS5
- AS5+CC2
- AC5

### CONTROLLER MODEL

- M6
- CEM6
- CEM6\*\*
- CEA6
- CEM6+CEC6.2
- CEA6

\*\* Pre-heating resistance in the Genset and Battery charger in the control panel included.

### Available Software:



Configuration



Monitoring



Fleet management



## ADVANTAGES

### HIGH PROTECTION

Protection for the Genset, as well as the different instruments and devices connected to the genset. Protection for: Overvoltage, Undervoltage, Asymmetry, Overamperage, Overfrequency, underfrequency, Overload, Incorrect genset phase sequence, inverse power, Shortcircuit, High Coolant temperature, Low Oil Pressure, Overspeed, Underspeed, etc ...

### COMPLETE HANDFUL OF MEASURES

Allows the reading of a handful of measures with no need of additional instruments or external gauges. Apart from protection, offers continuously the parameters of genset works and the digital readings for: Voltage, amperage, frequency, Fuel Level, tachometer, hour counter, power consumption, battery alternator voltage, battery voltage, engine temperature\*, oil pressure\*, Current power measures, cosine of phi per phase, reading and situation of the programmable inputs, Total energy consumption measures ( day, month and year\*\*), Alarm control.

### GREAT VERSATILITY

These module systems allow the adaptation and growing with the market demand and the law requirements. The modularity allows to have a sharp growth and all-purpose components (even with different types of engines). Depends of the plate location is possible to obtain different configurations. We start from a standard design and according to the needs it is possible to develop new extensions.

Install only the necessary elements. Basis stock reduction. The same control panel for different voltage. Electrical Supply voltage: 12/24V.

### SIMPLE

Installation is really simple. Wiring system is shortened. Easy to turn a manual device system into automatic and vice versa. With one simple programming of the control panel you can adjust measures and levels (i.e. automatic filling of the fuel tank). Power outputs remain protected. More than 64 nodes and more than 1.000 meters without signal repeater.

### FAST PROGRAMMING

Possibility to personalize the features of the control panel to your own application. Apart from programming measure parameters, thresholds, times, alarms, regulations, etc, you can also program the control panel to stop the genset (with or without cooling time) or simply give you a warning with no stop of the engine.

### DIFFERENT STARTING MODE

Manual Start, Automatic Start or free voltage contact

### NEW BUSINESS LINES

This control panel allows the creation of new business lines and different managing possibilities since it contains:

- Preventive maintenance.
- Fungible.
- Routes generation.
- Genset Global positioning.
- Remote control.
- Antitheft follow up.
- Protection/security.

\* Only with the corresponding sensors installed

\*\* Only with programming timer





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