

IWE4010

GENSET CONTROLLER

USER MANUAL



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## 1 OVERVIEW

**HGM4000N** series genset controllers integrate digitization and network technology which are used for genset automation and monitor control system of single unit to achieve automatic start/stop, data measurement, alarm protection and etc. functions. It fit with LCD display, optional languages interface (Chinese, English, Spanish, Russian, Turkish, French, Portugal, and Polish), and it is reliable and easy to use.

**HGM4000N** series genset controllers adopt micro-processor technology with precision parameters measuring, fixed value adjustment, time setting and set value adjusting and etc. All parameters can be configured from front panel or through programmable interface (USB or RS485 interface) via PC. It can be widely used in all types of automatic genset control system with compact structure, advanced circuits, simple connections and high reliability.

## 2 PERFORMANCE AND CHARACTERISTICS

**HGM4000N** series controller has six types:

**HGM4010N/HGM4010NC/HGM4010CAN:** ASM (Automatic Start Module), it controls generator to start/stop by remote signal;

**HGM4020N/HGM4020NC/HGM4020CAN:** AMF (Auto Mains Failure), updates based on HGM4010N/HGM4010NC/HGM4010CAN, moreover, has mains electric quantity monitoring and mains/generator automatic transfer control function, especially for automatic system composed by generator and mains.

Main features as follows:

- 132x64 LCD with backlight, selectable language interface (Chinese, English, Spanish, Russian, Turkish, French, Portugal, and Polish), push-button operation.
- Hard-screen acrylic material been used to protect screen with great wear-resisting and scratch-resisting functions.
- Silicone panel and pushbuttons can be used in extreme temperature environment.
- RS485 communication interface enable “Three remote functions” (remote control, remote measuring and remote communication) according to MODBUS protocol.
- Equipped with CANBUS port and can communicate with J1939 genset. Not only can monitor frequently-used data (such as water temperature, oil pressure, speed, fuel consumption and soon) of ECU machine, but also control starting up, shutdown , raising speed and speed droop via CANBUS port (need controller with CANBUS interface).
- Suitable for 3-phase 4-wire, 3-phase 3-wire, single phase 2-wire, and 2-phase 3-wire systems with voltage 120/240V and frequency 50/60Hz;
- Collects and shows 3-phase voltage, current, power parameter and frequency of generator or mains.

### Mains

Line voltage (Uab, Ubc, and Uca)  
 Phase voltage (Ua, Ub, and Uc)  
 Frequency Hz

### Generator

Line voltage (Uab, Ubc, and Uca)  
 Phase voltage (Ua, Ub, and Uc)  
 Frequency Hz

Phase sequence	Phase sequence
<b>Load</b>	
Current Ia, Ib, Ic	A (unit)
Each phase and total active power P	kW (unit)
Reactive power Q	kvar (unit)
Apparent power S	kVA (unit)
Power factor PF	
Accumulate total generator power W	kWh, kVarh, kVAh (unit)
Output percentage with load	%

- For Mains, controller has over and under voltage and loss of phase detection functions; for generator, controller has over and under voltage, over and under frequency, over current and over power detection functions.
- Precision measure and display parameters about Engine.
  - Temp. (WT) °C/°F both be displayed
  - Oil Pressure (OP) kPa/psi/bar all be displayed
  - Fuel Level (FL) %(unit) Fuel Quantity Left L(unit)
  - Speed (RPM) r/min (RPM)
  - Voltage of Battery V (unit)
  - Voltage of Charger V (unit)
  - Hour count accumulation
  - Start times accumulation
- Protection: automatic start/stop of the gen-set, ATS(Auto Transfer Switch) control with perfect fault indication and protection function.
- With ETS (energize to stop), idle control, pre-heat control and rise/drop speed control functions, which are all relay outputs.
- Parameter setting: parameters can be modified and stored in internal FLASH memory and cannot be lost even in case of power outage; most of them can be adjusted using front panel of the controller and also can be modified using PC via USB or RS485port.
- With multiplex input port 4 and 5. Input port 4 can be configured as switch input port or fuel level sensor; input port 5 can be set as switch input port or programmable sensor. It can flexible application in different occasions.
- Multiple temperature, pressure, oil pressure sensor can be used and self-defined directly.
- With one programmable sensor can be configured as temperature, pressure or liquid level sensor. It is achieved double temperature, pressure or liquid level sensor detections.
- Multiple crank disconnect conditions (speed sensor, oil pressure, generator frequency) are optional.
- With emergency start function.
- With flywheel tooth number automatic recognition function.
- Widely power supply range DC(8~35)V, suitable to different starting battery voltage environment.
- All parameters used digital adjustment, instead of conventional analog modulation with normal potentiometer, more reliability and stability.
- With maintenance function. Types (date and running time) can be optional and actions (warning, shutdown or trip and stop) can be set when maintenance time out.
- Event log, real-time clock, scheduled start & stop generator (can be set as start genset once a day/week/month whether with load or not). Maximum 99 event logs can be memorized.

- Waterproof security level IP55 due to rubber seal installed between the controller enclosure and panel fascia.
- Metal fixing clips enable perfect in high temperature environment.
- Modular design, anti-flaming ABS plastic enclosure, pluggable connection terminals and embedded installation way; compact structure with easy mounting.

### 3 SPECIFICATION OPERATION

Table 2 Technical Parameters

Items	Contents
Operating Voltage	DC8.0V to DC35.0V, Continuous Power Supply.
Power Consumption	<3W (standby ≤2W)
Alternator Volt Input Range	
3Phase 4Wire	AC15V-AC 360V (ph-N)
3Phase 3Wire	AC30V - AC620V (ph-ph)
Single Phase 2Wire	AC15V - AC360V (ph-N)
2Phase 3Wire	AC15V - AC360V (ph-N)
Alternator Frequency	50 Hz /60Hz
Speed sensor voltage	1.0V to 24.0V (RMS)
Speed sensor Frequency	10,000 Hz (max.)
Start Relay Output	5 A DC28V at supply output
Fuel Relay Output	5 A DC28V at supply output
Programmable Relay Output (1)	1 A DC28V at supply output
Programmable Relay Output (2)	1 A DC28V at supply output
Programmable Relay Output (3)	1A DC28V at supply output
Programmable Relay Output (4)	1A DC28V at supply output
Case Dimension	135mm x 110mm x 44mm
Panel Cutout	116mm x 90mm
CT Secondary Current	5A rated
Working Conditions	Temperature: (-25~+70)°C; Humidity: (20~93)%RH
Storage Condition	Temperature: (-25~+70)°C
Protection Level	IP55 Gasket
Insulating Intensity	Apply AC2.2kV voltage between high voltage terminal and low









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	voltage terminal; The leakage current is not more than 3mA within 1min.
Net Weight	0.32kg

4 OPERATION

4.1 KEY FUNCTION

Table 3 Key Function Descriptions


Icon	Function	Description
	Stop/ Reset	Stop running generator in Auto/Manual mode; In case of alarm condition, pressing the button will reset alarm; In stop mode, pressing and holding the button for 3 seconds will test indicator lights (lamp test); During stopping process, press this button again to stop generator immediately.
	Start	Under manual mode, press this button will start genset ; press this button during genset start up, genset will jump to next status and genset can fast-boot.
	Manual	Pressing this key will set the module into manual mode.
	Auto	Pressing this key will set the module into auto mode.
	C/O	Pressing this key causes the controller to toggle the display C/O and the main page. Press Up or Down key to control switch close or open in C/O interface under manual mode.
	Set/Confirm	Pressing this key will enter into Main Menu; In setting parameter status, press this key will shift cursor or confirm setting value.
	Up/Increase	Scrolls the screen up; Shift the cursor up or increase the set value in parameter setting menu. In C/O interface under manual mode: press this button can control mains close or open(HGM4020 series); press this button can control gen close (HGM4010 series).
	Down/Decrease	Scrolls the screen down; Shift the cursor down or decrease the set value in parameter setting menu. In C/O interface under manual mode: press this button can control gen close or open(HGM4020 series); press this button can control gen open (HGM4010 series).

## 4.2 CONTROLLER PANEL



HGM4010 Front Panel Indication

### 4.3 AUTO START/STOP OPERATION

Press , its indicator lights, and controller enters **Auto** mode.

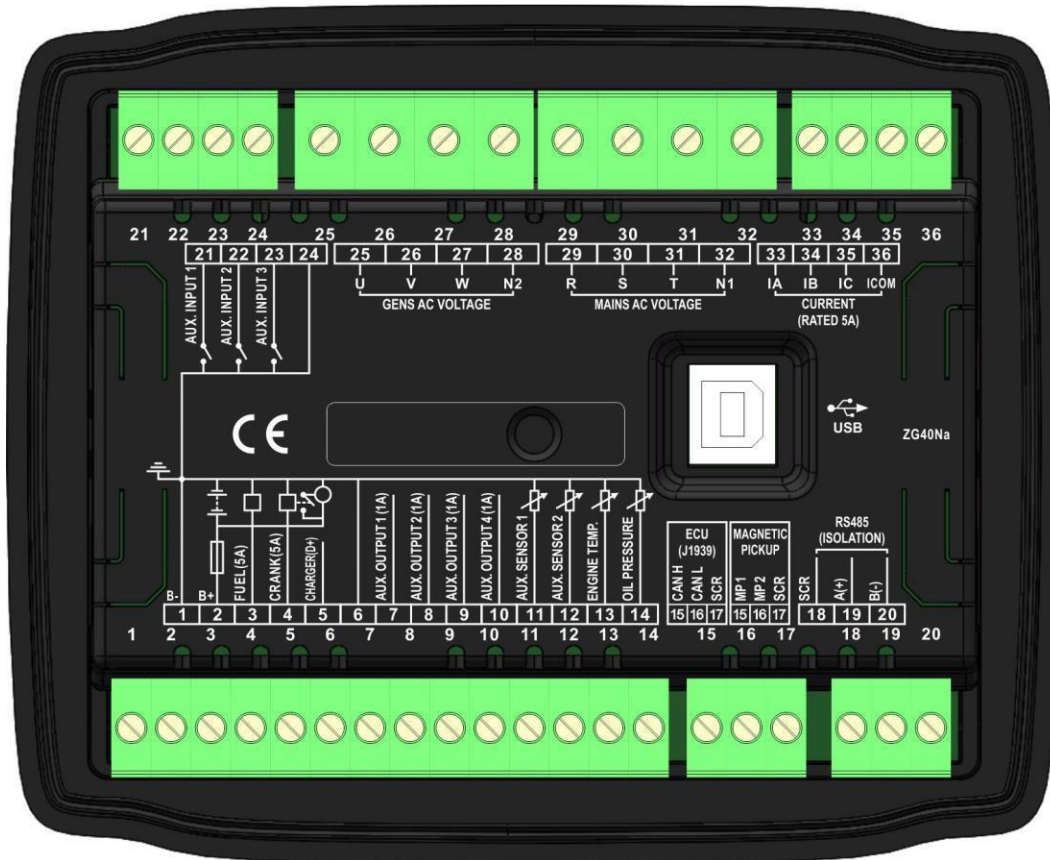
#### Starting Sequence,

- 1) **HGM4020**: When Mains is abnormal (over and under voltage, loss of phase), it enters into mains “abnormal delay” and LCD display count down time. When mains abnormal delay is over, it enters into “start delay”.
- 2) **HGM4010**: Generator enters into “start delay” as soon as “Remote Start on Load” is active.
- 3) Start Delay timer is shown on LCD.
- 4) When start delay is over, preheat relay outputs (if this be configured), “preheat start delay XX s” is shown on LCD.
- 5) When preheat delay is over, fuel relay outputs 1s and then start relay output; if engine crank fails during “cranking time”, the fuel relay and start relay deactivated and enter into “crank rest time” to wait for next crank.
- 6) If engine crank fails within setting times, the fifth line of LCD turn black and Fail To Start message appears on fifth line of LCD display at the same time.
- 7) In case of successful crank attempt, “safety on timer” starts. During this period, low oil pressure, high water temperature, under speed, charge failure alarms and auxiliary inputs (if configured) are disabled. As soon as this delay is over, “start idle delay” is initiated (if configured).



## 6 WIRINGS CONNECTION

Compared with HGM4020, HGM4010 missing one mains voltage three-phase input terminal. HGM4020 controller back panel is as follows:



HGM4020 Back Panel

Table 6 Terminal Wiring Connection

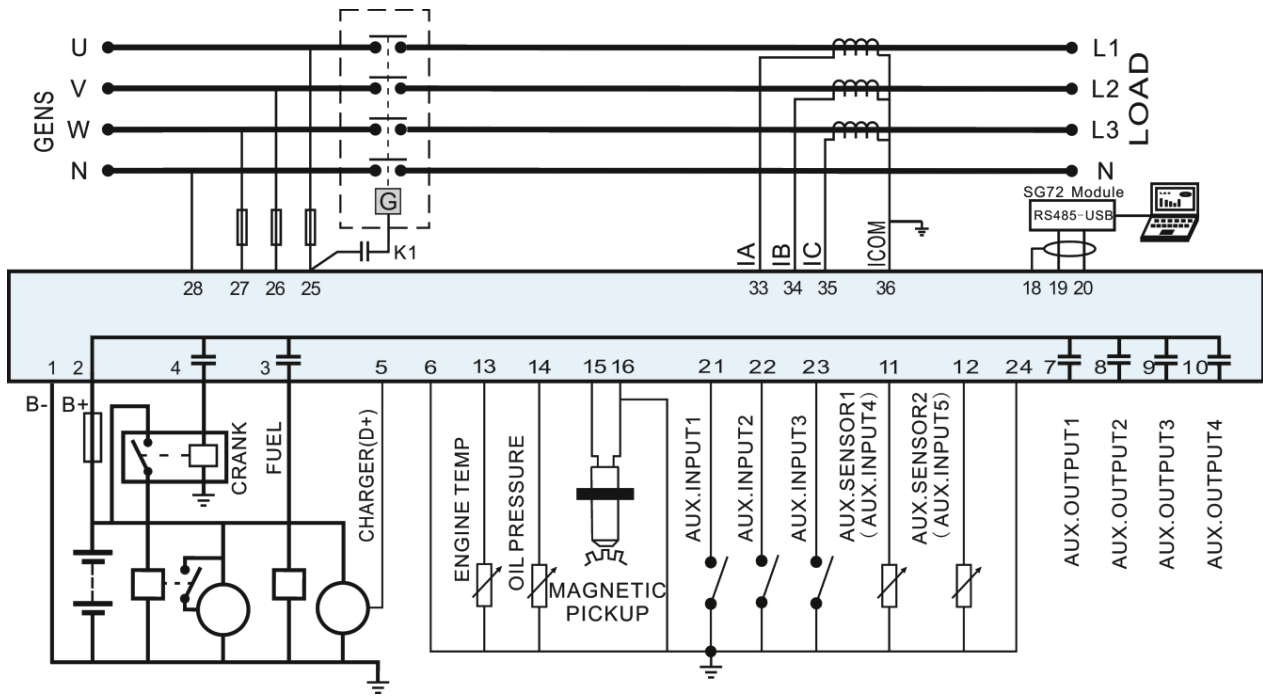
No.	Function	Cable Size	Remarks
1	B-	2.5mm <sup>2</sup>	Connected with negative of starter battery
2	B+	2.5mm <sup>2</sup>	Connected with positive of starter battery. If wire length is over 30m, better to double wires in parallel. Max. 20A fuse is recommended.
3	Fuel relay output	1.5mm <sup>2</sup>	B+ is supplied by 2 terminal, rated 5A Parameter set as “programmable relay output 5”.
4	Start relay output	1.5mm <sup>2</sup>	B+ is supplied by 2 terminal, rated 5A
5	Charger(D+)	1.0mm <sup>2</sup>	Connected with charger starter’s D+ (WL) terminals. Being hang up If there is no this terminal.
6	Common earth ground	1.5 mm <sup>2</sup>	Inside connect to B-.

## 10 COMMISSIONING

Please make sure the following checks are made before commissioning,

- 1) Ensure all the connections are correct and wires diameter is suitable.
- 2) Ensure that the controller DC power has fuse, controller's positive and negative connected to start battery are correct.
- 3) Emergency stop input is connected to the positive pole of starter battery via emergency stop button's normally closed point and fuse.
- 4) Take proper action to prevent engine to crank success (e. g. Remove the connection wire of fuel valve). If checking is OK, make the start battery power on; choose manual mode and controller will executive routine.
- 5) Set controller under manual mode, press "start" button, genset will start. After the cranking times as setting, controller will send signal of Start Failure; then press "stop" to reset controller.
- 6) Recover the action to prevent engine to crank success (e. g. Connect wire of fuel valve), press start button again, genset will start. If everything goes well, genset will normal running after idle running (if idle run be set). During this time, please watch for engine's running situations and AC generator's voltage and frequency. If abnormal, stop genset and check all wires connection according to this manual.
- 7) Select the **AUTO** mode from controller's panel, connect mains signal. After the mains normal delay, controller will transfer ATS (if fitted) into mains load. After cooling time, controller will stop genset and make it into "at rest" mode until there is mains abnormal situation.
- 8) When mains is abnormal again, genset will be started automatically and enter into normal running, then controller send signal to making generator switch on, and control the ATS transfer into generator load. If not like this, please check ATS' wires connection according to this manual.
- 9) If there is any other question, please contact SmartGen's service.

## 11 TYPICAL APPLICATION



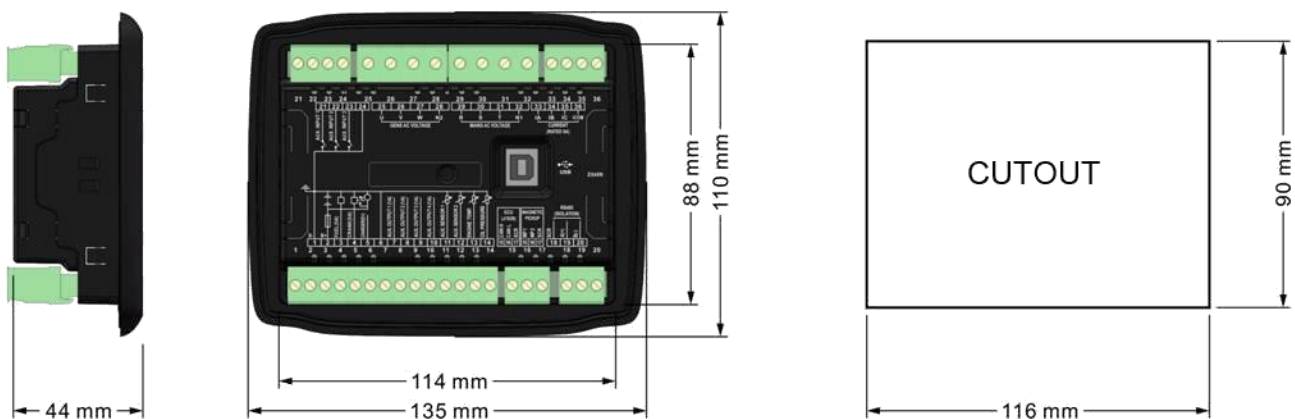
## 12 INSTALLATION

### 12.1 FIXING CLIPS

- 1) Controller is panel built-in design; it is fixed by clips when installed.
- 2) Withdraw the fixing clip screw (turn anticlockwise) until it reaches proper position.
- 3) Pull the fixing clip backwards (towards the back of the module) ensuring two clips are inside their allotted slots.
- 4) Turn the fixing clip screws clockwise until they are fixed on the panel.

**▲ Note:** Care should be taken not to over tighten the screws of fixing clips.

### 12.2 OVERALL DIMENSION



Graph 10 Overall Dimensions

HGM4000N series controller can suit for widely range of battery voltage DC(8~35)V. Negative of battery must be connected with the engine shell. Diameter of wire that connects from power supply to battery must be over 2.5mm<sup>2</sup>. If floating charge configured, please firstly connect output wires of charger to battery's positive and negative directly, then, connect wires from battery's positive and negative to controller's positive and negative input ports in order to prevent charge disturbing the controller's normal working.

#### SPEED SENSOR INPUT

Speed sensor is the magnetic equipment which be installed in starter and for detecting flywheel teeth. Its connection wires to controller should apply for 2 cores shielding line. The shielding layer should connect to No. 17 terminal in controller while another side is hanging in air. The else two signal wires are connected to No.1 and No.17 terminals in controller. The output voltage of speed sensor should be within AC(1~24)V (effective value) during the full speed. AC12V is recommended (in rated speed). When install the speed sensor, let the sensor is spun to contacting flywheel first, then, port out 1/3 lap, and lock the nuts of sensor at last.

#### OUTPUT AND EXPAND RELAYS

All outputs of controller are relay contact output type. If need to expand the relays, please add freewheel diode to both ends of expand relay's coils (when coils of relay has DC current) or, increase