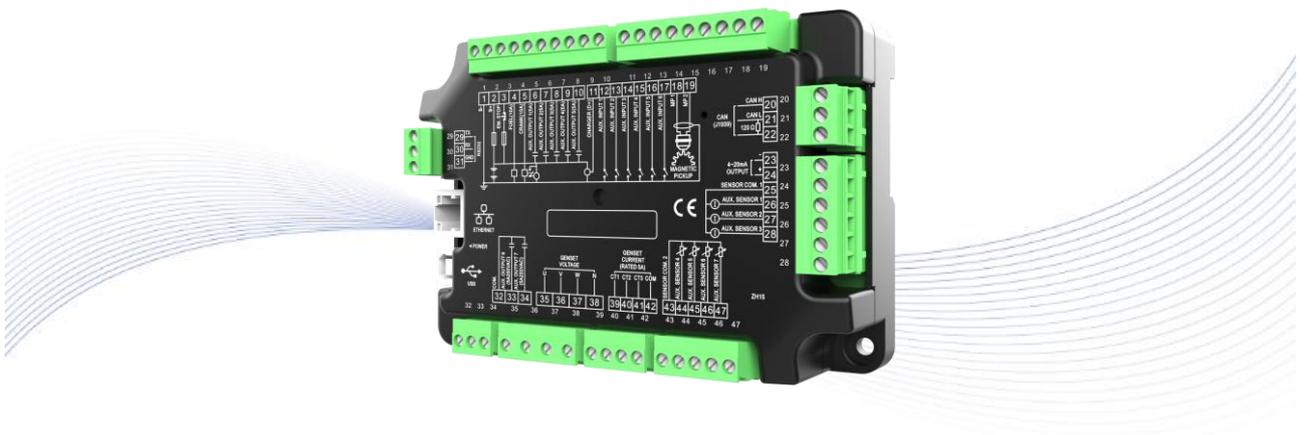# SmartGen
MAKING CONTROL SMARTER

CHP150
Combined Heat and Power Controller

User Manual

郑州众智科技股份有限公司
SMARTGEN(ZHENGZHOU)TECHNOLOGY CO.,LTD.

CONTENTS

SmartGen**Registered Trademark**

No.28 Xuemei Street, Zhengzhou, Henan, China

Tel: +86-371-67988888/67981888/67992951

+86-371-67981000(overseas)

Fax: +86-371-67992952

Email: sales@smartgen.cn

Web: www.smartgen.com.cn

www.smartgen.cn

SmartGen Technology reserves the right to change the contents of this document without prior notice.

Table 1 – Version History

Date	Version	Note
2022-09-14	1.0	Original release.

Table 2 – Notation Clarification

Sign	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.

1 OVERVIEW

CHP150 Combined Heat and Power Controller integrates digitalization, intelligent and networking technology, and adopts the split mode of 【master control + display】. It is suitable for the automation and monitoring system of single unit, realizing the automatic start/stop, data measurement, alarm protection and "three remotes" functions of genset.

CHP150 Combined Heat and Power Controller adopts MPU technology, realizes a variety of parameters of precision measurement, fixed value regulation, timing, and threshold setting functions. The parameters can be adjusted from front panel of the controller, also can by USB interface or ETHERNET interface of PC. It can be widely used in various types of gensets for its compact structure, simple wiring and high reliability.

CHP150D Display Module adopts LCD, which can run reliably in the temperature range of (-40℃ ~+70℃). The optional Chinese and English interfaces can display with simple operation and reliable running.

HMU8-CHP Display Module adopts 8-inch capacitive touch screen with 800*600 resolution, optional Chinese and English interfaces, which is simple to operate and reliable to run.

The master control module equipped with SAE J1939 interface can communicate with diversified ECU (ENGINE CONTROL UNIT) with J1939 interface.

2 PERFORMANCE AND CHARACTERISTICS

CHP150 controller is applicable for automatic CHP system of single unit. It can control genset start/stop by remote signal. The CHP150 controller is consisted of two parts: CHP150M (Master Control Module) and CHP150D/HMU8-CHP (Display Module).

Its main characteristics are as follows:

——The master control module has communication interfaces of ETHERNET and RS232 that can connect with display module or monitoring system;

——With 3 valves PID control functions; 2 on-off valves and a 4-20mA valve;

——The CAN BUS interface can connect to J1939 ECU, it not only can monitor the common data (water temperature, oil pressure, speed, fuel consumption, etc.) of ECU, but also can control start/stop and high/low speed through CANBUS interface;

——Suitable for 3P4W, 3P3W, 1P2W, 2P3W (120V/240V) power supply 50Hz/60Hz system;

——Collect and display parameters of Gen 3-phase voltage, 3-phase current, frequency and power parameters.

Table 3 – Data Collection

Type	Item	Symbol	Unit
Gen	Line Voltage	Uab、Ubc、Uca	V
	Phase Voltage	Ua、Ub、Uc	V
	Frequency	f	Hz
	Phase Sequence	/	
Load	Current	Ia、Ib、Ic	A
	Phases and Total Active Power	P	kW
	Reactive Power	Q	kVar
	Apparent Power	S	kVA
	Power Factor	λ(PF)	/
	Gen Total Power	W	kWh

——Gen with over/under voltage, over/under frequency, over current, over power functions;

——Precisely collect various parameters of engine;

——Control and protection functions: to realize the automatic start/stop of genset, close/open and perfect fault display protection functions;

——With ETS Solenoid Hold, idle speed control, preheat control, speed up/down control functions, and they are all relay outputs;

——Parameter setting function: allow the users to change and set the parameters, while keep in the internal FLASH memorize and will not be lost when the system is power off. All the parameters can be adjusted from the front panel of the control or by USB interface of PC;

——With 7 flexible sensors and can customize the parameters;

——Multiple conditions of crank disconnect (speed sensor, oil pressure, Gen) to select;

——With emergency start function: it can be realized by input port` (manually forced start), which is used in cold winter and needs to be manually start for a long time;

——Automatic identification function of flywheel tooth number;

——Wide power supply range (8~35)VDC, which can adapt to different starting battery voltage environment;

——All parameters adopt digital adjustment, abandoning the analog adjustment method of common potentiometer, and improving the reliability and stability of the whole machine;

——Maintenance function is dived into date and running time, and the maintenance time due action can be set (warning and alarm shutdown);

——Event log can circularly record 99 items;

——Data analysis function can circularly record 5 items of detailed data a minute before the shutdown alarm;

——With RTC and scheduled start/stop functions (start once monthly/weekly/daily and set

whether to take load or not).

2.1 CHP150D PERFORMANCE AND CHARACTERISTICS

It is used to display the parameters of the genset and adjust the parameter to control the genset by pressing the key.

——LCD is 132x64 with backlit, Chinese and English display, touch button operation;

——The screen is made of acrylic material with good abrasion resistance and scratch resistance;

——The silicone panel and buttons can easily adapt to high and low temperatures;

——With one RS232 interface and one CANBUS interface, the RS232 is used to communicate with master control module and the CANBUS interface is the reserved interface;

——The USB interface is used to upgrade the firmware of display module;

——A rubber seal ring is designed between the shell and the control panel, and the protection level of front panel can reach IP65.

2.2 HMU8-CHP DISPLAY MODULE PERFORMANCE AND CHARACTERISTICS

It is used to visually display the control system and control the genset by touch screen.

——With power indicator, communication indicator and alarm indicator;

——10 levels of brightness adjustment, which can be adjusted for different environments；

——With 4 RS485 interfaces, 1 CANBUS interface and 1 ETHERNET interface, among which the ETHERNET interface is used to communicate with the master control module and the others are reserved interfaces;

——The USB interface is used to upgrade the firmware of the display module;

——The USB host interface is for upgrading the interface pictures and font library of the display module;

——A rubber seal ring is designed between the shell and the control panel, and the protection level of front panel can reach IP65.

2.3 CHP150M PERFORMANCE AND CHARACTERISTICS

It is used to collect, monitor and protect the parameters of the CHP system and control the automatic start/stop of the genset.

Its main characteristics are as follows:

——One RS232 communication interface can be connected to CHP150D, realizing "three remote" functions by MODBUS protocol;

——One CANBUS interface can connect to ECU with J1939, it can not only monitor the common data of the ECU (such as water temperature, oil pressure and speed, etc.), but also control the start/stop, high/low speed by CANBUS interface;

——One USB interface can connect to PC to communicate with host computer for data monitoring and parameters configuration;

——One ETHERNET interface can connect to PC to communicate with host computer for data monitoring and parameters configuration, or connect to HMU8-CHP for data monitoring;

——A total of 7 analog sensors, including 4-resistance type, 3-current type;

——Modular design, flame retardant ABS shell, pluggable terminal with compact structure and easy installation.

3 **SPECIFICATION**

Table 4 – Technical Parameter

Items	Content
Operating Voltage	Range: DC10V ~ DC35V continuous power supply, DC reverse connection protection Resolution: 0.1V Accuracy: 1%
Power Consumption	HMU8-CHP: <6W CHP150D: <3W
AC generator Voltage Input	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
Speed Sensor	Voltage Range: 1V~ 24V(RMS) Frequency Range: 5Hz ~ 10000Hz
Charger (D+) Voltage	Range: DC0V~ DC60V Resolution: 0.1V Accuracy: 1%
Analog Sensor	Resistance Input Range: 0Ω~ 6000Ω Resolution: 0.1Ω Accuracy: 1Ω (below 300Ω) Current Input Range: 4mA~20mA Resolution: 0.01mA Accuracy: 0.2mA
Fuel Output	10A DC24V DC power supply output
Start Output	10A DC24V DC power supply output
Aux. Output 1	5A DC24V DC power supply output
Aux. Output 2	5A DC24V DC power supply output
Aux. Output 3	5A DC24V DC power supply output
Aux. Output 4	5A AC250V volts free output
Aux. Output 5	5A AC250V volts free output
Case Dimensions	CHP150D: 136mm x110mmx46mm (Panel Mounting) HMU8-CHP: 221mm x 163mm x 51mm (Panel Mounting) CHP150M: 150mmx104mmx49 mm (Cabinet Mounting)
Panel Cutout	CHP150D: 122mmx94mm HMU8-CHP: 205mmx147mm

Items	Content
	CHP150M: 135mmx89 mm
CT Secondary Current	Rated: 5A
Working Temperature	(-40~+70)°C
Working Humidity	(20~93)%RH
Storage Temperature	(-40~+70)°C
Protection Level	CHP150D HMU8-CHP：IP65 When water proof gasket ring inserted between panel and controller. CHP150M：IP20
Insulation	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal and the leakage current is not more than 3mA within 1min.
Weight	CHP150D：0.28kg HMU8-CHP：1.3kg CHP150M：0.43kg

4 OPERATION

4.1 CHP150D CONTROLLER PANEL

Fig.1- CHP150 Front Panel

⚠ Note: partial indicators description.

Alarm Indicator: slow flashing when warning alarms; rapidly flashing when shutdown alarms; not flash when there is no alarm.

4.2 HMU8-CHP CONTROLLER PANEL

Fig.2- HMU8-CHP Front Panel

4.3 CHP150D KEYS FUNCTIONS

Table 5 – CHP150 Keys Description

Icon	Key	Description
(red circle icon)	Stop/Reset	In manual/stop mode, press it can stop the running genset. Can reset the alarm in stop mode. In stop mode, press it for more than 3s to test whether the indicator is normal (Lamp Test). In the stop process, press it again to stop the genset quickly. Press it in the main interface to return to the homepage and press it in parameter setting interface to exit the set.
(green I icon)	Start	In manual mode, press it can start the stationary genset; press it during starting process, the state of genset will change to the next state.
(hand icon)	Manual	Press it to make the control in manual mode.
(auto icon)	Auto	Press it to make the controller in auto mode.
(close/open icon)	Close/Open	In manual mode, press it to control the switch close/open.
(gear/OK icon)	Menu/Confirm	Press it to enter the menu list, move the cursor and confirm the information in parameter setting.
(up arrow icon)	Up/Increase	Scroll up the screen to move the cursor up or increase the number of the cursor position.
(down arrow icon)	Down/Decrease	Scroll up the screen to move the cursor down or decrease the number of the cursor position.

CAUTION: the factory default password is "0318", and the operator could change the password to prevent others from changing the advanced configuration of the controller. Please remember the password after changing it. If you forget the

password, please contact the service personnel and give feedback of all the information on "Controller Information" to our staff.

NOTE: press any key to eliminate the alarm sound.

4.4 HMU8-CHP KEYS FUNCTION

Table 6 – HMU8-CHP Keys Description

Icon	Key	Description
	Stop/Reset	In manual/auto mode, press it can stop the running genset. Can reset the alarm in stop mode.
	Start	In manual mode, press it can start the stationary genset; press it during starting process, the state of genset will change to the next state.
	Manual	Press it to make the control in manual mode.
	Auto	Press it to make the controller in auto mode.
	Close	In manual mode, press it to control the switch close.
	Open	In manual mode, press it to control the switch open.

4.5   **CHP150D Main Display**

The main display uses pages to display, [△][▽] are used for flip over.

★The homepage includes the following contents:

Gen average line voltage, gen frequency and max. current of load, etc.

★Gen page includes the following contents:

Gen average phase voltage, line voltage, frequency and phase sequence.

★Load page includes the following contents:

Current, phases and total active power, total reactive power, total apparent power and power factor.

★Engine page includes the following contents:

Engine speed, measurement value of each programmable sensor, battery voltage, charger voltage, etc.

★Alarm page includes the following contents:

Display all the warnings and shutdown alarms.
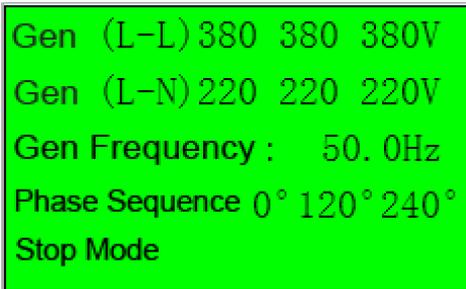
```
Gen (L-L)380  380  380V
Gen (L-N)220  220  220V
Gen Frequency :   50.0Hz
Phase Sequence 0° 120°240°
Stop Mode
```

Fig.3- Gen Page Example
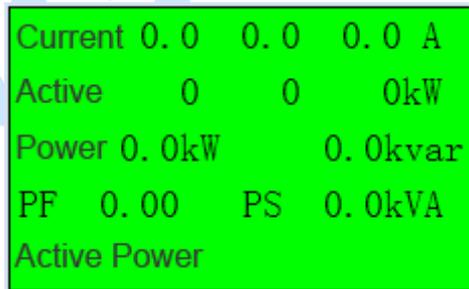
```
Current 0.0   0.0    0.0 A
Active     0     0     0kW
Power 0.0kW       0.0kvar
PF  0.00    PS  0.0kVA
Active Power
```

Fig.4 – Load Page Example

4.6 AUTO START/STOP OPERATION

Press ⊚ , the indicator beside will light up, the genset is in auto start mode.

AUTO START SEQUENCE:

1) When remote start input is active, it will enter "Start Delay";
2) LCD displays "Start Delay" countdown;
3) After the end of start delay, the preheating relay outputs (if configured), LCD displays "Start Preheating Delay XX s"
4) After the end of preheating delay, the fuel relay outputs for 1s and then the staring relay outputs; if the genset fails to start within the "Staring Time", the fuel relay and starting relay will stop output and enter the enter the "Starting Interval Time" to wait for the next starting.
5) If the genst fail to start within the setting starting times, the fifth line of LCD display window is black, and the fifth line of the LCD display window will display the starting failure alarm;
6) During any start, if crank disconnect, it will enter the "Safe Running Time". During this time, the low oil pressure, high water temperature, under speed, charging failure and aux. input (configured) alarms are inactive. After the safe running delay ends, it will enter the "Start Idle Delay" (if configured).
7) During the start idle delay, the under speed, under frequency and under voltage alarms are inactive. When the idle delay ends, it will enter the "High-speed Warming up Delay" (if configured).
8) When high-speed warming up ends, if Gen is normal and the indicator is illuminated. If the voltage and frequency of the genset meet the on-load requirements, the Gen closing relay outputs and the genset takes load and the power supply indicator is illuminated, the genset enters the normal running status; if the voltage or frequency of the genset are abnormal, the controller will alarm and stop (LCD displays the Gen alarms).

AUTO STOP SEQUENCE:

1) When remote start input is inactive, it will start "Stop Delay";
2) After the end of stop delay, it will start "High-speed Cooling Delay", and the gen close relay disconnects, the indicator of gen power is distinguished;
3) When entering "Stop Idle Delay" (if configured), the idle speed relay is power on and outputs;
4) When entering "ETS Solenoid Hold", ETS relay is power on and outputs, the fuel relay outputs is disconnected;
5) When entering "Genset Stop Time", it will automatically judge whether stop or not;
6) When genset stops, it will enter the gen standby status; the controller will alarm if the unit cannot stop (LCD displays the stop failure warning).

4.7 MANUAL START/STOP OPERATION

1) Press ✍, controller enters "Manual Mode" and the indicator is illuminated, then press ⓿ and

▐ **I** ▌ to start genset, it will automatically judge crank disconnect and raise high-speed running. If the high water temperature, low oil pressure, over speed and abnormal voltage occur during running of diesel genset, it can effectively and quickly protect the shutdown (See the start steps of auto start).

After the genset runs normally, manually press ⤬ or ▐—▌, and then the genset is loaded.

2) Manual stop: press ⊙ or ▣ to stop the running genset. (See the auto stop process).

5 PROTECTION

5.1 WARNING

When controller detects the warning signal, it will alarm but not stop and the LCD displays the warnings and alarm types.

Table 7- Warnings

No.	Type	Description
1	Loss of Speed Signal	When controller detects that the genset speed is 0 and the alarm type selects warning, the controller will issue a warning signal and the LCD displays the warning of loss of speed signal.
2	Gen Overcurrent	When controller detects that the genset current is greater than the set overcurrent value and the action type selects warning, the controller will issue a warning signal and the LCD displays the warning of gen overcurrent.
3	Shutdown Failure	When ETS solenoid hold/wait for genset stop ends, if the genset is not stop, the controller will issue a warning signal and the LCD displays the warning of stop failure.
4	Low Fuel Level	When controller detects that the genset fuel level value is lower than the set threshold value or low fuel level warning is active, the controller will issue a warning signal and the LCD displays the warning of low fuel level.
5	Charging Failure	When controller detects that the genset charger voltage is below the set threshold value, the controller will issue a warning signal and the LCD displays the warning of charging failure.
6	Battery Under Voltage	When controller detects that the battery voltage is lower than the set threshold value, the controller will issue a warning signal and the LCD displays the warning of battery under voltage.
7	Battery Over Voltage	When controller detects that the battery voltage is greater than the set threshold value, the controller will issue a warning signal and the LCD displays the warning of battery over voltage.
8	Low Coolant Level	When controller detects that the low coolant level warn is active, the controller will issue a warning signal and the LCD displays the warning of low coolant level.
9	Maintenance Time Due	The maintenance type is running time. When the genset running time is longer than the set time or the maintenance type is date, the current date exceeds the set date and the maintenance action setting is warning, the controller will issue a warning signal and the LCD displays the warning of maintenance time due.
10	Input Port Warning	When the digital input selects user defined and the configuration is warning, the controller will issue a conrresponding input warning signal after the input port is active.
11	Charging Failure	When controller detects that the external charging failure warning is

No.	Type	Description
		active, the controller will issue a warning signal and the LCD displays the warning of charging failure.
12	Over Power Warning	When controller detects that the genset power (power is positive) is greater than the setting threshold and the overpower active selects warning, the controller will issue a warning signal.
13	ECU Warning	When the controller receiveds the warning signal of engine by J1939, the controller will issue a warning signal.
14	RS232 Comm Failure	When multiple display modules are connected, if the RS232 interface displays the communication failure of display module, the controller will issue a warning signal. The LCD of display module on other CAN interfaces diplays a warning of RS232 communication failure.
15	Aux. Sensor Open	When controller detects that sensor is open and the open action selects warning, the controller will issue a warning signal.
16	Aux. Sensor High	When high warning enables and the controller detects that the sensor value is greater than the set value of upper limit, the controller will issue a warning signal.
17	Aux. Sensor Low	When low warning enables and the controller detects that the sensor value is lower than the set value of lower limit, the controller will issue a warning signal.
18	Reverse Power Warning	When reverse power detection enables and the controller detects that the reverse power value (power is negative) of genset is over than the set value, and the action tyepe of reverse power selects warning, the controller will issue a warning signal.
19	High Temp Warning	When controller detects that high temperature alarm is active and the enabled high temperature inhibits shutdown or the high temperature of input port inhibition is active, the controller will issue a warning alarm and the LCD displays the warning alarm of high temperature.
20	Gen Over Voltage	When controller detects that the genset voltage is over than the set value of over voltage, the controller will issue a warning signal.
21	Gen Under Voltage	When controller detects that the genset voltage is less than the set value of under voltage, the controller will issue a warning signal.
22	Gen Over Frequency	When controller detects that the genset frequency is over than the set value of over frequency, the controller will issue a warning signal.
23	Gen Under Frequency	When controller detects the genset frequency is less than the set value of under frequency, the controller will issue a warning signal

5.2 **TRIP ALARMS**

When controller detects that the signal of trip alarm, the controller will disconnect the gen close signal and the genset wil not stop.

Table 8 – Controller Trip Alarm

No.	Type	Description
1	Overcurrent Trip	When the action type of gen overcurrent is trip, and the controller detects that the genset current is over the set value, the controller will issue a trip signal.
2	Reverse Power Trip	When reverse power detection enables and the controller detects that the value of genset revers power (power is negative) is over the set value, and the action type of reverse power selects trip, the controller will issue a signal of trip.
3	Over Power Trip	When the action type of over power is trip and the controller detects that the value of genset power(power is positive) is over the set value, the controller will issue a signal of trip.
4	Input Port Trip	When the digital input selects user defined and the configuration is trip, the controller will issue a signal of input port trip after the input port is active.

5.3 **TRIP AND STOP ALARM**

When controller detects the signal of trip and alarm, the controller will open and stop immediately and display the alarm type.

Table 9- Controller Trip and Alarm

No.	Type	Description
1	Overcurrent Trip and Alarm	When the action type of Gen. overcurren is trip and alarm, and the controller detects that the genset current is over than the set value, the controller will issue a signal of trip and alarm.
2	Reverse Trip and Alarm	When reverse power detection enables, and controller detects that the reverse power (power is negative) of geset is over than the set value, and the action type of reverse power selects trip and alarm, the controller will issue a signal of trip and alarm.
3	Over Power Trip and Stop	When the action type of over power is trip and alarm, and the controller detects that the genset power (power is positive) is over than the set value, the controller will issue a signal of trip and alarm.
4	Input Port Trip and Alarm	When the digital input selects user defined and the configuration is trip and alarm, the controller will issue a signal of trip and alarm after the input port is active.

5.4 **SHUTDOWN ALARM**

When controller detects the signal of shutdown alarm, it will open and stop immediately, and displays the alarm type.

Table 10 - Shutdown Alarm

No.	Type	Description
1	EM. Stop	When controller detects the signal of emergency stop, it will send a signal of shutdown alarm and displays on LCD.
2	Over Speed	When controller detects that the genset speed is over than the set threshold value, it will send a signal of shutdown alarm and displays on LCD.
3	Under Speed	When controller detects that the genset speed is less than the set threshold value, it will send a signal of shutdown alarm and displays on LCD.
4	Loss of Speed Signal	When controller detects that the genset speed is 0 and the loss of speed delay is not 0, it will send a signal of shutdown alarm and displays on LCD.
5	Gen Over Voltage	When controller detects that the genset voltage is over than the set threshold value, it will send a signal of shutdown alarm and displays on LCD.
6	Gen Under Voltage	When controller detect that the genset voltage is less than the set threshold value, it will send a signal of shutdown alarm and displays on LCD.
7	Gen Overcurrent	When controller detects that the genset current is over than the set threshold value and not 0, it will send a signal of shutdown alarm and displays on LCD.
8	Start Failure	If the genset fails to start within the start times, the controller will send a signal of shutdown alarm and displays on LCD.
9	Gen Over Frequency	When controller detects that the genset frequency is over than the set threshold value, it will send a signal of shutdown alarm and displays on LCD.
10	Under Frequency	When controller detects that the genset frequency is less than the set threshold value, it will send a shutdown alarm and displays on LCD.
11	No Generation	When controller detects that the genset frequency is 0, it will send a signal of shutdown alarm and displays on LCD.
12	Maintenance Time Due	The maintenance type is running time. When the running time of the genset is greater than the maintenance time set by user, or the maintenance type is date, the current date exceeds the set date, and the maintenance action is set to stop, the controller will send a signal of shutdown alarm, and displays it on LCD. Setting maintenance parameters by maintenance password can reset the maintenance alarm.
13	Input Port Shutdown	When digital input selects user defined and the configuration is shutdown alarm, the controller will send a signal of shutdown alarm after the input port is active.
14	Over Power	When controller detect that the genset power value (power is positive)

No.	Type	Description
	Shutdown	is over than the set value and the action type selects shutdown alarm, it will send a signal of shutdown alarm.
15	Reverse Power Shutdown	When reverse power detection enables, the controller detects that the reverse power of gense (power is negative) is over than the set value, and the action type selects shutdown alarm, it wll send a signal of shutdown alarm.
16	ECU Shutdown	When controller receiveds the signal of shutdown alarm by J1939, it will send a shutdown alarm.
17	ECU Comm Failure Shutdown	When controller doesn't receive the data by J1939 after starting the engine, it will send a signal of communication failure shutdown alarm.
18	Aux. Sensor Open	When controller detects that the sensor is open and the action type selects shutdown alarm, it will send a shutdown alarm.
19	Aux. Sensor High Shutdown	When high shutdown alarm enables and the controller detects that the senseor value is greater than the setting value of upper limit, the controller will send a signal of shutdown alarm.
20	Aux. Sensor Low Shutdown	When low shutdown alarm enables and the controller detects that the senseor value is less than the setting value of lower limit, the controller will send a signal of shutdown alarm.
21	High Temp. Input	When controller detects that the high temperature alarm input is active, it wil send a signal of shutdown alarm and displays on LCD.
22	Low OP Input	When controller detects that the low oil pressure alarm input is active, it will send a signal of shutdown alarm and displays on LCD.

⚠Note: ECU warning and shutdown alarm instructions. If there are specific alarm contents, check the engine according to the content; otherwise, please refer to the engine manual for information according to the SPN alarm code.

6 WIRINGS

6.1 CHP150M CONTROLLER PANEL
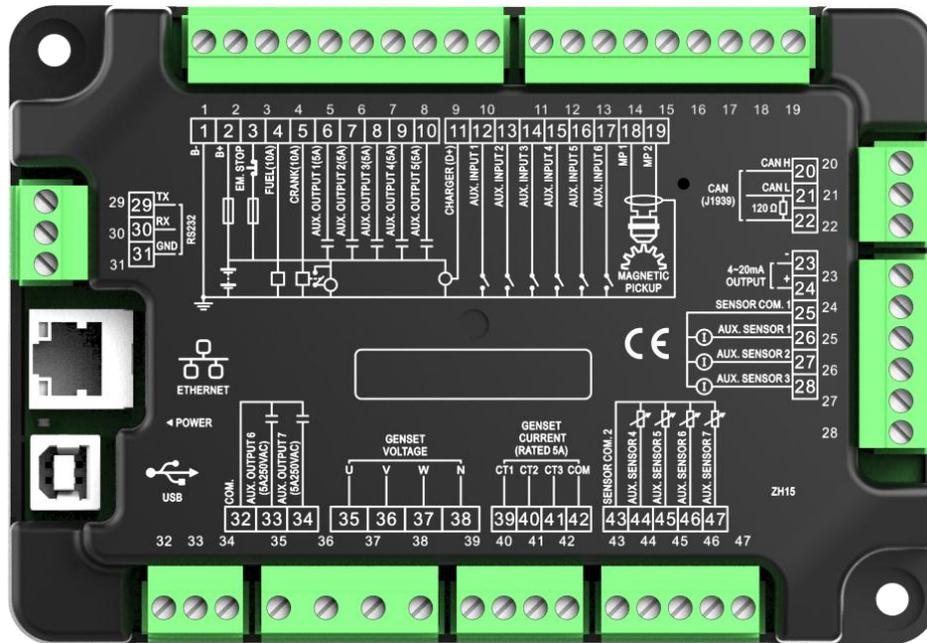
Fig.5- CHP150M Controller Panel

Table 11 – Terminal Descriptions

No.	Function	Cable Size	Remark	
1	B-	2.5mm^2	Connected with negative of starter battery.	
2	B+	2.5mm^2	Connected with positive of starter battery. If wire length is over 30m, better to double wires in parallel. Max. 20A fuse is recommended.	
3	Emergency Stop	2.5mm^2	Connected with B+ via emergency stop button.	
4	Fuel Relay	1.5mm^2	B+ is supplied by 3 points, rated 16A	
5	Starting Relay	1.5mm^2	B+ is supplied by 3 points, rated 16A. Connected to starter coil.	
6	Aux. Output 1	1.5mm^2	B+ is supplied by 2 points, rated 5A	Details see Table 14.
7	Aux. Output 2	1.5mm^2		
8	Aux. Output 3	1.5mm^2		
9	Aux. Output 4	1.5mm^2		
10	Aux. Output 5	1.5mm^2		
11	Charger (D+)	1.0mm^2	Connected with charger's D+ (WL) terminals. Be hanging up in the air if there is no this terminal.	
12	Aux. input 1	1.0mm^2	Grounded connection is active (B-)	Details see Table 15.
13	Aux. input 2	1.0mm^2	Grounded connection is active (B-)	

No.	Function		Cable Size	Remark	
14	Aux. input 3		1.0mm²	Grounded connection is active (B-)	
15	Aux. input 4		1.0mm²	Grounded connection is active (B-)	
16	Aux. input 5		1.0mm²	Grounded connection is active (B-)	
17	Aux. input 6		1.0mm²	Grounded connection is active (B-)	
18	Speed Sensro Input		0.5mm²	Connected with Speed sensor, shielding wire is recommended.	
19	Speed sensor input, the internal of controller has been connected to the battery negative.				
20	CAN	CAN H	0.5mm²	Impedance-120Ω shielding wire is recommended, its single-end connect with ground. Short connect Terminal 20 and Terminal 22 with 120Ω terminal resistor.	
21		CAN L	0.5mm²		
22		120Ω	0.5mm²		
23	4-20mA Output	4-20mA Output-	1.0mm²	(4-20)mA current output.	
24		4-20mA Output +	1.0mm²		
25	Sensor COM 1		1.0mm²	(4-20)mA current-type sensor common port.	
26	Aux. Sensor 1 Input		1.0mm²	Connect to a custom (4-20)mA current-type sensor.	Details see Table 16.
27	Aux. Sensor 2 Input		1.0mm²	Connect to a custom (4-20)mA current-type sensor.	
28	Aux. Sensor 3 Input		1.0mm²	Connect to a custom (4-20)mA current-type sensor.	
29	RS232	TX	0.5mm²	Connect to CHP150D module or monitoring system.	
30		RX	0.5mm²		
31		GND	0.5mm²		
32	Relay COM		1.5mm²	Common por of relay output.	
33	Aux. Output 6		1.5mm²	Relay normally open volts free contact, rated 5A, volts free output.	Details see Table 14.
34	Aux. Output 7		1.5mm²		
35	Gen-set U-phase voltage input		1.0mm²	Connected to gen-set U-phase (2A fuse is recommended).	
36	Gen-set V-phase voltage input		1.0mm²	Connected to gen-set V-phase (2A fuse is recommended).	
37	Gen-set W-phase voltage input		1.0mm²	Connected to gen-set W-phase (2A fuse is recommended).	

No.	Function	Cable Size	Remark	
38	Gen-set N-wire Input	1.0mm^2	Connected to gen-set N-phase (2A fuse is recommended).	
39	CT A-phase Input	1.5mm^2	Outside connected to secondary coil of current transformer (rated 5A)	
40	CT B-phase Input	1.5mm^2	Outside connected to secondary coil of current transformer (rated 5A)	
41	CT C-phase Input	1.5mm^2	Outside connected to secondary coil of current transformer (rated 5A)	
42	CT COM	1.5mm^2	Please see following section of 'AC input Installation'.	
43	Sensor COM2	1.0mm^2	Resistance-type sensor common port.	
44	Aux. Sensor 4 Input	1.0mm^2	Connect to resistance−type sensor.	Details see Table 16.
45	Aux. Sensor 5 Input	1.0mm^2	Connect to resistance−type sensor.	
46	Aux. Sensor 6 Input	1.0mm^2	Connect to resistance−type sensor.	
47	Aux. Sensor 7 Input	1.0mm^2	Connect to resistance−type sensor.	

⚠ Note 1: USB interface is parameter programming interface, which can use PC to program the controller.

⚠ Note 2: ETHERNET interface can be used as the parameter programming interface to use the PC to program the controller and also can be used as the communication interface or remote monitoring system with HMU8-CHP.

6.1.1 **CHP150D BACK PANEL**

Fig.6- CHP150D Back Panel

Table 12 – Terminal Connection Description

No.	Function		Cable Size	Remark
1	B-		1.0mm²	Connected with negative of starter battery.
2	B+		1.0mm²	Connected with positive of starter battery.
3	RS232	TX	0.5mm²	Connected with master control CHP150M module.
4		RX	0.5mm²	
5		GND	0.5mm²	
6	CAN	SCR	/	Reserved.
7		CANL	1.0mm²	
8		CANH	1.0mm²	

7 PROGRAMMABLE PARAMETER RANGE AND DEFINITION

7.1 THE PARAMETER OF CHP150 CONTROLLER

Table 13- Parameter Contents and Ranges

No.	Item	Range	Default	Description
01	Power-on Mode	(0~2)	0	0: Stop Mode; 1: Manual Mode; 2: Auto Mode.
02	Module Address	(1~254)	1	The communication addressof controller.
03	AC System	(0~3)	0	0: 3P4W; 1: 2P3W; 2: 1P2W; 3: 3P3W.
04	Password	(0~9999)	0318	Details see Table 3.
05	Start Interface	(0~1)	0	0: Disable; 1: Enable. Start interface delay also can be set.
06	RS232 Display Set	(0~1)	1	0: Communication failure displays disabled; 1: Communication failure displays enabled; Both control enable and communication failure warning enable can be set.
07	Gen Poles	(2~64)	4	The number of generator poles. This value can be used to calculate engine speed without speed sensor.
08	Gen Abnormal Delay	(0~20.0)s	10.0	Gen voltage high/low alarm delay.
09	Gen Over Volt. Threshold	(30~620)V	264	When Gen. voltage is over than this value and the set "Gen abnormal delay" continuous, it is considered as "High Gen Voltage" and sends a Gen abnormal shutdown alarm. When the voltage is set to 620V, the signal of high voltage is not detected.
10	Gen Under Volt. Threshold	(30~620)V	196	When sampling voltage is less than this value and the set "Gen Abnormal Delay" continuous, it is considered as "Low Gen Voltage" and sends a Gen abnormal shutdown alarm. When set to 30V, the signal of low voltage is not detected.
11	Gen Over Frequency Threshold	(0~75.0)Hz	57.0	When Gen. frequency is over than this value and lasts for 2s, it is considered as over frequency and sends a signal of shutdown alarm.
12	Gen Under Frequency	(0~75.0)Hz	45.0	When Gen. frequency is less than this

No.	Item	Range	Default	Description
	Threshold			value (not 0) and lasts for 10s, it is considered as under frequency and sends a signal of shutdown alarm.
13	Gen Over Volt. Warn Set	(30~620)V	253	When Gen. voltage is over than this value and lasts for 5s, it is considered as "High Gen Voltage" and sends an alarm of gen over voltage warning. When set to 620V, the signal of high voltage is not detected.
14	Gen Under Voltage Warn Set	(30~620)V	193	When sampling voltage is less than this value and lasts for 5s, it is considered as "Low Gen Voltage" and sends an alarm of gen under voltage warning. When set to 30V, the signal of low voltage is not detected.
15	Gen Over Frequency Warn Set	(0~75.0)Hz	55.0	When generator frequency is over than this value and lasts for 5s, it is considered as over frequency and sends a signal of Gen. over frequency warning.
16	Gen Under Frequency Warn Set	(0~75.0)Hz	42.0	When generator frequency is less than this value and lasts for 5s, it is considered as under frequency and sends a signal of Gen. under frequency alarm.
17	Start Delay	(0~3600)s	1	The time from remote start signal is active to the time when genset start.
18	Preheating Time	(0~300)s	0	Before the starter is powered on, the time for preheating the plug.
19	Cranking Time	(3~60)s	8	Each time the starter is powered on.
20	Cranking Rest Time	(3~60)s	10	When engine fails to start, the time to wait before the second power on begins.
21	Safety On Time	(1~60)s	10	During this time, low oil pressure, high water temperature, under speed, under frequency, under voltage, charging failure alarms are all inactive.
22	Start Idle Time	(0~3600)s	0	The idle running time of genset when starting up.
23	Warming Up Time	(0~3600)s	10	The time required to warm up the generator after it enters high speed running before closing.
24	Stop Delay	(0~3600)s	1	Time from inactive remote start signal to unit shutdown.
25	Cooling Time	(3~3600)s	10	After the genset is unloaded, the time required for cooling down before shutdown.
26	Stop Idle Time	(0~3600)s	0	Idle running time of genset during stop.

No.	Item	Range	Default	Description
27	ETS Solenoid Hold	(0~120)s	20	When to stop, the power-on time of the electromagnet solenoid.
28	Fail to Stop Delay	(0~120)s	0	When "ETS Solenoid Hold Output Time" is set to 0s, the required time from the end of idle delay to stop; when "ETS Solenoid Hold Output Time" is not 0s, the required time from the end of ETS solenoid hold delay to stop.
29	Engine Type	(0~39)	0	The default is non-ECU.
30	Flywheel Teeth	(10.0~300.0)	118.0	Tooth number of the engine, for judging of starter separation conditions and detecting of engine speed. See Table 4 for the description of configuration interface.
31	Under Speed Shutdown	(0~6000)RPM	1200	When engine speed is below this value and lasts for 10s, it is considered as under speed and sends a signal of shutdown alarm.
32	Over Speed Shutdown	(0~6000)RPM	1710	When engine speed is above this value and lasts for 2s, it is considered as over speed and sends a signal of shutdown alarm.
33	Loss of Speed Signal Delay	(0~20.0)s	5.0	When speed signal is lost and shutdown delays, if set to 0s, it will warns only but without stop.
34	Charging Failure Volt. Difference	(0~30)V	6.0	During the normal running of the genset, when the voltage difference between B+ and charger D+(WL) is greater than this value and lasts for 5s, it will send a shutdown alarm of charging failure.
35	Battery Volt. High Threshold	(12~40)V	33.0	When battery voltage is over than this value and lasts for 20s, it will send a signal of votage abnormal. This value only warn not stop.
36	Battery Volt. Low Threshold	(4~30)V	8.0	When battery voltage is less than this value and lasts for 20s, it will send a signal of votage abnormal. This value only warn not stop.
37	Start Attempts	(1~10)times	3	The max. attempts an engine starts when starting fails. When the set starting time is reached, the controller will send a signal of starting failure.
38	Crank Disconnect	(0~6)	2	The conditions of disconnecting starter with engine. The conditions are

No.	Item	Range	Default	Description
				generation, magnetic sensor and oil pressure, the purpose is to make the starter motor and engine separate as soon as possible. Details see Table 18.
39	Crank Disconnect Speed	(0~3000)RPM	360	When the engine speed is over this value, it is considered as crank disconnect and the starter will be sperated.
40	Crank Disconnect Frequency	(0~30)Hz	14	If the generator frequency is over this value during starting process, it is considered as unit crank disconnect and the starter will be separated.
41	Crank Disconnect OP	(0~400)kPa	200	If the oil pressure of the engine is greater than this value during starting process, it is considered as unit crank disconnect and the starter will be separated.
42	Crank Disconnect OP Delay	(0~20.0)s	0.0s	When the crank disconnect conditions include oil pressure and it is greater than the setting value and the delay is also longer than the setting value, it is considered as unit crank disconnect , the starter will be separated.
43	CT Ratio	(5~6000)/5	500	The ratio of external current transformer.
44	Full-load Current	(5~6000)A	500	It indicates the rated current of generator and it is used for calculating the over current of load.
45	Overcurrent Percentage	(50~130)%	120	When the load current is over than this percentage, the overcurrent delay begins.
46	Overcurrent Delay	(0~3600)s	30	Definite time overcurrent delay value. When the load current is over than the setting value and continuous to the setting time, it is considered as overcurrent. When the delay time is set to 0s, it will only warn but not stop.
47	Over Power Set	(0~4)	1	0: Inactive 1: Warn 2: Shutdown Alarm 3: Trip and Stop 4: Trip When the power is over than the seting value and the duration is longer than the delay value, the over power alarm is active.The return value and delay value can also be set.
48	Reverse Power Set	(0~4)	0	0: Inactive 1: Warn 2: Shutdown Alarm 3: Trip and Stop 4: Trip

No.	Item	Range	Default	Description
				When the power is negative, it is over than the setting value and the duration is longer than the delay value, the reverse power alarm is active. The return value and delay value can also be set.
49	Switch Close Delay	(0~10)s	5.0	The width of the mains and generation closing pulses, when it is 0s, indicating continuous output.
50	Sensor 1 Set	(0~11)	1	Sensor position (see Table 16), sensor curve (see Table 17) and sensor open action can be set.
51	Sensor 1 High Alarm	(0~3)	2	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is high and greater than the setting value, the duration is longer than the delay value, the high alarm is active. The return value and delay value can also be set.
52	Sensor 1 Low Alarm	(0~3)	3	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is low and less than the setting value, the duration is longer than the delay value, the low alarm is active. The return value and delay value can also be set.
53	Sensor 2 Set	(0~11)	2	Sensor position (see Table 16), sensor curve (see Table 17) and sensor open action can be set.
54	Sensor 2 High Alarm	(0~3)	0	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is high and greater than the setting value, the duration is longer than the delay value, the high alarm is active. The return value and delay value can also be set.
55	Sensor 2 Low Alarm	(0~3)	1	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is low and less than the setting value, the duration is longer than the delay value, the low alarm is active. The return value and delay value can also be set.
56	Sensor 3 Set	(0~11)	3	Sensor position (see Table 16), sensor curve (see Table 17) and sensor open action can be set.

No.	Item	Range	Default	Description
57	Sensor 3 High Alarm	(0~3)	2	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is high and greater than the setting value, the duration is longer than the delay value, the high alarm is active. The return value and delay value can also be set.
58	Sensor 3 Low Alarm	(0~3)	3	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is low and less than the setting value, the duration is longer than the delay value, the low alarm is active. The return value and delay value can also be set.
59	Sensor 4 Set	(0~11)	4	Sensor position (see Table 16), sensor curve (see Table 17) and sensor open action can be set.
60	Sensor 4 High Alarm	(0~3)	0	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is high and greater than the setting value, the duration is longer than the delay value, the high alarm is active. The return value and delay value can also be set.
61	Sensor 4 Low Alarm	(0~3)	1	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is low and less than the setting value, the duration is longer than the delay value, the low alarm is active. The return value and delay value can also be set.
62	Sensor 5 Set	(0~11)	5	Sensor position (see Table 16), sensor curve (see Table 17) and sensor open action can be set.
63	Sensor 5 High Alarm	(0~3)	2	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is high and greater than the setting value, the duration is longer than the delay value, the high alarm is active. The return value and delay value can also be set.
64	Sensor 5 High Alarm	(0~3)	3	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is low and less than the setting value, the

No.	Item	Range	Default	Description
				duration is longer than the delay value, the low alarm is active. The return value and delay value can also be set.
65	Sensor 6 Set	(0~11)	6	Sensor position (see Table 16), sensor curve (see Table 17) and sensor open action can be set.
66	Sensor 6 High Alarm	(0~3)	2	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is high and greater than the setting value, the duration is longer than the delay value, the high alarm is active. The return value and delay value can also be set.
67	Sensor 6 Low Alarm	(0~3)	3	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is low and less than the setting value, the duration is longer than the delay value, the low alarm is active. The return value and delay value can also be set.
68	Sensor 7Set	(0~11)	7	Sensor position (see Table 16), sensor curve (see Table 17) and sensor open action can be set.
69	Sensor 7 High Alarm	(0~3)	0	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is high and greater than the setting value, the duration is longer than the delay value, the high alarm is active. The return value and delay value can also be set.
70	Sensor 7 Low Alarm	(0~3)	1	0: Not Used 1: Warn 2: Shutdown 3: Warn + Shutdown When the measured value of the sensor is low and less than the setting value, the duration is longer than the delay value, the low alarm is active. The return value and delay value can also be set.
71	Aux. Input 1	(0~31)	1	Factory default: High temperature alarm input. See Table 15.
72	Aux. Input 1 Delay	(0~20.0)s	2.0	The active delay time of input port.
73	Aux. Input 2	(0~31)	2	Factory default: Low oil pressure alarm input. See Table 15.
74	Aux. Input 2 Delay	(0~20.0)s	2.0	The active delay time of input port.
75	Aux. Input 3	(0~31)	10	Factory default: Remote start input. See

No.	Item	Range	Default	Description
				Table 15.
76	Aux. Input 3 Delay	(0~20.0)s	2.0	The active delay time of input port.
77	Aux. Input 4	(0~31)	11	Factory default: Low fuel level warning input. See Table 15.
78	Aux. Input 4 Delay	(0~20.0)s	2.0	The active delay time of input port.
79	Aux. Input 5	(0~31)	12	Factory default: Low coolant level warning input. See Table 15.
80	Aux. Input 5 Delay	(0~20.0)s	2.0	The active delay time of input port.
81	Aux. Input 6	(0~31)	0	Factory default: User defined. See Table 15.
82	Aux. Input 6 Delay	(0~20.0)s	2.0	The active delay time of input port.
83	Aux. Output 1	(0~118)	2	Factory default: ETS control. See Table 14.
84	Aux. Output 2	(0~118)	3	Factory default: Idle speed control. See Table 14.
85	Aux. Output 3	(0~118)	5	Factory default: Gen closed. See Table 14.
86	Aux. Output 4	(0~118)	6	Factory default: Reserved. See Table 14.
87	Aux. Output 5	(0~118)	7	Factory default: Gen open. See Table 14.
88	Aux. Output 6	(0~118)	0	Factory default: Not used. See Table 14.
89	Aux. Output 7	(0~118)	0	Factory default: Not used. See Table 14.
90	4~20mA Output Set	Factory default feedback parameter: Sensor 1; Factory default target: 10; Factory default inverted output: disable; Factory default manual test: disable.		
91	4~20mA Range Set	Factory default lower limit: 4 mA; Factory default upper limit: 20mA.		
92	4~20mA SW1 Set	(4~20.0)mA	10.0	Set the center point value of the 4-20mA output.
93	44~20mA PI Parameter Set	(0~500)%	P:10% I:2%	Set the gain and stability of the 4-20mA output.
94	High Temp. Stop Inhibit Selection	(0~1)	0	Factory default: when the temperature is high, it will stop and alrm. Functions see Note 1.
95	Low OP Stop Inhibit Selection	(0~1)	0	Factory default: when the oil pressure i slow, it will stop and alrm. Functions see Note 2.
96	Fuel Pump Open Threshold	(0~100)%	25	When the fuel level is less than the set value and lasts for 10s, it will output the fuel pump open signal.
97	Fuel Pump Close Threshold	(0~100)%	80	When the fuel level is higher than the set value and lasts for 10s, it will output the fuel pump closed signal.

No.	Item	Range	Default	Description
98	Fuel Pump Max. Output Time	(0~3600)min	60	The longest continuous output time of the fuel pump.
99	Custom Sensor Curve	(1~7)	1	1 Sensor 1; 2 Sensor 2; 3 Sensor 3; 4 Sensor 4; 5 Sensor 5; 6 Sensor 6; 7 Sensor 7. Select the sensor to be set, and then input the resistance value (or current or voltage) and the corresponding value at each point of the curve. Eight points are required.
100	Scheduled Run Set	(0~1)	0	0: Disable; 1: Enable
101	Scheduled Cycle Run Set	(0~1)	0	Cycle conditions: monthly /weekly / daily are optional. Start time and duration can be set.
102	Auto Start Inhibit Set	(0~1)	0	0: Disable; 1: Enable
103	Auto Cycle Start Inhibit	(0~2)	0	Cycle conditions: monthly /weekly / daily are optional. Not start time and duration can be set.
104	Cycle Start Enable	(0~1)	0	0: Disable; 1: Enable
105	Host/Standby Selection	(0~1)	0	0: Standby; 1: Host
106	Cycle Time Enable	(0~1)	0	0: Disable; 1: Enable
107	Host Running Time	(0~1440)min	720	Set the host running time when the host/standby cycle start.
108	Standby Running Time	(0~1440)min	720	Set the standby running time when the host/standby cycle start.
109	Maintenance Password Set	(0~9999)	0	Password for entering the maintenance configuration item.
110	Date Set	Set the date of the controller.		
111	SPN Alarm Version	(0~3)	0	Alarm Version 1
112	Inlet Valve Set	The factory default feedback parameter: sensor 1; The factory default target: 70.		
113	Inlet Valve PID	The inlet valve response, stability, gain and dead band can be set separately.		
114	Water Supply Valve Set	The factory default feedback parameter: sensor 2; The factory default target: 75.		
115	Water Supply Valve PID	The inlet valve response, stability, gain and dead band can be set separately.		
116	Gas Engine Timer	(0~1)	0	0: Disable; 1: Enable. Enable or disable the gas enriched time, gas opening delay, and gas closing delay.
117	Gas Enriched Time	(0~60)s	0	Set the gas enriched time at the starting stage of the unit.

No.	Item	Range	Default	Description
118	Gas Open Delay	(0~60)s	0	Set the gas open delay time at the starting stage of the unit.
119	Gas Close Delay	(0~60)s	0	Set the gas closing time at the starting stage of the unit.

Note 1: If set the parameter items as high temperature inhibit stop, or set the Aux. inputs as high temperature inhibit stop input and the input ports are active, when the temperature is higher than the set high temperature shutdown value or high temperature alarm input signal is active, the controller will send a signal of high temperature warning but not stop.

Note 2: If set the parameter items as low oil pressure inhibit stop, or set the Aux. inputs as low oil pressure inhibit stop input and the input ports are active, when the oil pressure is less than the set low oil pressure shutdown value or low oil pressure alarm input signal is active, the controller will send a signal of low oil pressure but not stop.

Note 3: When set the parameter items through the PC software, the default password (0318) is not changed and doesn't need to be entered. If the password change is written into the parameter configuration through PC software for the first time, the password of the module needs to be written into the password input window.

Note 4: In the configuration interface of flywheel teeth, set the state of the number and the frequency is greater than 20Hz. Press the start button to automatically calculate the number of the teeth number, press the confirm button to change the teeth number.
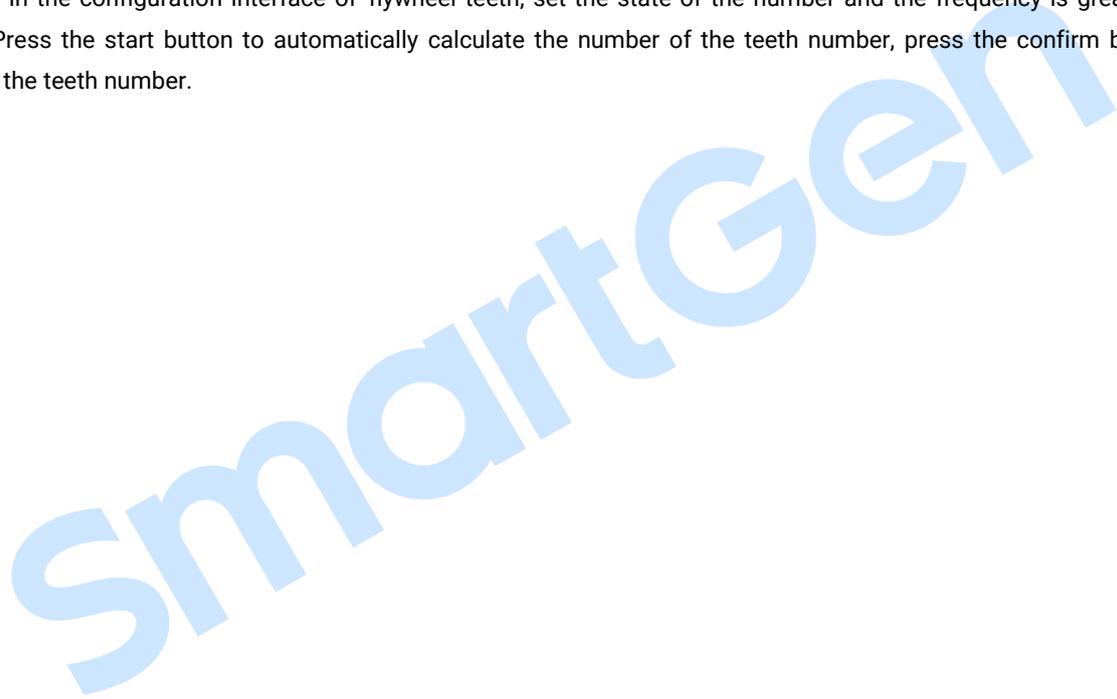
Table 14- Defined Contents of Programmable Output Ports

No.	Item	Description
00	Not Used	When this item is selected, it will not output.
01	Common Alarm	Including all the shutdown alarms and warning alarms. When only warning alarm inputs, the alarm will not self-lock. When shutdown alarm occurs, the alarm will self-lock until the alarm is reset.
02	ETS Solenoid Hold	Used for some oil machines with stop electromagnets to pick up when the stop idle ends. Disconnect when the set "ETS Solenoid Hold " ends.
03	Idle Speed Control	For some idle speed machine, it will pick up during start and disconnect when entering high-speed warming up; pick up during stop idle process and disconnect when unit stops.
04	Preheating Control	Close before starting up, disconnect before the starter is powered on..
05	Gen Closed	It can control the Gen switch onload.
06	Reserved	
07	Open	It can control the switch unload.
08	Speed-up Control	Act in high-speed warming up running period.
09	Speed-down Control	Act in stop idle-wait for stop running period.
10	Unit Running Output	Output after the normal running of the unit and disconncect when the speed is less than the crank disconnect speed.
11	Fuel Pump Output	A level sensor located at the fuel level position cooperates with the upper and lower limits set by the fuel pump to control its action.
12	High-speed Control	Act when the unit is normal running and high-speed cooling.
13	System in Auto Mode	Act when the system is in auto mode.
14	Shutdown Alarm	Act when there is a shutdown alarm.
15	Audible Alarm	Act when warns and stops. External alarm can be connected, when the aux. input "Alarm Mute" is active, the output can be inhibited.
16	Coolant Heating Control	A temperature sensor located at the outlet temperature position cooperates with the upper and lower limites of the heating control to control its action.
17	Fuel Output	Act when generator starts and disconnects when ETS solenoid hold.
18	Start Output	Output during start delay process and disconnect after crank disconnect.
19	ECU Stop	Suitable for engines that support ECU to control ECU shutdown.
20	ECU Power	Suitable for engines that support ECU to contro ECU power.
21	ECU Warning Alarm	Indicates that ECU sends a signal of warning alarm.
22	ECU Shutdown Alarm	Indicates that ECU sends a signal of shutdwon alarm.
23	ECU Comm Failure	When engine type is ECU, the engine will act duiring start idle-stop idle running and doesn't receive the speed signal.
24	Gas Valve Control	Act when generator starts and disconnect when ETS solenoid hold.
25	Reserved	

No.	Item	Description
26	Reserved	
27	Gas Enriched Control	Act during start delay process and within gas enriched time period.
28	Ignition control	Act when generator starts and disconnect after ETS solenoid hold delay and gas closed.
29	Reserved	
30	Customize Time Output 1	Details see customized period output.
31	Customize Time Output 2	
32	Customize Time Output 3	
33	Customize Time Output 4	
34	Customize Time Output 5	
35	Customize Time Output 6	
36	Custom Combination Output 1	Details see customized combination output.
37	Custom Combination Output 2	
38	Custom Combination Output 3	
39	Custom Combination Output 4	
40	Custom Combination Output 5	
41	Custom Combination Output 6	
42	Water Inlet Valve Open	Act when it controls the inlet water valve open.
43	Water Inlet Valve Close	Act when it controls the inlet water valve closed.
44	Water Supply Valve Open	Act when it controls water supply valve open.
45	Water Supply Valve Close	Act when it controls water supply valve closed.
46	Reserved	
47	Reserved	
48	Reserved	
49	Cooler Control	A temperature sensor located at the outlet temperature position cooperates with the upper and lower limites of the cooler control to control its action.

No.	Item	Description
50	Common Trip and Stop Alarm	Act when common trip and stop alarms.
51	Common Trip Alarm	Act when common trip alarms.
52	Common Warning Alarm	Act when common warning alarms.
53	Reserved	
54	Battery Volt. High	Act when the high warning of battery voltage alarms.
55	Battery Volt.Low	Act when the low warning of battery voltage alarms.
56	Reserved	
57	E.M Stop Alarm	Act when emergency stop alarms.
58	Start Failure Alarm	Act when start failure alarms.
59	Shutdown Failure Warning	Act when shutdown failure alarms.
60	Under Speed Shutdown	Act when under speed shutdown of the engine alarms.
61	Over Speed Shutdown Alarm	Act when over speed shutdown of the engine alarms.
62	Reserved	
63	Gen Over Frequency Shutdown Alarm	Act when Gen over frequency shutdown alarms.
64	Gen Over Voltage Shutdown	Act when Gen over voltage shutdown alarms.
65	Gen Under Frequency Shutdwon	Act when Gen under frequency shutdown alarms.
66	Gen Under Frequency Shutdown	Act when Gen under voltage shutdown alarms.
67	Reserved	
68	Over Pwer Alarm	When controller detects that the Gen over power occurs.
69	Reserved	
70	Reverse Power Alarm	When controller detects that the Gen reverse power occurs.
71	Over Current Alarm	Act when over current occurs.
72	Reserved	
73	Sensor 1 High Warning	Act when sensor 1 high warns.
74	Sensor 1 Low Warning	Act when sensor 1 Low warns.
75	Sensor 1 High Shutdown	Act when sensor 1 high shutdown occurs.
76	Sensor 1 Low Shutdown	Act when sensor 1 low shutdown occurs.
77	Sensor 1 Open	Act when sensor 1 open occurs.

No.	Item	Description
78	Sensor 2 High Warning	Act when sensor 2 high warns.
79	Sensor 2 Low Warning	Act when sensor 2 Low warns.
80	Sensor 2 High Shutdown	Act when sensor 2 high shutdown occurs.
81	Sensor 2 Low Shutdown	Act when sensor 2 low shutdown occurs.
82	Sensor 2 Open	Act when sensor 2 open occurs.
83	Sensor 3 High Warning	Act when sensor 3 high warns.
84	Sensor 3 Low Warning	Act when sensor 3 Low warns.
85	Sensor 3 High Shutdown	Act when sensor 3 high shutdown occurs.
86	Sensor 3 Low Shutdown	Act when sensor 3 low shutdown occurs.
87	Sensor 3 Open	Act when sensor 3 open occurs.
88	Reserved	
89	System in Stop Mode	Act when system is in stop mode.
90	System in Manual Mode	Act when system is in manual mode.
91	Reserved	
92	Reserved	
93	Input 1 Active	Act when input 1 is active.
94	Input 2 Active	Act when input 2 is active.
95	Input 3 Active	Act when input 3 is active.
96	Input 4 Active	Act when input 4 is active.
97	Input 5 Active	Act when input 5 is active.
98	Input 6 Active	Act when input 6 is active.
99	Sensor 4 High Warning	Act when sensor 4 high warns.
100	Sensor 4 Low Warning	Act when sensor 4 low warns.
101	Sensor 4 High Shutdown	Act when sensor 4 high shutdown occurs.
102	Sensor 4 Low Shutdown	Act when sensor 4 low shutdown occurs.
103	Sensor 4 Open	Act when sensor 4 open occurs.
104	Sensor 5 High Warning	Act when sensor 5 high warns.

No.	Item	Description
105	Sensor 5 Low Warning	Act when sensor 5 low warns.
106	Sensor 5 High Shutdown	Act when sensor 5 high shutdown occurs.
107	Sensor 5 Low Shutdown	Act when sensor 5 low shutdown occurs.
108	Sensor 5 Open	Act when sensor 5 open occurs.
109	Sensor 6 High Warning	Act when sensor 6 high warns.
110	Sensor 6 Low Warning	Act when sensor 6 low warns.
111	Sensor 6 High Shutdown	Act when sensor 6 high shutdown occurs.
112	Sensor 6 Low Shutdown	Act when sensor 6 low shutdown occurs.
113	Sensor 6 Open	Act when sensor 6 open occurs.
114	Sensor 7High Warning	Act when sensor 7 high warns.
115	Sensor 7 Low Warning	Act when sensor 7 low warns.
116	Sensor 7 High Shutdown	Act when sensor 7 high shutdown occurs.
117	Sensor 7 Low Shutdown	Act when sensor 7 low shutdown occurs.
118	Sensor 7 Open	Act when sensor 7 open occurs.

7.2 DEFINED PERIOD OUTPUT

Defined period output is composed by 2 parts, period output S1 and condition output S2.

While S1 and S2 are **TRUE** synchronously, OUTPUT;

While S1 or S2 is **FALSE**, NOT OUTPUT.

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

Condition output S2, can set as any conditions in output ports.

⚠**NOTE:** when delay time and output time both are 0 in period output S1, it is **TRUE** in this period.

Example,

Output period: start

Delay output time: 2s

Output time: 3s

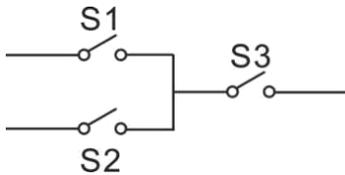Condition output contents: output port 1 is active

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

Input port 1 active, after enter "starts time" and delay 2s, this defined period output is outputting, after 3s, stop outputting;

Input port 1 inactive, defined output period is not outputting.

7.3 DEFINED COMBINATION OUTPUT

Defined combination output is composed by 3 parts, OR condition output S1, S2, AND condition output S3.

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

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

⚠**NOTE:** S1, S2, S3 can be set as any contents except for "defined combination output" in the output setting.

⚠**NOTE:** 3 parts of defined combination output (S1, S2, S3) couldn't include or recursively include themselves.

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, defined combination output is outputting; If input port 3 inactive, defined combination output is not outputting;

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

Table 15 Defined Contents of Programmable Input Ports (1~6)(All GND(B-)Connected Active)

No.	Item	Description
0	User-defined	Including following functions: Indication: indication only, no warning or shutdown. Warning: warning only, not shutdown. Shutdown: alarms and shuts down immediately Trip and stop: alarms, generator unloads and shuts down after high-speed cooling Trip: alarms, generator unloads but not shut down. Never: input inactive. Always: input is active all the time. From crank: detecting as soon as start. From safety on: detecting after safety on run delay.
1	High Temp. Input	After the safety on running delay ends, if this signal is active, the genset will alarm and stop immediately.
2	Low OP Alarm Input	
3	External Warning Input	If this signal is active, it will only warn but not stop.
4	External Shutdown Alarm Input	If this signal is active, the genset will alarm and stop immediately.
5	High Temp. Cooling Shutdown	When this signal is active and the unit is normal running, if the high temperature occurs, the controller will stop after high-speed cooling down; when this signal is inactive, if the high temperature occurs, the controller will stop with high-speed.
6	Gen Closed Status Input	Connec to the auxiliary point on the Gen's load switch.
7	Reserved	
8	High Temp. Shutdown Inhibit	If this signal is active, the high temperature shutdown is inhibited.See 'Parameter Configuration Note 2'.
9	Low OP Shutdown Inhibit	If this signal is active, the low oil pressure shutdown is inhibited. See 'Parameter Configuration Note 3'.
10	Remote Start Input	In auto mode, when input is active, it can automatically start the genset and the generator will be loaded after normal running. When input is inactive, it can automatically stop the genset.
11	Low Fuel Level Warning Input	Connect to the digital input of sensor, the controller will send a warning alarm when the input is active.
12	Low Coolant Warning Input	
13	Low Fuel Level Shutdown Input	Connect to the digital input of sensor, the controller will send a shutdown alarm when the input is active.
14	Low Coolant Level Shutdown Input	
15	Auto Start Inhibit	In auto mode, if this signal is active, no matter whether the mains is abnormal, the genset will not start. If the genset has been running normally, the genset will not stop. When this signal is inactive, the genset will automatically start or stop according to whether the mains is abnormal or not.

No.	Item	Description
16	Reserved	
17	Charging Failure Warning	Output when charging failure alarms.
18	Reserved	
19	Alarm Mute	When it is active, it can inhibit the "Audible Alarm" output of the configuration.
20	Idle Speed Mode	It will not protect under voltage/frequency/speed.
21	60Hz Active	It is used for ECU with CANBUS and active when it is 60Hz.
22	Speed-up Pulse Input	It is used for ECU with GTSC1, the engine speed will increase 50r when input is active.
23	Speed-down Pulse Input	It is used for ECU with GTSC1, the engine speed will decrease 50r when input is active.
24	Manual Forced Start	Forced to start the genset when it is active.
25	Battle Mode	All the shutdown alarms are inhibited except for emergency stop.
26	Watet Inlet Valve Closed	All water inlet valves are closed.
27	Instrument Mode	All the outputs are inhibited in this mode.
28	RS2321 Control Enabled	If the input port is configured this function, the CHP150D only displays the function but does not control the input when the input is inactive.
29	Water Inlet Vlve Open	All water inlet valves are open.
30	Water Supply Valve Closed	All water supply valves are closed.
31	Water Supply Valve Open	All water supply valves are open.

Table 16- Sensor Position (Number)

No.	Description
00	Not defined.
01	High temperature Water Inlet Temperature
02	Inlet Pressure
03	Outlet Pressure
04	Water Supply Temperature
05	Water Supply Pressure
06	Water Supply Flow
07	Return Water Temperature
08	Oil Pressure
09	Gas Pressure
10	Fuel Level
11	Water Level

Table 17- Sensor Curve

No.	Item	Content	Remark
0	Temperature Sensor	00 ECU 01 Custom Res Curve 02 VDO 03 SGH 04 SGD 05 CURTIS 06 DATCON 07 VOLVO-EC 08 SGX 09 Custom 4-20mA curve 10 Custom 0-5V 11 Digital Closed 12 Digital Open	Defined resistance's range is 0~1KΩ.
1	Pressure Sensor	00 ECU 01Custom Res Curve 02 VDO 03 SGH 04 SGD 05 CURTIS 06 DATCON 07 VOLVO-EC 08 SGX 09 Custom 4-20mA curve 10 Custom 0-5V 11 Digital Closed 12 Digital Open	Defined resistance's range is 0~1KΩ.
2	Level and Flow Senosr	00 ECU 01 Custom Res Curve 02 SGH 03 SGD 04 Custom 4-20mA curve 05 Custom 0-5V 06 Digital Closed 07 Digital Open	Defined resistance's range is 0~1KΩ.

Table 18- Crank Disconnect Conditions Selection

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

1) There are 3 conditions to make starter disconnect with engine, that is, speed, frequency and oil pressure. They all can be used separately. We recommend that oil pressure should be used with speed and frequency together, in order to make the starter motor separate with engine immediately and can check crank disconnect exactly.

2) Speed sensor is the magnetic equipment which be installed in starter for detecting flywheel teeth.

3) When select to speed sensor, must ensure that the number of flywheel teeth is as same as setting, otherwise, "over speed stop" or "under speed stop" may be caused.

4) If genset is without magnetic sensor, please don't select corresponding items, otherwise, "start fail" or "loss of speed signal" maybe caused.

5) If genset is without oil pressure sensor, please don't select corresponding items.

6) If not select generator in crank disconnect setting, controller will not collect and display the relative power quantity (can be used in water pump set); if not select magnetic sensor in crank disconnect setting, the speed displayed in controller is calculated by generator signal.

8 PARAMETER SETTING

After the controller is powered on, press ⚙/OK to enter the parameter setting menu and the items of the menu are:

1. Controller Parameter
2. Controller Information
3. Language
4. Event Log
5. Display Module Type
6. Maintenance Setting

◆ **PARAMETER SETTING OF CONTROLLER**

When entering the password, input "0318" to set all items in Table 10. After the default password (0318) is changed, you need to enter the same password as the controller to set parameters through the PC software. When more items need to be set or if you forget the password, such as voltage and current calibration, please contact the manufacturer.

NOTES:

1) Please change the controller parameters when generator is in standby mode only (e. g. Start conditions selection, configurable input, configurable output, various delay), otherwise, alarming to stop and other abnormal conditions may occur.

2) Over voltage threshold value must be over than under voltage threshold value in case that the circumstances of too high as well as too low will happen.

3) Over speed threshold value must be over than the under speed value in case that the circumstances of too high as well as too low will happen.

4) Please set the generator frequency value as low as possible when cranking, in order to make the starter be separated quickly as soon as crank disconnect.

5) Configurable input could not be set as same items; otherwise, there are abnormal functions. However, the configurable output can be set as same items.

6) When the temperature is too high, cool it down and then shut down. Please set the option of "High Temperature Cooling" at any programmable input port, and then ground the port; or set the high temperature stop act as: stop.

◆ **CONTROLLER INFORMATION**

1) This interface can display the development information of the controller, such as software version and release date.

⚠Note: Press ▼ on this interface can display the status of digital input ports and output ports.

2) Language Selection
The languages of Chinese, English, and Spanish are displayed on this interface.

3) LCD Contrast Adjustment

Press ⚙/OK and ▲ or ⚙/OK and ▼ simultaneously to adjust the LCD contrast to make the LCD character display clearly. The contrast adjustment range is 0~7.

9 SENSOR SETTING

1) When reselect sensors, the sensor curve will be transferred into the standard value. For example, if temperature sensor is SGH (120°C resistor type), its sensor curve is SGH (120°C resistor type); if select the SGD (120°C resistor type), the temperature sensor curve is SGD curve.

2) When there is difference between standard sensor curves and using sensor, user can select "Custom Sensor" and then input the "Custom Sensor Curve".

3) When input the sensor curve, X value (resistor) must be input from small to large, otherwise, mistake occurs.

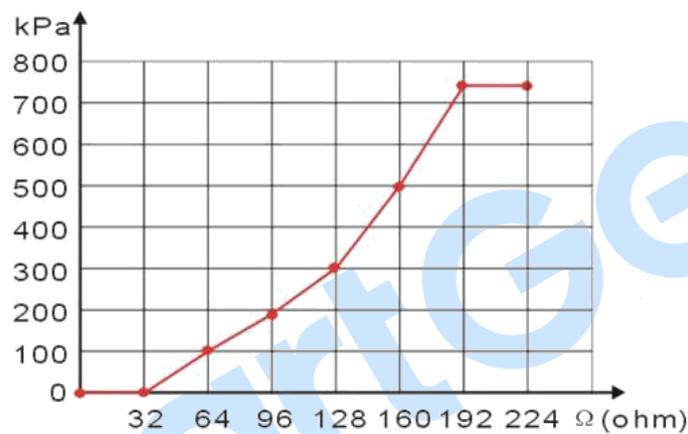4) The headmost or backmost values in the vertical coordinates can be set as same as below,

Fig.7- Sensor Curve

Table 19 - Normal Pressure Unit Conversion Form

	N/m^2 (Pa)	kgf/cm^2	bar	psi
1Pa	1	1.02×10^{-5}	1×10^{-5}	1.45×10^{-4}
1kgf/cm^2	9.8×10^4	1	0.98	14.2
1bar	1×10^5	1.02	1	14.5
1psi	6.89×10^3	7.03×10^{-2}	6.89×10^{-2}	1

10 COMMISSIONING

Before operation, the following checking should be carried out:

1) Check and ensure all the connections are correct and wires diameter is suitable;

2) The DC power supply is equipped with fuse, the positive and negative of the fuse connected to the starting battery are not correct incorrectly;

3) Emergence stop input must be connected to positive of starting battery via normally close contact of emergency stop;

4) Take proper actions to prevent engine to disconnect crank (e. g. Remove the connections of fuel value). If checking is OK, connect start battery, select Manual Mode, controller will execute the program;

5) Set controller as Manual Mode, press "start" button to start genset. If failed within the setting crank times, controller will send "Failed to Start" signal; then press "stop" to reset controller;

6) Recover actions of preventing engine to disconnect crank (e. g. Connect wire of fuel value), press "start" button again, genset will start. If everything goes well, genset will normal run after idle running (if configured). During this period, watch for engine's running situations and voltage and frequency of alternator. If there is abnormal, stop genset and check all connections according to this manual;

7) Select the Auto Mode from front panel, connect to mains signal. After the mains normal delay, controller will transfer ATS (if configured) into mains load. After cooling, controller will stop genset and into standby state until mains abnormal again;

8) When mains abnormal again, genset will start automatically and into normal running, send signal to make gens close, transfer ATS and make genset take load. If it not likes this, please check connections of ATS according to this manual;

9) If there are any other questions, please contact Smartgen's service.

11   TYPICAL APPLICATION
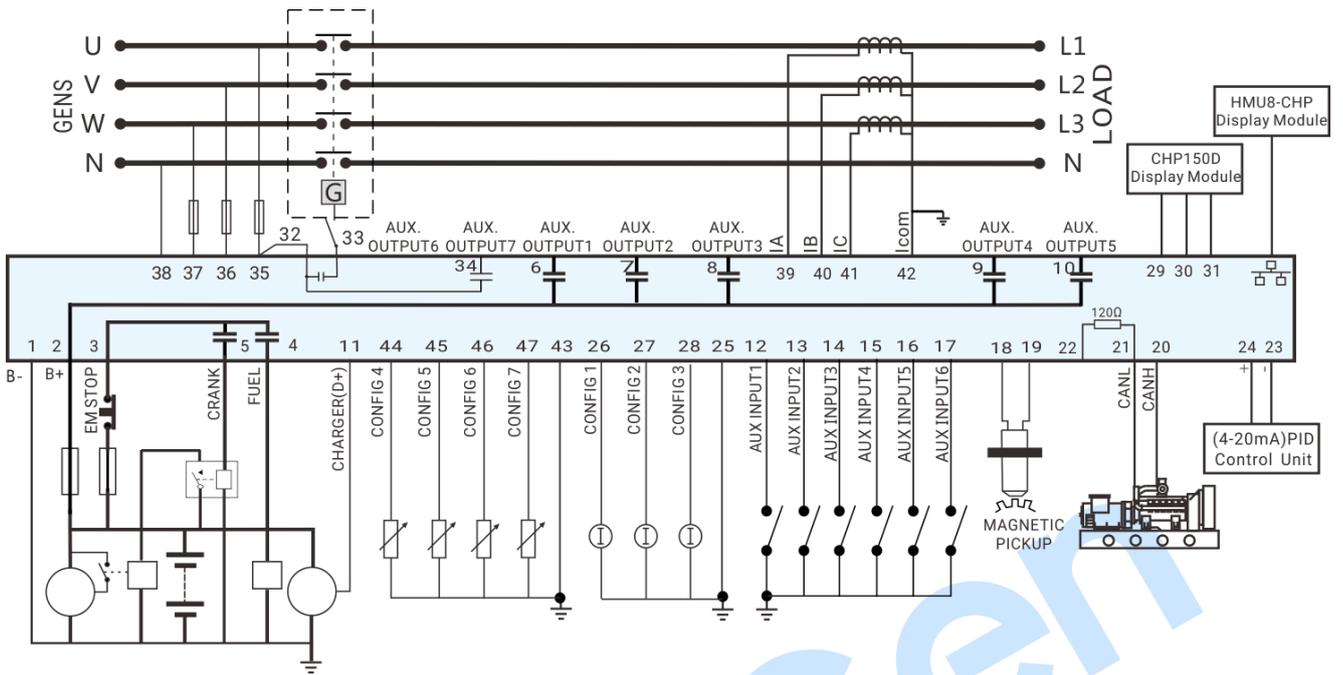
Remark: It is recommended to extend the relay capacity for starting and fuel rely output ports.
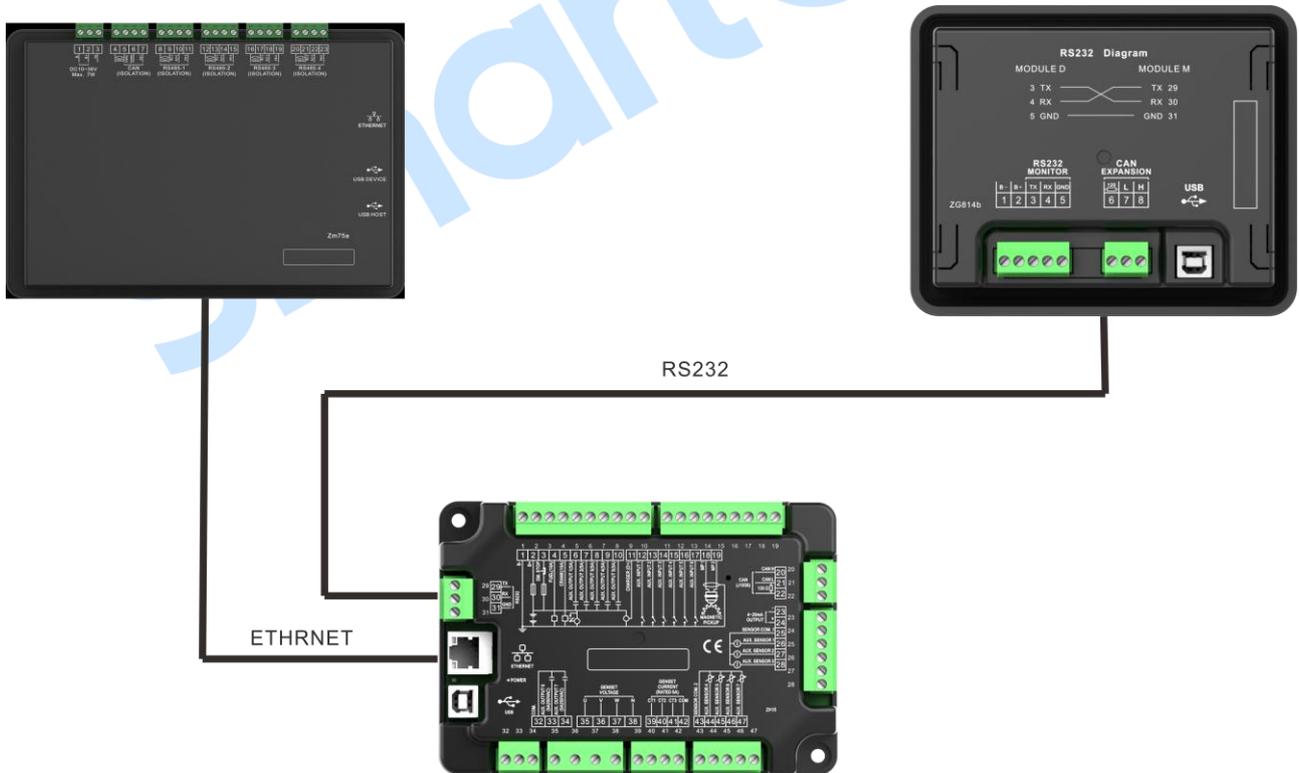
Fig.8 –CHP150M Typical Application Diagram
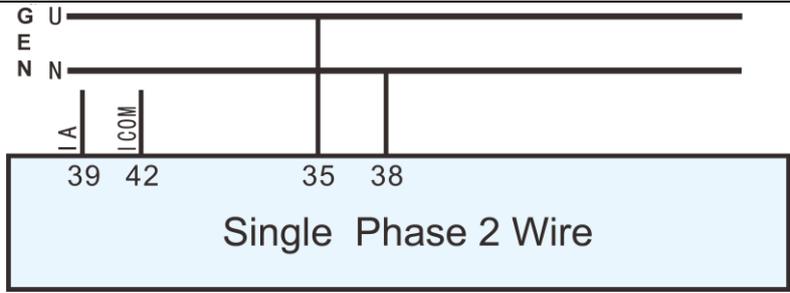

Fig.9- CHP150M Connection Diagram
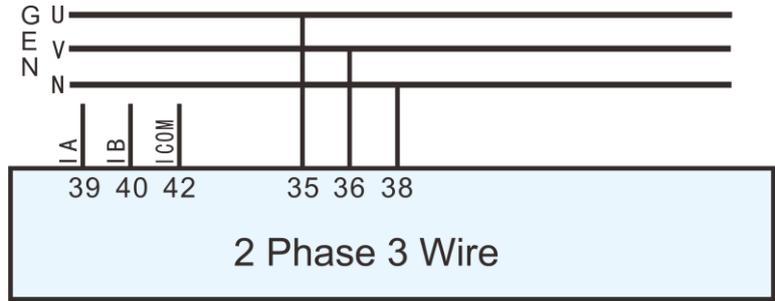

Fig.10 – Single Phase 2 Wire Diagram

Fig.11- 2 Phase 3 Wire Diagram

12 INSTALLATION

12.1 Fixing Clips

1) The module is panel mounting, and fixed by fixing clips during installation;

2) Withdraw the fixing clip screw ((turn anticlockwise) until it reaches proper position;

3) Pull the fixing clip backwards (towards the back of the module) to ensure the four clips are fixed in the slots;

4) Tighten the fixing clip screws clockwise to ensure fix it on the panel.

Δ **Note:** 0.27N•m (2.75kgf•cm) torque are recommended.

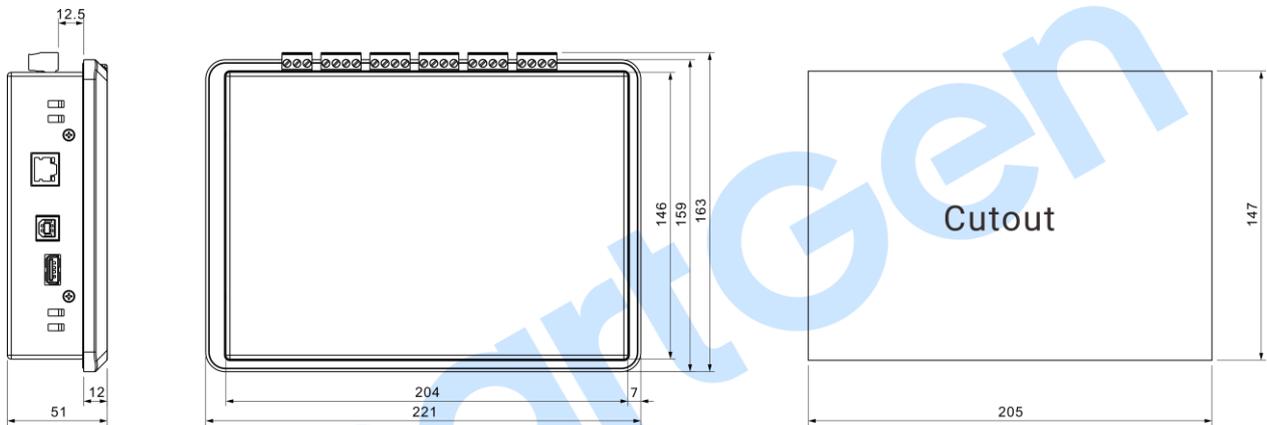### 12.2 CASE DIMENSIONS AND PANEL CUTOUT

Unit:mm

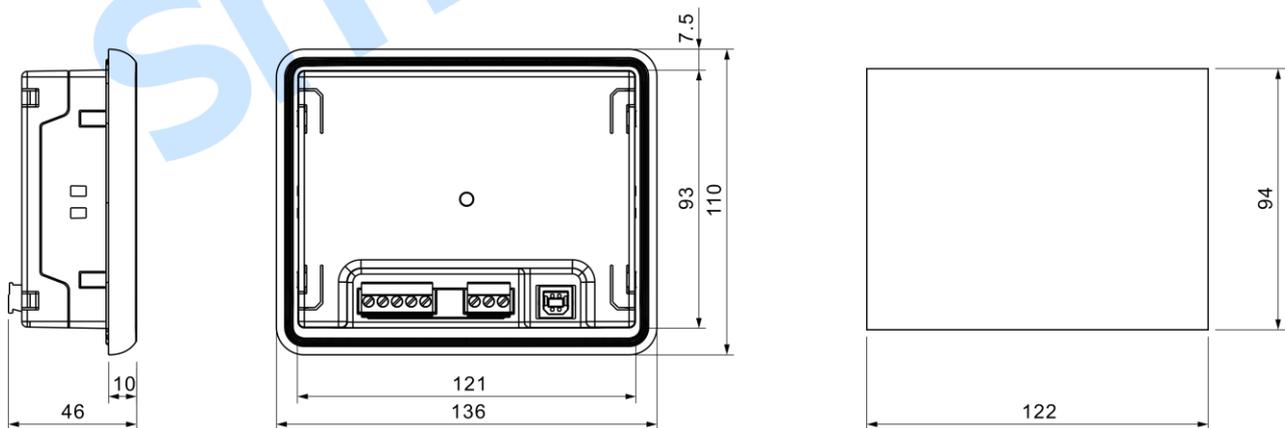**Fig.12- HMU8-CHP Case Dimensions and Panel Cutout**

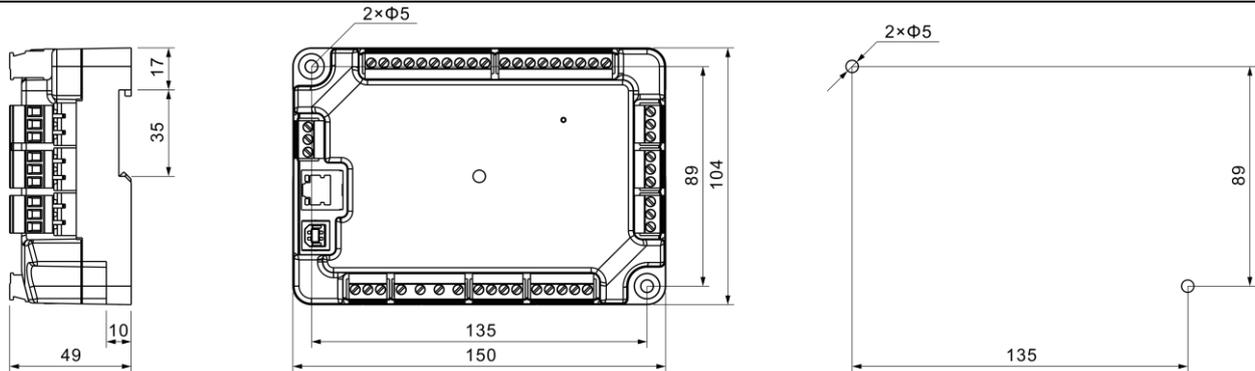**Fig.13-CHP150D Case Dimensions and Panel Cutout**

Fig.14- CHP150M Case Dimensions and Panel Cutout

CHP150 controller can adapt to the (10-35)VDC battery voltage. The negative of the battery must be reliably connected to the engine shell. The connection between the controller power and battery cannot be less than 2.5 mm2. If there is a floating charging, please connect the output cable of the charger directly to the battery, and then connect the cable separately from the positive and negative of the battery to the the input of the controller to prevent the charger from interfering with the normal operation of the controller.

1) Speed Sensor Input

Speed sensor is installed in the engine for testing flywheel teeth. The connection with controller uses 2-core screen, shield layer should be connected to terminal19 of controller and the other end vacant. The other two signal lines are respectively connected to terminal18 and terminal19. 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) Output and Expansion Relay

All the outputs of controller are relay output. If need to expand relay, please add freewheeling diode in both ends of relay coil (when expansion relay coil links DC), or add RC loop (when expansion relay coil links AC), in case controller or other equipments are interfered.

3) AC Input

CHP150 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: a. CT common must connect to the battery negative;
    b. When there is a load current, open circuit is inhibited in the CT secondary side.

4) 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.

13 CONNECTION OF CONTROLLER WITH J1939 ENGINE

13.1 CUMMINS ISB/ISBE

Table 20 Connector B

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

Table 21 9-pin Connector

Terminals of controller	9 pins connector	Remark
CAN_SCR	SAE J1939 shield	CAN communication shielding line (connect with ECU terminal only).
CAN(H)	SAE J1939 signal	Using impedance 120Ω connecting line.
CAN(L)	SAE J1939 return	Using impedance 120Ω connecting line.

Engine type: CUMMINS-ISB.

13.2 CUMMINS QSL9

Suitable for CM850 engine control module.

Table 22 50-pin Connector

Terminals of controller	50 pins connector	Remark
Aux. Ouput 1	39	Aux. output 1 is congiured as " Fuel Output".
Starting relay output	-	Connect to starter coil directly.

Table 23 9-pin Connector

Terminals of controller	9 pins connector	Remark
CAN_SCR	SAE J1939 shield-E	CAN communication shielding line (connect with ECU terminal only).
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.

13.3 CUMMINS QSM11(IMPORT)

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

Table 24 C1Connector

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.
Starting relay output	-	Connect to starter coil directly.

Table 25 3-pin Data Link Connector

Terminals of controller	3 pins data link connector	Remark
CAN_SCR	C	CAN communication shielding line (connect with ECU terminal only).
CAN(H)	A	Using impedance 120Ω connecting line.
CAN(L)	B	Using impedance 120Ω connecting line.

Engine type: CUMMINS-ISB.

13.4 **CUMMINS-CM570**

It is suitable for CM570 engine control module.

Table 26 50-pin Connector

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

Table 27 9-pin Connector

Terminals of controller	9 pins connector	Remark
CAN_SCR	SAE J1939 shield-E	CAN communication shielding line (connect with ECU terminal only).
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.

13.5 **CUMMINS QSM11**

Table 28 Engine OEM Connector

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

Engine type: common J1939.

13.6 **CUMMINS QSZ13**

Table 29 Engine OEM Connector

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

Engine type: common J1939.

13.7 **DETROIT DIESEL DDEC III / IV**

Table 30 Engine CAN Port

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

Engine type: common J1939.

13.8 **DEUTZ EMR2**

Table 31 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.	
Starting relay output	-	Connect to starter coil directly.
-	1	Connect to battery negative.
CAN_SCR	-	CAN communication shielding line.
CAN(H)	12	Using impedance 120Ω connecting line.
CAN(L)	13	Using impedance 120Ω connecting line.

Engine Type: VOLVO-EDC4.

13.9 **JOHN DEERE**

Table 32 21-pin Connector

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

Egine Type: JOHN DEERE。

13.10　**MTU ADEC(SMARTModule)**

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

Table 33 ADEC (X1 port)

Terminals of controller	ADEC (X1Port)	Remark
Fuel relay output	X1 10	X1 Terminal 9 Connected to negative of battery.
Starting relay output	X1 34	X1 Terminal 33 Connected to negative of battery.

Table 34 SMART (X4 port)

Terminals of controller	SMART (X4 Port)	Remark
CAN_SCR	X4 3	CAN communication shielding line.
CAN(H)	X4 1	Using impedance 120Ω connecting line.
CAN(L)	X4 2	Using impedance 120Ω connecting line.

Engine Type: MTU-ADEC。

13.11　**MTU ADEC(SAM Module)**

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

Table 35 ADEC (X1 port)

Terminals of controller	ADEC (X1Port)	Remark
Fuel relay output	X1 43	X1 Terminal 28 Connected to negative of battery.
Starting relay output	X1 37	X1 Terminal 22 Connected to negative of battery.

Table 36 SAM (X23 port)

Terminals of controller	SAM (X23 Port)	Remark
CAN_SCR	X23 3	CAN communication shielding line.
CAN(H)	X23 2	Using impedance 120Ω connecting line.
CAN(L)	X23 1	Using impedance 120Ω connecting line.

Engine type: Common J1939.

13.12　**PERKINS**

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

Table 37 Connector

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

Engine Type: PERKINS。

13.13 SCANIA

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

Table 38 B1 Connector

Terminals of controller	B1 Connector	Remark
Fuel relay output	3	
Starting relay output	-	Connect to starter coil directly.
CAN_SCR	-	CAN communication shielding line.
CAN(H)	9	Using impedance 120Ω connecting line.
CAN(L)	10	Using impedance 120Ω connecting line.

Engine Type: SCANIA.

13.14 VOLVO EDC3

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

Table 39 "Stand alone" Connector

Terminals of controller	"Stand alone" Connector	Remark
Fuel relay output	H	
Starting relay output	E	
Aux. Output 2	P	ECU power; Aux. output 2 is congigured as "ECU Power".

Table 40 "Data bus" Connector

Terminals of controller	"Data bus" Connector	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	1	Using impedance 120Ω connecting line.
CAN(L)	2	Using impedance 120Ω connecting line.

Engien Type: VOLVO。

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

13.15 VOLVO EDC4

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

Table 41 Connector

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

Engine Type: VOLVO-EDC4.

13.16 *VOLVO-EMS2*

Suitable engine types are: TAD734, TAD940, TAD941, TAD1640, TAD1641, TAD1642。

Table 42 Engine CAN Port

Terminals of controller	Engine's CAN port	Remark
Aux. Output 1	6	ECU stop; Aux. output 1 is congigured as "ECU stop".
Aux. Output 2	5	ECU power; Aux. output 2 is congigured as "ECU power".
	3	Negative power.
	4	Positive power.
CAN_SCR	-	CAN communication shielding line.
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.

13.17 **YUCHAI**

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

Table 43 Engine 42-pin Port

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

Table 44 Engine 42-pin 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.

13.18 WEICHAI

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

Table 45 Engine Port

Terminals of controller	Engine Port	Remark
Fuel relay output	1.40	Connect to engine ignition lock.
Starting relay output	1.61	
CAN_SCR	-	CAN communication shielding line.
CAN(H)	1.35	Using impedance 120Ω connecting line
CAN(L)	1.34	Using impedance 120Ω connecting line

Engine Type: GTSC1.

⚠ If there is any question of connection between controller and ECU communication, please feel free to contact Smartgen's service.

14 ETHERNET INTERFACE

Ethernet interface is used for the monitoring of controller to realize the connection mode of network client.

⚠Note: After changing the network parameters of the controller (such as the IP address and subnet mask), you need to power off the controller and power it on again to make the new parameters take effect

14.1 HMU8-CHP CONNECTION MODE

As a network server, the controller is monitored by the user over the network interface using TCP ModBus protocol.
The steps are as follows:

1. Set the IP address and subnet mask of the controller. The IP address must be in the same network segment but different from the IP address used by the monitoring device (e.g. PC). For instance, if the IP address of the monitoring device is 192.168.0.16, the IP address of the controller can be set as 192.168.0.18, and subnet mask is 255.255.255.0.

2. Connect the controller to the monitoring device can by a network cable or a switch.

3. The monitoring device communicates with the controller by TCP ModBus protocol.

⚠Note: By this connection mode, the parameters of the controller can be set. The test software provided by our company can be connected by this mode. The communication protocol can be obtained from relevant personnel of our company.

14.2 DESCRIPTION OF CONNECTING NETWORK CABLES

Table 46 Network Interface Definition of the Controller

No.	Definition	Description
1	TX+	Tranceive Data+
2	TX-	Tranceive Data-
3	RX+	Receive Data+
4	NC	Not connected
5	NC	Not connected
6	RX-	Receive Data-
7	NC	Not connected
8	NC	Not connected

1. The connections between controller and PC or controller and HMU8-CHP display module is only by a network cable.

   This connection mode uses a crossed cable.

   The method of crossedcable is: one end adpots EIA/TIA 568A standard and the other end adopts EIA/TIA 568B standard.

⚠Note: If the PC interface has the functions of sending or receiving of auto flipping, a straight-through cable can be used.

2. The connection between controller and PC is by a switch (or router).

    This connection mode should use a straight-through cable.

    The method of through line is: both ends are EIA/TIA 568A standard or EIA/TIA 568B standard.

⚠Note: If the switch (or router) has the functions of sending and receiving of auto flipping, a crossed cable can be used.

15 FAULT FINDING

Table 47 Fault Finding

Symptoms	Possible Solutions
Controller no response with power.	Check starting batteries; Check controller connection wirings; Check DC fuse.
Genset shutdown	Check the water/cylinder temperature is too high or not; Check the AC genset voltage; Check DC fuse.
Controller emergency stop	Check emergence stop button is correct or not; Check whether the starting battery positive be connected with the emergency stop input; Check whether the circuit is open.
Crank disconnect sensor alarm	Check the related sensor and its connections.
Shutdown alarm in running	Check related switch and its connections according to the information on LCD; Check programmable inputs.
Crank not disconnect	Check fuel oil circuit and its connections; Check starting batteries; Check speed sensor and its connections; Refer to engine manual.
Starter no response	Check starter connections; Check starting batteries.

_____