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**Manual**

**GM8010/8011/8012**

**Genset controller**

**TH101132ER1**

## The Interpretation of the symbol

**WARNING:**

A WARNING indicates a potentially hazardous situation which, if not avoided, could result in death, or equipment damage.

**NOTE:**

Provide the user's help is very useful information and tips or alert the operator to the correct operation.

## History

No.	Rev.	Date	Editor	Validation	Changes
1	TH101132ER1	2018.8	L	C	NEW
2					

**WARNING:**

Read this entire manual pertaining to the work to be performed before installing, operating, or servicing this controller. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

The engine or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An over temperature or low pressure shutdown device may also be needed for safety, as appropriate.

**CAUTION:**

To prevent damage to a controller that uses an alternator or battery-charging device, make sure the power cable of charge or charger and controllers is turned off before disconnecting the battery from the system.

**CAUTION:**

Controllers contain static-sensitive parts. Observe the following precautions to prevent damage to these parts.

Do not disassemble the rear back of controller and touch the components or conductors on a printed circuit board.

**CAUTION:**

The controller comes with the factory settings. As the factory settings may not fully meet the actual user needs, the generator settings must be checked before.

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## 1 Description

**GM8010/GM8011/GM8012** is a new generation of generator set intelligent controller, using a new form structure, refine and improve the performance of the controller, so that the product fully meet of generator users or professional assembly plants of different types of generator sets , including oil and gas generator sets to open automatic stop control and protection needs.

### Features:

- True RMS measure of voltage and current.
- The controller has two operating modes: automatic/manual, and the two operating modes are selected by the buttons on the panel.
- The controller displays the control status, operating status and related measurement data of the generator set through the LED on the panel.
- USB communication port, communicate with PC, can read and set the operating parameters of the controller
- It is very easy and convenient to connect, move, repair and replace the equipment through the pin terminal connection.

### Model Comparison:

Model	GM8010	GM8011	GM8012
Generator Volt.	Three-phase	Single phase	Single phase
Generator Current	—	Single phase	Single phase
Number of digital inputs	4	4	2
Number of control relay output	4	4	4
Analog sensor count	—	—	2

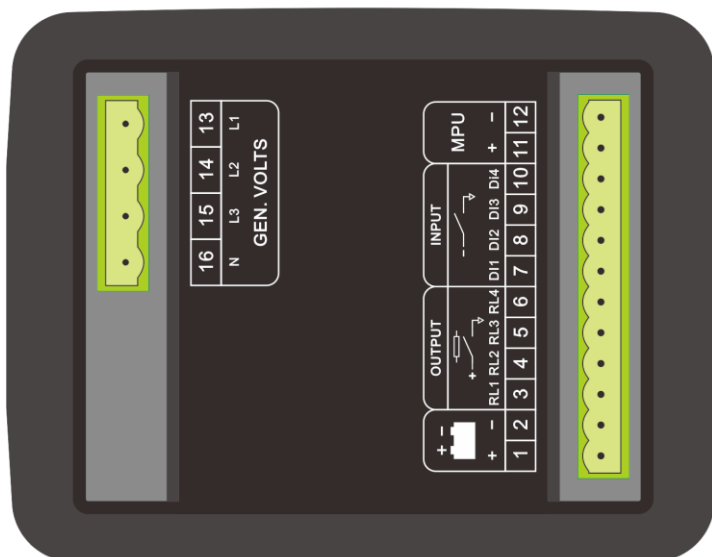
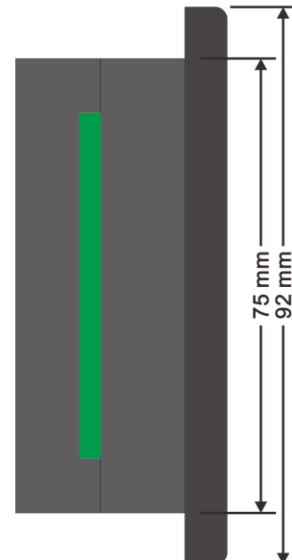
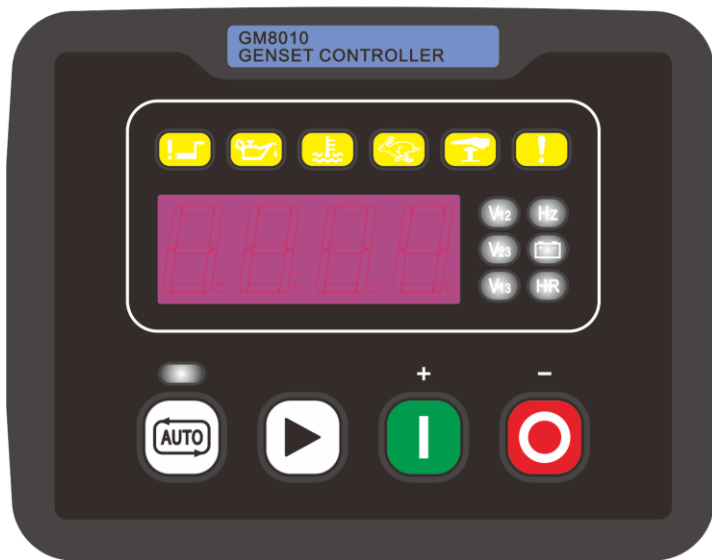
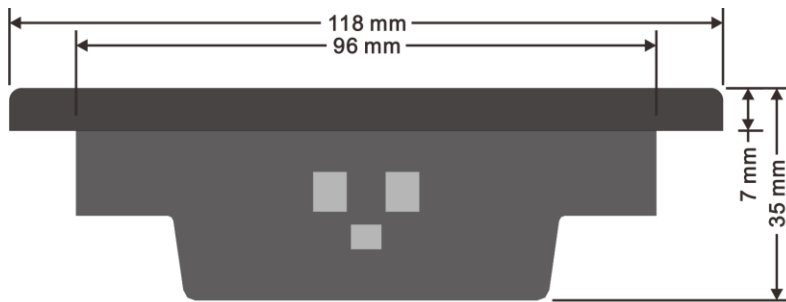
“—” : without      “●” : Standard configuration

## 2 The Outline Dimension Drawings and Controller Wiring

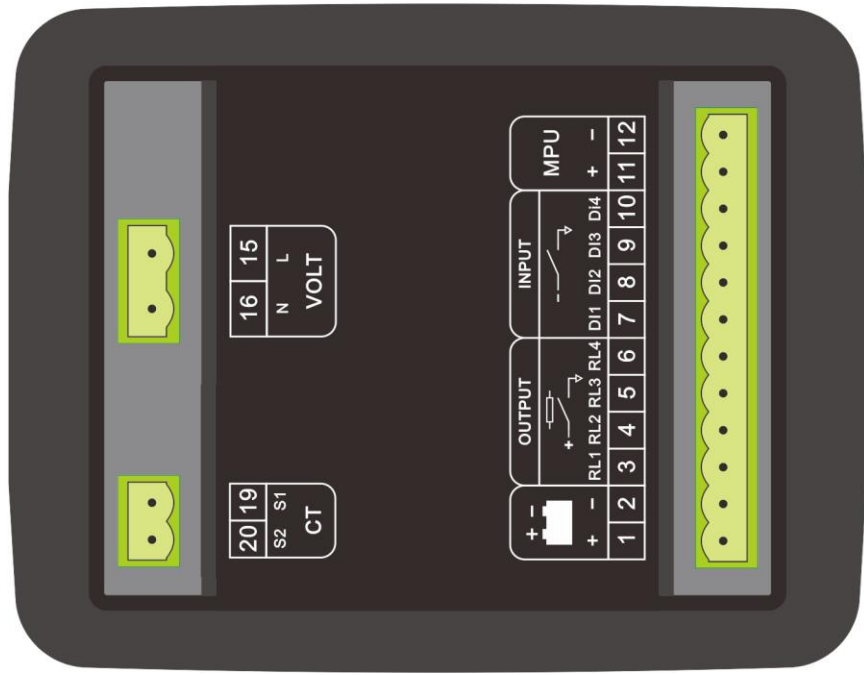
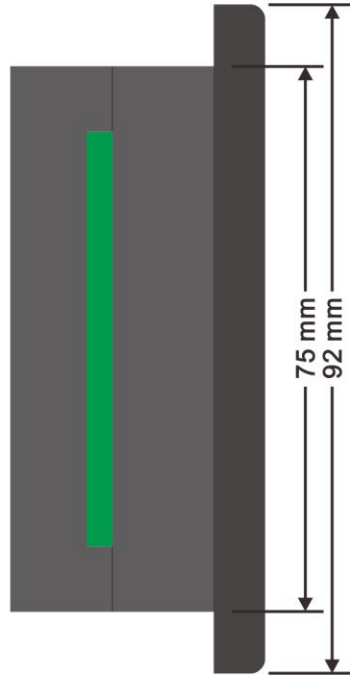
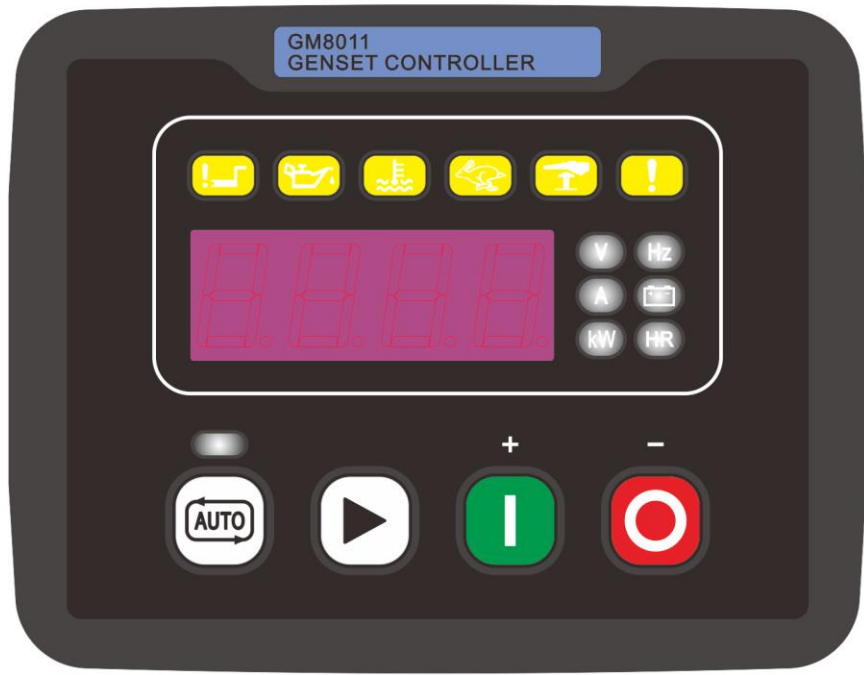
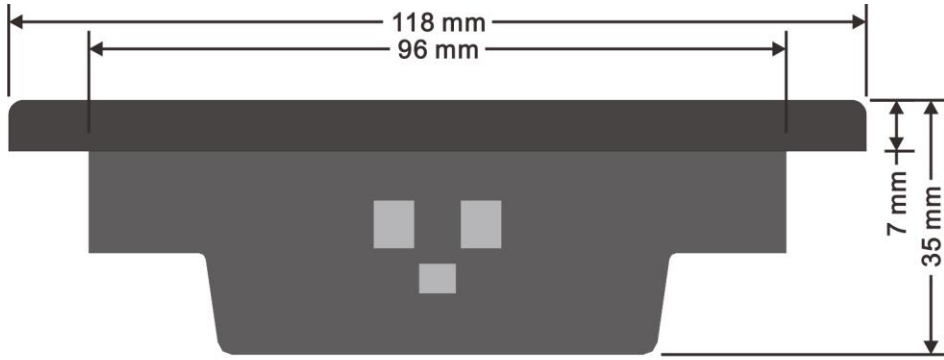
### 2.1 Following Details:

Module Dimensions	W118mm×H92mm
Panel Cutout	W98mm×H77mm
Thickness	D37.5mm

#### GM8010



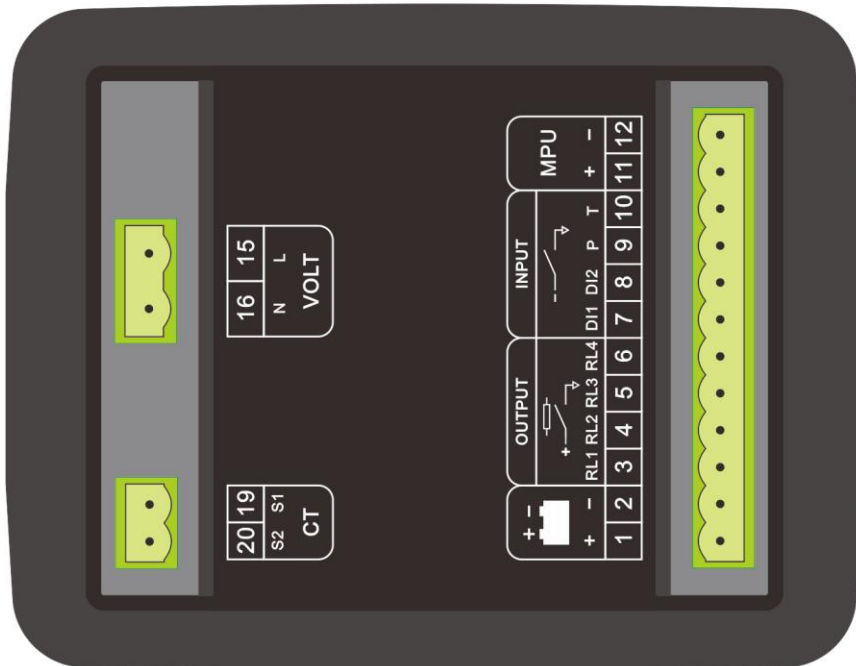
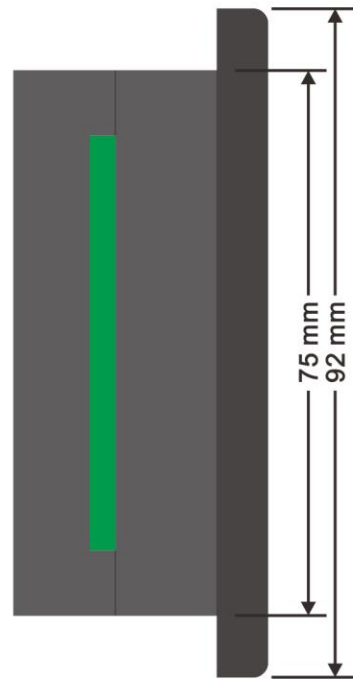
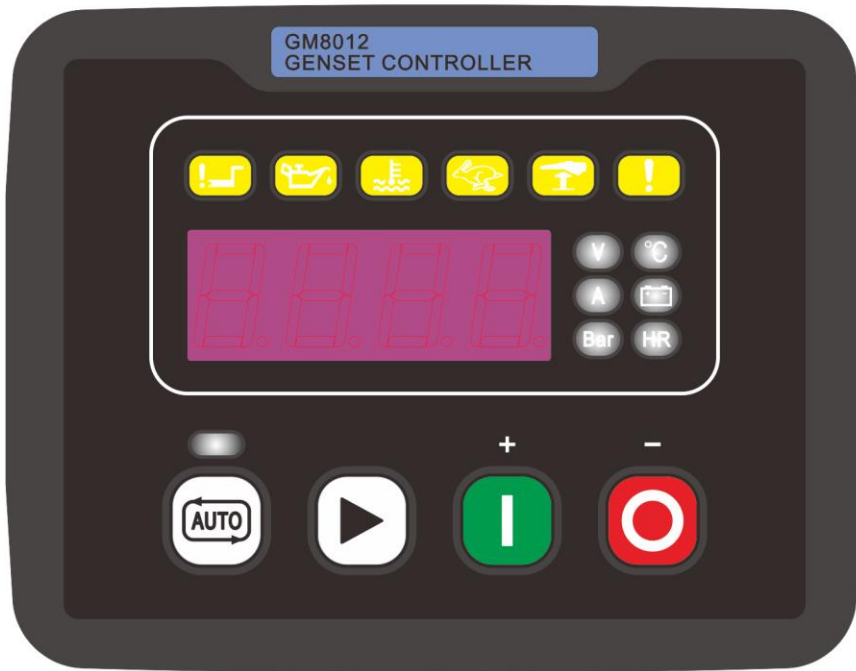
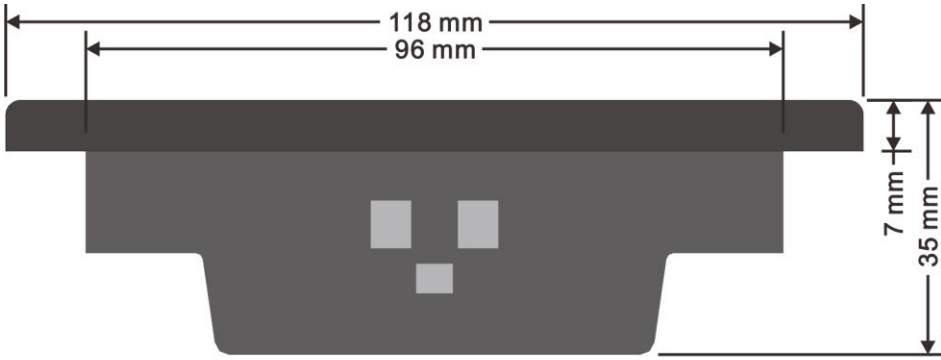
GM8011







GM8012





## 2.2 Terminal Connections:

## GM8010

Terminal	Function	Signal	Connection
1	Battery supply (+B)	12V/24V (8-35Vdc continuous)	2.5mm <sup>2</sup>
2	Battery supply (-B)		2.5mm <sup>2</sup>
3	Relay output 1	N.O. contact, 3A/30Vdc, defined (1)	1mm <sup>2</sup>
4	Relay output 2	N.O. contact, 3A/30Vdc, defined (2)	1mm <sup>2</sup>
5	Relay output 3	N.O. contact, 3A/30Vdc, defined (3)	1mm <sup>2</sup>
6	Relay output 4	N.O. contact, 3A/30Vdc, defined (4)	1mm <sup>2</sup>
7	D-Input 1	Defined (1)	1mm <sup>2</sup>
8	D-Input 2	Defined (2)	1mm <sup>2</sup>
9	D-Input 3	Defined (3)	1mm <sup>2</sup>
10	D-Input 4	Defined (4)	1mm <sup>2</sup>
11	Magnetic pick-up signal {+}	1-70Vac	Two-core shielded cable
12	Magnetic pick-up signal {-}		
13	GEN. VL1-N input	0-346Vac	1mm <sup>2</sup>
14	GEN. VL2-N input	0-346Vac	1mm <sup>2</sup>
15	GEN. VL3-N input	0-346Vac	1mm <sup>2</sup>
16	GEN. Neutral		1mm <sup>2</sup>

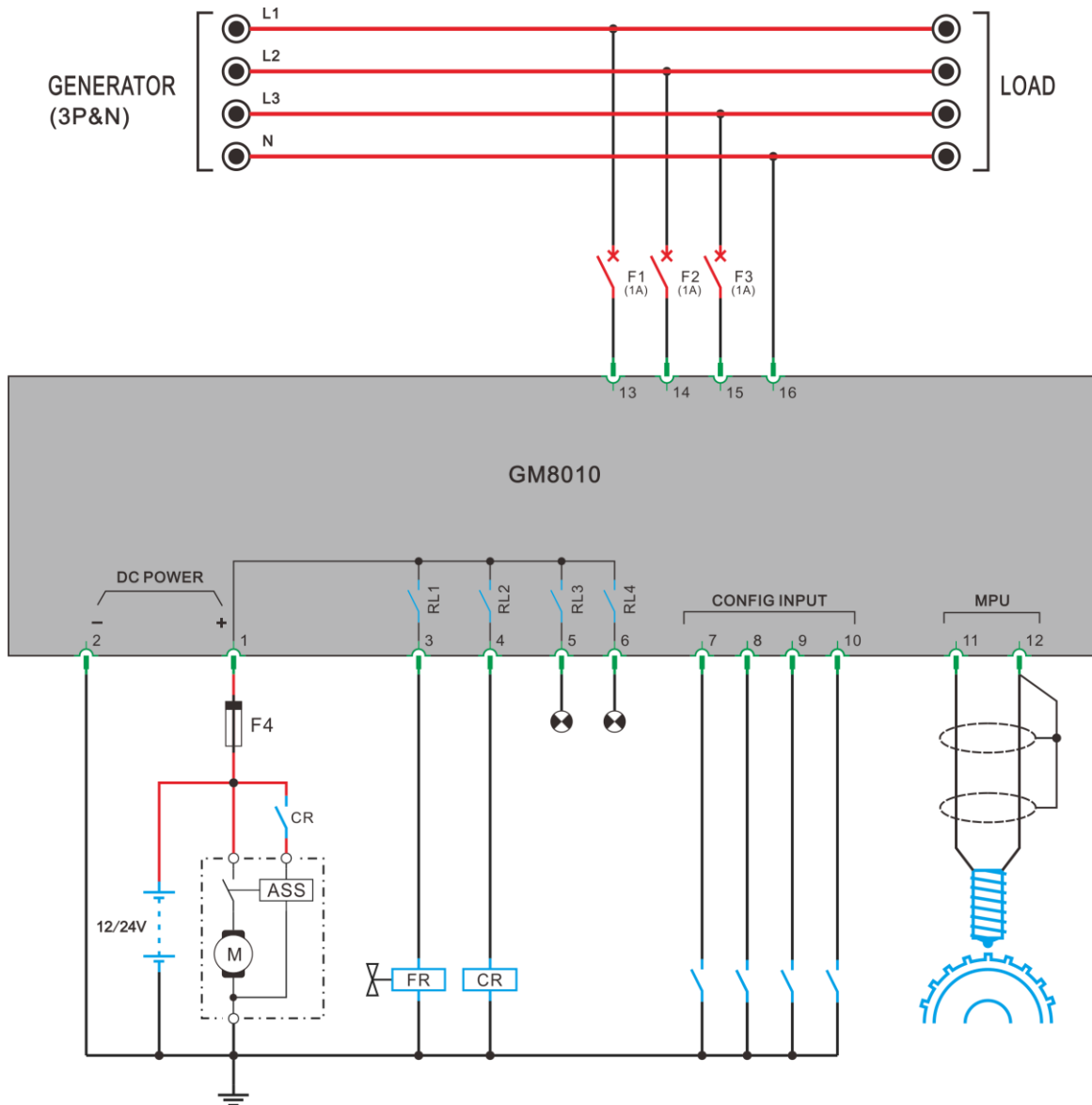
## GM8011

Terminal	Function	Signal	Connection
1	Battery supply (+B)	12V/24V (8-35Vdc continuous)	2.5mm <sup>2</sup>
2	Battery supply (-B)		2.5mm <sup>2</sup>
3	Relay output 1	N.O. contact, 3A/30Vdc, defined (1)	1mm <sup>2</sup>
4	Relay output 2	N.O. contact, 3A/30Vdc, defined (2)	1mm <sup>2</sup>
5	Relay output 3	N.O. contact, 3A/30Vdc, defined (3)	1mm <sup>2</sup>
6	Relay output 4	N.O. contact, 3A/30Vdc, defined (4)	1mm <sup>2</sup>
7	D-Input 1	Defined (1)	1mm <sup>2</sup>
8	D-Input 2	Defined (2)	1mm <sup>2</sup>
9	D-Input 3	Defined (3)	1mm <sup>2</sup>
10	D-Input 4	Defined (4)	1mm <sup>2</sup>
11	Magnetic pick-up signal {+}	1-70Vac	Two-core shielded cable
12	Magnetic pick-up signal {-}		
13	No		
14	No		
15	GEN. VL1-N input	0-346Vac	1mm <sup>2</sup>
16	GEN. Neutral		1mm <sup>2</sup>
17	No		
18	No		
19	I1 Gen current input (S1)	0-5A	2.5mm <sup>2</sup>
20	Comm. port for current inputs (S2)		2.5mm <sup>2</sup>

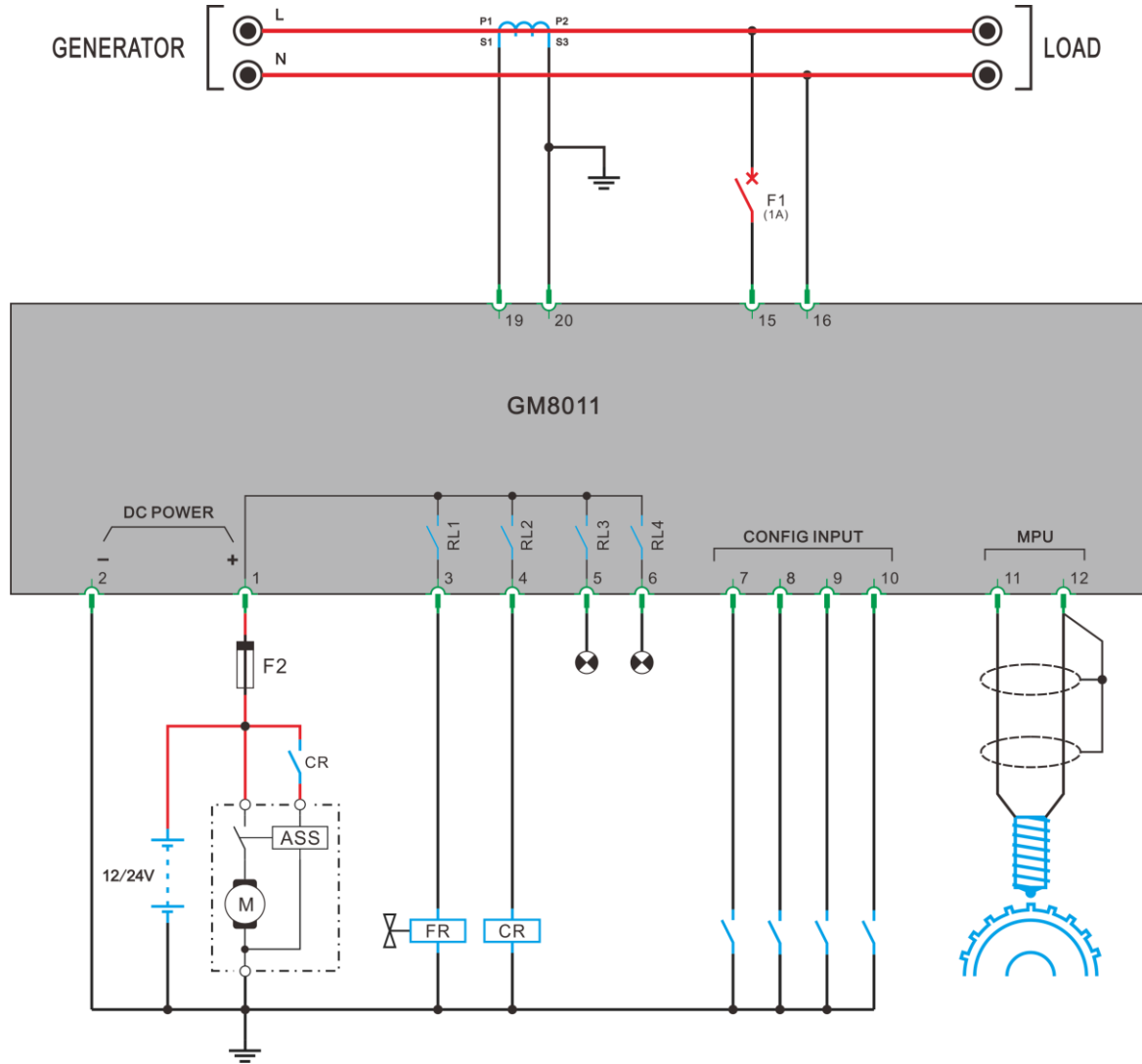
## GM8012

Terminal	Function	Signal	Connection
1	Battery supply (+B)	12V/24V (8-35Vdc continuous)	2.5mm <sup>2</sup>
2	Battery supply (-B)		2.5mm <sup>2</sup>
3	Relay output 1	N.O. contact, 3A/30Vdc, defined (1)	1mm <sup>2</sup>
4	Relay output 2	N.O. contact, 3A/30Vdc, defined (2)	1mm <sup>2</sup>
5	Relay output 3	N.O. contact, 3A/30Vdc, defined (3)	1mm <sup>2</sup>
6	Relay output 4	N.O. contact, 3A/30Vdc, defined (4)	1mm <sup>2</sup>
7	D-Input 1	Defined (1)	1mm <sup>2</sup>
8	D-Input 2	Defined (2)	1mm <sup>2</sup>
9	LOP detection	Resistive pressure sensor (<1K $\Omega$ )	2.5mm <sup>2</sup>
10	HET detection	Resistive temperature sensor (<1K $\Omega$ )	2.5mm <sup>2</sup>
11	Magnetic pick-up signal {+}	1-70Vac	Two-core shielded cable
12	Magnetic pick-up signal {-}		
13	No		
14	No		
15	GEN. VL1-N input	0-346Vac	1mm <sup>2</sup>
16	GEN. Neutral		1mm <sup>2</sup>
17	No		
18	No		
19	I1 Gen current input (S1)	0-5A	2.5mm <sup>2</sup>
20	Comm. port for current inputs (S2)		2.5mm <sup>2</sup>

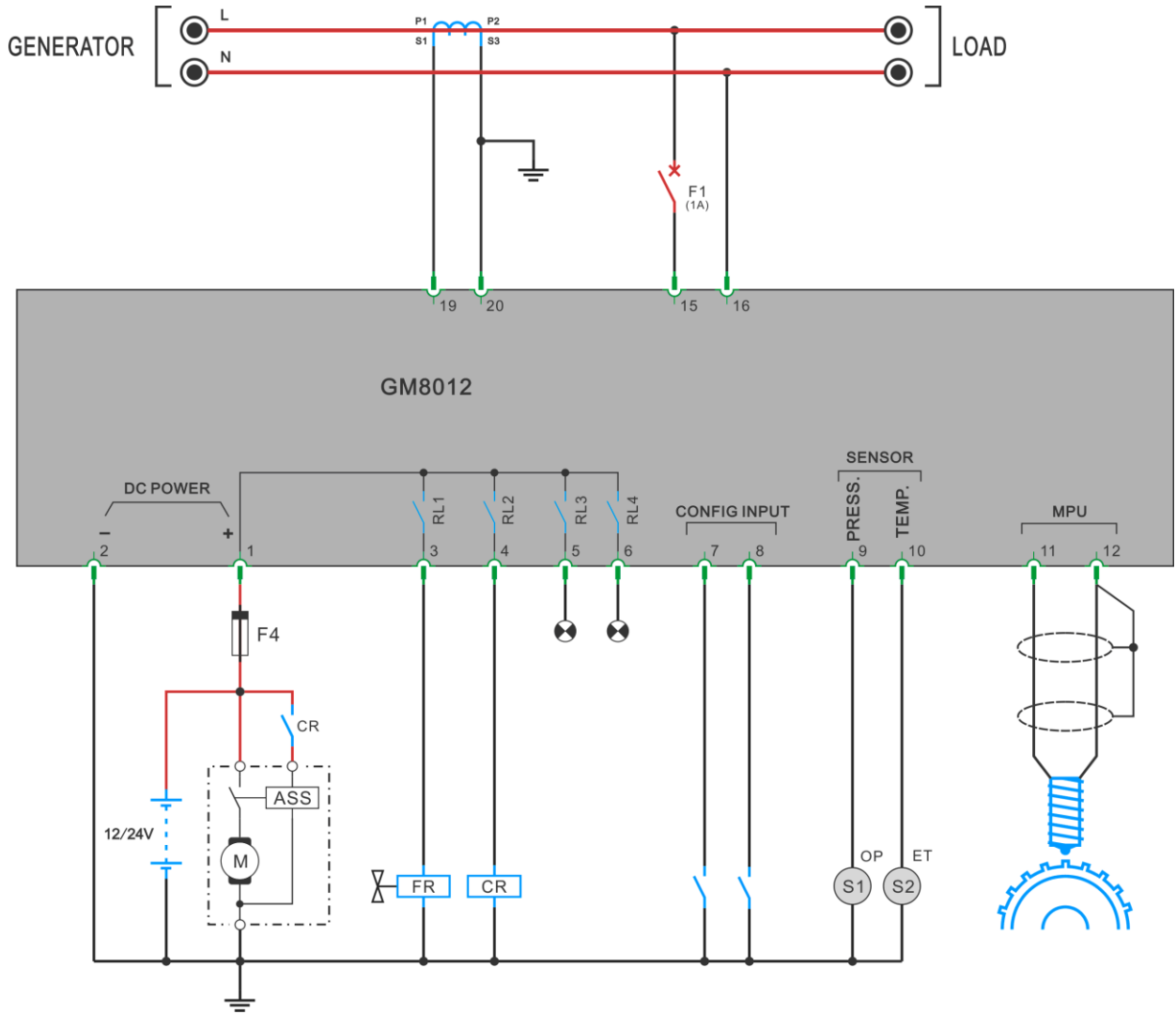
2.3 Typical Wiring Diagram:  
GM8010



**GM8011**



GM8012










### 3 Panel Operation




The operation panel consists of 3 sections: 4-digit LED digital tube displays measurement parameters and operating status, common warning/fault indicator, operation buttons and control mode selection buttons

The LED digital tube display and its control buttons provide the operator with a friendly operator interface that allows the operator to read information and set operating parameters.

#### Control buttons and LEDs

Function Description	Tag
<p><b>Scroll Button</b>            Scroll menu for parameters display            Enter into or exit parameters setting by pressing and holding this button for 2sec.</p>	
<p><b>AUTO Mode Button/ RETURN</b>            This button controller operation mode, press this button repeatedly, can choose automatic mode and nonautomatic mode, when the LED indicator light on this button, the controller running in automatic mode.            When in parameters setting mode, this button is used to return to the last page.</p>	
<p><b>START Button / "+" Value Increase</b>            The push button is used for manually start the Genset. When controller is running in MANUAL mode, press this button to start the generator.            When in parameters setting mode, this button is used to increase value or scroll up menu.</p>	
<p><b>STOP / RESET Button / "-" Value Decrease</b>            The push button is used for manually stop the Genset. When controller is running in MANUAL mode, press this button to stop the generator.            If failure occurs, press this button, the shutdown alarm lockout can be cleared.            No matter what mode the controller is running, the "Stop" button is valid. In the "automatic" or other mode of operation, press and hold this button for 2sec to stop the generator, the controller automatically from other modes to manual mode.            When executing the program in a shutdown of the generator set, press the button again, immediate shutdown and the cessation of associated control output.            When in parameters setting mode, this button is used to decrease value or scroll down menu.</p>	
<p><b>Shutdown Alarm (FAILURE) LED</b>            The LED will illuminate when pre-alarm occurs.            The LED will illuminate permanently when shutdown alarm occurs.</p>	
<p><b>Start failure light</b>            The LED will illuminate when pre-alarm occurs.            The LED will illuminate permanently when shutdown alarm occurs.</p>	
<p><b>Low oil pressure lamp</b>            When the controller has a low oil pressure warning, the indicator light flashes.            When the controller has a low oil pressure shutdown fault, the indicator light is on.</p>	




<p><b>High water temperature lamp</b></p> <p>When the controller has a high water temperature warning, the indicator light flashes.</p> <p>When the controller has a high water temperature shutdown fault, the indicator light is on.</p>	 A yellow square icon with rounded corners, containing a black symbol of a thermometer with wavy lines below it, representing high water temperature.
<p><b>Overspeed light</b></p> <p>The indicator flashes when the controller has an overspeed warning.</p> <p>When the controller has an overspeed shutdown fault, the indicator light is on.</p>	 A yellow square icon with rounded corners, containing a black symbol of a hand holding a wheel, representing overspeed.
<p><b>Emergency stop light</b></p> <p>When a digital input that is defined as an emergency stop is active, the indicator light is on.</p>	 A yellow square icon with rounded corners, containing a black symbol of a hand with a vertical bar, representing emergency stop.

## 4 Control and Operation Instruction

The controller has a variety of control mode, the operator panel can be set to automatic mode and the non-automatic mode. Non-automatic mode there are two kinds of situations, such as no definable switch is set to "activate the test mode", for the manual operation mode; if a definable switch is set to "Enable Test Mode" and effective, then is test operation mode.

### 4.1 Operation Mode Setting:

Description	Action
Press the "AUTO" button, the LED is illuminated, the controller is running in "AUTO" mode. Press the "AUTO mode" button again, the LED is off, the controller is running in non-automatic operation mode.	



**Note:**

Controller keeps the states for the previous mode when changing the operation mode, then implements the control procedure of the next mode according to the present states.



**Note:**

If a defined panel lock switch input will not change the operating mode of the controller.

## 4.2 AUTO Control Sequence

The controller is running in "AUTO" mode.

### Generator Auto Start Sequence:

Generator in the standby mode, only in the following situations occur, generator start-up program began:

- Definable input port for the remote control load a definition.
- Definable input port for the remote control no-load a definition.

The start delay timer is activated, when it times out, the Preheat relay output is energised (if preheat function selected), the timer starts. When it times out, the fuel relay output is energised, and operates the fuel solenoid of the engine. After 300ms delay, the start relay output is energised, the start motor engages and begins to crank. When the engine speed reaches the crank cutout RPM, the start relay output is de-energised and the safety-on delay starts. When the safety-on times out, if the controller detects that the parameters of the Genset such as voltage, frequency, oil pressure, coolant temperature are normal, and no other failure is detected this indicates the Genset has successfully started and running normally. The LED displays the Genset Measurement Parameters.

If you have selected idle function, the idle relay will be closed at the same time as the start relay is closed, the idle timer will begin counting down after successful crank, when it times out, the idle relay opens, other procedure is the same as above.



#### Note:

- When the engine is running at idle period, the controller does not detect the failure of low-voltage, low-frequency, low-speed and charging failure.
- When no one input port as defined as remote start, the "remote start" signal is not as boot judgment condition.



#### NOTE:

The start motor will power off while cranking if there are one of the following conditions occur:

- The generator's frequency reaches the preset value (configurable cranking cutout value);
- The AC engine speed reaches **crank cutout value**;
- Generator's voltage reaches the **crank cutout value** (optional);
- Cutout P-delay time's up (optional);
- Cranking time's up.

The controller can not implement crank procedure in one of the following conditions:

- A. The generator's frequency reaches the preset value (configurable cranking cutout value);
- B. The AC engine speed reaches **crank cutout value**;
- C. Generator's voltage reaches the **crank cutout value** (optional);
- D. Oil pressure switch is opened or oil pressure is higher than **crank cutout value** (optional).

**CAUTION:**

- If the control system does not use the speed sensor, that is, the engine cut off the signal from the generator frequency, must ensure that the generator in the process of turning, the output voltage is greater than the controller measure the voltage to avoid damage to the motor.

**Repeat Start:** During the crank period, if the engine can not ignite and controller will not output start signal during crank rest. Once crank rest timer times out the start relay energises once again and will attempt to start engine again. The above procedure will be repeated until engine successfully ignites or reaches the preset number of crank attempt.

If any shutdown alarm occurs during operation, controller will stop the control output immediately, and the Genset only can be restarted after clearing the failure and reset.

**Start Failure:** When the procedure above repeats again and again and reaches the preset number of crank attempt, the crank relay output is then de-energised. The failure LED illuminates and the LED digital tube displays fail to start.

**CAUTION:**

- If fail to start occurs, operator must check the whole Genset system to find out failure reason, only after clearing the failure can press "reset button to relieve fault lock out status, and restart the genet.

**Power supply process:**

When the generator running, the generator voltage and frequency reaches to the the generation load voltage and power generation with load frequency, power generation delay timer is started, time's up, the GCB relay closure outputs, the transfer switch power generation side switch is closed, power supply.

**Generator unloading and shutdown process**

Under the following conditions, the controller sends the generator uninstall command:

- Loading remote signal of definable input port is invalid.

In GOB, cooling delay began to countdown , when it times out, the controller fuel relay action, immediately disconnect the fuel solenoid ,into standby generator.

**Stop Failure:** When cool down times out, the fuel relay action and the timer for stop delay begins. If the controller detects that the voltage of the generator is greater than the cutout values, or the speed is greater than the RPM, or the oil pressure switch is off, or the oil pressure is greater than the crank cutout oil pressure, the failure LED illuminates and the LED digital tube displays **Fail to stop**.

**NOTE:**

- After stop failure occurs and the generator can not be started unless it is removed and reset .

### 4.3 MAN control Sequence

The controller is running in “MANUAL” mode.

#### **Generator starting sequence:**

Pressing “START” button the fuel relay action, and open the fuel solenoid of engine. After 300ms delay, the start relay closed output, the start motor engages and begins to crank, When the engine speed reaches the crank cutout RPM, the controller output is de-energised and the safety-on delay starts. When the safety-on times out, if the controller detects that the parameters of the genset such as voltage, frequency, oil pressure, coolant temperature are normal, and no other failure is detected this indicates the Genset has successfully started and running normally. The LED digital tube displays the Genset Measurement Parameters.

#### **Generator opening and stopping sequence:**

Press “STOP” button, GCB relay opens, the generator is unload, the cool down timer starts, disconnect when it times out , the fuel relay action, disconnect the fuel solenoid immediately, generator stops and goes to standby status.

If press “STOP” button again during cool down period, generator stops immediately without cool down time.

#### 4.4 Start and stop sequence of engine whose fuel solenoid is N.O.type:

There are two kinds of fuel solenoids for an engine, one is N.C. type, the valve of this solenoid is closed when the engine is in standby and it can be opened by switching on power; another is N.O. type, the valve of this solenoid is opened when engine is in standby and it can be closed by switching on power. All control sequences above are for N.C. type.

##### Start control sequence for N.O. type:

During the starting sequence the fuel relay of controller will not energise, fuel solenoid is no power, fuel solenoid open by the fuel solenoid to no-activate.

##### Stop control sequence for N.O. type:

During the stop sequence, the fuel relay energises, fuel solenoid is on power, the fuel solenoid action, the solenoid closed and the engine begins to stop. After a delay (same as Stop delay) fuel relay disconnect, disconnecting the supply from the fuel solenoid.

**Other control sequences are same as engine whose fuel solenoid is N. C. type.**

#### 4.5 Idle function:

For **idle** function set one of the configurable outputs as **idle**.  
Refer to the flow chart for start and stop for idle control flows.

**NOTE:**

- Controller will not detect under voltage, under frequency, under speed, and charge failure during idle period.

#### 4.6 Preheat function:

For preheat function, one of the configurable outputs as **Preheat**, the controller has 5 type selectable preheat control modes as below:

Mode 1 — during preheat time, preheat relay closure output.

Mode 2 — during preheat time, preheat relay closure output until the successful ignition.

Mode 3 — during preheat time, preheat relay closure output until safety-on delay times out.

Mode 4 — one of the configurable inputs is defined as **Preheat**, preheat relay closure output when this configurable input is active, and disconnect when configurable input is inactive.

Mode 5 — the temperature measurement value from the T-sensor port is used as the preheat control signal. When the temperature measured by the controller is lower than the preheated Preheat ON value, the preheat relay closes the output until the temperature reaches the Preheat OFF value, the preheat relay is disconnected.

For preheat mode 1 to 3, please refer to the flow chart for start and stop for **Preheat** control flows.

For preheat mode 4 to 5, preheat function is active immediately when the controller is switched on power.

During crank period, the preheat relay output will not energise in any of above modes.



## 5 Measure and Display Data

Gen 3 phase line voltage **L1-L2 L2-L3 L3-L1**

Gen frequency **Hz** (L1)

Gen  $V_{Ph-N}$  (L1-N)

Gen current **I1**

Gen single-phase active power **P1**

Engine oil pressure **Bar** (signal from engine LOP sensor)

Engine coolant temperature **°C**(signal from engine HET sensor)

Battery voltage **Vdc**

Genset Running hour **Hour**

(The above data vary according to different models)



## 6 Pre-alarm and Shutdown Alarm

Controller to configure different levels of alarm, according to actual application requirements for each limit beyond the protection function is triggered and control procedures to be configured, different grade configuration table is as follows:

Alarm level	Screen display	"Warning" LED flash Sound sirens	Power generation load switch GCB disconnect	"Fault" LED illuminate Close generators
<b>A1 Silence Warning</b>	Y	N	N	N
	<b>Warning:</b> This warning is not to interrupt the operation of equipment, do not issue public alarm, the screen displays a warning content, except relay action is defined as trigger a warning, without any other control behavior. Related events recorded in the event log.			
<b>A2 Voice and light Warning</b>	Y	Y	N	N
	<b>Warning:</b> This warning is not to interrupt the operation of equipment, Public Warning "LED lights lit and sound the alarm, the screen displays a warning content, except is defined trigger a warning relay action, without any other control behavior. Related events recorded in the event log.			
<b>A3 Unload Warning</b>	Y	Y	Soft Uninstall	N
	<b>Warning:</b> Public "Warning "LED illuminate and sound the alarm, the controller performs the uninstall program, the screen displays a warning content and trigger a defined warning relay action generator without stopping the machine. Related events recorded in the event log.			
<b>B1 Unload Shutdown</b>	Y	Y	Soft Uninstall	Cooling timing
	<b>Shutdown failure:</b> public "fault" LED illuminate and sound the alarm rang, the controller performs the uninstall program, opening, the generator cooling down, the screen displays the content of the fault and the program process information. Related events recorded in the event log. Troubleshooting, fault reset, and can be re-operations unit.			
<b>B2 Cooling Shutdown</b>	Y	Y	Immediately	Cooling timing
	<b>Shutdown failure:</b> public "fault" LED illuminate and sound the alarm, real-time sub-gate generator cooling down, the screen displays the fault content and program process information. Related events recorded in the event log. Troubleshooting, fault reset, and can be re-operations unit.			
<b>B3 Immediately Shutdown</b>	Y	Y	Immediately	Immediately
	<b>Shutdown failure:</b> public "fault" LED illuminate and sound the alarm, real-time sub-gate, immediate shutdown generator, the screen displays the fault content. Related events recorded in the event log. Troubleshooting, fault reset, and can be re-operations unit.			
<b>Control</b>	N	N	N	N
	<b>Control:</b> only as a control condition to trigger related control command.			



**Note:**

- Warning is a non-serious fault state, temporarily do not constitute a hazard to the generator system, but to remind the operator not to meet the requirements of the situation and timely solution to ensure continuous operation of the system. When the warning occurs, the warning indicator immediately, the fault is not locked, the unit does not stop, once the failure to remove the warning automatic release.
- Genset shutdown after the shutdown failure, fault status locked when the fault is cleared, and then press the reset button, fault lock before lifting.

## 7 Parameters Setting

### 7.1 SYSTEM

NO.	Items		Setting Range	Preset
1.0	Quit	8888		
1.1	Password	PRSS	0000 to 9999	
1.2	Comm. address	8888	1 to 247	1
1.3	Startup mode	8888	0 Man/1 Auto/ 2 Last	0
1.4	CT ratio	8888	5:5 to 6000:5	1000:5
1.5	PT ratio	8888	1.0:1 to 10.0:1	1.0:1
1.6	Rated voltage	8888	45 to 3000VAC	220
1.7	Rated current	8888	1 to 6000A	1000
1.8	Rated active power	8888	1 to 9999KW	500
1.9	Auto scroll time	88SP	1 to 60s / not used	not used
1.10	Default settings	8888		
1.11	Firmware Update	8888		

#### Menu descriptions:

##### Password

- There are 3 levels of password (CL0/CL1/CL2) for different users.
- CL0 for the operator, who can read parameters, start and stop controller. The default setting is no password.
- CL1 for the technician, who has the authority of CL0 and can modify all parameters, the default setting is "1111".
- CL2 for factory, who have the authority of CL1 and Firmware update, the default setting as "2222".
- All passwords are automatically inactive 60 seconds after exiting menu.

##### Comm. address

- Used to configure ID address for MODBUS.
- Each controller on the same MODBUS has a unique communication address.

##### Startup mode

- Used to configure the Startup mode of controller when it is powered up.
- When parameter is configured as "0", the controller will be in Manual mode when it is powered up.
- When parameter is configured as "1", the controller will be in Automatic mode when it is powered up.
- When parameter is configured as "2", the controller will be in the mode which is the same as last time when it is powered up.

##### CT Ratio

- The current is derived from CT on generator or load. Secondary current on CT is fixed at 5A.
- Used to calculate for GEN or load: A, KW.
- Used to set the limit trigger: overcurrent, overload , etc.

##### PT Ratio

- Definition Gen Voltage PT ratio of the primary and secondary.
- Used to calculate for GEN: V,Hz, KW.
- Used to set the limit trigger:: high / low voltage, overload , etc.

**Rated voltage**

- For the definition of the power generation rated voltage.
- As a reference value for high / low voltage.

**Rated current**

- Used to define the generator rated current.
- As a reference value for overcurrent limit.

**Rated active power**

- Definition generator rated active power.
- As the reference value of the active power value judgment.

**Auto scroll time**

- Use to setting the interval of LED digital tube display scroll page, any button will start auto scroll page after 30 seconds.
- When the parameter is set to " not use" Press "▶" Manually scroll.

**Default settings**

- Parameters returned to the factory default.

**Firmware Update**

- Used for the controller is set to online programming mode, after enter the 30 seconds will automatically exit if the upgrade not proceed.
- Must enter CL2 (Factory) permission password is "2222".
- Before electrify, press and hold the stop button (or scroll page ) can quickly enter the mode.
- After the upgrade you need to restart the controller.

## 7.2 GENERATOR

NO.	Parameter	Setting range	Preset
2.0	Quit	8888	
2.1	GEN V-monitor type	8888	0 ph-ph/1 ph-n
2.2	<b>GEN-V under 1</b>		
	Function	0 N/1 Y	1
	Limit	8888	20 to 200%
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
2.3	<b>GEN-V under 2</b>		
	Function	0 N/1 Y	0
	Limit	8888	20 to 200%
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	3
2.4	<b>GEN-V over 1</b>		
	Function	0 N/1 Y	1
	Limit	8888	20 to 200%
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
2.5	<b>GEN-V over 2</b>		
	Function	0 N/1 Y	1
	Limit	8888	20 to 200%
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	3
2.6	<b>GEN-Hz under 1</b>		
	Function	0 N/1 Y	1
	Limit	8888	10.0 to 500.0Hz
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
2.7	<b>GEN-Hz under 2</b>		
	Function	0 N/1 Y	0
	Limit	8888	10.0 to 500.0Hz
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	3
2.8	<b>GEN-Hz over 1</b>		
	Function	0 N/1 Y	1
	Limit	8888	10.0 to 500.0Hz
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2

2.9	<b>GEN-Hz over 2</b>			
	Function		0 N/1 Y	1
	Limit	8888	10.0 to 500.0Hz	57.0Hz
	Delay		0 to 999s	5s
	Delay by		0 to 3	3
	ALM. class		0 to 6	3
2.10	<b>GEN-I over 1</b>			
	Function		0 N/1 Y	1
	Limit	8888	50 to 300%	110%
	Delay		0 to 999s	5s
	Delay by		0 to 3	3
	ALM. class		0 to 6	2
2.11	<b>GEN-I over 2</b>			
	Function		0 N/1 Y	1
	Limit	8888	50 to 300%	115%
	Delay		0 to 999s	5s
	Delay by		0 to 3	3
	ALM. class		0 to 6	3
2.12	<b>GEN-KW over 1</b>			
	Function		0 N/1 Y	1
	Limit	8888	20 to 200%	110%
	Delay		0 to 999s	5s
	Delay by		0 to 3	3
	ALM. class		0 to 6	2
2.13	<b>GEN-KW over 2</b>			
	Function		0 N/1 Y	1
	Limit	8888	20 to 200%	120%
	Delay		0 to 999s	5s
	Delay by		0 to 3	3
	ALM. class		0 to 6	3
2.14	GEN. loading Volt	8000	20 to 200%	90%
2.15	GEN. loading Hz	8800	10.0 to 100.0Hz	48.0Hz
2.16	GEN. on delay	8888	0 to 9999s	5s

**Menu descriptions:****GEN V-monitor type**

- Use to select a controller in **ph - ph** voltage or **ph - n** voltage as monitoring object.
- In different voltage input type, select "phase - phase" or "phase - zero" , monitoring voltage is different, specifically in the following table:

Parameter Voltage type	Ph - ph	Ph - N
GM8010	$V_{L1-L2}$ , $V_{L2-L3}$ , $V_{L3-L1}$	
GM8011		$V_{L1-N}$
GM8012		$V_{L1-N}$

**GEN-V under 1&2**

- Controller provides two levels of low-voltage limit monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level, when the protection function triggered , LED digital tube displays "! W: GEN-V under 1" or "! W: GEN-V under 2"; if select 4/5/6 alarm level , when protection function triggered, LED digital tube displays "! A: GEN-V under 1" or "! A: GEN-V under 2 ".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define low-voltage protection threshold. When the generated voltage reaches or falls below this threshold, lasts time longer than the delay time, the define operation of alarm levels are triggered.
Delay	If the generation low voltage exceeds the value of the delay time set, the define operation of alarm levels are triggered; if low voltage higher than the voltage limit in the delay before termination, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time Set (2): from safety supervision delay time over, start effective Set (3): after running ,start effectively
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

**GEN-V over 1&2**

- Controller provides two levels of high-voltage limit monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when the protection function triggered, LED digital tube displays "!W:GEN-V over 1" or "!W:GEN-V over 2"; if select 4/5/6 alarm level when protection function triggered, LED digital tube display "!A:GEN-V over 1" or "!A:GEN-V over 2".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define high voltage protection threshold. When the generated voltage reaches or is higher than this threshold, lasts time longer than the delay time, the define operation of alarm levels are triggered.
Delay	If the generation high voltage exceeds the value of the delay time set, the define operation of alarm levels are triggered; if high voltage is below the voltage limit in the delay before termination, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

**GEN-Hz under 1&2**

- Controller provides two levels of low-frequency limit monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when the protection function triggered, LED digital tube displays "!W:GEN-Hz under 1" or "!W:GEN-Hz under 2"; if select 4/5/6 alarm level when protection function triggered, LED digital tube display "!A:GEN-Hz under 1" or "!A:GEN-Hz under 2".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define low frequency protection threshold. When the generated frequency reaches or falls below this threshold, lasts time longer than the delay time, the define operation of alarm levels are triggered. This parameter set compatible with 400 hz intermediate frequency system, 50/60 hz system reference range are set.
Delay	If the generation low frequency exceeds the value of the delay time set, the define operation of alarm levels are triggered; if low frequency higher than the frequency limit in the delay before termination, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

**GEN-Hz over 1&2**

- Controller provides two levels of high-frequency limit monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when the protection function triggered, LED digital tube displays "!W:GEN-Hz over 1" or "!W:GEN-Hz over 2"; if select 4/5/6 alarm level when protection function triggered, LED digital tube display"!A:GEN-Hz over 1"or"!A:GEN-Hz over 2"..

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define high frequency protection threshold. When the generated frequency reaches or is higher than this threshold, lasts time longer than the delay time, the define operation of alarm levels are triggered. This parameter set compatible with 400 hz intermediate frequency system, 50/60 hz system reference range are set.
Delay	If the generation high frequency exceeds the value of the delay time set, the define operation of alarm levels are triggered; if high frequency is below the frequency limit in the delay before termination, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

**GEN-I over 1&2**

- Controller provides two levels of overcurrent limit monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when the protection function triggered, LED digital tube displays "!W:GEN-I over 1" or "!W:GEN-I over 2"; if select 4/5/6 alarm level when protection function triggered , LED digital tube displays"!A:GEN-I over 1" or"!A:GEN-I over 2".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define overcurrent protection threshold. When the generated current reaches or is higher than this threshold, lasts time longer than the delay time, the define operation of alarm levels are triggered.
Delay	If the generation overcurrent exceeds the value of the delay time set, the define operation of alarm levels are triggered; if overcurrent is below the current limit in the delay before termination, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.



**GEN-KW over 1&2**

- Controller provides two levels of overload monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when the protection function triggered, LED digital tube displays "!W:GEN-KW over 1" or "!W:GEN-KW over 2"; if select 4/5/6 alarm level when protection function triggered, LED digital tube displays "!A:GEN-KW over 1" or "!A:GEN-KW over 2".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define overload protection threshold. When the generated power reaches or is higher than this threshold, lasts time longer than the delay time, the define operation of alarm levels are triggered.
Delay	If the generation overload exceeds the value of the delay time set, the define operation of alarm levels are triggered; if overload is below the current limit in the delay before termination, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

**GEN. loading Volt**

- Used to define the voltage threshold of GEN can closing power supply.

**GEN. loading Hz**



- Used to define the frequency threshold of GEN can closing power supply.

**GEN. on delay**

- Used to set the delay time of the GEN auto closing power supply from load conditions are satisfy.

## 7.3 ENGINE

No.	Parameter	Setting range	Preset
3.0	Quit	0000	
3.1	Engine rated speed	0000	1500
3.2	MPU input	0 N/1 Y	0
3.3	Fly wheel teeth	5 to 300	120
3.4	Set pickup now	SEES	
3.5	Pair of poles	1 to 20	2
3.6	Fuel mode	0 N.C/1 N.O	0
3.7	Start delay	0 to 999s	10s
3.8	Crank attempts	1 to 10	3
3.9	Crank time	1 to 99s	5s
3.10	Crank pause time	1 to 300s	15s
3.11	Crank cutout RPM	1 to 9999 RPM	300RPM
3.12	Crank cutout volt	1 to 100% / not used	85%
3.13	Crank cutout Oil-P	0.1 to 150.0Bar / not used	2.2 Bar
3.14	Crank cutout P-DLY	1 to 60s / not used	not used
3.15	Idle time	1 to 9999s / not used	not used
3.16	Pre-heat mode	1 to 6	1
3.17	Pre-heat time	1 to 9999s / not used	3s
3.18	Safety-on delay	0 to 600s	10s
3.19	Cool down mode	0 Full speed /1 Idle	1
3.20	Cool down time	0 to 9999s	300s
3.21	Stop time	0 to 60s	20s
3.22	EX. Crank permit	0 N/1 Y	0
3.23	<b>Overspeed level1</b>		
	Function	0 N/1 Y	1
	Limit	SP00	1600 RPM
	Delay	0 to 999s	1s
	Delay by	0 to 3	1
	ALM. class	0 to 6	2
3.24	<b>Overspeed level2</b>		
	Function	0 N/1 Y	1
	Limit	SP02	1710 RPM
	Delay	0 to 999s	0s
	Delay by	0 to 3	1
	ALM. class	0 to 6	6
3.25	<b>Underspeed level1</b>		
	Function	0 N/1 Y	1
	Limit	SP00	1440RPM
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.26	<b>Underspeed level2</b>		
	Function	0 N/1 Y	0
	Limit	SP02	1350 RPM
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	3

3.27	<b>Batt. Overvolt</b>		
	Function	0 N/1 Y	1
	Limit		1.0 to 40.0 V
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	2
3.28	<b>Batt. Undervolt</b>		
	Function	0 N/1 Y	1
	Limit		1.0 to 40.0 V
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	2

**Menu description:****Engine rated speed**

- Used to define the rated speed of engine running.

**MPU input**

- Used to define the controller whether using the speed sensor
- When the parameter is set to "1", the controller uses the speed sensor as the engine speed measurement signal source; When the parameter is set to "0", the controller of the engine speed measurement value from the frequency signal of the generator , the conversion was calculated.
- Speed (RPM) and frequency conversion formula:  $\text{speed (RPM)} = (\text{Hz} * 60) / \text{pole-pairs}$ . Example: the measurement frequency of the generator is 50Hz, when the pole-pairs is set to 2, the speed (RPM) =  $(50 * 60) / 2 = 1500$  (RPM).

**Fly wheel teeth**

- Used to define the engine per revolution of pulses / flywheel teeth.

**Set pickup now**

- If user not know the engine per revolution pulse / flywheel teeth, by measuring the frequency of power frequency and speed sensor, to calculate, obtained the number of flywheel teeth.
- flywheel teeth and power frequency conversion formula:  $\text{flywheel teeth} = (f1 * \text{pole-pairs}) / f2$ , {f1 speed sensor frequency, f2 generating frequency}.
- Operating procedures:
  - "Speed sensor input "parameter is set to" 0. "
  - Open the generator, enter "set sensor frequency" setup menu press to confirm and enter the correct CL2 authorized password, press OK, automatically modify the parameters of "flywheel teeth" of the menu.
  - "Speed sensor input "parameter is set to" 1 ", complete the relevant settings of speed sensor.

**Note:**

- This function is only used for debugging process of controllers and generators.

**Pair of poles**

- Used to define the generator exciter poles.
- Controller speed measurement value from the frequency signal of the generator, for the measurement operation of speed.

**Fuel mode**

- Used to define the type of fuel ( details refer to section 4.4).
- N.C. type means the fuel channel is closed when fuel can not be used: N.O. type means the fuel channel is opened when fuel can not be used.

**Start delay**

- Used to define the time from satisfy conditions of the generator enable to the executing engine enable procedure.
- This time is opened in the following conditions are valid:
  - automatic operating mode, the remote signal is active.
  - test mode is active.
- When the start delay timer working, LED digital tube displays the time course.

**Crank attempts**

- The controller can repeatedly attempt to start the engine; the setting value is equal to the maximum crank times.

**Crank time**

- Use to configure the duration of the engine crank command issued for setting.
- This parameter is used in diesel engines, start to timing and the crank command issued at the same time; used on the gas engine, start to timing and the gas valve open command issued at the same time.

**Crank pause time**

- The time between last crank and next crank.
- The time will be began in crank stop output, until the end of the time to re-issue the crank command.

**Crank cutout RPM**

- The crank cutout speed.

**Crank cutout volt**

- The crank disconnect voltage.
- Expressed by percentage, use "Rated ph-voltage" as factor.

**Crank cutout Oil-P**

- The crank cutout engine oil pressure, signal is from LOP-sensor.
- When parameter is configured as "not used", this function is inactive.

**Crank cutout P-DLY**

- Used to configure the period from engine LOP-switch opened or oil pressure reaches oil Pressure Crank cutout value to crank disconnection.
- When parameter is configured as "not used", this function is inactive, also both being the condition of judging stop failure and can not implement crank process are inactive.

**Pre-heat mode**

- Used to configure the mode of preheat.
- There are 5 pre-heat modes for selection, please read the description of preheat function for details.

**Pre-heat time**

- The warm-up duration before the engine starts to drive;
- When the parameter is set to "Not used", the warm-up function is invalid.

**Safety-on delay**

- Used to define the time from engine crank ignition successfully to Genset stable running.
- The controller shielded low-speed, low voltage, low frequency, low oil pressure protection in the security monitoring delay time.

**CAUTION:**

- Some of the protection are disabled during safety-on delay, so the safety-on delay should be set carefully and properly, this is very important, otherwise it may cause engine damage.

**Cool down mode**

- Used to define the mode of cool down.
- When parameter is configured as "0", the engine will run at rated speed during cooling down. When parameter is configured as "1", the engine will run in idle during cooling down.

**Cool down time**

- The no-load run time allowed before the engine is stopped.
- It is necessary to set cool down time, it can make the engine stop at a lower temperature after a long time running with load..

**Stop time**

- The maximum time permit for the engine stop.
- When the controller executes the stop command, that is, the fuel control relay is disconnected (the control relay closed output when the fuel is N.O). After the time out if the controller detects that the generator voltage is greater than the crank cutout voltage, or speed greater than the crank cutout speed, or oil pressure switch disconnected, or oil pressure is greater than the crank cutout oil pressure, then the shutdown failure.
- In N.O fuel control, after the engine downtime time out, the fuel control relay disconnect output.

**EX. Crank permit**

- Used to configure permit external crank to trigger the the normal controller monitoring, control and protection alarm function.
- Refer to 4.7 for details.

### Overspeed level1&2

- Controller provides two levels of overspeed monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when the protection function triggered, LED digital tube displays "!W:Overspeed level1" or "!W:Overspeed level2"; If you select 4/5/6 alarm level when protection function triggered, LED digital tube displays"!A:Overspeed level1 "or"!A:Overspeed level2".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define the overspeed protection threshold. when the engine speed is at or above this threshold, time of duration over than delay time, the define operation of alarm levels are triggered.
Delay	If the overspeed time of duration over than the set time delay value, the define operation of alarm levels are triggered; if overspeed under the overspeed limit before delay stop, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

### Underspeed level1&2

- Controller provides two levels of low-speed monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when the protection function triggered, LED digital tube displays "!W:Underspeed level1" or "!W:Underspeed level2"; If you select 4/5/6 alarm level when protection function triggered, LED digital tube display"!A:Underspeed level1 "or"!A:Underspeed level2".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define the low-speed protection threshold. when the engine speed is at or under this threshold, time of duration over than delay time, the define operation of alarm levels are triggered.
Delay	If the low-speed time of duration over than the set time delay value, the define operation of alarm levels are triggered; if low-speed under the low-speed limit before delay stop, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

**Batt. overvolt**

- The controller detects the battery voltage, and provide a high limit protection for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when the protection function triggered, LED digital tube displays "!W:Batt.Overvolt"; If select 4/5/6 alarm level when protection function triggered, LED digital tube displays "!A:Batt.Overvolt".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define the high voltage protection threshold. when the battery voltage is at or over this threshold, time of duration over than delay time, the define operation of alarm levels are triggered.
Delay	If the high voltage time of duration over than the set time delay value, the define operation of alarm levels are triggered; if battery voltage under the high voltage limit before delay stop, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time.; Set (2): from safety supervision delay time over, start effective. Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

**Batt. undervolt**

- The controller detects the battery voltage to provide a low-limit value of the protection, for the user to select for warning, downtime and control. If you select 1/2/3 alarm level when protection function triggered, LED digital tube display "!W:Batt.Undervolt", If you select 4/5/6 alarm level when protection function triggered, LED digital tube displays "!A:Batt.Undervolt"..

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define the low voltage protection threshold. when the battery voltage is at or under this threshold, time of duration over than delay time, the define operation of alarm levels are triggered.
Delay	If the low voltage time of duration over than the set time delay value, the define operation of alarm levels are triggered; if battery voltage over than the low voltage limit before delay stop, the delay time is set to zero..
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively..
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

## 7.4 Analog INPUT

No.	Parameter	Setting range	Preset
4.0	Quit		
4.1	P-sensor type	1 to 16 /not used	4
4.2	<b>Oil-P low level1</b>		
	Function	0 N/1 Y	1
	Limit	0.0 to 150.0 Bar	1.4Bar
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
4.3	<b>Oil-P low level2</b>		
	Function	0 N/1 Y	1
	Limit	0.0 to 150.0 Bar	1.1Bar
	Delay	0 to 999s	0s
	Delay by	0 to 3	3
	ALM. class	0 to 6	6
4.4	T-sensor type	1 to 16 /not used	3
4.5	<b>High temp. level1</b>		
	Function	0 N/1 Y	1
	Limit	50 to 320°C	92°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
4.6	<b>High temp. level2</b>		
	Function	0 N/1 Y	1
	Limit	50 to 320°C	100°C
	Delay	0 to 999s	0 s
	Delay by	0 to 3	3
	ALM. class	0 to 6	6
4.7	Heater on level	-20 to 320°C	50°C
4.8	Heater off level	-20 to 320°C	60°C
4.9	Cooler on level	-20 to 320°C	80°C
4.10	Cooler off level	-20 to 320°C	70°C



**Menu descriptions:****P-sensor type**

- Used to define the type of pressure sensor.
- The controller built-in a variety of pressure sensor types to choose, as follow:

Code	Mode	Note
0	Not used	
1	Close for LOP	Closed (low) is valid
2	Open for LOP	Open (high) is valid
3	VDO 5 bar	
4	VDO 10 bar	
5	Datcon 7 bar	
6	Murphy 7 bar	
7	Pre-set 1	
8	Pre-set 2	
9	Pre-set 3	
10	Pre-set 4	
11	Configurable 1	
12	Configurable 2	
13	Configurable 3	
14	0-5V	Through the select panel "configurable sensor values" - Oil Pressure Sensor 1: Fixed point 1 measurement value is minimum; fixed point 2 measurement value is maximum
15	4-20mA	

**CAUTION:**

- The P-sensor is used to measure the pressure, the measured pressure value for the engine low oil pressure protection function, the measurement accuracy related to the controller of the normal control and protection function is valid or not, so the correct choice of pressure sensor type or configurable sensor parameters is very important. Otherwise, it may cause damage to the engine.

- The parameters appendix of LOP sensor::

**VDO 5 bar:**

P(Bar)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5
P(PSI)	0	7.3	14.5	21.8	29.0	36.3	43.5	50.8	58.0	65.3	72.5
R(Ω)	11	29	47	65	82	100	117	134	151	167	184

**VDO 10 bar:**

P(Bar)	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
P(PSI)	0	14.5	29.0	43.5	58.0	72.5	87.0	101.5	116.0	130.5	145.0
R(Ω)	10	31	52	71	90	106	124	140	155	170	184

**Datcon 7 bar:**

P(Bar)	0.0	0.7	1.4	2.1	2.8	3.4	4.1	4.8	5.5	6.2	6.9
P(PSI)	0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0
R(Ω)	240	200	165	135	115	95	78	63	48	35	25

**Murphy 7 bar:**

P(Bar)	0.0	0.7	1.4	2.1	2.8	3.4	4.1	4.8	5.5	6.2	6.9
P(PSI)	0	10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0	100.0
R( $\Omega$ )	240	205	171	143	123	103	88	74	60	47	33

**Pre-set 1:**

P(Bar)	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
P(PSI)	0	14.5	29.0	43.5	58.0	72.5	87.0	101.5	116.0	130.5	145.0
R( $\Omega$ )	15	31	49	66	85	101	117	132	149	164	178

**Pre-set 2:**

P(Bar)	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0
P(PSI)	0	14.5	29.0	43.5	58.0	72.5	87.0	101.5	116.0	130.5	145.0
R( $\Omega$ )	30	41	65	88	110	115	145	150	172	185	190

**Pre-set 3:**

P(Bar)	0	1.7	3.4	5.2	6.9	8.6	10.3				
P(PSI)	0	25	50	75	100	125	150				
R( $\Omega$ )	21	36	52	72	84	100	120				

**Pre-set 4:**

P(Bar)	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0		
P(PSI)	14.5	29.0	43.5	58.0	72.5	87.0	101.5	116.0	130.5		
R( $\Omega$ )	195	155	127	107	88	72	61	54	48		

**NOTE:**

- “Configurable” means user can input the data manually according to the sensor parameter. Configurable 1 only can be set through the software; configurable 2 or 3 can be done through the push buttons on the front panel or software.
- When configuring, please input the “resistance- measured value” from small to big one by one.

**Oil-P low level 1&2**

- Controller provides two levels of low oil pressure limit monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when protection function triggered, LED digital tube displays " !W: Oil-P low level 1" or " !W: Oil-P low level 2"; if select 4/5/6 alarm levels, when protection function is triggered, LED digital tube displays " !A: Oil-P low level 1" or " !A: Oil-P low level 2".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define the engine oil pressure protection threshold. when the engine oil pressure is at or under this threshold, time of duration over than delay time, the define operation of alarm levels are triggered.
Delay	If the low oil pressure time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the low oil pressure under than the low speed limit before delay stop, the delay time is set to zero.
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of "limit value". The preset values of other items refer to the above menu list.

**T-sensor type**

- Used to define the type of T-sensor ..
- The controller built-in a variety of T-sensor types to choose,as follow:

Code	Mode	Note
0	Not used	
1	Close for HET switch	Closed (low) is valid
2	Open for HET switch	Disconnect (high) is valid
3	VDO 120°C	
4	VDO 150°C	
5	Datcon	
6	Murphy	
7	Pt100	
8	Pre-set 1	
9	Pre-set 2	
10	Pre-set 3	
11	Pre-set 4	
12	Configurable 1	
13	Configurable 2	
14	Configurable 3	
15	0-5V	Through the select panel "configurable sensor values" – TEMP. Sensor 1: Fixed point 1 measurement value is minimum; fixed point 2 measurement value is maximum
16	4-20mA	

**CAUTION:**

- The T-sensor is used to measure the temperature, the measured temperature value for the engine high temperature protection function, the measurement accuracy related to the controller of the normal control and protection function is valid or not, so the correct choice of temperature sensor type or custom sensor parameters are very important. Otherwise, it may cause damage to the engine

- The parameters appendix of HEP sensor:

**VDO 120°C:**

T(°C)	40	50	60	70	80	90	100	110	120	130	140
T(°F)	104	122	140	158	176	194	212	230	248	266	284
R(Ω)	291	197	134	97	70	51	38	29	22	18	15

**VDO 150°C:**

T(°C)	50	60	70	80	90	100	110	120	130	140	150
T(°F)	122	140	158	176	194	212	230	248	266	284	302
R(Ω)	322	221	155	112	93	62	47	37	29	23	19

**Datcon:**

T(°C)	40	50	60	70	80	90	100	110	120	130	140
T(°F)	104	122	140	158	176	194	212	230	248	266	284
R(Ω)	900	600	400	278	200	141	104	74	50	27	4

**Murphy:**

T(°C)	40	50	60	70	80	90	100	110	120	130	140
T(°F)	104	122	140	158	176	194	212	230	248	266	284
R(Ω)	1029	680	460	321	227	164	120	89	74	52	40

**PT100:**

T(°C)	-100	-50	0	20	40	60	80	100	150	200	300
T(°F)	-148	-58	32	68	104	140	176	212	302	392	572
R(Ω)	60	81	100	108	116	123	131	139	157	176	212

**Pre-set 1:**

T(°C)	20	30	40	50	60	70	80	90	100	110	120
T(°F)	68	86	104	122	140	158	176	194	212	230	248
R(Ω)	900	600	420	282	152	113	86	62	48	40	30

**Pre-set 2:**

T(°C)	30	50	60	70	80	90	100	110	120		
T(°F)	86	122	140	158	176	194	212	230	248		
R(Ω)	980	400	265	180	125	90	65	50	38		

**Pre-set 3:**

T(°C)	20	30	40	50	60	70	80	90	100	110	120
T(°F)	68	86	104	122	140	158	176	194	212	230	248
R(Ω)	805	540	380	260	175	118	83	58	42	30	21

**Pre-set 4:**

T(°C)	28	35	40	50	60	70	80	90	95	98	
T(°F)	82	95	104	122	140	158	176	194	203	208	
R(Ω)	579	404	342	250	179	136	103	77	67	63	

**NOTE:**

- “Configurable” means user can input the data manually according to the sensor curve. Configurable 1 only can be set through the software; configurable 2 or 3 can be done through the push buttons on the front panel or software.
- When configuring, please input the “resistance-value” from small to big one by one.

**High temp. level 1&2**

- Controller provides two levels of high-temperature limit monitoring for users to choose for warning, fault shutdown and control. If you select 1/2/3 alarm level when protection function triggered, LED digital tube displays "!W:High temp. level1 " or " !W:High temp. level2"; if select 4/5/6 alarm level when protection function triggered, LED digital tube display " !A:High temp. level1 "or" !A:High temp. level2 ".

Function	Select "Y", the monitoring function is active; Select "N", the monitoring function is invalid.
Limit	Used to define high temp protection threshold. when the engine temperature is at or higher than this threshold, time of duration over than delay time, the define operation of alarm levels are triggered.
Delay	If the high temp time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the high temperature under than this limit before delay stop, the delay time is set to zero..
Delay by	Defined time range of effective monitoring function: Set (0): always effective; Set (1): starting from crank, monitoring effectively at the same time; Set (2): from safety supervision delay time over, start effective; Set (3): after running ,start effectively.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Note: Panel operation is only used for the modification of “limit value”. The preset values of other items refer to the above menu list.

**Heater on level**

- This parameter is used to set the controller to select the preheat mode 5 is defined as a " preheat " relay action of the temperature low- limit, and set " preheat control" relay action of the temperature low limit.
- To This parameter is valid, the temperature sensor type can not be set to " not use" and "switch".

**Heater off level**

- This parameter is used to set the controller to select the preheat mode 5 is defined as a " preheat " relay stop action of the high-temperature limit, and set " preheat control" relay stop action of the high-temperature limit.
- To This parameter is valid, the temperature sensor type can not be set to "not use" and "switch".

**Cooler on level**

- This parameter is used to set is defined as a "cooling control" relay action of high temperature limit.
- To This parameter is valid, the temperature sensor type can not be set to " not use" and "switch".

**Cooler off level**

- This parameter is used to set is defined as a "cooling control" relay stop action of low temperature limit.
- To This parameter is valid, the temperature sensor type can not be set to " not use" and "switch".

## 7.5 Discrete IN/OUT

No.	Parameter		Setting range	Preset
5.0	Quit	8000		
5.1	D-Input 1 Config	8001	0 to 30	6
5.2	D-Input 2 Config	8002	0 to 30	2
5.3	D-Input 3 Config	8003	0 to 30	3
5.4	D-Input 4 Config	8004	0 to 30	4
5.5	Relay 1 Config	8007	0 to 120	2
5.6	Relay 1 logic	8007	0 N.O /1 N.C	0
5.7	Relay 2 Config	8002	0 to 120	1
5.8	Relay 2 logic	8002	0 N.O /1 N.C	0
5.9	Relay 3 Config	8003	0 to 120	0
5.10	Relay 3 logic	8003	0 N.O /1 N.C	0
5.11	Relay 4 Config	8004	0 to 120	0
5.12	Relay 4 logic	8004	0 N.O /1 N.C	0

**Menu descriptions:****D-Input \* Config**

- Used to define the D-input function.
- The digital input is active when closed (low level);

Function	Defined the function of discrete input, controller built-in a variety of functions for user to choose, as follows "definable D-input function menu.
logic	Select "0", the discrete input is active in close (low level); Select "1", the discrete input is active in open circuit.

**NOTE:**

- Only in the function is set to "1", that is, when the discrete input function user-defined parameters of the delay, start point and alarm level is set to be effective.

- Configure D-input menu is as follows:

code	Function	Note
0	Not used	
1	User configured	When you select this function, the user can use the discrete input user- configured menu to configuration this function of discrete.
2	Oil pressure switch	Select this function of discrete input port external one mounted pressure switch which is on the engine, and through this limit action switch to trigger the engine low oil pressure protection. Controller allows the oil pressure switch as low oil pressure protection and with reference to the measurement of pressure sensor as the engine low oil pressure protection exist at the same time. Triggered by low oil pressure alarm level, Users according to the defined function of the alarm level 2 configuration tables to choose.
3	Temp. high switch	Select this function of discrete input port external one mounted temperature switch which is on the engine, and through this limit action switch to trigger the engine high temperature protection. Controller allows the temperature switch as high temperature protection and with reference to the measurement of temperature sensor as the engine high temperature protection exist at the same time. Triggered by high temperature alarm level, Users according to the defined function of the alarm level 2 configuration tables to choose.
4	Emergency stop	Select the digital input port of this function to connect an emergency stop switch. When this input is valid, the controller will turn off all control outputs and the engine will stop immediately.
5	Remote off load	This input is active, the generator start-up, power generation does not issue a closing command after normal operation, has been unload operation until the input signal becomes invalid. This signal is only use in remote start with load for automatic operation mode is invalid.
6	Remote with load	This input is active, the generator starting, after normal operation, power generation issue a closing command, and has been maintained until the input signal becomes invalid. This signal is only effective in automatic operation mode.
7	Reserve	

8	GEN closed aux.	Select this function of discrete input port connected to the GCB auxiliary contacts of power generation load switch, for monitoring the status of the closing or opening of the GCB.
9	Low fuel switch	Select this function of discrete input port connected to the fuel tank of the engine oil level switch for monitoring the fuel tank low oil level.
10	Lamp test	Select this function discrete input signal is active, the indicator light on the controller operation panel all illuminate.
11	Reserve	
12	Reserve	
13	Air-flap Closed	Select this function of discrete input port connected to the auxiliary contacts on the engine ventilation door, and through the limit actions of switch to determine the ventilation door working conditions.
14	Pre-heat switch	Select this function of discrete input port connected to the temperature switch which is mounted on the engine preheater, and through the limit action of switch to stop preheat relay output. Only for the Preheat mode 4.
15	Critical mode	In critical mode, all the shutdown fault change to warning, that is when the unit in shutdown fault, only alarm not to shutdown. LED digital tube display critical mode.
16	Alarm mute	When selecting this digital input signal of function is active, the alarm buzzer of controller will stop sound, one is defined as "sound alarm" relay output will be closed. The functionality of input signal is equivalent to the the "mute" button on the controller panel.
17	Alarm reset	Select this function discrete input signal is active, the controller shutdown fault lock will unlock.
18	Reserve	
19	Reserve	
20	Panel lock	When selecting this digital input signal of function is active, you can not modify the operating parameters on the operation panel of the controller, can not select the operating mode of the controller. LED digital tube display panel lock information.
21	Activate AUTO mode	When selecting this digital input signal of function is active, the controller change to auto operation mode, which provides users with a remote button to select auto operation mode. This operating mode selection function is not affected by panel lock.
22	Activate MAN mode	When selecting this digital input signal of function is active, the controller change to manual operation mode, which provides users with a remote button to select manual operation mode. This operating mode selection function is not affected by panel lock.
23	Activate TEST mode	When selecting this digital input signal of function is active, the controller change to test operation mode, which provides users with a remote button to select test operation mode. This operating mode selection function is not affected by panel lock.
24	Stop button	Select this function, the discrete input signal function is equivalent to control panel "stop" button, it provides users with a remote stop buttons.



25	Start button	Select this function, the discrete input signal function is equivalent to control panel "start" button, it provides users with a remote start buttons.
26	Inhibit Genset	When selecting this digital input signal of function is active, the controller can not issue a closing signal in any mode.
27	Low water level	When selecting this digital input signal of function is active, the controller has a low water level alarm, the corresponding alarm levels and delay settings are valid.
28	Gas leakage1	When selecting this digital input signal of function is active, the controller has gas leak alarm 1, the corresponding alarm levels and delay settings are valid.
29	Gas leakage2	When selecting this digital input signal of function is active, the controller has gas leak alarm 2, the corresponding alarm levels and delay settings are valid.
30	Fire	When selecting this digital input signal of function is active, the controller has fire alarm, the corresponding alarm levels and delay settings are valid.

**Relay \* Config**

- Use to configure the relay function selection.

Function	Define the role of the relay output, controller built-in a variety of functions for the user to choose, as follows " configure relay output menu".
Logic	Select " 0", the monitoring function is active; Select " 1", the monitoring function is invalid.

- Configure relay output function table:

code	Function	Note
0	Not used	
1	Crank	Select this function of the output relay is used to control the engine starter motor, when need the engine crank, its running, stop in crank cutout conditions are satisfy.
2	Fuel	Select this function of the output relay is used to control the diesel engine throttle electromagnet, when need to start the engine, its running, stop in crank cutout conditions are satisfy.
3	Gas valve	Select this function of the output relay is used to control the gas engine fuel valve closed or open, when need to start the engine, its running, stop in crank cutout conditions are satisfy.
4	Ignition	Select this function of the output relay is used to control the gas engine ignition system provides power or signal, when to achieve ignition conditions, its running, stop running in ignition stop delay timing over.
5	Shutdown alarm	Select this function of the output relay running when occurrence of one or more of shutdown fault, after fault clearance and press the fault reset, then its stop.
6	Warning	Select this function of the output relay running when occurrence of one or more of warning, after fault clearance, its stop.
7	Idle	Select this function, the output relay action, in controller internal idle time timing period, stop working in the end of timing.
8	Preheat output	Select the function, the output relay action, please refer to the description of preheating function.
9	Reserve	
10	Reserve	
11	Reserve	
12	Genset running	Select this function of the output relays action when the generator is normal running, that is the engine speed, oil pressure, temperature, etc., and the electrical parameters of the generator have reached the limits of the normal setting.
13	Auto mode	output relay action, when controller running in the auto operation mode.
14	Test mode	output relay action, when controller running in the test operation mode.
15	Man mode	output relay action, when controller running in the manual operation mode.
16	Reserve	
17	Reserve	

18	GCB fail to close	Output relay action, after the generator closing failure occurred .
19	Fail to start	The crank attempts of engine reaches the setting have been not successful ignition, the output relay action.
20	Fail to stop	The engine is still running after the end of the downtime timing set, the output relay action.
21	Reserve	
22	Generator close/open	The output relay is used to control the power generation load switch GCB closing and opening action, when the controller commands power generation supply, its action, and not need the power generation supply, its stop working.
23	Audible alarm	When you need on the basis of the controller built-in alarm buzzer add a warning sound, the output relay action be equal to built-in alarm buzzer.
24	Cooling down	output relay action, in timing of the cooling time.
25	Reserve	
26	Reserve	
27	Reserve	
28	Reserve	
29	Battery over volt	when the controller detects that the battery voltage is higher than the set value, its action.
30	Battery under volt	When the controller detects that the battery voltage is lower than the set value, its action.
31	Under speed level1	When the engine speed is lower than the setting of under speed level 1 while delay confirm, its action.
32	Under speed level 2	When the engine speed is lower than the setting of under speed level 2 while delay confirm, its action.
33	Over speed level1	When the engine speed is higher than the setting of overspeed level 1 while delay confirm, its action.
34	Over speed level2	When the engine speed is higher than the setting of overspeed level 2 while delay confirm, its action.
35	Oil pressure low level1	When the engine oil pressure lower than the setting of low oil level 1 while delay confirm, its action..
36	Oil pressure low level2	When the engine oil pressure lower than the setting of low oil level 2 while delay confirm, its action..
37	High temperature level1	When the cooling temperature of engine is higher than the setting of high temperature level 1 while delay confirm, its action.
38	High temperature level2	When the cooling temperature of engine is higher than the setting of high temperature level 2 while delay confirm, its action.
39	Reserve	
40	Reserve	
41	GEN-V under1	When the generator voltage is lower than the setting of the power generation of low voltage level 1 while delay confirm, its action.
42	GEN-V under2	When the generator voltage is lower than the setting of the power generation of low voltage level 2 while delay confirm, its action.
43	GEN-V over1	When the generator voltage is higher than the setting of power generation of high-voltage level 1 while delay confirm, its action.
44	GEN-V over2	When the generator voltage is higher than the setting of power generation of high-voltage level 2 while delay confirm, its action.

45	GEN-Hz under1	When the generator frequency is lower than the setting of power generation of low-frequency level 1 while delay confirm, its action.
46	GEN-Hz under2	When the generator frequency is lower than the setting of power generation of low-frequency level 2 while delay confirm, its action.
47	GEN-Hz over1	When the generator frequency is higher than the setting of power generation of high-frequency level 1 while delay confirm, its action.
48	GEN-Hz over2	When the generator frequency is higher than the setting of power generation of high-frequency level 2 while delay confirm, its action.
49	GEN-I over1	When the generator current is higher than the setting of overcurrent level 1 while delay confirm, its action.
50	GEN-I over2	When the generator current is higher than the setting of overcurrent level 2 while delay confirm, its action.
51	GEN-KW over1	When the active load of engine is higher than the setting of power generation overload level 1 while delay confirm, its action.
52	GEN-KW over2	When the active load of engine is higher than the setting of power generation overload level 2 while delay confirm, its action.
53	Idle 1	Select this function of output relay, for 1 second after the end of the idle time in the controller,
54	Idle 2	Select this function of output relay, for 1 second after the start of the cooling time in the controller,
55	Reserve	
56	Reserve	
57	Reserve	
58	Reserve	
59	Reserve	
60	Reserve	
61	Oil-P sensor open	Select this function of the output relays action after the controller detect oil pressure sensor . The triggered alarm level is defined by the low oil pressure alarm level 2.
62	Loss of pickup	When select the speed sensor as the engine speed control signal, in crank command is issued, undetectable speed sensor signal, the function of the output relay action.
63	Reserve	
64	Blinds control	Select this function of output relay at the beginning of the start time delay, its action, and stop after the engine stops running.This output is connected to the electric shutter of engine cooling air duct, control the blinds open and close.
65	Cooler control	Select this function of output relay, when the cooling temperature of engine is higher than the lower limit of cooling open level value of setting, its action, and keep until the cooling temperature lower than the high limit of the cooling stop level of setting, its stop.
66	Reserve	
67	Reserve	

68	Heater control	Select this function of output relay, when the cooling temperature of engine is below the lower limit of preheat open level value of setting, its action, and keep until the cooling temperature higher than the high limit of the preheat stop level of setting, its stop
69	Reserve	
70	Reserve	
71	GCB open	This output relay is connected to the shut excitation coil of generate power load switch GCB, when controller command of generate power to outage, stopped working after the switch opening.
72	Reserve	
73	Reserve	
74	Reserve	
75	Reserve	
76	Reserve	
77	Reserve	
78	Reserve	
79	Reserve	
80	Soft unload	When soft unloading time start timing action, stop action at the end of timing.
81	Off load	Its action when the controller is in the opened load
82	Reserve	
83	Reserve	
84	Emergency stop	When this function is active, the generator is emergency stop fuel output.
85	Reserve	
86	Reserve	
87	Reserve	
88	Reserve	
89	Reserve	
90	Reserve	
91	Reserve	
92	Reserve	
93	Reserve	
94	Reserve	
95	Reserve	
96	Reserve	
97	Reserve	
98	D-Input 1 alarm	D-input 1 is set to "1 user configured", when a warning or fault input is active.
99	D-Input 2 alarm	D-input 2 is set to "1 user configured", when a warning or fault input is active
100	D-Input 3 alarm	D-input 3 is set to "1 user configured", when a warning or fault input is active
101	D-Input 4 alarm	D-input 4 is set to "1 user configured", when a warning or fault input is active
102-120	Reserve	

## 7.6 CALIBRATION MENU

No.	Parameter		Setting range	Preset
6.0	Quit	8888		
6.1	GEN. V1 offset	0001	-9.9% to 9.9%	
6.2	GEN. V2 offset	0002	-9.9% to 9.9%	
6.3	GEN. V3 offset	0003	-9.9% to 9.9%	
6.4	Current I1 offset	0001	-9.9% to 9.9%	
6.5	Pressure offset	0000	-9.9% to 9.9%	
6.6	Temperature offset	0000	-9.9% to 9.9%	
6.7	Batt. V offset	0000	-9.9% to 9.9%	

### Menu descriptions:

#### GEN. V1 offset

- Used to modify the measured value of GEN Phase 1 voltage.
- Reference to the Rated ph-voltage.

#### GEN. V2 offset

- Used to modify the measured value of GEN Phase 2 voltage.
- Reference to the Rated ph-voltage.

#### GEN. V3 offset

- Used to modify the measured value of GEN Phase 3 voltage.
- Reference to the Rated ph-voltage.

#### Current I1 offset

- Used to modify the measured value of Phase 1 current.
- Reference to the Rated current.

#### Pressure offset

- Used to modify the measured value of LOP sensor.

#### Temperature offset

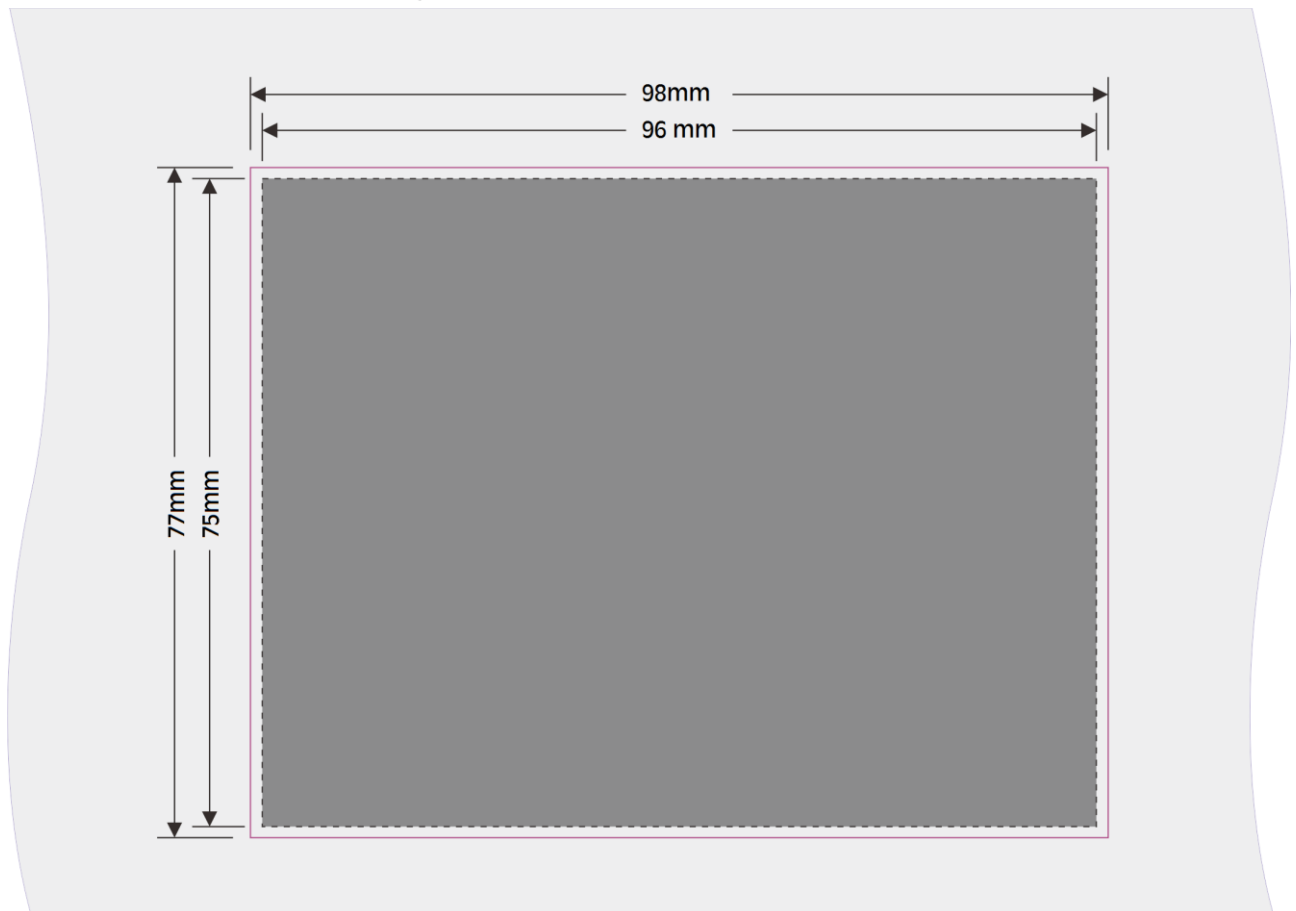
- Used to modify the measured value of HET sensor.

#### Batt. V offset

- Used to modify the measured value of battery voltage.

## 8 Installation Guide

### 8.1 The cutout dimensional drawing installed on panel as follows:



Cutout dimension: 98mm(W) x 77mm (H) . Dashed box dimensions for the controller..  
The controller is fixed by 2 special fittings.

**NOTE:**

- If the installation of the controller installed directly on the chassis of the generator or other violent vibration of the device, must be installed shock absorber.
- To ensure that the degree of protection of the installation controller is IP65, the required panel mounting hole size must be strictly enforced.

## 9 LED digital tube displays and Menu System

### 9.1 LED displays measuring parameters:










The four-digit digital tube display provides the operator with various operational status information and measurement data information, while displaying multiple data information, manually pressing "▶" can turn pages to view the information of each screen, also can set the controller to automatically turn pages, automatically switch display screens at a regular time, when a fault occurs, the digital tube display in the status bar. Fault status information.

#### Example: GM8010







Operation	LED	Description
Status display when no light is on Press "▶" to switch the display interface		
When the light is on, the power line voltage L12 is displayed. Press "▶" to switch the display interface		
This page shows the power line voltage V23 Press "▶" to switch the display interface		
This page shows the power line voltage V13 Press "▶" to switch the display interface		
This page shows the generator frequency Press "▶" to switch the display interface		
This page shows the battery voltage Press "▶" to switch the display interface		
This page shows the runtime Press "▶" to switch the display interface		















**Example: GM8011**

Operation	LED	Description
This page shows the power generation phase voltage L1 Press “  ” to switch the display interface		
This page shows the generator current I1 Press “  ” to switch the display interface		
This page shows the active power P1 Press “  ” to switch the display interface		












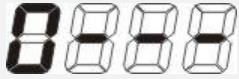






**Example: GM8012**

Operation	LED	Description
This page shows oil pressure Press “  ” to switch the display interface		
This page shows the water temperature Press “  ” to switch the display interface		





### 9.2 Setting running parameter

Press and hold “” button 2sec to enter into settings menu, parameter setting modification is incremented or decremented bit by bit, then use “” or “” to scroll page in the same menu list, press “” enter into submenu, go to menu 1.2 “password” to enter password first, or select the required item, press “” enter into modify mode, press “” or “” to modify, the LED displays  0 0 0 when prompted to enter password, then use “” or “” enter password, press “” to confirm after the password is set as 1111, then you can modify parameters. Otherwise it will prompt to key in password again. Press and hold “” for more than 2sec to quit parameter settings mode after finishing configuration.

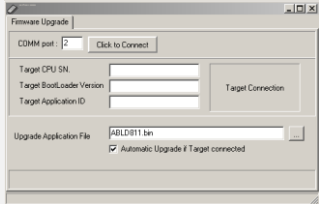



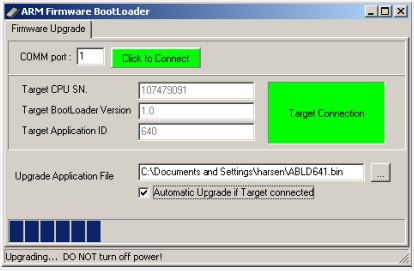
#### FOR EXAMPLE: (SETTING CONTROLLER CRANK ATTEMPT AT 2)

Operation	Description
Press and hold “  ” 2sec, enter into parameters setting menu, then LED displays	
Press “  ” button 2 times, then press “  ” button, LED displays:	
Press “  ” 7 times and then press “  ”, LED displays:	
Press “  ” or “  ” prompted enter password (1111), press “  ” button to confirm after entering password.	
Press “  ” or “  ” to change parameters, change at 2.	
Press “  ” button to confirm, and then press “  ” 2sec will quit parameter settings menu, LED displays:	

**Example: (the parameters of the controller reverts to the factory default values)**

Operation	Description
Press and hold "▶" 2sec, enter into parameters settings menu, then LED displays	
Press "▶" button and then press "I" 3 times, then LED displays:	
Press "▶" button, prompted enter password (2222), press "▶" button to confirm after entering password..	
Press "▶" reverts default values, press and hold "▶" 2sec will quit parameter settings menu.	

**Example: (CONFIGURE CONTROLLER AS ONLINE PROGRAM MODE)**

Operation	Description
Open the programming software "ABLDs.exe" on your computer, such as the right to import the upgrade process, the controller connected to the computer via cable Minu USB, the computer will recognize the serial port software to fill "COMM port", but do not open the serial port, as following methods to enter programming mode;  ( If cannot identify serial port you need to installation the USB driver in CD )	
Press and hold "▶" 2sec, enter into parameters settings menu, then LED displays:	
Press "▶" button, then press "I" 2 times, LED displays:	
Press "▶" button, prompted enter password (2222), press "▶" button to confirm after entering password.	
Press "▶" to confirm enter the programming mode, then the controller LED disappears, later click computer software "ABLDs.exe" serial port " Click to Connect ", then it will automatically upgrade.  In this mode it must ensure that the normal power supply, communication line connection will not be interrupted, restart the controller to work after a successful upgrade program.	

## 9.3 Fault Code Table

Name	Code		Name	Code	
GEN-V under 1	1	8888	Underspeed level 2	23	8888
GEN-V under 2	2	8882	Fail to start	24	8888
GEN-V over 1	3	8888	Fail to stop	25	8888
GEN-V over 2	4	8882	Batt. over volt	31	8888
GEN-Hz under 1	5	8288	Batt. under volt	32	8888
GEN-Hz under 2	6	8282	Oil-P low level1	33	8888
GEN-Hz over 1	7	8288	Oil-P low level2	34	8882
GEN-Hz over 2	8	8282	High temp. level1	35	8888
GEN-I over 1	9	8888	High temp. level 2	36	8882
GEN-I over 2	10	8882	D-input 1	56	8888
GEN-KW over 1	13	8888	D-input 2	57	8882
GEN-KW over 2	14	8882	D-input 3	58	8883
Overspeed level 1	20	8888	D-input 4	59	8884
Overspeed level 2	21	8882	Loss of pickup	68	8888
Underspeed level 1	22	8888	Oil-P sensor open	69	8888

## 10 Technical Specification

### 10.1 AC voltage:

Type	True RMS
Phase voltage	15 to 346VAC
Line voltage	25 to 600VAC
Max power wastage per line	<0.1W
Accuracy	1%
Display	0 to 600KV

### 10.2 AC voltage frequency:

Input frequency	3 to 500Hz (voltage $\geq$ 15VAC)
Accuracy	0.1%
Display	0 to 500Hz

### 10.3 Current (isolated):

Measurement	True RMS
Measuring current	5A
Accuracy	1%
Display	0 to 30000A
Max power wastage per line	<0.01W

### 10.4 Power supply:

Voltage range	12V/24V (8-35V) continuous
Max. operating current	@12V 100mA, @24V 50mA
Max. standby current	@12V 40mA, @24V 20mA
Cranking drop outs	As before cranking voltage $\geq$ 10V, can be maintained 80 ms at 0V, after the voltage is restored, the controller can work without to install additional auxiliary power.
Accuracy	1%
Display	0 to 40V

### 10.5 D-input:

Number	4 (Max)
Max. contact resistance	5K $\Omega$
Max. contact current per line	1mA

### 10.6 Configurable relay outputs

Quantity	4
Relay	3A/30Vdc

**10.7 Analog Inputs**

Number	2 (Max)
Sensor type	Resistance
Resolution	10 bits
Range	0 to1 K $\Omega$
Accuracy	2% When full scale, except for sensor error

**10.8 Speed sensor**

Voltage range	1 to 70V
Max. frequency	10000Hz
Fly wheel teeth	5 to 300

**10.9 Environmental parameters**

Operating ambient temperature Standards	-20 to 70°C IEC60068-2-1 和 IEC60068-2-2
Storage ambient temperature Standards	-30 to 80°C IEC60068-2-1 和 IEC60068-2-2
Humidity Standards	40°C, 93%RH, 96 hour IEC60068-2-30
Electro Magnetic compatibility (EMC) Standards	EN 61000-6-4 and EN 61000-6-2
Vibration Standards	EN 60068-2-6
Shock Standards	EN 60068-2-27
Electrical safety Standards	EN 60950-1
Degrees of protection Standards	IP65(front) IP20 (back) BS EN 60529