



SmartGen
ideas for power

HGM6100N SERIES

(HGM6110N/6120N/6110NC/6120NC/6110CAN/6120CAN)

GENSET CONTROLLER

USER MANUAL



SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.

3 SPECIFICATION











Table 2 – Technical Parameters

Items	Contents
Working Voltage	DC8.0V to DC35.0V, continuous
Power Consumption	<3W(Standby mode: ≤2W)
AC System 3P4W 3P3W 1P2W 2P3W	AC15V - AC360 V (ph-N) AC30V - AC620 V (ph-ph) AC15V - AC360 V (ph-N) AC15V - AC360 V (ph-N)
AC Alternator Frequency	50Hz/60Hz
Rotate speed sensor Voltage	1.0V to 24V (RMS)
Rotate speed sensor Frequency	10,000 Hz (max.)
Start Relay Output	16 A DC28V at supply voltage
Fuel Relay Output	16 A DC28V at supply voltage
Auxiliary Relay Output 1	7 A DC28V at supply voltage
Auxiliary Relay Output 2	7 A AC250V volt-free output
Auxiliary Relay Output 3	16 A AC250V volt-free output
Auxiliary Relay Output 4	16 A AC250V volt-free output
Overall Dimensions	209mm x 166mm x 45mm
Panel Cutout	186mm x 141mm
C.T. Secondary Current	5A (rated)
Working Condition	Temperature: (-25~70)°C; Relative Humidity: (20~93)%RH
Storage Condition	Temperature: (-30~+80)°C
Protection Level	IP65: when water-proof gasket installed between control panel and enclosure.
Insulation Intensity	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal. The leakage current is not more than 3mA within 1min.
Weight	0.56kg

4 OPERATION

4.1 KEYS DSCRIPTION

Table 3 – Keys Description

Icon	Function	Description
	Stop/ Reset	Can stop generator under Manual/Auto mode; Can reset shutdown alarm; Press this key at least 3 seconds to test panel indicators are OK or not(lamp test); During stopping process, press this key again can stop generator immediately.
	Start	Start genset under Manual or Manual Test mode.
	Manual	Pressing this key will set the module as Manual mode.
	Auto	Pressing this key will set the module as Auto mode.
	Gens Close/Open	Can control gens to switch on or off in Manual mode. Note: the key is fit for HGM6120 series controllers.
	Close	Can control gens to switch on in Manual mode. Note: the key is fit for HGM6110 series controllers.
	Open	Can control gens to switch off in Manual mode. Note: the key is fit for HGM6110 series controllers.
	Set/ Confirm	Press this key to enter menu interface; Shift cursor to confirm In parameters setting menu.
	Up/Increase	Screen scroll; Up cursor and increase value in setting menu.
	Down/Decrease	Scroll screen; Down cursor and decrease value in setting menu.
	Home/Return	Return to homepage when in main interface; Exit when in parameters setting interface.

4.2 CONTROLLER PANEL



Fig.1 - HGM6110N/ HGM6110NC/ HGM6110CAN Front Panel Indication




Fig.2 - HGM6120N/ HGM6120NC/ HGM6120CAN Front Panel Indication

▲Note: Partial indicator states:

Alarm Lamp: slowly blink when warning alarms; fast blink when shutdown alarms; won't illuminate when there is no alarm.

Status Lamp: won't illuminate when genset stand by; blink 1 time per second in start or stop process and always illuminate when runs normally; for HGM6100CAN, press start key in auto mode or manual mode, ECU power output and status lamp always illuminate.

4.3 AUTOMATIC START/STOP OPERATION

Auto mode is activated by pressing the , LED indicator beside the button is illuminating which confirms this action.

Starting Sequence



- 1) **HGM6120:** When mains is abnormal (over/under voltage, lack of phase), enter into “Mains Abnormal Delay” and LCD displays count-down time. When delay is over, “Start Delay” begins.
- 2) **HGM6110:** when “remote start” input is active, enter into “Start Delay”.
- 3) “Count- down” of start delay is displayed in LCD.
- 4) When start delay is over, preheat relay is outputting (if configured), “Preheat Delay XX s” is displayed in LCD.
- 5) When preheat delay is over, fuel relay is outputting for 1s and then start relay outputs; if genset failed to start during “Crank Time”, the fuel and start relay stop outputting and enter into “Crank Rest Time” and wait for next cranking.
- 6) If genset failed to start within set start times, the fifth line of LED will turn black and Fail to Start alarm will be displayed.
- 7) Any time to start genset successfully, it will enter into “Safe Running”. During this period, alarms of low oil pressure, high temperature, under speed, Failed To Charge and Aux. input (be configured) are disabled. As soon as this delay is over, genset will enter into “Start Idle Delay” (if configured).
- 8) During start idle delay, alarms of under speed, under frequency, under voltage are disabled. As soon as this delay is over, genset will enter into “Warming up Delay” (if configured).
- 9) When “Warming up Delay” is over, the indicator is illuminating if gens normal. If voltage and frequency of engine reach the load requirement, close relay outputs, genset is taking load and indicator illuminates; if engine voltage or frequency is abnormal, controller will alarm and shutdown (LCD displays the alarm information).





Stopping Sequence

- 1) **HGM6120:** during normal running, if mains normal, genset will enter into “Mains Normal Delay”, when mains indicator illuminates, “Stop Delay” begins.
- 2) **HGM6110:** genset enters into “Stop Delay” as soon as “Remote Start” is inactive.
- 3) When “Stop Delay” is over, genset enters into “Cooling Delay”. Closing relay is disconnected. After switch “Transfer Rest Delay”, closing relay is outputting, mains is taking load, generator indicator eliminates while mains indicator illuminates.
- 4) When entering “Stop Idle Delay”, idle relay is energized to output. (If configured).
- 5) When entering “ETS Delay”, ETS relay is energized to output, fuel relay output is disconnected.
- 6) When entering “Genset at Rest”, genset will automatically judge if it has stopped.
- 7) When genset has stopped, enter into standby mode; if genset failed to stop, controller will alarm (“Fail to Stop” alarm will be displayed in LCD).



4.4 MANUAL START/STOP OPERATION

- 1) **HGM6120, Manual** Mode is active when press  and its indicator illuminates. Under both of the modes, press  to start genset, it can automatically detect crank disconnect and accelerate to

high speed running. If there is high temperature, low oil pressure, over speed and abnormal voltage during genset running, controller can protect genset to stop (detail procedures please refer to No.4~9 of Auto start operation). Under Manual Mode, switch won't transfer automatically, it is necessary to press   to transfer load.

- 2) **HGM6110**, **Manual** Mode is active when pressing  , and its indicator is illuminating. Then press  to start genset, it can automatically detect crank disconnect and accelerate to high speed running. If there is high temperature, low oil pressure, over speed and abnormal voltage during running, controller can protect genset to stop quickly (detail procedures please refer to No.4~9 of Auto start operation). After genset runs well in high speed, press  and gens take load.
- 3) Manual stop, pressing  can shut down the running genset (detail procedures please refer to No.3~7 of Auto stop operation).

4.5 EMERGENCY START

In manual mode, pressing  and  can compel genset to start. The controller won't judge whether the controller has started successfully according to disconnect conditions and the disconnection of starter needs to control by operators. When operators observed the genset has started successfully, loose the keys and the controller enter safety delay with start stops to output.

5 PROTECTION

5.1 WARNINGS

When controller detects the warning signal, the genset only alarm and not stop. The alarms are displayed in LCD.

Table 4 – Controller Warning Alarms

No.	Items	Description
1	Loss Of Speed Signal	When the speed of genset is 0 and speed loss delay is 0, controller will send warning alarm signal and it will be displayed in LCD.
2	Genset Over Current	When the current of genset is higher than threshold and setting over current delay is 0, controller will send warning alarm signal and it will be displayed in LCD.
3	Fail To Stop	When genset cannot stop after the “stop delay” is over, controller will send warning alarm signal and it will be displayed in LCD.
4	Low Fuel Level	When the fuel level of genset is lower than threshold or low fuel level warning is active, controller will send warning alarm signal and it will be displayed in LCD.
5	Failed To Charge	During genset normal running process, when the voltage difference

6 CONNECTIONS

Compared with HGM6120, HGM6110 doesn't have 3-phase input terminal of mains voltage. The back panel of HGM6120 is as below.

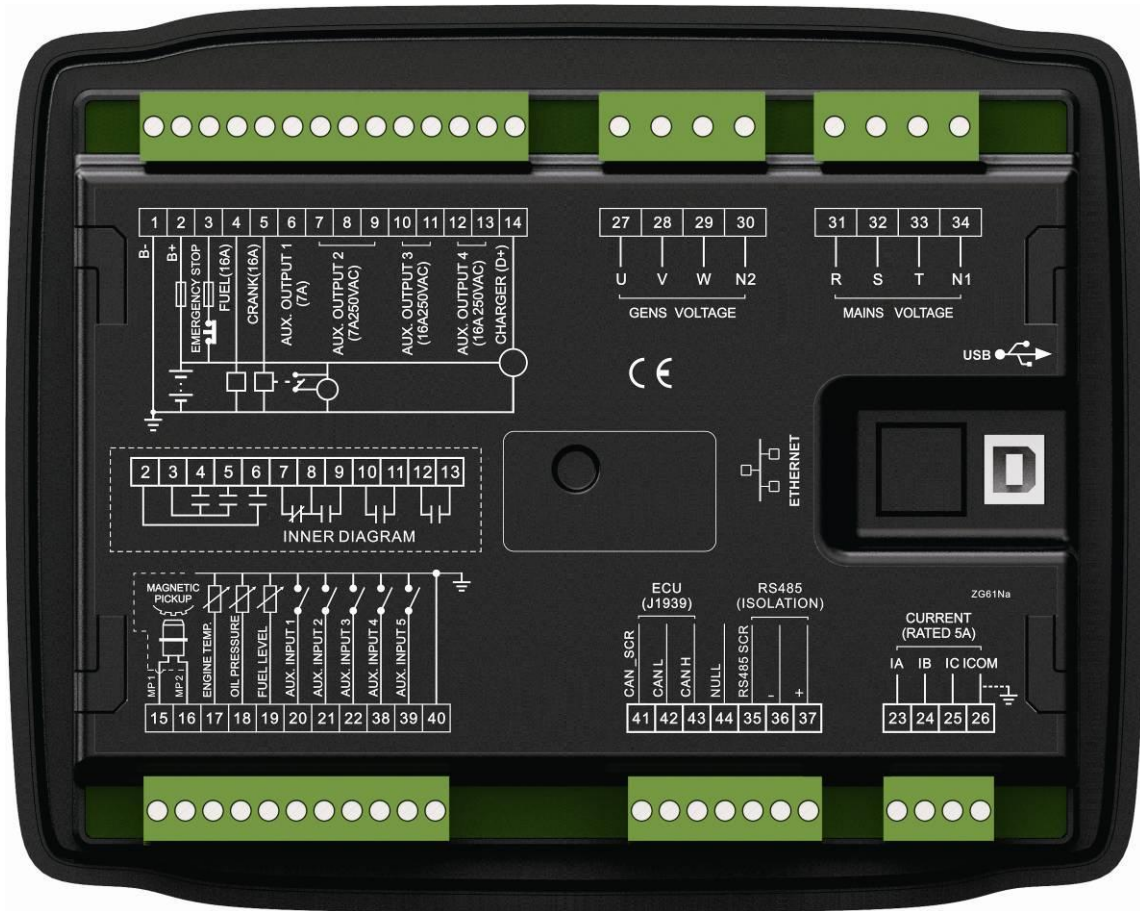
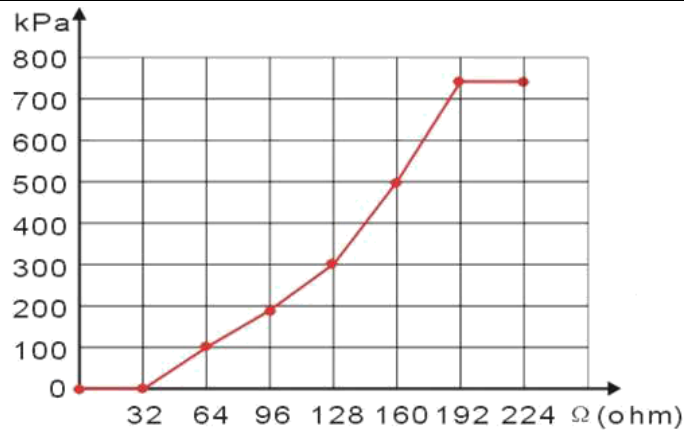


Fig.3 – Controller Rare Panel Drawing

Table 6 – Terminal Connection Description

No.	Function	Cable Size	Description
1	DC input B-	2.5mm ²	Connected to negative of starter battery
2	DC input B+	2.5mm ²	Connected to positive of starter battery. If wire length is over 30m, better to double wires in parallel. Max. 20A fuse is recommended.
3	Emergency Stop	2.5mm ²	Connected to B+ via emergency stop button.
4	Fuel Relay Output	1.5mm ²	B+ is supplied by 3 points, rated 16A
5	Start Relay Output	1.5mm ²	B+ is supplied by 3 points, rated 16A Connect to starter coil
6	Aux. Relay Output 1	1.5mm ²	B+ is supplied by 2 points, rated 7A
7	Aux. Relay Output 2	1.5mm ²	Normal close output, 7 A rated.
8			Relay common port
9			Normal open output, 7 A rated.
10	Aux. Relay Output 3	2.5mm ²	Relay normal open volt-free contact output 16 A rated
11	Aux. Relay Output 4	2.5mm ²	
12			
13			

Reference Table 8


Fig.4 Sensor Curve Diagram
Table 12 - Conventional pressure unit conversion table

	1N/m ² (pa)	1kgf/cm ²	1bar	(1b/in ²) psi
1Pa	1	1.02x10 ⁻⁵	1x10 ⁻⁵	1.45x10 ⁻⁴
1kgf/cm ²	9.8x10 ⁴	1	0.98	14.2
1bar	1x10 ⁵	1.02	1	14.5
1psi	6.89x10 ³	7.03x10 ⁻²	6.89x10 ⁻²	1

10 COMMISSIONING

Before operation, the following checking should be carried out:

- Check and ensure all the connections are correct and wires diameter is suitable.
- Ensure that the controller DC power has fuse; battery positive and negative have correctly connected.
- Emergence stop input must be connected to positive of starting battery via normally close contact of emergency stop.
- Take proper actions to prevent engine to disconnect crank (e. g. Remove the connections of fuel value). If checking is OK, connect start battery, select Manual Mode, controller will execute the program.
- Set controller as Manual Mode, press “start” button to start genset. If failed within the setting crank times, controller will send “Failed to Start” signal; then press “stop” to reset controller.
- Recover actions of preventing engine to disconnect crank (e. g. Connect wire of fuel value), press “start” button again, genset will start. If everything goes well, genset will normal run after idle running (if configured). During this period, watch for engine’s running situations and voltage and frequency of alternator. If there is abnormal, stop genset and check all connections according to this manual.
- Select the Auto Mode from front panel, connect to mains signal. After the mains normal delay, controller will transfer ATS (if configured) into mains load. After cooling, controller will stop genset and into standby state until mains abnormal again.
- When mains abnormal again, genset will start automatically and into normal running, send signal to make gens close, transfer ATS and make genset take load. If it not likes this, please check connections of ATS according to this manual.
- If there are any other questions, please contact SmartGen’s service.

11 TYPICAL APPLICATION

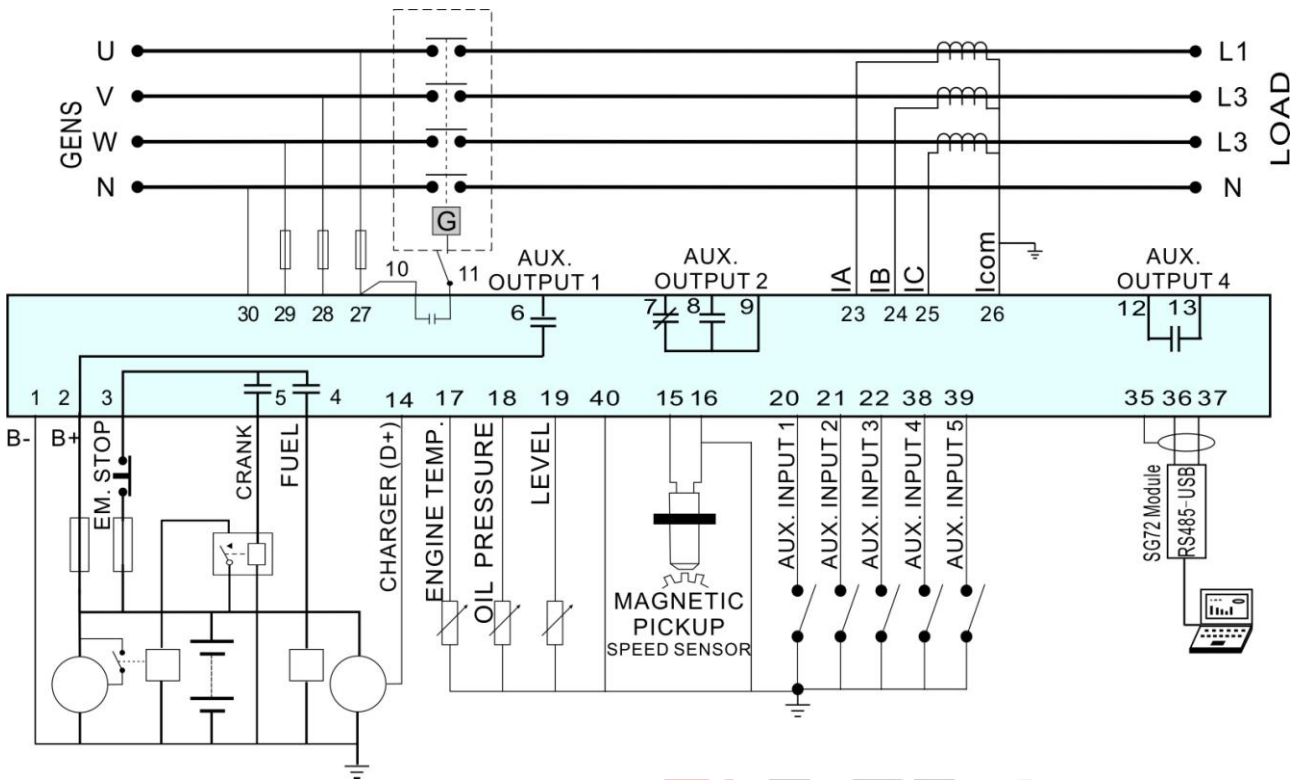


Fig.5 - HGM6110NC Typical Application Diagram

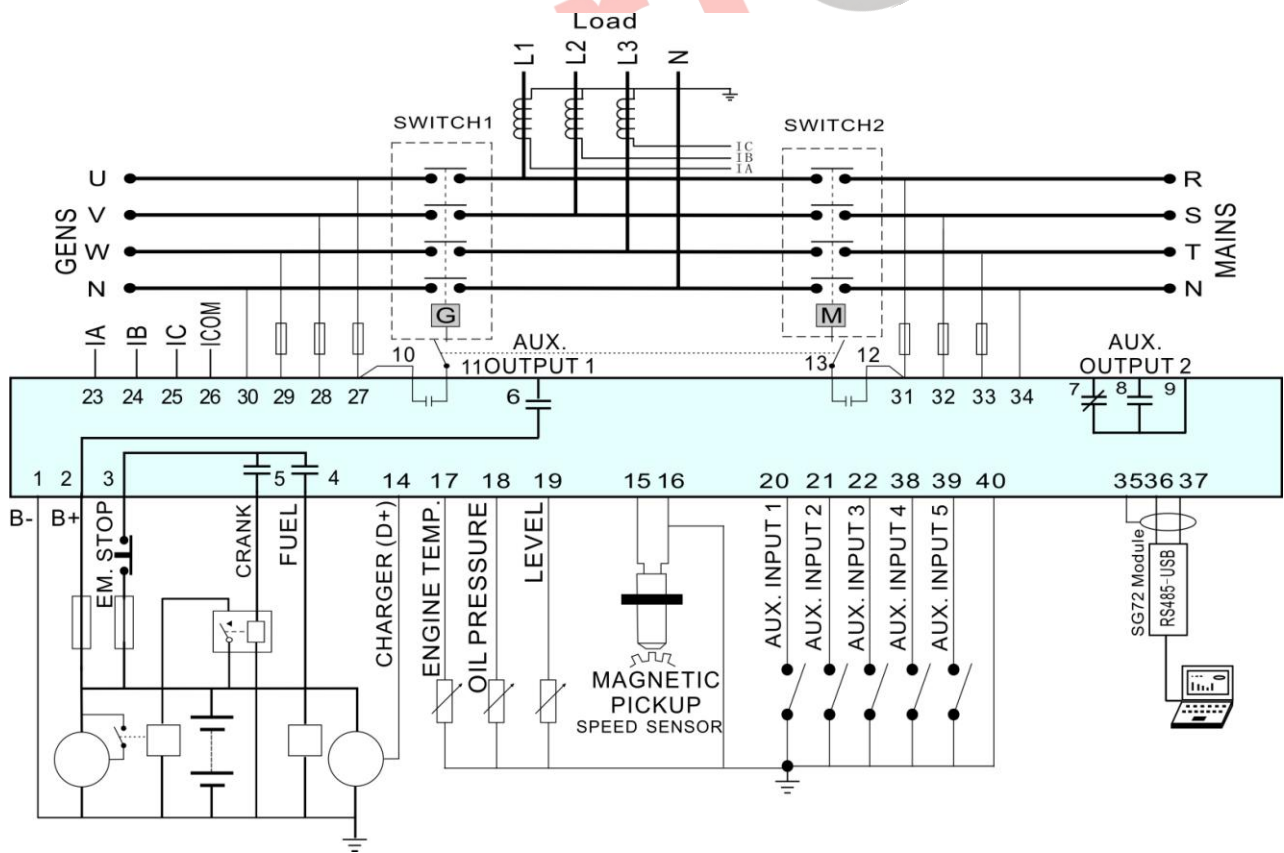


Fig.6 - HGM6120NC Typical Application Diagram

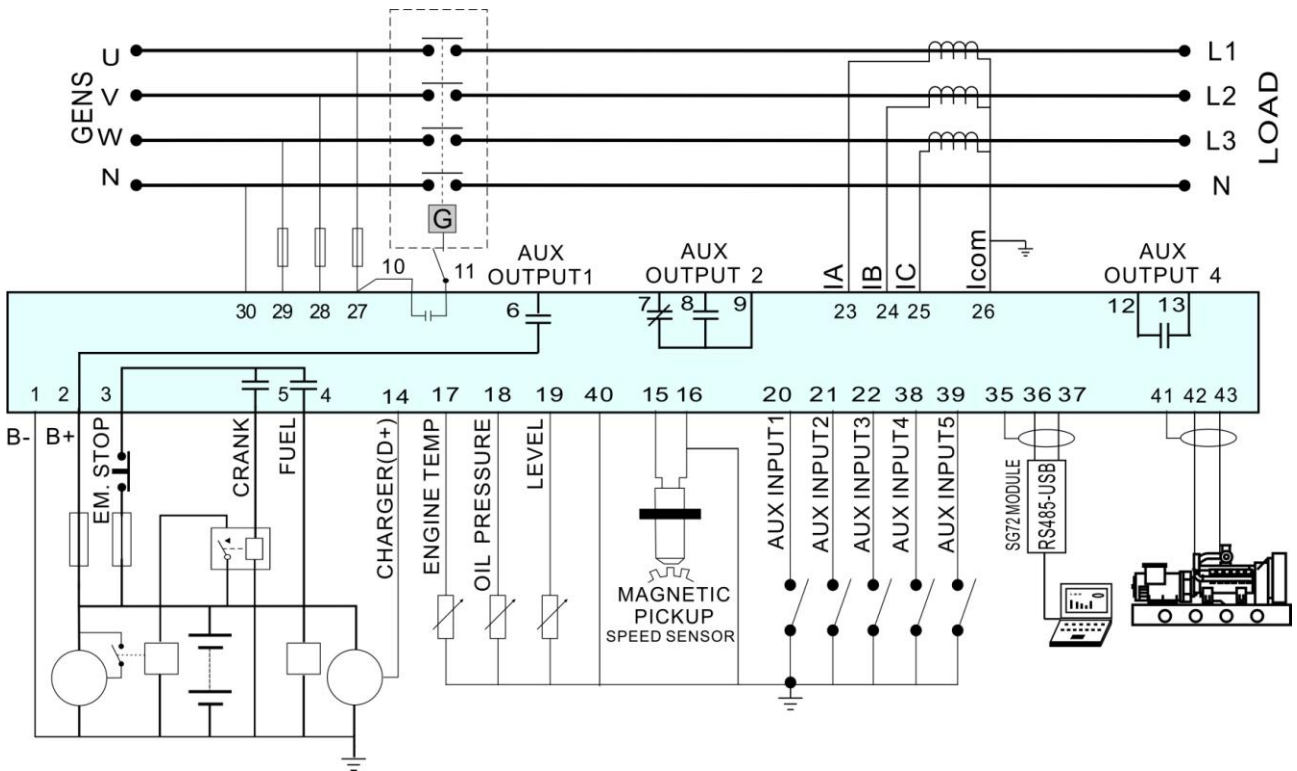


Fig.7 - HGM6110CAN Typical Application Diagram

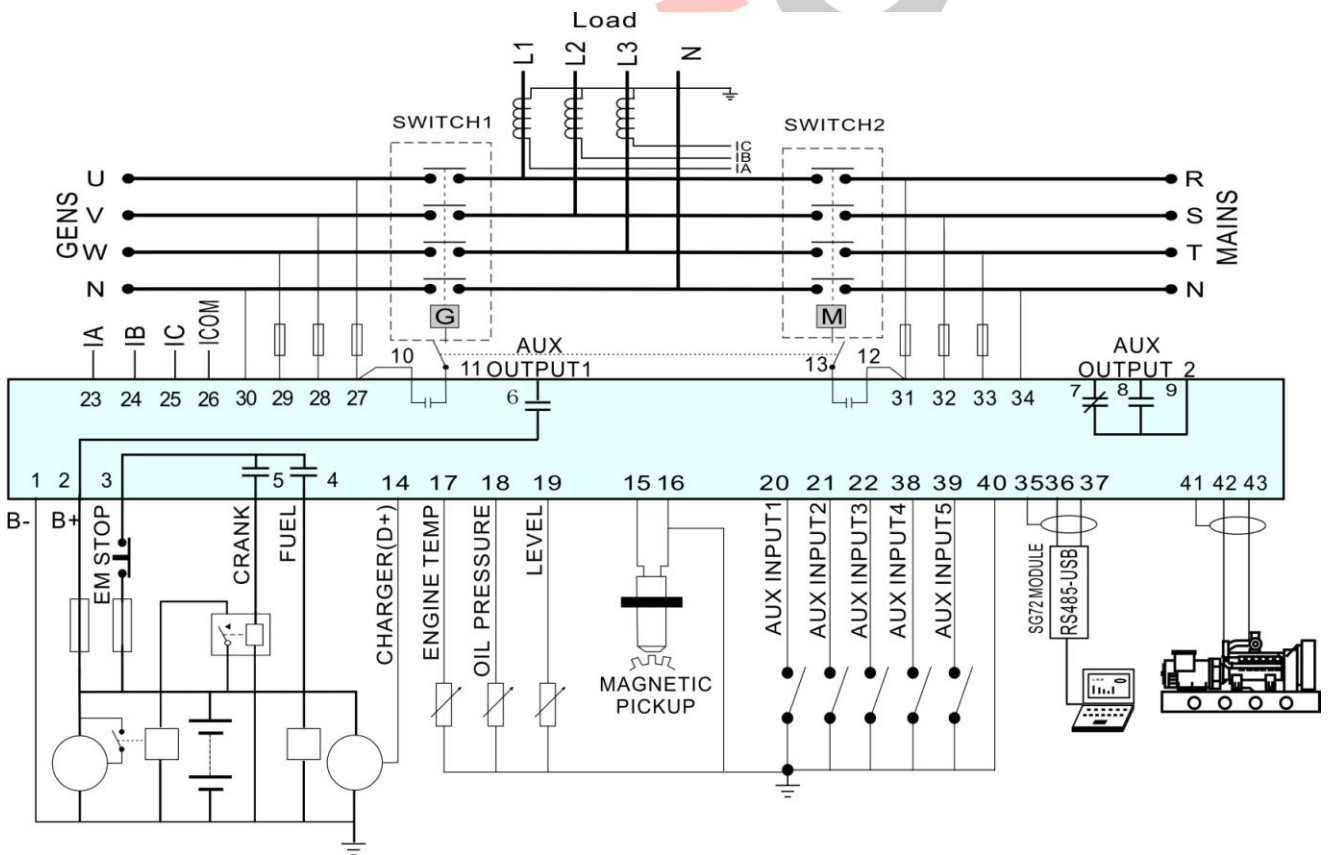


Fig.8 - HGM6120CAN Typical Application Diagram

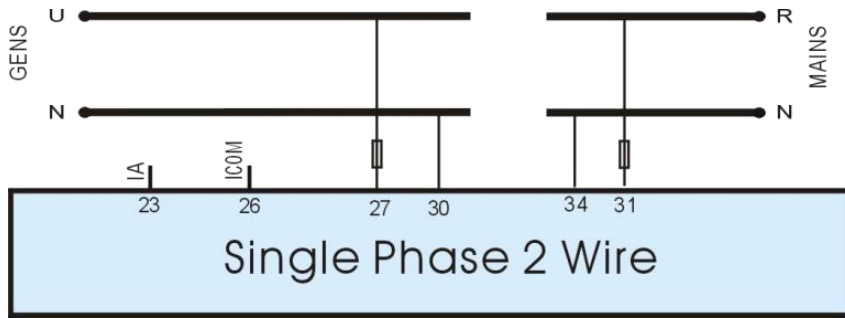


Fig. 9 - Single Phase 2 Wire

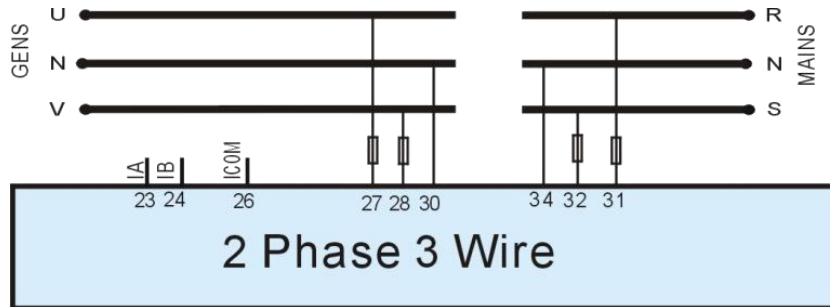


Fig. 10 - 2 Phase 3 Wire

▲Note: Recommend that the output of crank and Fuel expand high capacity relay.

12 INSTALLATION

12.1 FIXING CLIPS

The module is held into the panel fascia using the supplied fixing clips.

- Withdraw the fixing clip screw (turn anticlockwise) until it reaches proper position.
- Pull the fixing clip backwards (towards the back of the module) ensuring four clips are inside their allotted slots.
- Turn the fixing clip screws clockwise until they make contact with the panel.
- Care should be taken not to over tighten the screws of fixing clips.

12.2 OVERALL DIMENSION AND PANEL CUTOUT

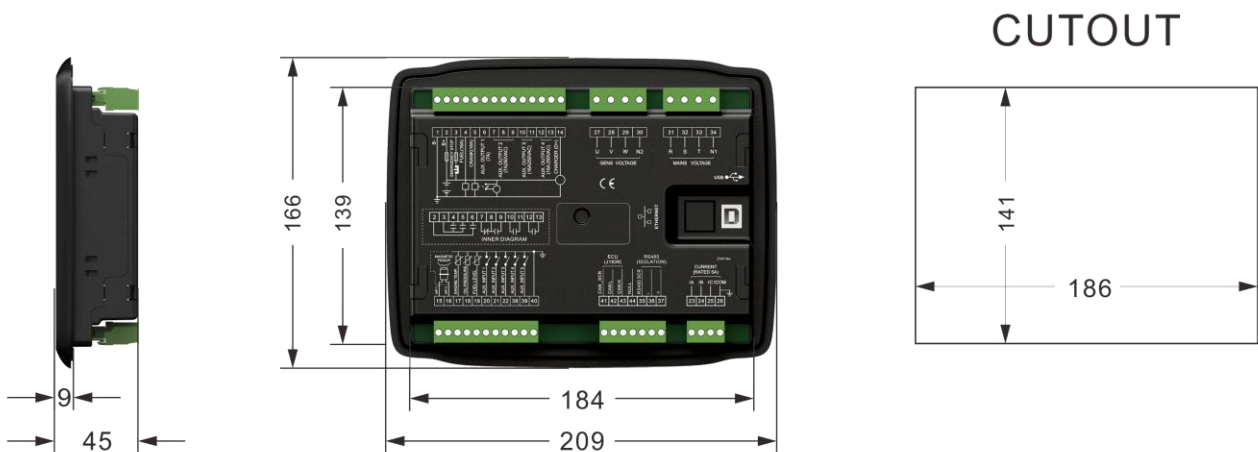


Fig.11 – Case and Overall Dimensions