SmartGen

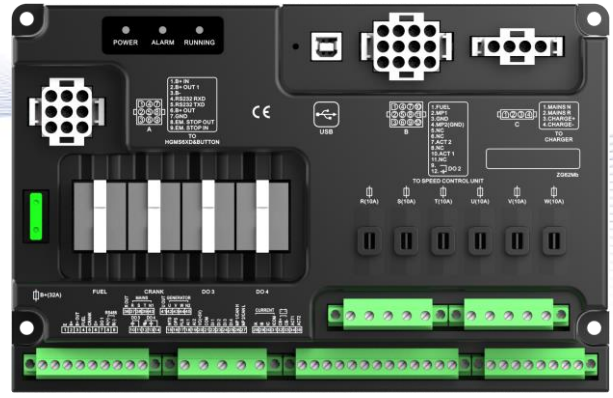
MAKING CONTROL SMARTER

HGMS61/HGMS62

SPLIT TYPE GENSET CONTROLLER

USER MANUAL

HGMS62D Display Module



HGMS61M/HGMS62M Master Control Module

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Table 1 – Software Version

Date	Version	Note
2022-01-17	1.0	Original release.
2022-05-12	1.1	Add HGMS61.
2024-06-13	1.2	1. Add “Regeneration Input” of Input Port 20, “Regeneration Inhibit Input” of Input Port 50; 2. Update the format of user manual.

Table 2 – Symbol Instruction

Symbol	Instruction
 NOTE	Highlights an essential element of a procedure to ensure correctness.
 CAUTION	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 WARNING	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

CONTENTS

1 OVERVIEW

HGMS61/HGMS62 Genset Controller adopts split structure of "Master Control and Display", integrating digital, intelligent and network techniques, is used for automatic control and monitoring system of genset. It can carry out functions of automatic start/stop, data measurement, alarm protection and "four remote" (remote control, remote measure, remote communication and remote adjustment). The controller uses monochrome LCD display, optional interface with multiple languages, which is easy and reliable to operate.

HGMS61/HGMS62 Genset Controller uses 32-bit microprocessor technique which can achieve precision measurement, value adjustment, timing and threshold setting etc. All the parameters can be configured from front panel or use USB interface (or RS485 interface) to adjust via PC. It is equipped with fuse, fuel, start relay and auxiliary output 3, 4 are pluggable. The compact structure and simple wiring of the controller solve the problem of complex wiring and low efficiency, and improve the production efficiency of the control cabinet. It can be widely used in various types of automatic control system.

2 PERFORMANCE AND CHARACTERISTICS

Display Module: HGMS61D/HGMS62D

Master Control Module: HGMS61M/HGMS62M, HGMS61CAN HGMS62MCAN.

Table 3 –Model Comparison

Item	HGMS61M	HGMS61MCAN	HGMS62M	HGMS62MCAN
Mains Monitoring			●	●
CAN BUS		●		●
MPU	●		●	

HGMS61: HGMS61D+HGMS61M;

HGMS61CAN: HGMS61D+HGMS61MCAN;

HGMS62: HGMS62D+HGMS62M;

HGMS62CAN: HGMS62D+HGMS62MCAN.

HGMS61M/HGMS62M: MPU interface, suitable for ESC controlled engines.

HGMS61MCAN/HGMS62MCAN: CAN BUS interface, suitable for ECU controlled J1939 engines.

Different harnesses in the cabinet are available:

XS-HGMS62DM (standard backpack screen installation method), **XS-HGMS62DM-S** (sound-attenuating cabinet installation method), details see 7.3 HGMS61/HGMS62 harness description.

Other lengths need to be customized.

NOTE: HGMS61/HGMS62 is taken as an example for following descriptions.

HGMS61: gen power monitoring, single phase power outage and self-start function of mains, suitable for single unit automatic system with one generator. It can control genset auto start/stop via remote start signal.

HGMS62: mains/gen power monitoring function, used for mains/gen automatic transfer (AMF), suitable for single unit automation system with one mains and one generator. It can disable mains by setting parameters for single unit automation, control genset auto start/stop vis remote start signal.

Its main features are as follows:

- 132x64 resolution LCD with backlight, optional language interface (Chinese, English, others), can be selected through the panel on site, which is convenient for debugging personnel;
- With RS485 communication port, can achieve “four remote” functions (remote control, remote measurement, remote communication and remote adjustment) via MODBUS protocol;
- Adapt to 3P4W, 3P3W, 1P2W and 2P3W (120V/240V), 50Hz/60Hz power system;
- Can measure and display 3-phase voltage, 3-phase current, frequency, power parameter of mains (Only for HGMS62);

Mains/Gens

Line voltage	Uab, Ubc, Uca	
Phase voltage	Ua, Ub, Uc	
Frequency	Hz	
Phase sequence		

Load

Current	Ia, Ib, Ic	A
Each phase and total active power	P	kW
Reactive power	Q	kvar
Apparent power	S	kVA
Power factor	PF	
Gen accumulated energy		kWh, kvarh, kVAh
Load output PCT	(active power/rated power)x100%	

- HGMS62 has over/under voltage, over/under frequency, loss of phase, reverse phase sequence functions of mains;
- HGMS61 has single phase power outage and self-start function of mains;
- With over/under voltage, over/under frequency, over current, over power, reverse power, loss of phase and reverse phase sequence functions of gen;
- Precise measure and display of various parameters of engine:

Temp. (WT)	°C/ °F
Oil pressure (OP)	kPa/psi/bar
Fuel level (FL)	%
Speed (SPD)	r/min (RPM)
Battery Voltage (VB)	V
Charger D+ Voltage (VD)	V
Accumulated running hours	Up to 65535 hours
Accumulated start times	Up to 65535 times

- Control protection: automatic start/stop of genset, ATS transfer (HGMS62) and perfect failure display and protection functions;
- With ETS, idle speed control, pre-heat control, speed drop/raise control, all of them are relay outputs;
- Parameter setting: allow users to modify setting, parameters cannot be lost even when power off. Most of parameters can be set from the front panel, all parameters can be adjusted via USB interface (or RS485 interface) of PC.;
- A variety of temperature, pressure and fuel level sensor curves can be used directly, and can be defined by users; pressure, config.2 can be connected to resistance, voltage or current type sensor;

- Multiple conditions of crank disconnect (frequency, speed, oil pressure) can be selected;
- Wide power supply range: DC(8~35)V, adapting to different starting battery volts;
- Event log, RTC, scheduled start/stop (once a month/week/day can be set whether to take load or not);
- With black box functions of mains voltage/frequency (only for HGMS62), gen voltage/frequency, current, temperature, oil pressure, fuel level, speed, etc. 1min before stop failure, max 5 pieces can be recorded;
- Can be used for water pump unit, also can be used as indication instrument (only indication, alarm, no action for relay);
- With maintenance function. Maintenance time or actions (only warning or trip shutdown or alarm shutdown) can be set;
- Add rubber gasket between HGMS61D/HGMS62D shell and panel, protection level can reach IP65;
- HGMS61D/HGMS62D is fixed by metal fixing clips and HGMS61M/HGMS62M is fixed with screws;
- Self-defined startup interface can be set as demand;
- customize the startup interface as required
- Modular design and pluggable terminal, compact structure and easy installation.

3 SPECIFICATION

Table 4 – Performance Parameters

Item	Content
Working Voltage	Range: DC8V~DC35V, continuous power supply, DC reverse connection protection Resolution: 0.1V Accuracy: 1%
Overall Consumption	<9W (standby mode≤2.5W)
AC Voltage	3P4W: 15V AC - 360V AC (ph-N) 3P3W: 30V AC - 620V AC (ph-ph) 1P2W: 15V AC - 360V AC (ph-N) 2P3W: 15V AC - 360V AC (ph-N) Resolution: 1V Accuracy: 1%
AC Frequency	Range: 10Hz-75Hz Resolution: 0. 1Hz Accuracy: 0.1Hz
AC Current	Rated: 5A Range: 0A - 10A Resolution: 0.1A Accuracy: 1%
Speed Sensor	Voltage Range: 1V - 24V (RMS) Frequency Range: 5Hz - 10000Hz
Charger (D+) Voltage	Range: DC0V - DC60V continuous power supply Resolution: 0.1V Accuracy: 1%
Analog Sensor	**Resistance Input** Range: 0Ω - 6000Ω Resolution: 0.1Ω Accuracy: 1Ω (below 300Ω) **Voltage Input** Range: 0V - 5V Resolution: 0.1V Accuracy: 0.1V **Current Input** Range: 4mA-20mA Resolution: 0.01mA Accuracy: 0.2mA
Fuel Relay Output	10A DC24V supply output (relay output, pluggable)
Crank Relay Output	10A DC24V supply output (relay output, pluggable)
Digital Output 1	7A DC24V supply output (relay output)
Digital Output 2	7A AC250V volts free output (relay output)

Item	Content
Digital Output 3	10A AC250V volts free output (relay output, pluggable)
Digital Output 4	10A AC250V volts free output (relay output, pluggable)
Overall Dimensions	HGMS61D/HGMS62D: 209*167*45mm HGMS61M/HGMS62M: 243*158*65mm
Panel Cutout	HGMS61D/HGMS62D: 186*141mm HGMS61M/HGMS62M: hole space: 230.5*125.5mm; aperture: Φ5.5
CT Secondary Current	Rated: 5A
Working Temperature	(-25~+70)°C
Working Humidity	(20~93)%RH
Storage Temperature	(-30~+80)°C
Protection Level	HGMS61D/HGMS62D: IP65 HGMS61M/HGMS62M: IP20
Insulation Strength	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal. The leakage current is not more than 3mA within 1min.
Weight	HGMS61D/HGMS62D: 0.5kg HGMS61M/HGMS62M: 1.0kg

4 OPERATION

4.1 KEYS DESCRIPTION

Table 5 – Keys Description

Icon	Key	Description
	Stop/Reset	Can stop the genset in Manual/Auto mode; Can reset alarm in Stop mode; Press this key more than 3s to test panel indicators are OK or not (lamp test); During shutdown process, press this key again can stop genset immediately.
	Start	Start genset in Manual mode.
	Manual	Press this key to set the module as Manual mode.
	Auto	Press this key to set the module as Auto mode.
	C/O (Only for HGMS62)	Can control breaker close/open in Manual mode.
	Close (Only for HGMS61)	Can control breaker close in Manual Mode.
	Open (Only for HGMS61)	Can control breaker open in Manual Mode.
	Set/Confirm	Press this key to enter menu interface; Shift cursor to confirm in parameters setting menu.
	Up/Increase	Screen scroll; Up cursor or increase value in setting menu.
	Down/Decrease	Screen scroll; Down cursor or decrease value in setting menu.
	Home/Return	Return to homepage when pressing this key in main interface; Return to the previous interface when pressing this key in parameters setting interface; Press this key more than 3s to reset trip alarm.

4.2 CONTROLLER PANEL

Fig.1 – HGMS61D Front Panel Indication

Fig.2 – HGMS62D Front Panel Indication

Table 6 – Alarm Indicators

Alarm Type	Alarm Indicator
Warning	Slow flashing (1 time per second)
Trip	Slow flashing (1 time per second)
Shutdown	Fast flashing (5 times per second)
Trip and Stop	Fast flashing (5 times per second)

NOTE1: Status indicator: always illuminates before ETS and after crank success, distinguishes during other periods.

NOTE2: Gen normal indicator: always illuminates in normal running, flashes in abnormal running; distinguishes in no

generator.

NOTE3: Mains normal indicator(only for HGMS62): always illuminates in normal running, flashes in abnormal running; distinguishes in no mains.

NOTE4: When mains is disabled of HGMS62, mains indicator always distinguishes, mains close/open key is inactive at the same time.

4.3 AUTOMATIC START/STOP OPERATION

4.3.1 ILLUSTRATION

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

4.3.2 AUTO START SEQUENCE

a) HGMS61/HGMS62 Start Conditions:

HGMS61

When mains outage or remote start (on-load) input is active, it enters into “Start Delay”;

HGMS62

- **Mains enable:** when mains abnormal situations (over/under voltage, over/under frequency, loss of phase, reverse phase sequence) occur, then it enters into “Mains Abnormal Delay”, LCD status page displays countdown; When mains abnormal delay is over, it enters into “Start Delay”; or remote start (on-load) input is active, it enters into “Start Delay”;
- **Mains disable:** when remote start (on-load) input is active, it enters into “Start Delay”;

b) When start delay is over, preheating relay is outputting (if configured), “Preheating Delay XX s” is displayed on LCD;

c) When preheating delay is over, fuel relay is outputting for 1s (output time can be configured) and then crank relay outputs; if genset fails to start during “Crank Time”, the fuel and crank relay will stop outputting and enter into “Crank Rest Time” and wait for next cranking;

d) If genset fails to start within set start times, the controller will send shutdown alarm of start failure and display the alarm on LCD;

e) Any time to start genset successfully, it will enter into “Safe Running”. During this period, alarms of low oil pressure, high water temperature, under speed, failed to charge are disabled. As soon as this delay is over, genset will enter into “Start Idle Delay” (if configured).

f) 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).

g) When mains abnormal starts or HGMS62 remote start (on-load) inputs, if “Warming Up Delay” is over, the indicator will illuminate if gen is normal. If genset voltage and frequency reach the load requirement, the closing relay outputs, genset is taking load and indicator illuminates, genset enters normal running; if genset voltage or frequency is abnormal, controller will send alarm and shutdown (LCD displays the alarm information).

NOTE: When remote start (off-load) inputs, the procedure is same as above, only in g), gen close relay not outputs, genset not take load.

4.3.3 AUTO STOP SEQUENCE

a) HGMS61: When unit is normally running, the remote start input or mains recovers power supply, "Stop Delay" begins;
HGMS62: When unit is normally running, if mains recovers normal, "Mains Normal Delay", mains indicator illuminates after confirming mains normal, "Stop Delay" begins; or when remote start input is inactive, then "Stop Delay" begins;

b) HGMS61: When "Stop Delay" is over, genset enters into "Cooling Delay", and gen closing relay is disconnected; gen supply indicator distinguishes;
HGMS62: When "Stop Delay" is over, genset enters into "Cooling Delay", and gen closing relay is disconnected, gen supply indicator distinguishes; after "Breaker Transfer Delay", mains close relay outputs, mains takes load, mains supply indicator illuminates;

c) When entering "Stop Idle Delay" (if configured), idle relay is energized to output;

d) When entering "ETS Delay", ETS relay is energized to output, fuel relay output is disconnected;

e) When entering "Genset at Rest", genset will automatically judge if it has stopped.

f) When genset stops, it enters into "After Stop Delay", stop failure warning is issued if genset not stops; if genset has stopped, the stop failure warning will be removed automatically);

g) When "After Stop Delay" is over, it enters at rest mode.

4.4 MANUAL START/STOP OPERATION

a) HGMS61/HGMS62: Manual Mode is active when press  and its indicator illuminates. Press  to start genset, it can automatically detect crank disconnect and accelerate to high speed running. If there is high water temperature, low oil pressure, over speed and abnormal voltage during genset running, controller can protect genset to stop (detailed procedures please refer to 4.3.2 of Auto Start Sequence); In manual mode, load breaker will not transfer automatically, press the close/open key manually to switchl load close/open;

b) Manual Stop: pressing  can shut down the running genset (detailed procedures please refer to 4.3.3 of Auto Stop Sequence).

4.5 EMERGENCY START

In manual mode, pressing  and  can force 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 be controlled by operators. When operators observe the genset has started successfully, after loosening the keys, the start relay disconnects and then the controller enters safety delay.

5 HGMS61/HGMS62 BREAKER CONTROL PROCEDURE

5.1 MANUAL TRANSFER PROCEDURE

When controller is in manual mode, manual breaker transfer is active.
The operation personnel controls ATS load transfer via close/open key.

HGMS62

Mains Disable:

If open detection is disabled, press gen 

key, if gen takes load, breaker open outputs; if load is disconnected, gen will close the breaker. If mains takes load, mains breaker will open, when open delay is over, gen breaker closes. Press mains 

key, if mains takes load, open breaker outputs, if load is disconnected, mains will close the breaker. If gen takes load, gen breaker will open, when open delay is over, mains breaker closes.

If open detection is enabled, mains on-load is transferred to gen on-load, press mains 

key first, after open delay, then press gen 

key, gen will close (directly press gen close key, no action). The procedure of gen on-load to mains on-load is same as above.

Mains Enable: After pressing gen 

key, if gen not take load, then gen close outputs. After pressing gen 

key, if gen takes load, then gen open outputs.

HGMS61

After pressing gen  , if gen not take load, then gen close outputs. After pressing gen  key, if gen takes load, then gen open outputs.

5.2 AUTO TRANSFER PROCEDURE

When controller is in auto or stop mode, auto breaker transfer is active.

a) If input port is configured as closed auxiliary input:

Mains Enable (only for HGMS62):

- If open detection is enabled, mains on-load is transferred to gen on-load, after open delay, transfer rest delay, transfer failure detection begins when open outputs; when detection time is due, if open failure, then gen will not close, otherwise, gen will close, and transfer failure detection begins at the same time; when detection time is due, if close failure, then wait for gen close. If transfer failure warning is enabled, close/open failure warning will be issued. The procedure of gen on-load to mains on-load is same as above.
- If open detection is disabled, mains on-load is transferred to gen on-load, after open delay, transfer rest delay, gen will close, transfer failure detection begins at the same time; when detection time is due, if close failure, then wait for gen close. If transfer failure warning is enabled, warning signal will be issued. The procedure of gen on-load to mains on-load is same as above.

Mains Disable/HGMS61:

- If open detection is enabled, gen on-load is transferred to gen off-load, after open delay, transfer failure detection begins when open outputs; when detection time is due, if open failure, then wait for breaker open, otherwise, breaker open is completed. When gen off-load is transferred to gen on-load, after close delay, transfer failure detection begins when close outputs; when detection time is due, if close failure, then wait for closing, otherwise, breaker close is completed. If transfer failure warning is enabled, close/open failure warning will be issued.
- If open detection is disabled, gen on-load is transferred to gen off-load, after open delay, breaker open is completed. When gen off-load is transferred to gen on-load, after close delay, transfer

failure detection begins when close outputs; when detection time is due, if close failure, then wait for closing, otherwise, breaker close is completed. If transfer failure warning is enabled, warning signal will be issued when closing fails.

b) If input port is not configured as closed auxiliary input:

Mains Enable (only for HGMS62):

When mains on-load is transferred to gen on-load, after open delay, transfer rest delay, gen will close. The procedure of gen on-load to mains on-load is same as above.

Mains Disable/HGMS61:

When gen off-load is transferred to gen on-load, gen close outputs; when gen on-load is transferred to gen off-load, gen open outputs.

⚠**NOTE1:** When ATS without interposition is used, open detection should be disabled.

⚠**NOTE2:** When ATS with interposition is used, open detection can be enabled or disabled, if enabled, please configure open output.

⚠**NOTE:** When AC contactor is used, open detection enable is recommended.

6 PROTECTION

6.1 WARNING ALARMS

When controller detects the warning signal, the controller only alarms but not stop.

Table 7 – Warning Alarms

No.	Warnings	Description
1	Gen Over Speed	When genset speed is higher than threshold, controller will send warning alarm signal.
2	Gen Under Speed	When genset speed is lower than threshold, controller will send warning alarm signal.
3	Loss of Speed Signal	When the speed of genset is 0 and speed loss action selects “Warning”, controller will send warning alarm signal.
4	Gen Over Frequency	When genset frequency is higher than threshold, controller will send warning alarm signal.
5	Gen Under Frequency	When genset frequency is lower than threshold, controller will send warning alarm signal.
6	Gen Over Voltage	When genset voltage is higher than threshold, controller will send warning alarm signal.
7	Gen Under Voltage	When genset voltage is lower than threshold, controller will send warning alarm signal.
8	Gen Over Current	When the current of genset is higher than threshold and overcurrent action selects “Warning”, controller will send warning alarm signal.
9	Stop Failure	When “Fail to stop” delay is over, if engine not stop completely, controller will send warning alarm signal.
10	Charge Failure	When genset charger voltage is lower than threshold, controller will send warning alarm signal.
11	Battery Over Voltage	When the battery voltage of genset is higher than threshold, controller will send warning alarm signal.
12	Battery Under Voltage	When the battery voltage of genset is lower than threshold, controller will send warning alarm signal.
13	Maintenance Due	When maintenance countdown is 0 or maintenance date is due, and maintenance action selects “Warning”, controller will send warning alarm signal.
14	Reverse Power	When genset reverse power value (power is negative) is higher than threshold, and reverse power action selects “Warning”, controller will send warning alarm signal.
15	Over Power	When genset power value (power is positive) is higher than threshold, and over power action selects “Warning”, controller will send warning alarm signal.
16	ECU Warning	When controller CAN interface receives engine warning signal via J1939 protocol, controller will send warning alarm signal.
17	Gen Loss of Phase	When gen losses phase, controller will send warning alarm signal.
18	Gen Reverse Phase	When gen phase sequence is wrong, controller will send warning alarm

No.	Warnings	Description
	Sequence	signal.
19	Transfer Failure	When breaker close/open fails and transfer failure warning is enabled, controller will send warning alarm signal.
20	Temp. Sensor Open	When temperature sensor is open and open action selects “Warning”, controller will send warning alarm signal.
21	High Temp.	When temperature value is higher that threshold, controller will send warning alarm signal.
22	Low Temp.	When temperature value is lower that threshold, controller will send warning alarm signal.
23	Oil Pressure Sensor Open	When oil pressure sensor is open and open action selects “Warning”, controller will send warning alarm signal.
24	Low Oil Pressure	When oil pressure value is lower than threshold, controller will send warning alarm signal.
25	Level Sensor Open	When level sensor is open and open action selects “Warning”, controller will send warning alarm signal.
26	Low Level	When level value is lower than threshold, controller will send warning alarm signal.
27	Aux. Sensor 1 Open	When aux. sensor 1 is open, and open action selects “Warning”, controller will send warning alarm signal.
28	Aux. Sensor 1 High	When aux. sensor 1 value is higher that threshold, controller will send warning alarm signal.
29	Aux. Sensor 1 Low	When aux. sensor 1 value is lower that threshold, controller will send warning alarm signal.
30	Aux. Sensor 2 Open	When aux. sensor 2 is open, and open action selects “Warning”, controller will send warning alarm signal.
31	Aux. Sensor 2 High	When aux. sensor 2 value is higher that threshold, controller will send warning alarm signal.
32	Aux. Sensor 2 Low	When aux. sensor 2 value is lower that threshold, controller will send warning alarm signal.
33	Input Warning	When digital warning input is active, controller will send warning alarm signal.

6.2 SHUTDOWN ALARMS

When controller detects shutdown alarm, it will send signal to open breaker and stop genset. The alarms are displayed in LCD.

Table 8 – Shutdown Alarms

No.	Shutdown	Description
1	Emergency Stop	When controller detects emergency stop signal, it will send shutdown alarm signal.
2	Over Speed	When genset speed is higher than threshold, controller will send shutdown alarm signal.
3	Under Speed	When genset speed is lower than threshold, controller will send shutdown alarm signal.
4	Loss of Speed Signal	When speed is 0 and speed signal loss action selects “Shutdown”, controller will send shutdown alarm signal.
5	Gen Over Frequency	When genset frequency is higher than threshold, controller will send shutdown alarm signal.
6	Gen Under Frequency	When genset frequency is lower than threshold, controller will send shutdown alarm signal.
7	Gen Over Voltage	When genset voltage is higher than threshold, controller will send shutdown alarm signal.
8	Gen Under Voltage	When genset voltage is lower than threshold, controller will send shutdown alarm signal.
9	Fail to Start	Within set start times, if fails to start, controller will send shutdown alarm signal.
10	Gen Over Current	When genset current is higher than threshold and overcurrent action selects “Shutdown”, it will send shutdown alarm signal.
11	Maintenance Due	When maintenance countdown is 0 or maintenance date is due, maintenance due action selects “Shutdown”, controller will send shutdown alarm signal.
12	Reverse Power	When reverse power value (power is negative) is higher than threshold, and reverse power action selects “Shutdown”, controller will send shutdown alarm signal.
13	Over Power	When power value (power is positive) is higher than threshold, and over power action selects “Shutdown”, controller will send shutdown alarm signal.
14	Temp. Sensor Open	When temperature sensor is open and open action selects “Shutdown”, controller will send shutdown alarm signal.
15	High Temp.	When temperature value is higher than threshold, controller will send shutdown alarm signal.
16	Oil Pressure Sensor Open	When oil pressure sensor is open and open action selects “Shutdown”, controller will send shutdown alarm signal.
17	Low Oil Pressure	When oil pressure value is lower than threshold, controller will send shutdown alarm signal.

No.	Shutdown	Description
18	Level Sensor Open	When level sensor is open and open action selects “Shutdown”, controller will send shutdown alarm signal.
19	Low Level	When level value is lower than threshold, controller will send shutdown alarm signal.
20	Aux. Sensor 1 Open	When aux. sensor 1 is open and open action selects “Shutdown”, controller will send shutdown alarm signal.
21	Aux. Sensor 1 High	When aux. sensor 1 value is higher than threshold, controller will send shutdown alarm signal.
22	Aux. Sensor 1 Low	When aux. sensor 1 value is lower than threshold, controller will send shutdown alarm signal.
23	Aux. Sensor 2 Open	When aux. sensor 2 is open and open action selects “Shutdown”, controller will send shutdown alarm signal.
24	Aux. Sensor 2 High	When aux. sensor 2 value is higher than threshold, controller will send shutdown alarm signal.
25	Aux. Sensor 2 Low	When aux. sensor 2 value is lower than threshold, controller will send shutdown alarm signal.
26	Input Shutdown	When digital input is active for shutdown alarm, controller will send shutdown alarm signal.

6.3 TRIP AND STOP ALARMS

When controller detects trip and stop alarm signal, it will disconnect gen close signal immediately and stop after cooling.

Table 9 – Trip and Stop Alarms

No.	Trip and Stop	Description
1	Over Current	When genset current is higher than threshold and overcurrent action selects “Trip and Stop”, controller will send trip and stop alarm signal.
2	Maintenance Due	When maintenance countdown is 0 and maintenance date is due, maintenance due action selects “Trip and Stop”, controller will send trip and stop alarm signal.
3	Reverse Power	When genset reverse power value (power is negative) is higher than threshold, and reverse power action selects “Trip and Stop”, controller will send trip and stop alarm signal.
4	Over Power	When genset power value (power is positive) is higher than threshold, and over power action selects “Trip and Stop”, controller will send trip and stop alarm signal.
5	Input Trip and Stop	When input port is configured as “Trip and Stop” and active, controller will send trip and stop alarm signal.

6.4 TRIP ALARMS

When controller detects trip alarm signal, it will disconnect close signal immediately while genset will not stop.

Table 10 – Trip Alarms

No.	Trip	Description
1	Over Current	When genset current is higher than threshold and overcurrent action selects “Trip”, controller will send trip alarm signal.
2	Reverse Power	When genset reverse power value (power is negative) is higher than threshold, and reverse power action selects “Trip”, controller will send trip alarm signal.
3	Over Power	When genset power value (power is positive) is higher than threshold, and over power action selects “Trip”, controller will send trip alarm signal.
4	Input Trip	When input port is configured as “Trip” and active, controller will send trip alarm signal.

7 CONNECTIONS

7.1 HGMS61M/HGMS62M CONTROLLER PANEL

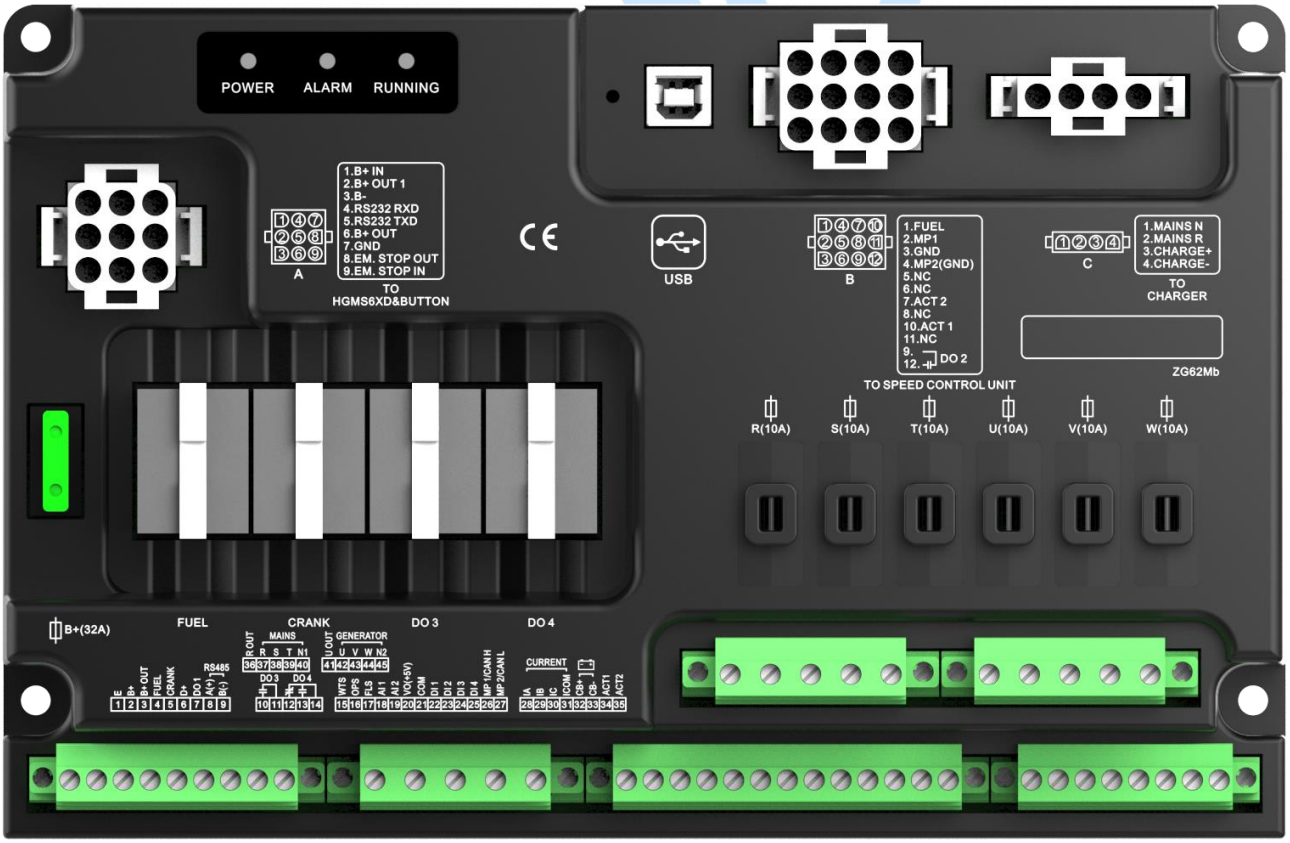


Fig.3 – HGMS61M/HGMS62M Controller Panel Drawing

Table 11 – HGMS61M/HGMS62M Terminal Connection Description

No.	Function	Size	Remarks
1	B-	2.5mm²	Connect starting battery negative.
2	B+	2.5mm²	Connect starting battery positive, 32A fuse is used inside controller.
3	B+ OUT	2.5mm²	Main terminal 2 (DC B+) is connected to this terminal after passing the fuse.
4	Fuel Relay	1.5mm²	B+ is supplied by 2 points, rated 10A.
5	Crank Relay	1.5mm²	Relay specification: DC 24V (pluggable).
6	Charger D+	1.0mm²	Connect charger D+ (WL) terminal, if charger has no this terminal, then it will be hung.
7	Aux. Relay Output 1	1.5mm²	B+ is supplied by 2 points, rated 7A.
8	RS485(A+)	0.5mm²	120Ω shielding line recommended to use, its single end should be grounded.
9	RS485(B-)	0.5mm²	
10	Aux. Relay Output 3	1.5mm²	Relay 250V AC volts free (N/O) output (pluggable), rated 10A.
11			Relay common point.
12	Aux. Relay Output 4	1.5mm²	Relay 250V AC volts free (N/C) output (pluggable), rated 10A.
13			Relay 250V AC volts free (N/O) output (pluggable), rated 10A.
14			Relay common point.
15	Temp. Sensor Input	1.0mm²	Connect temperature sensor.
16	Pressure Sensor Input	1.0mm²	Connect pressure sensor (resistance, current, voltage sensor are all ok).
17	Level Sensor Input	1.0mm²	Connect level sensor.
18	Aux. Sensor 1 Input	1.0mm²	Connect aux. resistance type sensor.
19	Aux. Sensor 2 Input	1.0mm²	Connect aux. sensor (resistance, current, voltage sensor are all ok).
20	DC 5V Voltage Output	1.0mm²	Provide 5V power for voltage type sensor.
21	Sensor COM	1.0mm²	B- has connected inside controller.
22	Aux. Input 1	1.0mm²	Ground (B-) connected is active.
23	Aux. Input 2	1.0mm²	
24	Aux. Input 3	1.0mm²	
25	Aux. Input 4	1.0mm²	
26	CAN H/MP1	0.5mm²	HGMS61MCAN/HGMS62MCAN: this terminal connects ECU CANBUS interface, 120Ω shielding line recommended to use, its single end should be grounded. HGMS61M/HGMS62M: connects speed sensor, shielding line is recommended to use, no. 27 has connected B- inside the controller.
27	CAN L/MP2	0.5mm²	

No.	Function	Size	Remarks
28	CT A Phase Monitoring Input	2.5mm²	Externally connect current transformer secondary coil (rated 5A).
29	CT B Phase Monitoring Input	2.5mm²	
30	CT C Phase Monitoring Input	2.5mm²	
31	CT COM	2.5mm²	
32	CB+	1.5mm²	Connect external starting battery positive. This terminal and terminal 3 of connector C has been connected inside controller.
33	CB-	1.5mm²	Connect external starting battery negative. This terminal and terminal 4 of connector C has been connected inside controller.
34	ACT1	1.5mm²	Connect external actuator. This terminal and terminal 10 of connector B has been connected inside controller.
35	ACT2	1.5mm²	Connect external actuator. This terminal and terminal 7 of connector B has been connected inside controller.
36	R OUT	1.5mm²	HGMS61：Mains L wire outputs after passing the fuse. HGMS62: Mains R phase monitoring outputs after passing the fuse.
37	Mains R Phase Voltage Monitoring Input	1.5mm²	HGMS61: Connect mains L wire, 10A fuse is used for controller. HGMS62: Connect mains R phase, 10A fuse is used for controller. (The terminal in the controller of HGMS61/HGMS62 is connected to the input terminal of R wire of connector C.)
38	Mains S Phase Voltage Monitoring Input (only for HGMS62)	1.0mm²	Connect mains S phase, 10A fuse is used for controller. (The terminal in the controller of HGMS61/HGMS62 is connected to the input terminal of N wire of connector C.)
39	Mains T Phase Voltage Monitoring Input (only for HGMS62)	1.0mm²	Connect mains T phase, 10A fuse is used for controller.
40	Mains N1 Line Input	1.0mm²	Connect mains N line.
41	U OUT	1.5mm²	Genset U phase monitoring outputs after passing the fuse.
42	Genset U Phase Voltage Monitoring Input	1.5mm²	Connect U phase of genset output, 10A fuse is used for controller.

No.	Function	Size	Remarks
43	Genset V Phase Voltage Monitoring Input	1.0mm²	Connect V phase of genset output, 10A fuse is used for controller.
44	Genset W Phase Voltage Monitoring Input	1.0mm²	Connect W phase of genset output, 10A fuse is used for controller.
45	Genset N2 Line Input	1.0mm²	Connect N line of genset output.
Connector A (Connect to HGMS61D/HGMS62D)			
1	B+ IN	1.5mm²	Connect terminal 6 (B+ OUT) to this terminal through a power switch to supply for positive of HGMS61M/HGMS62M.
2	B+ OUT1	1.5mm²	Supply power to positive of HGMS61D/HGMS62D.
3	B-	1.5mm²	Negative of controller power.
4	RS232 RXD	0.5mm²	RS232 communication port is connected with HGMS61D/HGMS62D. Shielding line is required, shielded layer is connected to terminal 7 GND.
5	RS232 TXD	0.5mm²	
6	B+ OUT	1.5mm²	Main terminal 2 (DC B+) is connected to this terminal after passing the fuse.
7	GND	0.5mm²	The internal part is connected with negative of controller.
8	EM.STOP OUT	0.75mm²	Emergency input connect to external emergency stop button.
9	EM.STOP IN	0.75mm²	
Connector B (Connect to ESC)			
1	Fuel Relay Output	1.5mm²	B+ is supplied by 2 points, rated 10A. Connect to positive of ESC power.
2	MP1 Speed Output	0.5mm²	The controller inside is connected to speed sensor of Main terminal 26. Connect to speed sampling terminal of ESC.
3	GND	1.5mm²	The controller inside has connected to B-.
4	MP2 Speed Output	0.5mm²	The controller inside has connected to B-.
5	NC		
6	NC		Connect to ACT2 terminal of ESC.
7	ACT2	1.5mm²	
8	NC		
10	ACT1	1.5mm²	Connect to ACT1 terminal of ESC.
11	NC		
9	Aux. Output 2	0.75mm²	Relay common point.
12			Relay N/O output, rated 7A.
Connector C (Connect to charger)			
1	Mains N Line Input	0.75mm²	This terminal inside is connected with main terminal 40. Connect to terminal N of charger.

No.	Function	Size	Remarks
2	Mains R Phase Input	0.75mm^2	This terminal inside is connected with main terminal 37. Connect to terminal L of charger.
3	Charger Output +	1.5mm^2	This terminal inside is connected with main terminal 32. Connect to charger B-.
4	Charger Output -	1.5mm^2	This terminal inside is connected with main terminal 33. Connect to charger B-.

NOTE: USB ports are programmable parameter ports; user can directly program via PC.

7.2 HGMS61D/HGMS62D CONTROLLER REAR PANEL

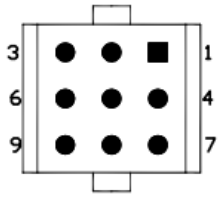
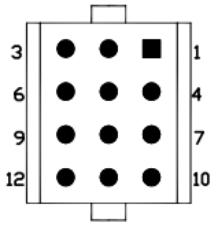
Fig.4 – HGMS61D/HGMS62D Controller Rear Panel Drawing

Table 12 – HGMS61D/HGMS62D Terminal Connection Description

No.	Function		Cable Size	Description
1	RX232	TXD	0.5mm²	Connect master controller HGMS61M/HGMS62M. Shielding line is required, shielded layer is connected to terminal 4 GND.
2		RXD	0.5mm²	
3	NC			
4	GND		1.0mm²	Connect negative of controller power.
5	B-		1.0mm²	
6	B+		1.0mm²	Connect positive of controller power.

7.3 HGMS61/HGMS62 WIRE HARNESS DESCRIPTION

Table 13 – HGMS61/HGMS62 Wire Harness Description

Harness Port				Harness Length	
Diagram	No.	Function	Cable Size	**XS-HGMS62DM**	**XS-HGMS62DM-S**
	1	MAINS N	0.75mm²	0.55m	1.05m
	2	MAINS R	0.75mm²		
	3	CHARGE+	1.5mm²		
	4	CHARGE-	1.5mm²		
	2	B+ OUT1	1.5mm²	0.65m	0.85m
	3	B-	1.5mm²		
	4	RS232 RXD	0.5mm²		
	5	RS232 TXD	0.5mm²		
	7	GND	0.5mm²		
	1	B+ IN	1.5mm²	0.85m	1.0m
	6	B+ OUT	1.5mm²		
	8	EM.STOP OUT	0.75mm²	0.75m	1.5m
	9	EM.STOP IN	0.75mm²		
	1	FUEL	1.5mm²	0.4m	1.0m
	2	MP1	0.5mm²		
	3	GND	1.5mm²		
	4	MP2(GND)	0.5mm²		
	7	ACT 2	1.5mm²		
	10	ACT 1	1.5mm²		
	9	DO2	0.75mm²		
	12				
	5	NC			
	6	NC			
	8	NC			
	11	NC			

8 PARAMETER RANGE AND DEFINITION

8.1 PARAMETER CONTENT AND RANGE

Table 14 – Parameter Content and Range

No.	Items	Range	Default	Description
Mains Setting (only for HGMS62)				
1	Mains Enable	(0-1)	1	0: Disable; 1: Enable.
2	Supply System	(0-3)	0	0: 3P4W; 1: 3P3W; 2: 2P3W; 3: 1P2W.
3	Rated Voltage	(30-30000)V	230	Provide standard for mains over/under voltage. If PT is used, this value is transformer secondary voltage.
4	Rated Frequency	(10.0-75.0)Hz	50.0	Provides standard for mains over/under frequency.
5	Normal Delay	(0-3600)s	10	Confirm time from mains abnormal to normal.
6	Abnormal Delay	(0-3600)s	5	Confirm time from mains normal to abnormal.
7	PT Setting	(0-1)	0	0: Disable; 1: Enable.
		(30-30000)	100	Primary.
		(30-1000)	100	Secondary.
8	Over Voltage Setting	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	120	Set value: mains rated voltage PCT.
		(0-200)%	116	Return value: mains rated voltage PCT.
		(0-3600)s	5	Confirm time for over voltage detection.
9	Under Voltage Setting	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	80	Set value: mains rated voltage PCT.
		(0-200)%	84	Return value: mains rated voltage PCT.
		(0-3600)s	5	Confirm time for under voltage detection.
10	Over Frequency Setting	(0-1)	0	0: Disable; 1: Enable.
		(0-200)%	114	Confirm time for over freq. detection.
		(0-200)%	110	Confirm time for over freq. detection.
		(0-3600)s	5	Confirm time for over freq. detection.
11	Under Frequency Setting	(0-1)	0	0: Disable; 1: Enable.
		(0-200)%	90	Confirm time for over freq. detection.
		(0-200)%	94	Confirm time for over freq. detection.
		(0-3600)s	5	Confirm time for under freq. detection.
12	Loss of Phase Setting	(0-1)	1	0: Disable; 1: Enable.
13	Reverse Phase Setting	(0-1)	1	

No.	Items	Range	Default	Description
14	AMF Enable Setting (Only for HGMS61)	(0-1)	1	0: Disable; 1: Enable. When it enables, the unit will start automatically when the single phase mains power is off in auto mode.
Timer Setting				
1	Start Delay	(0-3600)s	1	Time from mains abnormal or remote start signal active to genset start.
2	Stop Delay	(0-3600)s	1	Time from mains normal or remote start signal inactive to genset stop.
3	Preheat Time	(0-3600)s	0	Pre-power time of heater plug before starter is powered.
4	Crank Time	(3-60)s	8	Every starter power-on time.
5	Crank Rest Time	(3-60)s	10	Wait time before secondary power-on begins when engine crank fails.
6	Safety Run Time	(0-3600)s	10	Low oil pressure, high temperature, under speed, under frequency, under voltage, charge failure alarms are inactive during the period.
7	Start Idle Time	(0-3600)s	0	Genset idle running time when starting.
8	Warming Up Time	(0-3600)s	10	Warming up time before closing after genset entering high-speed running.
9	Cooling Time	(0-3600)s	10	Cooling time before stopping after genset off-load.
10	Stop Idle Time	(0-3600)s	0	Genset idle running time when stopping.
11	ETS Time	(0-3600)s	20	Stop solenoid power-on time when stopping.
12	Wait for Stop Time	(0-3600)s	0	Time from idle delay over to stop completely when “ETS Time” is 0; Time from ETS delay over to stop completely when “ETS Time” is not 0.
13	After Stop Time	(0-3600)s	0	Time from complete stop to standby.
14	Raise Speed Pulse Time	(0-20.0)s	1.0	Raise speed pulse output time when genset entering warming up.
15	Drop Speed Pulse Time	(0-20.0)s	1.0	Drop speed pulse output time when genset entering stop idle.
16	Smart Preheat	(0-1)	0	0: Disable; 1: Enable.
17	Smart Preheat Sensor	(0-4)	0	0: Temperature Sensor; 1: Aux. Sensor 1; 2: Aux. Sensor 2; 3: Oil Pressure Sensor; 4: Fuel Level Sensor.
18	Sensor Set Value	(0-1000)	40	
19	Fuel Output Time	(0-3600)s	1	Pre-fuel output time before starter is powered on.

No.	Items	Range	Default	Description
Engine Setting				
1	Type	(0-69)	0	Default: 0 Non-ECU.
2	Flywheel Teeth	(1.0-300.0)	118.0	Flywheel teeth on the engine, used for judging starter disconnect conditions and detecting engine speed, see following installation description.
3	Rated Speed	(0-6000)r/min	1500	Provide standard for over/under/loading speed.
4	Idle Speed	(0-3000)r/min	750	Engine speed in idle status.
5	Loading Speed	(0-100)%	90	Set value is percentage of rated speed, controller detects it as taking load. When the speed is lower than loading speed, it will not enter normal running.
6	Speed Signal Loss Delay	(0-3600)s	5	Time from speed is 0 to confirm action.
7	Speed Signal Loss Action	(0-1)	0	0: Warning; 1: Shutdown.
8	Over Speed Shutdown	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	114	Set value: engine rated speed PCT.
		(0-3600)s	2	Confirm time for over speed shutdown detection.
9	Under Speed Shutdown	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	80	Set value: engine rated speed PCT.
		(0-3600)s	3	Confirm time for under speed shutdown detection.
10	Over Speed Warning	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	110	Set value: engine rated speed PCT.
		(0-200)%	108	Return value: engine rated speed PCT.
		(0-3600)s	5	Confirm time for over speed warning detection.
11	Under Speed Warning	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	86	Set value: engine rated speed PCT.
		(0-200)%	90	Return value: engine rated speed PCT.
		(0-3600)s	5	Confirm time for under speed warning detection.
12	Battery Voltage	(0-60.0)V	24.0	Provide standard for battery over/under voltage.
13	Over Volt Warning	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	120	Set value: battery rated volt PCT.
		(0-200)%	115	Return value: battery rated volt PCT.
		(0-3600)s	60	Confirm time for battery over volt detection.

No.	Items	Range	Default	Description
14	Under Volt Warning	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	85	Set value: battery rated volt PCT.
		(0-200)%	90	Return value: battery rated volt PCT.
		(0-3600)s	60	Confirm time for battery under volt detection.
15	Charge Failure	(0-1)	1	0: Disable; 1: Enable.
		(0-60.0)V	8.0	Set value: Charge failure warning is issued when charger D+(WL) voltage is lower than this value during genset normal running.
		(0-60.0)V	10.0	Return value: Warning is removed when charger D+(WL) voltage value is higher than this value.
		(0-3600)s	10	Confirm time for charge failure detection
16	Crank Times	(1-10)times	3	Max crank times for engine. When the set crank times is reached, controller will issue crank failure warning
17	Crank Disconnect Conditions	(0-6)	2	See Table 17. There are 3 conditions for starter and engine disconnect, which can be used separately or together, aiming at disconnecting starting motor and engine as soon as possible.
18	Crank Disconnect Frequency	(0-200)%	24	Set value is percentage of gen rated frequency. When gen frequency is higher than it, starter will be disconnected, see following installation description.
19	Crank Disconnect Speed	(0-200)%	24	Set value is percentage of gen rated speed. When speed is higher than it, starter will be disconnected, see following installation description.
20	Crank Disconnect OP	(0-1000)kPa	200	When oil pressure is higher that set value, starter will be disconnected, see following installation description.
21	CAN Vaud Rate	(0-1)	0	0: 250bps; 1: 500bps.
22	TSC1 Source Address	(0-255)	3	When engine type is GTSC1 PLUS, this item is active.
23	Charge Volt Sampling	(0-1)	0	0: Controller; 1: ECU
24	Engine Temp Sampling	(0-1)	1	0: Controller; 1: ECU
25	OP Sampling	(0-1)	1	0: Controller; 1: ECU
26	Battery Under Volt Start	(0-1)	0	0: Disable; 1: Enable.

No.	Items	Range	Default	Description
27	Battery Under Volt Start Value	(1.0-60.0)V	10.0	Set value is battery under voltage start value, which is active in auto mode.
28	Battery Under Volt Stop Value	(1.0-60.0)V	24.0	Set value is battery under voltage stop value after charging, which is active in auto mode.
29	Battery Under Volt Start/Stop Delay	(0-3600)s	60	When battery voltage reaches start threshold, genset will start after delay; when battery voltage reaches stop threshold, genset will stop after delay.
Generator Setting				
1	Supply System	(0-3)	0	0: 3P4W; 1: 3P3W; 2: 2P3W; 3: 1P2W.
2	Poles	(2-64)	4	Generator pole numbers. It can be used for calculating engine speed without speed sensor.
3	Rated Voltage	(30-30000)V	230	Provide standard for gen over/under/loading voltage. If PT is used, it is PT secondary voltage.
4	Loading Voltage	(0-200)%	85	Set value is gen rated voltage percentage, controller detects it as taking load. When gen voltage is lower than the loading voltage, it will not enter normal running.
5	Rated Frequency	(10.0-75.0)Hz	50.0	Provide standard for over/under/loading frequency.
6	Loading Frequency	(0-200)%	85	Set value is gen rated frequency percentage, controller detects it as taking load. When gen frequency is lower than the loading frequency, it will not enter normal running.
7	PT Set	(0-1)	0	0: Disable; 1: Enable.
		(30-30000)	100	Primary.
		(30-1000)	100	Secondary.
8	Gen Over Volt Shutdown	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	120	Set value: gen rated voltage PCT.
		(0-3600)s	3	Confirm time for gen over voltage shutdown detection.
9	Gen Under Volt Shutdown	(0-1)	0	0: Disable; 1: Enable.
		(0-200)%	80	Set value: gen rated voltage PCT.
		(0-3600)s	3	Confirm time for gen under voltage shutdown detection.

No.	Items	Range	Default	Description
10	Gen Over Freq. Shutdown	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	114	Set value: gen rated frequency PCT.
		(0-3600)s	2	Confirm time for gen over frequency shutdown detection.
11	Gen Under Freq. Shutdown	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	80	Set value: gen rated frequency PCT.
		(0-3600)s	3	Confirm time for gen under frequency shutdown detection.
12	Gen Over Volt Warning	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	110	Set value: gen rated voltage PCT.
		(0-200)%	108	Return value: gen rated voltage PCT.
		(0-3600)s	5	Confirm time for gen over voltage warning detection.
13	Gen Under Volt Warning	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	84	Set value: gen rated voltage PCT.
		(0-200)%	86	Return value: gen rated voltage PCT.
		(0-3600)s	5	Confirm time for gen under voltage warning detection.
14	Gen Over Freq. Warning	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	110	Set value: gen rated frequency PCT.
		(0-200)%	108	Return value: gen rated frequency PCT.
		(0-3600)s	5	Confirm time for gen over frequency warning detection.
15	Gen Under Freq. Warning	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	84	Set value: gen rated frequency PCT.
		(0-200)%	86	Return value: gen rated frequency PCT.
		(0-3600)s	5	Confirm time for gen under frequency warning detection.
16	Loss of Phase Set	(0-1)	1	0: Disable; 1: Enable.
17	Reverse Phase Set	(0-1)	1	
Load Setting				
1	CT Ratio	(5-6000)/5	500	External CT ratio.
2	Rated Current	(5-6000)A	500	Generator rated current, used for judging load current.
3	Rated Power	(0-6000)kW	276	Generator rated power, used for judging load power.
4	Over Current Enable and Threshold	(0-1)	1	0: Disable; 1: Enable.
		(0-200)%	120	Set value is gen rated current percentage, delay value can be set DMT or IDMT, action type can be set as warning, shutdown, trip and stop, trip.

No.	Items	Range	Default	Description
		(0-3)	2	0: Warning; 1: Shutdown; 2: Trip and Stop; 3: Trip.
5	Over Current Delay	(0-1)	0	0: DMT; 1: IDMT
		(0-3600)s	10	Delay
		(1-36)	36	Delay rate
6	Reverse Power Set	(0-1)	0	0: Disable; 1: Enable.
		(0-200)%	10	Set value: load rated power percentage.
		(0-200)%	5	Return value: load rated power percentage.
		(0-3600)s	5	Confirm time for reverse power detection.
7	Reverse Power Action	(0-3)	0	0: Warning; 1: Shutdown; 2: Trip and Stop; 3: Trip.
8	Over Power Set	(0-1)	0	0: Disable; 1: Enable.
		(0-200)%	110	Set value: load rated power percentage.
		(0-200)%	105	Return value: load rated power percentage.
		(0-3600)s	5	Confirm time for over power detection.
9	Over Power Action	(0-3)	0	0: Warning; 1: Shutdown; 2: Trip and Stop; 3: Trip.
Breaker Setting				
1	Transfer Time (only for HGMS62)	(0-7200)s	5	Interval time from mains open to gen close or from gen open to mains close.
2	Close Time	(0-20.0)s	5.0	Pulse width of mains close (only for HGMS62) and gen close. When it is 0, it means continuous output.
3	Open Time	(0-20.0)s	3.0	Pulse width of mains open (only for HGMS62) and gen open.
4	Detection Time	(0-20.0)s	5.0	Breaker auxiliary contact detection time after ATS transferring.
5	Transfer Failure Warning	(0-1)	0	0: Disable; 1: Enable.
6	Open Detection	(0-1)	0	
7	Fast Trip in Mains Abnormal (only for HGMS62)	(0-1)	1	0: Disable; 1: Enable.
Module Setting				
1	Power-on Mode	(0-2)	0	0: Stop Mode; 1: Manual Mode; 2: Auto Mode.
2	Module Address	(1-254)	1	Controller address in remote monitoring.
3	Language	(0-2)	0	0: Simplified Chinese; 1: English; 2: Others.

No.	Items	Range	Default	Description
4	Password	(0-65535)	00318	The password for entering advanced parameter setting.
5	LCD Light-on	(0-3600) s	300	LCD is always illuminated when it is 0.
6	Mains Page Display	(0-1)	1	0: 4 parameters 1: 8 parameters
7	Pressure Unit	(0-1)	0	0: psi 1:bar
8	Date and Time		/	Display time of master control module: YY:MM:DD (WEEK); HH:MM:SS.
9	ECU Run Time Display	(0-1)	1	0: Disable; 1: Enable.
Schedule and Maintenance Setting				
1	Scheduled Run	(0-1)	0	0: Disable; 1: Enable.
2	Scheduled Not Run	(0-1)	0	0: Disable; 1: Enable.
3	Maintenance Set	(0-1)	0	0: Disable; 1: Enable.
Analog Sensor Setting				
Temperature Sensor				
1	Curve Type	(0-15)	8	SGD. See Table 16.
2	Open Action	(0-2)	0	0: Warning; 1: Shutdown; 2: None.
3	Over High Shutdown	(0-1)	1	0: Disable; 1: Enable.
		(-50-300)°C	98	When external temperature value is higher than it, high temp shutdown will be issued. This value only begins to judge after safety delay is over.
		(0-3600)s	3	Confirm time for high temperature shutdown detection.
4	Over High Warning	(0-1)	1	0: Disable; 1: Enable.
		(-50-300)°C	95	When external temperature value is higher than it, high temp warning will be issued. This value only begins to judge after safety delay is over.
		(-50-300)°C	93	Return value: when external temperature value is less than or equal to it, warning will be removed.
		(0-3600)s	5	Confirm time for high temperature warning detection.
5	Over Low Warning	(0-1)	0	0: Disable; 1: Enable.
		(-50-300)°C	70	When external temperature value is lower than it, low temp warning will be issued. This value only begins to judge after safety delay is over.
		(-50-300)°C	75	Return value: when external temperature value is more than or equal to it, warning will be removed.

No.	Items	Range	Default	Description
		(0-3600)s	5	Confirm time for low temperature warning detection.
6	Heater Control	(0-1)	0	0: Disable; 1: Enable.
		(-50-300)°C	50	When external temperature value is more than or equal to it, coolant heating control outputs.
		(-50-300)°C	55	Return value: when external temperature value is more than or equal to it, coolant heating will stop.
		(0-3600)min	60	Coolant heating control output time.
7	Cooler Control	(0-1)	0	0: Disable; 1: Enable.
		(-50-300)°C	80	When external temperature value is more than or equal to it, coolant heating control outputs.
		(-50-300)°C	75	Return value: when external temperature value is less than or equal to it, coolant heating will stop.
		(0-3600)min	60	Coolant heating control output time.
Oil Pressure Sensor				
1	Curve Type	(0-15)	8	SGD. See Table 16.
2	Open Action	(0-2)	0	0: Warning; 1: Shutdown; 2: None.
3	Over Low Shutdown	(0-1)	0	0: Disable; 1: Enable.
		(0-1000)kPa	103	When external oil pressure value is lower than it, low oil pressure shutdown alarm will be issued. This value only begins to judge after safety delay is over.
		(0-3600)s	3	Confirm time for over low oil pressure shutdown detection.
4	Over Low Warning	(0-1)	0	0: Disable; 1: Enable.
		(0-1000)kPa	124	When external oil pressure value is lower than it, low oil pressure warning will be issued. This value only begins to judge after safety delay is over.
		(0-1000)kPa	138	Return value: when external oil pressure value is more than or equal to this value, alarm is removed.
		(0-3600)s	5	Confirm time for over low oil pressure warning detection.
5	Sensor Type	(0-2)	0	0: Resistance Type; 1: Current Type; 2: Voltage Type.
Level Sensor				
1	Curve Type	(0-15)	4	SGD. See Table 16.

No.	Items	Range	Default	Description
2	Open Action	(0-2)	0	0: Warning; 1: Shutdown; 2: None.
3	Over Low Warning	(0-1)	1	0: Disable; 1: Enable.
		(0-300)%	10	When external level value is lower than it, low level warning will be issued. This value is always judged.
		(0-300)%	15	Return value: when external level value is more than or equal to it, warning will be removed.
		(0-3600) s	5	Confirm time for low level warning detection.
4	Over Low Shutdown	(0-1)	0	0: Disable; 1: Enable.
		(0-300)%	8	When external level value is lower than it, low level shutdown will be issued. This value is always judged.
		(0-3600) s	5	Confirm time for low level shutdown detection.
5	Fuel Pump Output	(0-1)	0	0: Disable; 1: Enable.
		(0-300)%	10	When external level value is less than or equal to it, fuel pump control outputs.
		(0-300)%	80	When external level value is more than or equal to it, fuel pump stops output.
		(0-3600) s	60	Fuel pump control output time.
Aux. Sensor 1				
1	Sensor Selection	(0-3)	0	0: Not Used; 1: Temperature Sensor; 2: Pressure Sensor; 3: Level Sensor.
Aux. Sensor 2				
1	Sensor Selection	(0-3)	0	0: Not Used; 1: Temperature Sensor; 2: Pressure Sensor; 3: Level Sensor.
Digital Inputs Setting				
Input Port 1 Setting				
1	Content Set	(0-50)	28	Remote start (on-load). See Table 15.
2	Active Type	(0-1)	0	0: Close; 1: Open.
Input Port 2 Setting				
1	Content Set	(0-50)	26	High temperature shutdown input. See Table 15.
2	Active Type	(0-1)	0	0: Close; 1: Open.
Input Port 3 Setting				
1	Content Set	(0-50)	27	Low oil pressure shutdown input. See Table 15.
2	Active Type	(0-1)	0	0: Close; 1: Open.
Input Port 4 Setting				
1	Content Set	(0-50)	0	User-defined. See Table 15.

No.	Items	Range	Default	Description
2	Active Type	(0-1)	0	0: Close; 1: Open.
3	Active Range	(0-3)	2	0: After Safety Delay; 1: From Start; 2: Always; 3: Inactive.
4	Active Action	(0-4)	0	0: Warning; 1: Shutdown; 2: Trip and Stop; 3: Trip; 4: Indication.
5	Active Delay	(0-20.0)s	2.0	Time from detecting input port is active to confirm.
6	Input Port Description			When the input port is active, it is the LCD display content.
Input Port 5 Setting		Same as setting of input port 4.		
Input Port 6 Setting				
Input Port 7 Setting				
Input Port 8 Setting				
Input Port 9 Setting				
Relay Output Setting				
Output Port 1 Setting				
1	Content Set	(0-239)	1	Custom period output 1 (default as output in preheat). See Table 14.
2	Output Type	(0-1)	0	0: Normally Open; 1: Normally Close.
Output Port 2 Setting				
1	Content Set	(0-239)	35	Idle control. See Table 14.
2	Output Type	(0-1)	0	0: Normally Open; 1: Normally Close.
Output Port 3 Setting				
1	Content Set	(0-239)	29	Gen closed output. See Table 14.
2	Output Type	(0-1)	0	0: Normally Open; 1: Normally Close.
Output Port 4 Setting				
1	Content Set	(0-239)	31	Mains closed output (only for HGMS62). See Table 14.
2	Output Type	(0-1)	0	0: Normally Open; 1: Normally Close.

8.2 DEFINED CONTENTS OF AUXILARY OUTPUT 1-4

8.2.1 DEFINED CONTENTS TABLE OF AUXILARY OUTPUT 1-4

Table 15 – Defined Contents of Auxiliary Output 1-4

No.	Type	Function Description
0	Not Used	
1	Custom Period Output 1	Function description refers to the following contents.
2	Custom Period Output 2	
3	Custom Period Output 3	
4	Custom Period Output 4	
5	Custom Period Output 5	

No.	Type	Function Description
6	Custom Period Output 6	
7	Custom Combination Output 1	
8	Custom Combination Output 2	
9	Custom Combination Output 3	
10	Custom Combination Output 4	
11	Custom Combination Output 5	
12	Custom Combination Output 6	
13	Reserved	
14	Reserved	
15	Reserved	
16	Reserved	
17	Air Flap Control	Action in over speed shutdown and emergency shutdown, it can close engine inlet port.
18	Audible Alarm	Action in warning, shutdown, ELE trip. It can connect an alarm externally. When “Alarm Mute” is active, its output is inhibited.
19	Louver Control	Action in genset starts, it disconnects after genset stops completely.
20	Fuel Pump Control	Its action is controlled by fuel pump threshold of level sensor.
21	Heater Control	Its action is controlled by heating control threshold of temp sensor.
22	Cooler Control	Its action is controlled by cooling control threshold of temp sensor.
23	Pre-fuel Output	Action in crank-safety running.
24	Excitation Output	Outputs in crank process, if there is no gen frequency in high speed running, it outputs 2s again.
25	Oil Pre-lubricate Output	Action in preheat-safety running.
26	Remote Comm. Control	It is controlled by PC.
27	Reserved	
28	Reserved	
29	Gen Closed Output	Can control gen breaker close.
30	Open Output	Can control breaker open.
31	Mains Closed Output (only for HGMS62)	Can control mains breaker close.
32	Reserved	
33	Crank Relay Output	Outputs in crank delay process, disconnect after crank success.
34	Fuel Relay Output	Action in genset start, disconnect In ETS.

No.	Type	Function Description
35	Idle Control	Used for machines with idle, pick up before cranking, disconnect after entering warming up, pick up in stop idle process and disconnect after stopping completely.
36	Raise Speed Output	Action in high speed warming up.
37	Drop Speed Output	Action in stop idle-wait for stop.
38	ETS Control	Used for oil engine with stop solenoid, pick up when stop idle is over. It will disconnect when set “ETS Delay” is over.
39	Pulse Drop Speed Output	Action when entering stop idle, the action continue time is drop speed pulse output time.
40	ECU Stop	Suitable for engine supports ECU, used for control ECU stop.
41	ECU Power	Suitable for engine supports ECU, used for control ECU power.
42	Pulse Raise Speed Output	Action after entering high speed warming up, the action continue time is raise speed pulse output time.
43	Crank Success	Pick up when detecting crank success signal.
44	Gen Normal	Action in gen normal.
45	Gen Available	Action in gen normal running and high speed cooling.
46	Mains Normal (only for HGMS62)	Action in mains normal.
47	Full Speed Output	Action when engine speed is higher than loading speed.
48	Common Alarm	Action when common warning, common shutdown and common ELE trip occur.
49	Common Trip and Stop	Action when common trip and stop alarm occurs.
50	Common Shutdown	Action when common shutdown alarm occurs.
51	Common Trip	Action when common trip alarm occurs.
52	Common Warning	Action when common warning alarm occurs.
53	Reserved	
54	Battery Over High Volt	Action when battery over high warning alarm occurs.
55	Battery Over Low Volt	Action when battery over low warning alarm occurs.
56	Charge Failure	Action when charging genset failure warning occurs.
57	Reserved	
58	Reserved	
59	ECU Key Switch	Action after fuel outputs 3s, stops after ETS.
60	ECU Warning Alarm	Indicate that ECU sends a warning alarm signal.
61	ECU Shutdown Alarm	Indicate that ECU sends a shutdown alarm signal.
62	ECU Comm. Failure	Action after not receiving speed signal during start idle-stop idle when the engine type is ECU.
63	Reserved	
64	Reserved	
65	Reserved	
66	Reserved	
67	Reserved	
68	Reserved	

No.	Type	Function Description
69	Input Port 1 Active	Action when the input port 1 is active.
70	Input Port 2 Active	Action when the input port 2 is active.
71	Input Port 3 Active	Action when the input port 3 is active.
72	Input Port 4 Active	Action when the input port 4 is active.
73	Input Port 5 Active	Action when the input port 5 is active.
74	Input Port 6 Active	Action when the input port 6 is active.
75	Input Port 7 Active	Action when the input port 7 is active.
76	Input Port 8 Active	Action when the input port 8 is active.
77	Input Port 9 Active	Action when the input port 9 is active.
78	Input Port 1 Shutdown	Action when input port 1 shutdown alarm occurs.
79	Input Port 2 Shutdown	Action when input port 2 shutdown alarm occurs.
80	Input Port 3 Shutdown	Action when input port 3 shutdown alarm occurs.
81	Input Port 4 Shutdown	Action when input port 4 shutdown alarm occurs.
82	Input Port 5 Shutdown	Action when input port 5 shutdown alarm occurs.
83	Input Port 6 Shutdown	Action when input port 6 shutdown alarm occurs.
84	Input Port 7 Shutdown	Action when input port 7 shutdown alarm occurs.
85	Input Port 8 Shutdown	Action when input port 8 shutdown alarm occurs.
86	Input Port 9 Shutdown	Action when input port 9 shutdown alarm occurs.
87-98	Reserved	
99	Emergency Stop Alarm	Action when emergency stop alarm occurs.
100	Crank Failure Alarm	Action when crank failure alarm occurs.
101	Stop Failure Warning	Action when stop failure alarm occurs.
102	Under Speed Warning	Action when engine under speed warning occurs.
103	Under Speed Shutdown	Action when engine under speed shutdown occurs.
104	Over Speed Warning	Action when engine over speed warning occurs.
105	Over Speed Shutdown	Action when engine over speed shutdown occurs.
106	Reserved	
107	Reserved	
108	Reserved	
109	Gen Over Freq. Warn	Action when gen over frequency warning occurs.
110	Gen Over Freq. Shut.	Action when gen over frequency shutdown occurs.
111	Gen Over Volt Warn	Action when gen over voltage warning occurs.
112	Gen Over Volt Shut	Action when gen over voltage shutdown occurs.
113	Gen Under Freq. Warn	Action when gen under frequency warning occurs.
114	Gen Under Freq. Shut	Action when gen under frequency shutdown occurs.
115	Gen Under Volt Warn	Action when gen under voltage warning occurs.
116	Gen Under Volt Shut	Action when gen under voltage shutdown occurs.
117	Gen Loss of Phase	Action when gen losses phase.
118	Gen Reverse Phase Seq.	Action when gen reverse phase sequence occurs.
119	Reserved	
120	Over Power Alarm	Action when gen over power occurs.
121	Reserved	

No.	Type	Function Description
122	Reverse Power	Action when controller detects reverse power.
123	Over Current Alarm	Action when over current occurs.
124	Reserved	
125	Mains Blackout (only for HGMS62)	Action when mains can't not be detected.
126	Mains Over Freq. (only for HGMS62)	Action when mains over frequency warning occurs.
127	Mains Over Volt	Action when mains over voltage warning occurs.
128	Mains Under Freq. (only for HGMS62)	Action when mains under frequency warning occurs.
129	Mains Under Volt (only for HGMS62)	Action when mains under voltage warning occurs.
130	Mains Phase Seq. Error (only for HGMS62)	Action in mains sequence is wrong.
131	Mains Loss of Phase (only for HGMS62)	Action in mains phase lose.
132-138	Reserved	
139	High Temp Warn	Action when high temperature warning alarm occurs.
140	Low Temp Warn	Action when low temperature warning alarm occurs.
141	High Temp Shut	Action when high temperature shutdown alarm occurs.
142	Reserved	
143	Low Oil Pressure Warn	Action when low oil pressure warning occurs.
144	Low Oil Pressure Shut	Action when low oil pressure shutdown occurs.
145	OP Sensor Open	Action when oil pressure sensor is open.
146	Reserved	
147	Low Fuel Level	Action when controller issues low fuel level alarm.
148	Reserved	
149	Reserved	
150	Aux. Sensor 1 High Warn	Action when aux. sensor 1 high warning occurs.
151	Aux. Sensor 1 Low Warn	Action when aux. sensor 1 low warning occurs.
152	Aux. Sensor 1 High Shut	Action when aux. sensor 1 high shutdown occurs.
153	Aux. Sensor 1 Low Shut	Action when aux. sensor 1 low shutdown occurs.
154	Aux. Sensor 2 High Warn	Action when aux. sensor 2 high warning occurs.
155	Aux. Sensor 2 Low Warn	Action when aux. sensor 2 low warning occurs.
156	Aux. Sensor 2 High Shut	Action when aux. sensor 2 high shutdown occurs.
157	Aux. Sensor 2 Low Shut	Action when aux. sensor 2 low shutdown occurs.
158-229	Reserved	
230	Stop Mode	Action when system in stop mode.
231	Manual Mode	Action when system in manual mode.
232	Reserved	Reserved

No.	Type	Function Description
233	Auto Mode	Action when system in auto mode.
234	Gen On-load Indication	Outputs when gen is closed.
235	Mains On-load Indication (only for HGMS62)	Outputs when mains is closed.
236	Reserved	
237	Reserved	
238	Reserved	
239	Reserved	

8.2.2 CUSTOM PERIOD OUTPUT

Custom period output includes: period output S1 and condition output S2.

S1 and S2 are both **TRUE**, it outputs;

S1 or S2 is **FALSE**, it doesn't output;

Period output S1 can set generator's one or more period outputs freely, can set the delayed time and output time after entering into period.

Condition output S2 can be set as any contents in output ports.

NOTE1: When delay time and output time both are 0 in period output S1, it is TRUE in this period.

NOTE2: When selected period is standby, it is cycle output, and other periods are single output.

For example:

Output period: start

Delay output time: 2s

Output time: 3s

Condition output contents: input port 1 is active

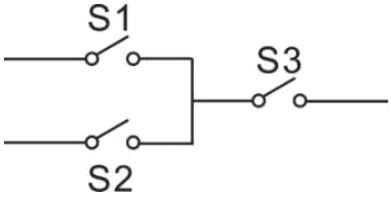
Close when condition output active/inactive: close when active (disconnect when inactive);

Output port 1 active, after enter "start time" and delay 2s, the custom period output is outputting, after 3s, stop outputting;

Output port 1 inactive, custom output period is not outputting.

8.2.3 CUSTOM COMBINATION OUTPUT

Custom combination output is composed by 3 parts, **or condition output S1, or condition output S2, and condition output S3**.



S1 or S2 is **TRUE**, while S3 is **TRUE**, custom combination output is outputting;

S1 and S2 are **FALSE**, or S3 is **FALSE**, custom combination output is not outputting.

NOTE1: S1, S2, S3 can be set as any contents except for "custom combination output" itself in the output setting.

NOTE2: 3 parts of custom combination output (S1, S2, S3) couldn't include or recursively include themselves.

For example:

Contents of or condition output S1: input port 1 is active;

Close when or condition output S1 is active /inactive: close when active (disconnect when inactive);

Contents of or condition output S2, input port 2 is active;

Close when or condition output S2 is active /inactive: close when active (disconnect when inactive);

Contents of and condition output S3: input port 3 is active;

Close when and condition output S3 is active /inactive: close when active (disconnect when inactive);

When input port 1 active or input port 2 active, if input port 3 is active, custom combination output is outputting; If input port 3 inactive, custom combination output is not outputting;

When input port 1 inactive and input port 2 inactive, whatever input port 3 is active or not, customc combination output is not outputting

8.3 DEFINED CONTENTS OF DIGITAL INPUT 1-9

Table 16 – Defined Contents of Digital Input 1-9 (All GND (B-) Active)

No.	Type	Function Description
0	User-defined	Users can define contents as bellow: Indication: only display without warning and shutdown. Warning: only warning without shutdown. Shutdown: alarm and shutdown immediately. Trip and stop: alarm, generator ramp-off load and stop after high-speed cooling. Trip: alarm, generator ramp-off load but not stop. Inactive: input doesn't work. Always active: input detects all the time. Active from crank: start detecting at the beginning of startup. Active after safety delay: detecting after safety on delay is expired.
1	Reserved	
2	Alarm Mute	"Audible Alarm" in output configuration outputs when it is active.
3	Alarm Reset	Shutdown alarm, trip alarm can be reset when it is active.
4	60Hz Active	Used for ECU engine with CANBUS, and it is 60Hz when active.
5	Lamp Test	When input is active, all LED indicators are light.
6	Panel Lock	When input is active, other keys on the panel are inactive except for  , and  displays on LCD status page.
7	Reserved	
8	Idle Mode	Under speed, under frequency and under voltage are not protected in this mode.
9	Inhibit Auto Stop	After generator is normal running in auto mode, when input is active, genset auto stop function is inhibited.
10	Inhibit Auto Start	After input is active in auto mode, genset auto start is inhibited.
11	Inhibit Scheduled Start	After input is active in auto mode, genset scheduled start is inhibited.
12	Reserved	

No.	Type	Function Description
13	Aux. Gen. Closed	Connect the auxiliary contactor of generator loading switch.
14	Gen. On-load Inhibit	When input is active, genset will inhibit to close.
15	Aux. Mains Closed (only for HGMS62)	Connect the auxiliary contactor of mains loading switch.
16	Mains On-load Inhibit (only for HGMS62)	When input is active, mains will inhibit to close.
17	Auto Mode Input	When input is active, controller will enter into auto mode, and other keys on the panel are inactive except for  , and displays on LCD status page.
18	Auto Mode Inactive	When input is active, controller will not work in auto mode, key is unavailable.
19	Reserved	
20	Regeneration Input	When input is active, the engine post-processing regeneration enables.
21	Inhibit Alarm Shutdown	All shutdown alarms are inhibited except for emergency stop (also called Battle Mode or Override Mode)
22	Instrument Mode	All outputs are inhibited in this mode.
23	Box Temp High Warning	When input is active, it means box temperature high warning alarm is issued.
24	Reset Maintenance Time	When input is active, controller will reset maintenance time and date as pre-set values.
25	Low Level Shutdown	Connect to sensor digital input.
26	High Temp Shutdown	Connect to sensor digital input.
27	Low OP Shutdown	Connect to sensor digital input.
28	Remote Start (On-load)	When input is active in auto mode, genset will start automatically, and then genset takes on load after normal running. When input is inactive, genset will stop automatically.
29	Remote Start (Off-load)	When input is active in auto mode, genset will start automatically without taking load after normal running. When input is inactive, genset will stop automatically.
30	Manual Start Input	When input is active in manual mode, genset will start automatically. When input is inactive, genset will stop automatically.
31-39	Reserved	
40	Raise Speed Pulse	When engine type is 35 MTSC1 and is active, the target engine speed increases 50RPM.
41	Drop Speed Pulse	When engine type is 35 MTSC1 and is active, the target engine speed decreases 50RPM.
42	Idle Pulse Input	When engine type is 35 MTSC1 and is active, the target engine speed goes to 750RPM.

No.	Type	Function Description
43	Reserved	
44	Reserved	
45	Simulate Mains OK (only for HGMS62)	In auto mode if input is active, then mains is OK.
46	Simulate Mains Failure (only for HGMS62)	In auto mode if input is active, then mains is abnormal.
47	Alternative Config 1 Active	When input port is active, alternative configuration is available. Alternative configuration can be set as different parameters, which is convenient to select current configuration via input ports.
48	Alternative Config 2 Active	
49	Alternative Config 3 Active	
50	Regeneration Inhibit Input	When input is active, engine post-processing inhibit regeneration enables.

8.4 SENSOR SELECTION

Table 17 – Sensor Selection

No.	Items	Content	Description
1	Temperature Sensor	0 Not used 1 Use-defined Resistance Curve 2 User-defined Current/Voltage Curve 3 VDO 4 CURTIS 5 VOLVO-EC 6 DATCON 7 SGX 8 SGD 9 SGH 10 PT100 11 SUZUKI 12-14 Reserved 15 Digital Input Port 5	Defined input resistance range is 0Ω~6000Ω, factory default is SGD sensor.
2	Oil Pressure (Pressure) Sensor	0 Not used 1 Use-defined Resistance Curve 2 User-defined Current/Voltage Curve 3 VDO 4 CURTIS 5 VOLVO-EC 6 DATCON 7 SGX 8 SGD 9 SGH 10 PT100 11 SUZUKI 12-14 Reserved 15 Digital Input Port 6	Defined input resistance range is 0Ω~6000Ω, factory default is SGD sensor.
3	Level (Fuel Level) Sensor	0 Not used 1 Use-defined Resistance Curve 2 User-defined Current/Voltage Curve 3 SGD 4 SGH 5 SUZUKI 6-14 Reserved 15 Digital Input Port 7	Defined input resistance range is 0Ω~6000Ω, factory default is SGH sensor.

NOTE: The connected input signal of pressure sensor and aux. sensor 1 can be resistance, current or voltage. When set “Custom Current/Voltage Curve” via controller panel, X coordinate data should expand 10 times, like 4mA input data is “40”.

8.5 CRANK DISCONNECT CONDITIONS SELECTION

Table 18 – Crank Disconnect Conditions Selection

No.	Content
0	Frequency
1	Speed
2	Speed + Frequency
3	Oil pressure
4	Oil pressure + Frequency
5	Oil pressure + Speed
6	Oil pressure + Speed + Frequency

NOTE:

a) There are 3 kinds of crank disconnect conditions. Speed, frequency and oil pressure can be used alone. Oil pressure is used with speed and generator frequency together is recommended, in order to make the starter and the engine disconnect as soon as possible.

b) Speed sensor is a magnetic device installed on the engine body to test the number of flywheel teeth.

c) When choosing speed, ensure the number of flywheel teeth is the same as the preset, otherwise over or under speed shutdown may occur.

d) If generator has no magnetic pickup sensor, don't choose speed item; otherwise Fail to Start or Loss of Speed Signal shutdown will occur.

e) If the generator has no oil pressure sensor, don't choose corresponding item.

f) If generator frequency has not been selected, controller will not measure and display the relative parameters (can be applied to the pump set); if speed has not been selected, the rotating speed will be calculated by the generating signal.

9 PARAMETER SETTING

9.1 MENU ITEMS

After controller starting, press  to enter into the parameters setting menu:

1) Parameters Setting
2) Language
3) Event Log
4) Controller Information
5) Date and Time
6) Battery Under Voltage Start

9.2 PARAMETERS SETTING

"00318" can set most parameter items during inputting password. When default password has been changed, it needs to input the same password with controller for parameter setting via PC software. If more parameter items need to be set or password is forgotten, such as voltage and current calibration, please contact with the factory.

NOTES:

a) Please modify the internal parameters in standby mode (crank conditions, aux. input and output configuration, multi delays, etc.) otherwise shutdown alarm or other abnormal conditions may appear.

b) The over threshold must be greater than the under threshold, such as over voltage threshold must be greater than under voltage threshold; otherwise over voltage and under voltage will occur at the same time.

c) The over speed threshold must be greater than under speed threshold, otherwise over speed and under speed will occur at the same time.

d) Please set return value correctly when setting warning alarm, otherwise alarm cannot occur normally. When setting over warning. return value should be less than set value; when setting under warning, return value should be greater than set value.

e) Generator frequency should be lower value in crank disconnect so as to disconnect starter quickly.

f) Aux. input 1-9 cannot be set as the same items, otherwise it cannot realize correct function; aux. output 1-4 can be set as the same items.

9.3 LANGUAGE

This item can select display language as simplified Chinese, English or others, others are defaulted as Spanish.

9.4 EVENT LOG

Event log can be checked via this item, max can reach 99 pieces.

9.5 CONTROLLER INFORMATION

a) This interface can display controller develop information, such as software version, hardware version, issue date.

b) Press  in this interface can display digital input port and output port status.

c) Press  in this interface can display boot screen.

9.6 DATE AND TIME

This item can calibrate controller date and time.

9.7 BATTERY UNDER VOLTAGE START

This item can set battery under voltage start enable, start value, stop value, delay value.

10 SENSOR SETTING

— When re-choosing sensor, standard value of sensor curve will be needed. If default temperature sensor is set as SGH (120ºC resistance type), sensor curve should be SGH (120ºC resistance type); If it is set as SGD (120ºC resistance type), sensor curve should be SGD curve.
— If there is difference between standard sensor curve and chosen sensor curve, select “Defined Sensor”, and then input defined sensor curve.
— When sensor curve is inputted, X value (resistance) must be in accordance with the order of lower to higher, otherwise errors will occur.
— When sensor is selected as “None”, sensor curve is inactive.
— If there is only alarm switch for corresponding sensor, this sensor must be set as “None”, otherwise alarm shutdown or warning may appear.
— Can set several points of forehand or backmost as the same ordinate, as the following picture:

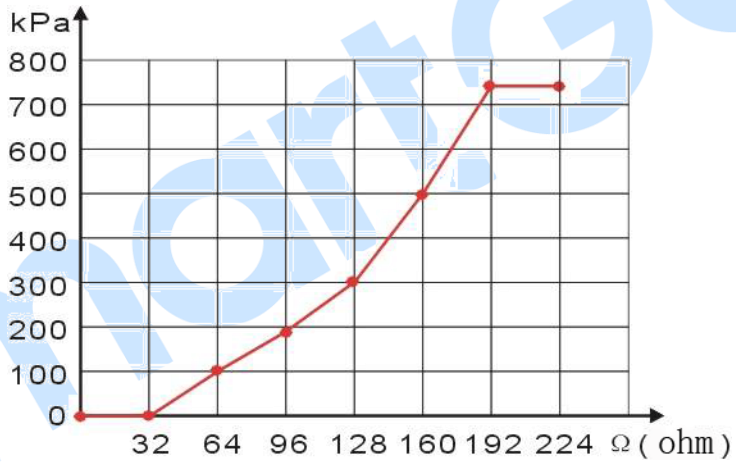


Fig.5 – Sensor Curve Diagram

Table 19 – Normal Pressure Unit Conversion

Item	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

11 COMMISSIONING

Before operation, the following checkings 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.
- Take proper actions to prevent engine to disconnect crank (e.g. Remove the connections of fuel value). If checking is OK, connect starting battery, select Manual Mode, controller will execute the program.
- Set controller as Manual Mode, press “start” button to start genset. If fails within the setting crank times, controller will send “Fail 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 normally run after idle running (if configured). During this period, watch for engine’s running situations, voltage and frequency of alternator. If there is abnormal situation, stop genset and check all connections according to this manual.
- HGMS62: Select the Auto Mode from front panel and connect mains signal. After mains normal delay, controller will transfer ATS (if configured) to mains on-load. After cooling time, it will stop to enter standby status unit mains has abnormal situations again.
- HGMS62: When mains is abnormal again, genset will start automatically to enter normal running status, then close gen command is issued, ATS is controlled to genset on-load. If not, please check all connections according to this manual.
- If there are any other questions, please contact SmartGen’s service.

12 TYPICAL APPLICATION

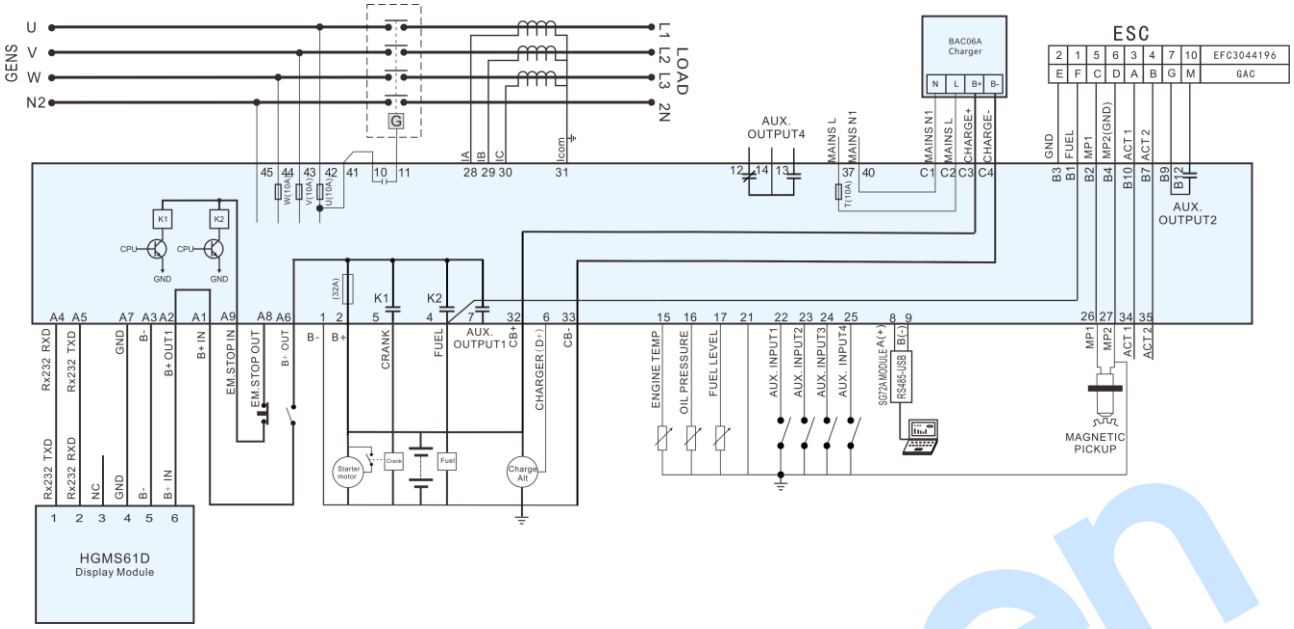


Fig.6 – HGMS61 Typical Application Diagram

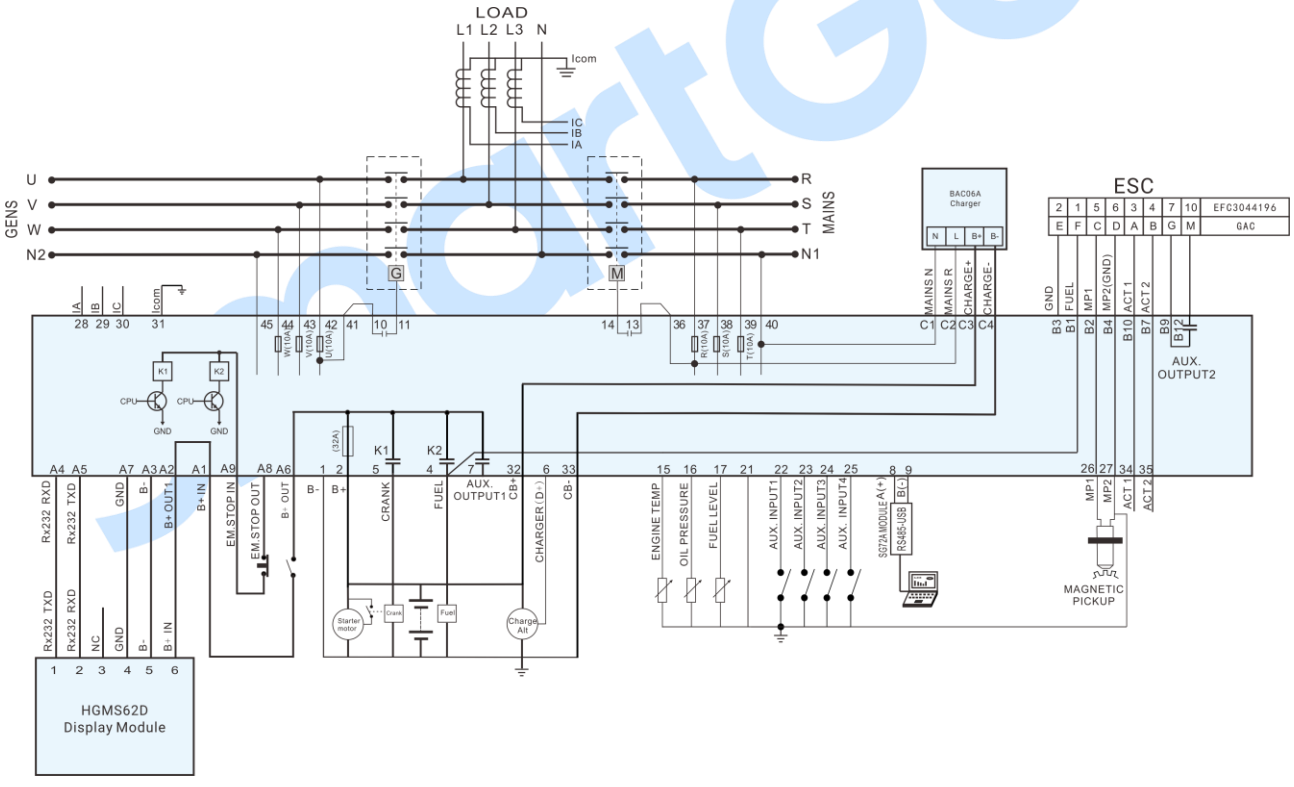


Fig.7 – HGMS62 Typical Application Diagram

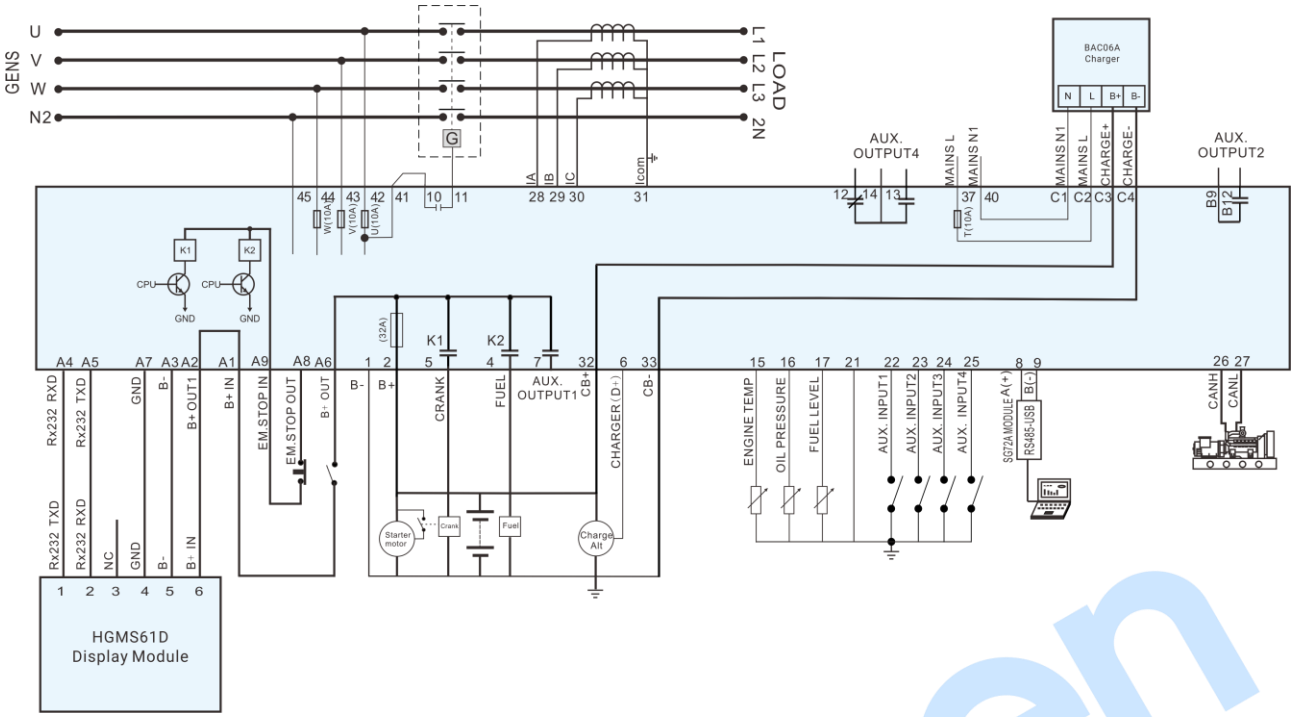


Fig.8 – HGMS61CAN Typical Application Diagram

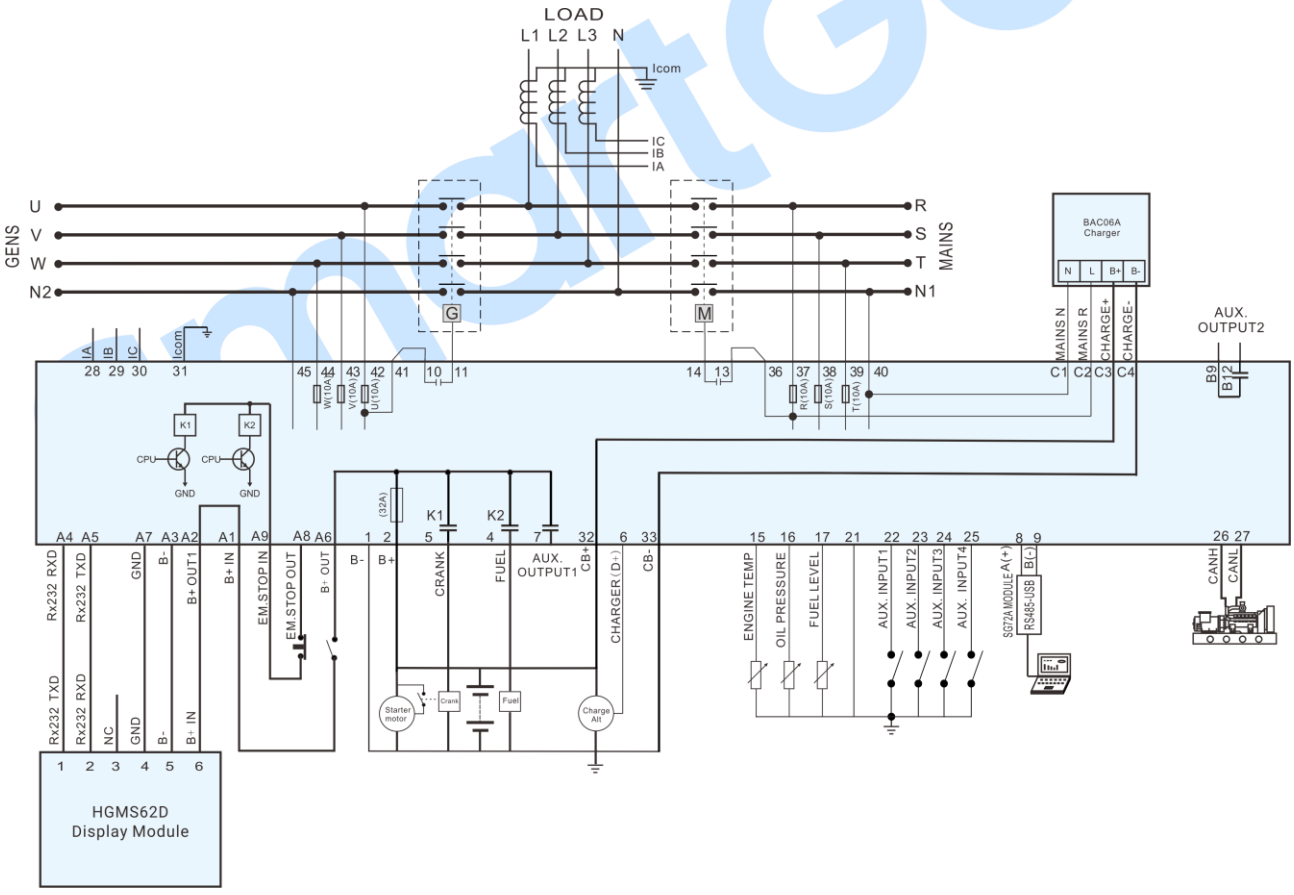


Fig.9 – HGMS62CAN Typical Application Diagram

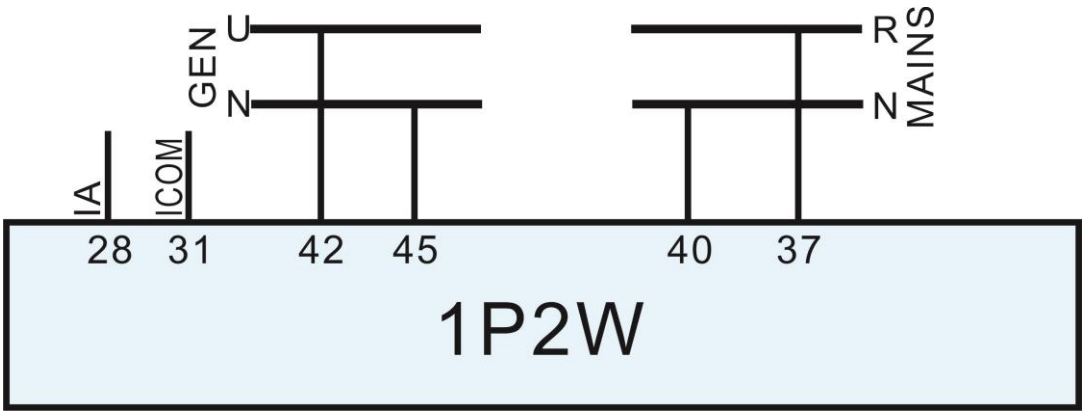


Fig. 10 – Single Phase 2 Wire Diagram

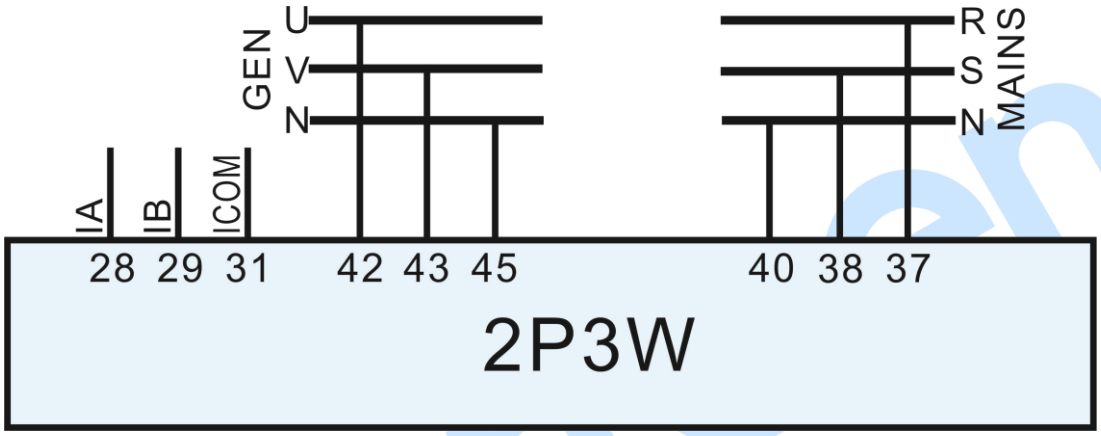


Fig. 11 – 2 Phase 3 Wire Diagram

13 INSTALLATION

13.1 FIXING CLIPS

— The HGMS61D/HGMS62D display module is panel mounting and installed by 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.

NOTE: 0.27N·m (2.75kgf·cm) torque is recommended to tighten the fixing clips.

13.2 OVERALL DIMENSION AND PANEL CUTOUT

Unit: mm

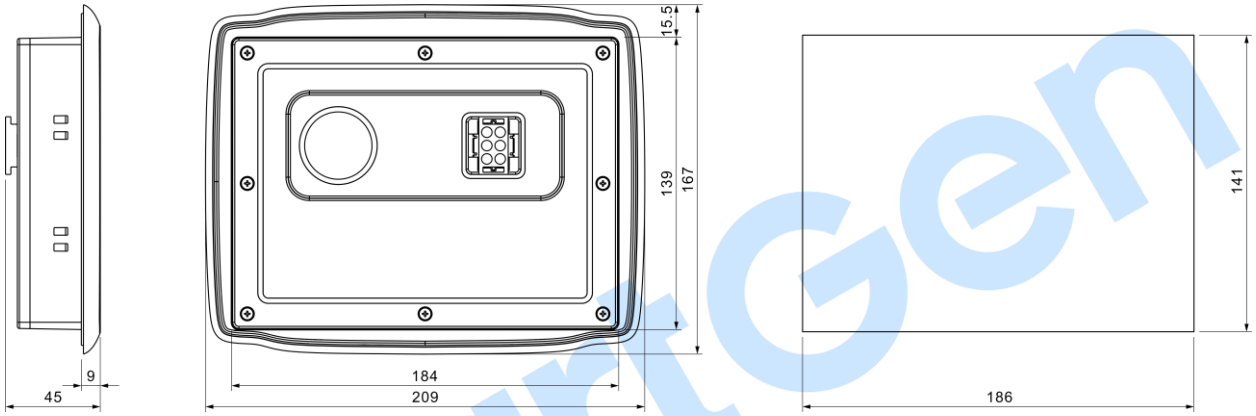


Fig. 12 – HGMS61D/HGMS62D Case and Overall Dimensions

Unit: mm

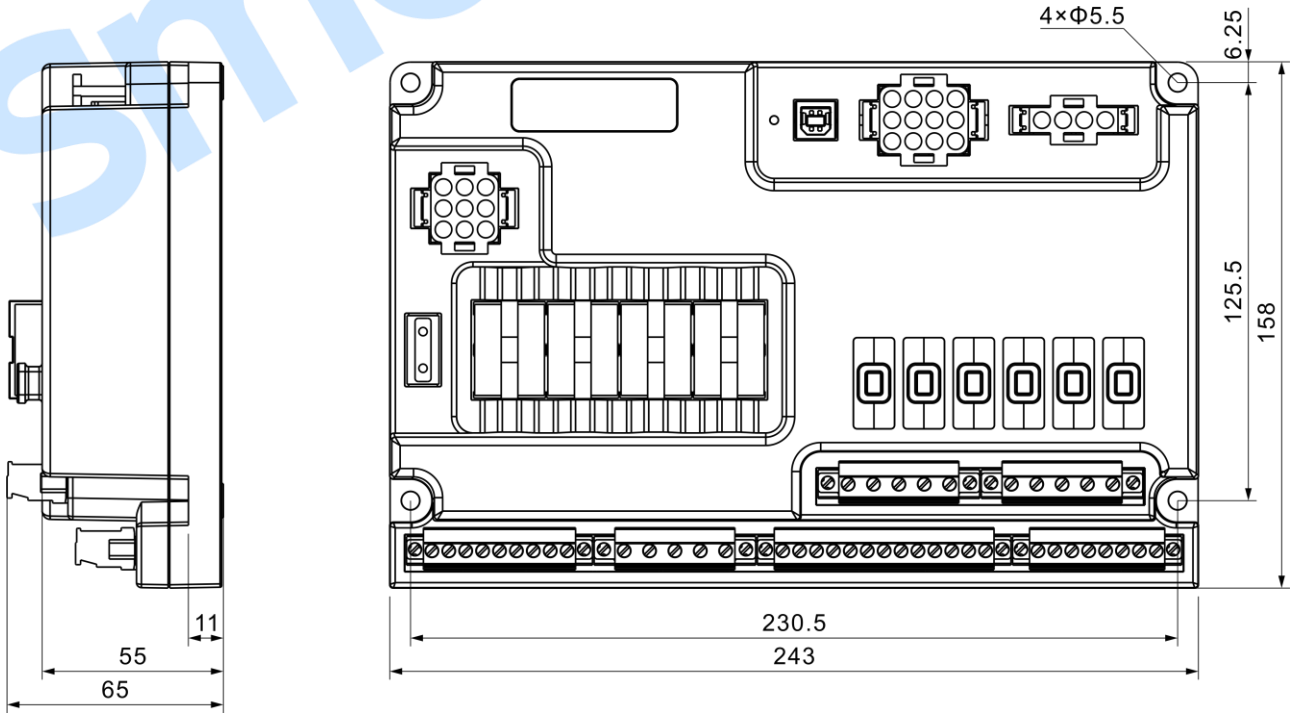


Fig.13 – HGMS61M/HGMS62M Case and Overall Dimensions

HGMS61/HGMS62 controller can be applicable to (8~35) VDC battery voltage. Battery negative must be reliably connected to engine shell. The connection between controller power and battery should not be less than 2.5mm^2. If a float charger is fitted, please connect output line of the charger with battery directly, and then connect battery positive and negative to power input of controller separately, in case that charger will interfere with the normal running of controller.

1) Speed Sensor Input

Speed sensor is the magnetic device installed in the engine body for testing flywheel teeth. The connection with controller uses 2-core shieling line, shield layer should be connected to terminal 27 of controller and the other end vacant. The other two signal lines are respectively connected to terminal 26 and terminal 27. At full speed, output voltage range is (1~24)VAC (RMS), 12VAC is recommended (rated speed). During installing, make the speed sensor contact the flywheel firstly, then pour out 1/3 laps, finally lock nut on the sensor.

2) AC Input

HGMS61/HGMS62 controller must externally connect to current transformer; CT secondary current must be 5A. Besides, the phase of CT and input voltage must be correct, or the sampling current and active power may be incorrect.

NOTE: The common end of CT must connect to battery cathode of the controller.

WARNING: When there is load current, open circuit is inhibited in the CT secondary side.

3) Withstand Voltage Test

When the controller has been installed in the control panel, during the test please disconnect all the terminals, in case high voltage damages the controller.

14 CONNECTIONS OF CONTROLLER WITH J1939 ENGINE

14.1 CUMMINS ISB/ISBE

Table 20 – Connector B

Terminals of controller	Connector B	Remark
Fuel relay output	39	
Crank relay output	-	Connect to starter coil directly.

Table 21 – 9 Pins Connector

Terminals of controller	9 pins connector	Remark
CAN(H)	SAE J1939 signal	Using impedance 120Ω connecting line.
CAN(L)	SAE J1939 return	Using impedance 120Ω connecting line.

Engine type: CUMMINS-ISB.

14.2 CUMMINS QSL9

Suitable for CM850 engine control module.

Table 22 – 50 Pins Connector

Terminals of controller	50 pins connector	Remark
Fuel relay output	39	
Crank relay output	-	Connect to starter coil directly.

Table 23 – 9 Pins Connector

Terminals of controller	9 pins connector	Remark
CAN(H)	SAE J1939 signal-C	Using impedance 120Ω connecting line.
CAN(L)	SAE J1939 return-D	Using impedance 120Ω connecting line.

Engine type: CUMMINS-CM850.

14.3 CUMMINS QSM11 (IMPORT)

It is suitable for CM570 engine control module. Engine type is QSM11 G1, QSM11 G2.

Table 24 – C1 Connector

Terminals of controller	C1 connector	Remark
Fuel relay output	5&8	Outside expand relay, when fuel outputs, making port 5 and port 8 of C1 be connected.
Crank relay output	-	Connect to starter coil directly.

Table 25 – 3 Pins Data Link Connector

Terminals of controller	3 pins data link connector	Remark
CAN(H)	A	Using impedance 120Ω connecting line.
CAN(L)	B	Using impedance 120Ω connecting line.

Engine type: CUMMINS-ISB.

14.4 CUMMINS QSX15-CM570

It is suitable for CM570 engine control module. Engine type is QSX15.

Table 26 – 50 Pins Connector

Terminals of controller	50 pins connector	Remark
Fuel relay output	38	Oil spout switch.
Crank relay output	-	Connect to starter coil directly.

Table 27 – 9 Pins Connector

Terminals of controller	9 pins connector	Remark
CAN(H)	SAE J1939 signal-C	Using impedance 120Ω connecting line.
CAN(L)	SAE J1939 return-D	Using impedance 120Ω connecting line.

Engine type: CUMMINS -CM570.

14.5 CUMMINS GCS-MODBUS

It is suitable for GCS engine control module. Using RS485-MODBUS to read information of engine. Engine types are QSX15, QST30, QSK23/45/60/78 and so on.

Table 28 – D-SUB Connector 06

Terminals of controller	D-SUB connector 06	Remark
Fuel relay output	5&8	Outside expand relay, when fuel outputs, connect Port 05 and Port 08 of the Connector 06.
Crank relay output	-	Connect to starter coil directly.

Table 29 – D-SUB Connector 06

Terminals of controller	D-SUB connector 06	Remark
RS485+	21	Using impedance 120Ω connecting line.
RS485-	18	Using impedance 120Ω connecting line.

Engine type: CUMMINS-QSK-Modbus, CUMMINS -QST- MODBUS, CUMMINS-QSX-MODBUS.

14.6 CUMMINS QSM11

Table 30 – Engine OEM Connector

Terminals of controller	Engine OEM connector	Remark
Fuel relay output	38	
Crank relay output	-	Connect to starter coil directly.
CAN(H)	46	Using impedance 120Ω connecting line.
CAN(L)	37	Using impedance 120Ω connecting line.

Engine type: common J1939.

14.7 CUMMINS QSZ13

Table 31 – Engine OEM Connector

Terminals of controller	Engine OEM connector	Remark
Fuel relay output	45	
Crank relay output	-	Connect to starter coil directly.
CAN(H)	1	Using impedance 120Ω connecting line.
CAN(L)	21	Using impedance 120Ω connecting line.

Engine type: Common J1939.

14.8 DETROIT DIESEL DDEC III / IV

Table 32 – Engine CAN Port

Terminals of controller	Engine CAN port	Remark
Fuel relay output	Expand 30A relay, ECU battery voltage is supplied by relay.	
Crank relay output	-	Connect to starter coil directly.
CAN(H)	CAN(H)	Using impedance 120Ω connecting line.
CAN(L)	CAN(L)	Using impedance 120Ω connecting line.

Engine type: Common J1939.

14.9 DEUTZ EMR2

Table 33 – F Connector

Terminals of controller	F connector	Remark
Fuel relay output	Expand 30A relay, battery voltage of 14 is supplied by relay. Fuse is 16A.	
Crank relay output	-	Connect to starter coil directly.
-	1	Connect to battery negative.
CAN(H)	12	Using impedance 120Ω connecting line.
CAN(L)	13	Using impedance 120Ω connecting line.

Engine type: VOLVO- EDC4.

14.10 JOHN DEERE

Table 34 – 21 Pins Connector

Terminals of controller	21 pins connector	Remark
Fuel relay output	G, J	
Crank relay output	D	
CAN(H)	V	Using impedance 120Ω connecting line.
CAN(L)	U	Using impedance 120Ω connecting line.

Engine type: JOHN DEERE.

14.11 MTU ADEC (SMART MODULE)

It is suitable for MTU engine with ADEC (ECU8) and SMART module.

Table 35 – ADEC (X1 Port)

Terminals of controller	ADEC (X1 port)	Remark
Fuel relay output	X1 10	X1 Terminal 9 connected to battery negative.
Crank relay output	X1 34	X1 Terminal 33 connected to battery negative.

Table 36 – SMART (X4 Port)

Terminals of controller	SMART (X4 port)	Remark
CAN(H)	X4 1	Using impedance 120Ω connecting line.
CAN(L)	X4 2	Using impedance 120Ω connecting line.

Engine type: MTU-ADEC.

14.12 MTU ADEC (SAM MODULE)

It is suitable for MTU engine with ADEC (ECU7) and SAM module.

Table 37 – ADEC (X1 Port)

Terminals of controller	ADEC (X1 port)	Remark
Fuel relay output	X1 43	X1 Terminal 28 connected to battery negative .
Crank relay output	X1 37	X1 Terminal 22 connected to battery negative.

Table 38 – SAM (X23 Port)

Terminals of controller	SAM (X23 port)	Remark
CAN(H)	X23 2	Using impedance 120Ω connecting line.
CAN(L)	X23 1	Using impedance 120Ω connecting line.

Engine type: Common J1939.

14.13 PERKINS

It is suitable for ADEM3/ADEM4 engine control module. Engine type is 2306, 2506, 1106, and 2806.

Table 39 – Connector

Terminals of controller	Connector	Remark
Fuel relay output	1, 10, 15, 33, 34	
Crank relay output	-	Connect to starter coil directly.
CAN(H)	31	Using impedance 120Ω connecting line.
CAN(L)	32	Using impedance 120Ω connecting line.

Engine type: PERKINS.

14.14 SCANIA

It is suitable for S6 engine control module. Engine type is DC9, DC12, and DC16.

Table 40 – B1 Connector

Terminals of controller	B1 connector	Remark
Fuel relay output	3	Set aux. output 1 as “Fuel Output”.
Crank relay output	-	Connect to starter coil directly.
CAN(H)	9	Using impedance 120Ω connecting line.
CAN(L)	10	Using impedance 120Ω connecting line.

Engine type: SCANIA.

14.15 VOLVO EDC3

Suitable engine control model is TAD1240, TAD1241, and TAD1242.

Table 41 – “Stand alone” Connector

Terminals of controller	“Stand alone” connector	Remark
Fuel relay output	H	
Crank relay output	E	
Aux. output 2	P	Set aux. output 2 as “ECU Power”.

Table 42 – “Data bus” Connector

Terminals of controller	“Data bus” connector	Remark
CAN(H)	1	Using impedance 120Ω connecting line.
CAN(L)	2	Using impedance 120Ω connecting line.

Engine type: VOLVO.

NOTE: When this engine type is selected, preheating time should be set to at least 3 seconds.

14.16 VOLVO EDC4

Suitable engine types are TD520, TAD520 (optional), TD720, TAD720 (optional), TAD721, TAD722, and TAD732.

Table 43 – Connector

Terminals of controller	Connector	Remark
Fuel relay output	Expanded 30A relay, and relay offers battery voltage to Terminal 14. Fuse is 16A.	
Crank relay output	-	Connect to starter coil directly.
	1	Connected to battery negative.
CAN(H)	12	Using impedance 120Ω connecting line.
CAN(L)	13	Using impedance 120Ω connecting line.

Engine type: VOLVO-EDC4.

14.17 VOLVO-EMS2

Volvo Engine types are TAD734, TAD940, TAD941, TAD1640, TAD1641, and TAD1642.

Table 44 – Engine CAN Port

Terminals of controller	Engine CAN port	Remark
Aux. output 1	6	Set aux. output 1 as “ECU Stop”.
Aux. output 2	5	Set aux. output 2 as “ECU Power”.
-	3	Negative power.
-	4	Positive power.
CAN(H)	1(Hi)	Using impedance 120Ω connecting line.
CAN(L)	2(Lo)	Using impedance 120Ω connecting line.

Engine type: VOLVO-EMS2.

NOTE: When this engine type is selected, preheating time should be set to at least 3 seconds.

14.18 YUCHAI

It is suitable for Yuchai BOSCH common rail electronic-controlled engine.

Table 45 – Engine 42 Pins Port

Terminals of controller	Engine 42 pins port	Remark
Fuel relay output	1.40	Connect to engine ignition switch.
Crank relay output	-	Connect to starter coil directly.
CAN(H)	1.35	Using impedance 120Ω connecting line.
CAN(L)	1.34	Using impedance 120Ω connecting line.

Table 46 – Engine 2 Pins Port

Battery	Engine 2 pins port	Remark
Battery negative	1	Wire diameter 2.5mm^2.
Battery positive	2	Wire diameter 2.5mm^2.

Engine type: BOSCH.

14.19 WEICHAI

It is suitable for Weichai BOSCH common rail electronic-controlled engine.

Table 47 – Engine Port

Terminals of controller	Engine port	Remark
Fuel relay output	1.40	Connect to engine ignition switch.
Crank relay output	1.61	
CAN(H)	1.35	Using impedance 120Ω connecting line.
CAN(L)	1.34	Using impedance 120Ω connecting line.

Engine type: GTSC1.

NOTE: If there is any problem in controller and ECU communication, please contact SmartGen service.

15 FAULT FINDING

Table 48 – Fault Finding

Symptoms	Possible Solutions
Controller NO Operation	Check starting battery; Check connections of controller; Check the DC fuse.
Genset Shutdown	Check if water/cylinder temperature too high. Check alternator voltage. Check the DC fuse.
Emergency Stop	Check if an emergency stop button is fitted; Ensure battery positive is connected to the emergency stop input; Check if connection is open circuit.
Low Oil Pressure Alarm (After Crank Disconnect)	Check oil pressure sensor and connections.
High Temp. Alarm (After Crank Disconnect)	Check temperature sensor and connections.
Shutdown Alarm During Running	Check switch and connections according to information on LCD; Check auxiliary inputs.
Crank Disconnect Failure	Check fuel circuit and its connections. Check starting battery. Check speed sensor and its connections; Refer to engine manual.
Starter NO Operation	Check connections of starter; Check starting battery.
Genset Running While ATS Not Transfer	Check ATS; Check connections between ATS and controller.
RS485 Failure	Check connections; Check if COM port is correct; Check if A and B of RS485 is connected reversely; Check if PC COM port is damaged; 120Ω resistance between RS485's A and B is recommended.