

Manual

EP6690
Engine water pump
controller

TH101134ER1

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	TH101134ER1	2017.4	L	C	NEW

**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.

**WARNING:**

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.

**WARNING:**

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

During installation, care must be taken to prevent static electricity.

**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

EP6690 is a water pump system intelligent controller used for the engine as power. It adopts new shape structure and perfect performance, and fully meets the different types of engine automation control.

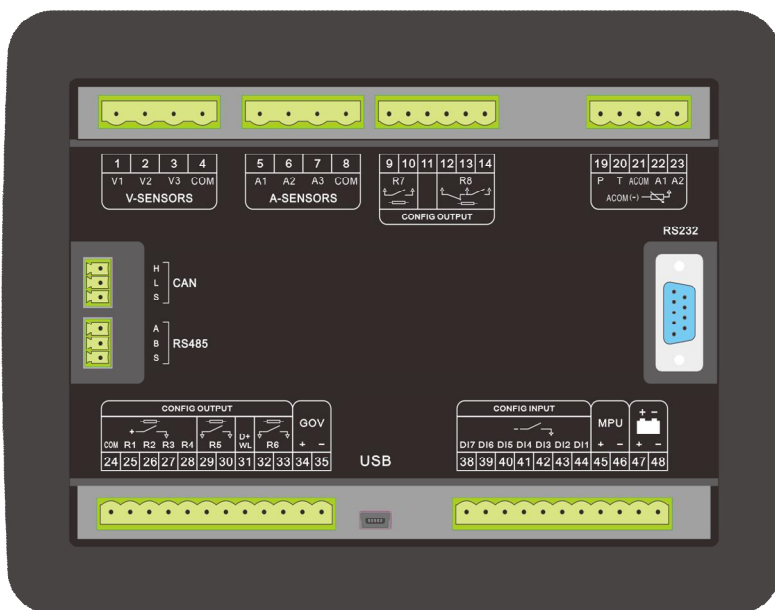
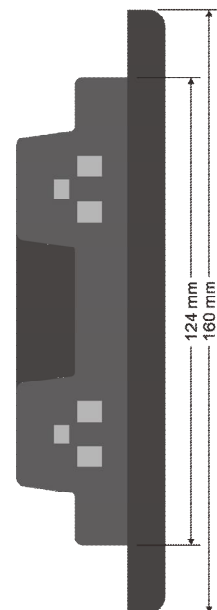
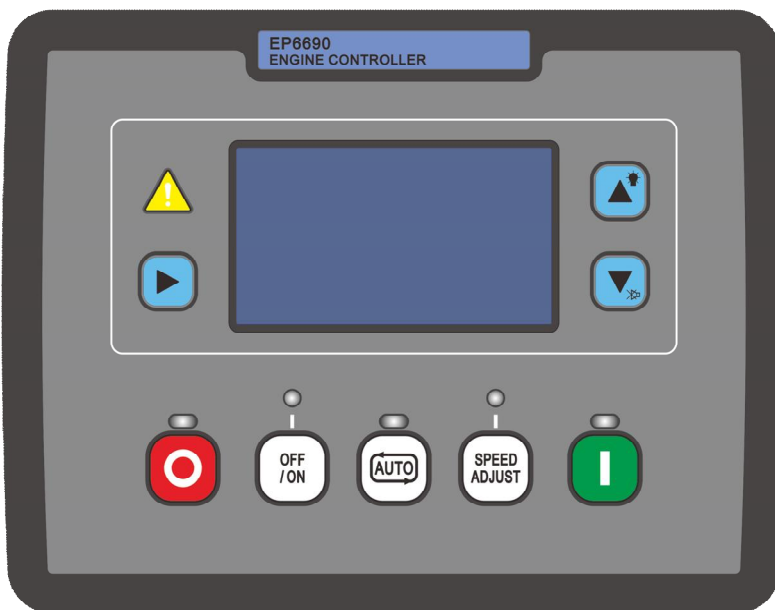
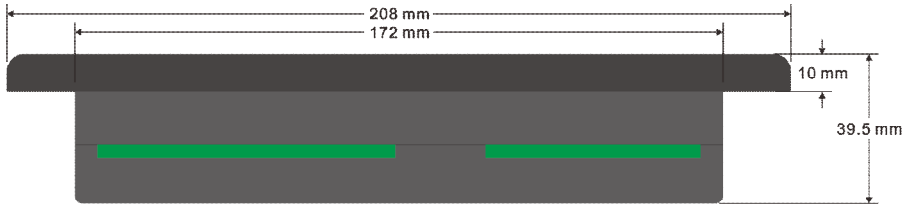
Features:

- I Multilingual menu selection
- I 132*64 dot matrix LCD display
- I Unit maintenance time presetting and reminding function
- I 10 analog measurement inputs, measuring display oil pressure, temperature and oil level, built-in multiple sensor options, customizable parameters
- I 8 definable control relay outputs
- I 7 definable discrete inputs
- I With extensions
- I Control panel keys to manually adjust the engine speed
- I The keys on the controller panel are used to select the control mode, start and stop the running program, data display and modification of the operation protection parameters. The LED indicator is used to indicate the controller's operation mode and the unit's operating status. The LCD displays various measurement parameters and status
- I Standard RS485 and RS23 communication port for remote monitoring, or communication with PC, complete remote signaling, telemetry, remote control
- I USB communication port, communicates with PC, can read and set the operating parameters of the controller
- I Can be adapted to GPRS-DTU module to realize the SMS emergency function of the controller and wireless network monitoring function
- I CANbus communication port reads and controls the parameters of ECU engine, which can realize the automatic control of engine speed
- I Through the pin-type locking terminal connection, it is very easy and convenient to connect, move, repair and replace the equipment.
- I Calendar and clock
- I Event record and measurement parameter record with clock
- I To achieve the scheduled time to start and shutdown

2 The Outline Dimension Drawings and Controller Wiring

2.1 Details:

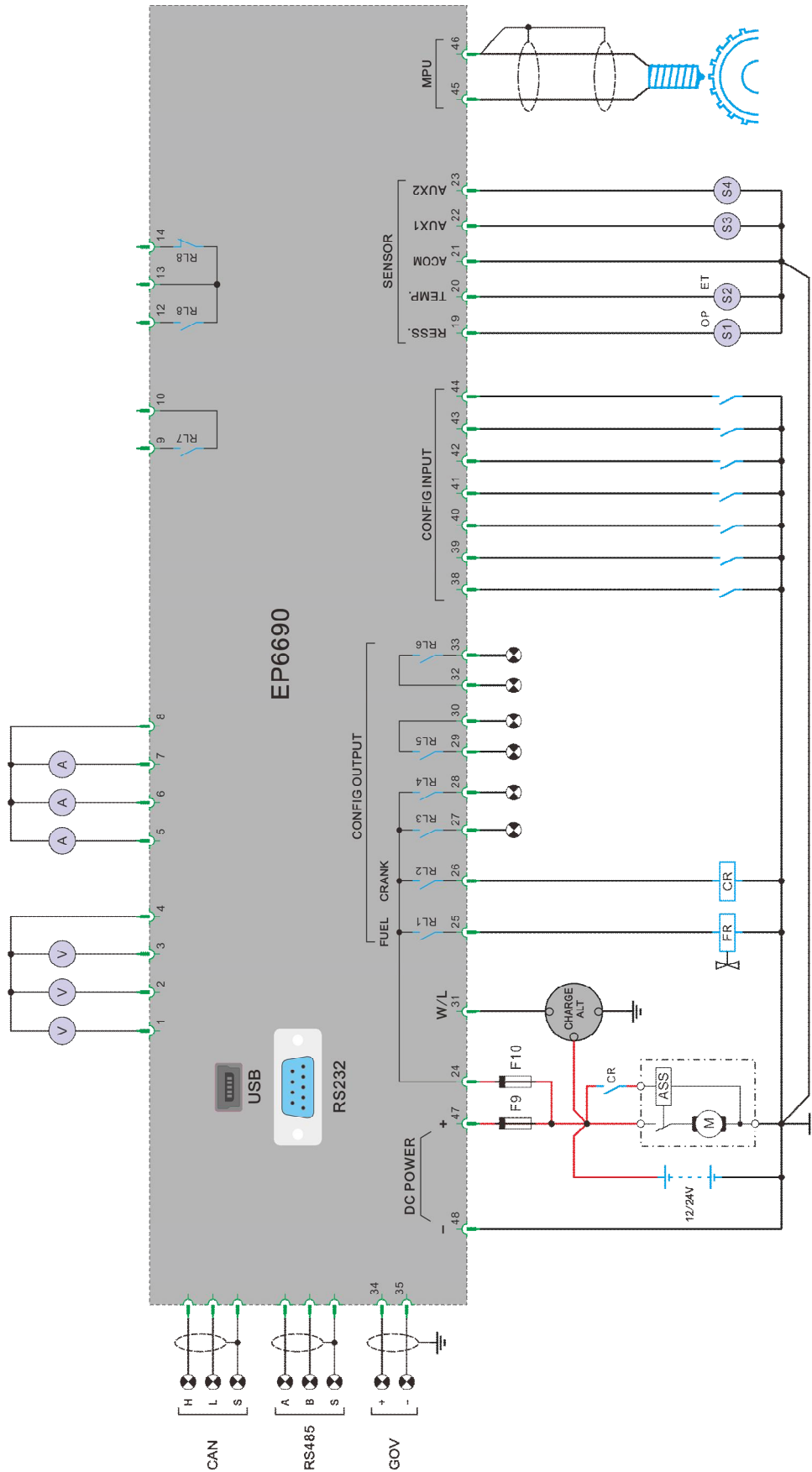
Module Dimensions	W208mm×H160mm
Panel Cutout	W173mm×H125mm
Thickness	D39.5mm



2.2 接线端口:

Pin	Function Description	Signal	Dim
1	V-SENSOR	0-10Vdc	1mm ²
2	V-SENSOR		1mm ²
3	V-SENSOR		1mm ²
4	Sensor common point		1mm ²
5	I-SENSOR	4-20mA	1mm ²
6	I-SENSOR		1mm ²
7	I-SENSOR		1mm ²
8	Sensor common point		1mm ²
9	Relay output 7	N.O. contact, 16A/30Vdc, defined (7)	2.5mm ²
10	Relay output 7		2.5mm ²
11	No		
12	Relay output 8	N.C. contact, 16A/30Vdc, defined (8)	2.5mm ²
13	Relay output common point		2.5mm ²
14	Relay output 8	N.O. contact, 16A/30Vdc, defined (8)	2.5mm ²
19	LOP detection	Resistive pressure sensor (<1KΩ)	2.5mm ²
20	HET detection	Resistive temperature sensor (<1KΩ)	2.5mm ²
21	Sensor common point		2.5mm ²
22	Auxiliary sensor 1	Resistive sensor (<1KΩ)	2.5mm ²
23	Auxiliary sensor 2	Resistive sensor (<1KΩ)	2.5mm ²
24	Relay output common point		2.5mm ²
25	Relay output 1	N.O. contact, 16A/30Vdc, defined (1)	2.5mm ²
26	Relay output 2	N.O. contact, 16A/30Vdc, defined (2)	2.5mm ²
27	Relay output 3	N.O. contact, 3A/30Vdc, defined (3)	1mm ²
28	Relay output 4	N.O. contact, 3A/30Vdc, defined (4)	1mm ²
29	Relay output 5	N.O. contact, 3A/30Vdc, defined (5)	1mm ²
30	Relay output 5		1mm ²
31	Charger excitation power output	If not used, do not connect to negative	1mm ²
32	Relay output 6	N.O. contact, 3A/30Vdc, defined (6)	1mm ²
33	Relay output 6		1mm ²
34	GOV speed output{+}		Two-core shielded
35	GOVspeed output {-}		
36	No		
37	No		
38	D-Input 7	Defined (7)	1mm ²
39	D-Input 6	Defined (6)	1mm ²
40	D-Input 5	Defined (5)	1mm ²
41	D-Input 4	Defined (4)	1mm ²
42	D-Input 3	Defined (3)	1mm ²
43	D-Input 2	Defined (2)	1mm ²
44	D-Input 1	Defined (1)	1mm ²
45	Magnetic pick-up signal {+}	1-70Vac	Two-core shielded
46	Magnetic pick-up signal {-}		
47	Battery supply (+B)	12V/24V (8-35Vdc continuous)	2.5mm ²
48	Battery supply (-B)		2.5mm ²
	H	ECU CAN communication port (Built-in termination resistor)	Two-core shielded cable
	L		
	S		
	A	RS485 communication port	Two-core shielded cable
	B		
	S		

2.3 Terminal Connections:









3 Panel Operation

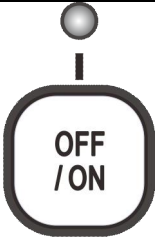


The operation panel consists of 3 sections: LCD display indicating measurement parameters, LED indicator for common failure, and push buttons for Genset and selection of control modes.

LCD with 132*64 pixels can display multi-line data in the same time. LCD also has a backlight so that the operator can clearly read information day or night. After pressing any button the backlight will automatically turn off after a preset time.

The LCD display and its control push buttons provide a friendly operational interface for the operator to easily control the Genset, read information and parameter setting.

Buttons and LEDs


Function Description	Tag
<p>Scroll Button Scroll menu for parameters display Enter into or exit parameters setting by pressing and holding this button for 2sec.</p>	
<p>Lamp Test/“+” Value Increase Pass and hold this button, all lights on the control panel are bright, used to test the indicator whether work. When in parameters setting mode, this button is used to increase value / scroll up menu.</p>	
<p>MUTE / “-” Value Decrease When failure occurs, alarm buzzer will sound. Pressing mute button will mute the sound. LCD will display mute icon. Press it again will clear the mute function, buzzer will continue to sound. When the mute function is effectively, LCD display mute symbols. When in parameters setting mode, this button is used to decrease value / scroll down menu.</p>	
<p>AUTO Mode Button 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. LCD display controller selected mode of operation.</p>	
<p>START Button/ RETURN When controller is running in MANUAL mode, press this button to start the generator. When in parameters setting mode, this button is used to return.</p>	
<p>STOP / RESET Button The push button is used for manually stops the Genset. 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.</p>	

<p>OFF/ON button In the manual operation mode, if a custom relay output of the controller is defined as "load", this button can control the closing or opening of the "load". When the button is closed, the indicator light is illuminated. When the button is off, the indicator light is off.</p>	 <p>The image shows a button with a circular indicator light above it. The button is rectangular with rounded corners and contains the text "OFF / ON".</p>
<p>Speed adjustment button In the manual operation mode, press this button, the indicator light on the button is illuminated, and the controller displays the engine speed adjustment interface. At this time, you can adjust the increase of the engine speed through the "up" and "down" on the controller panel.</p>	 <p>The image shows a button with a circular indicator light above it. The button is rectangular with rounded corners and contains the text "SPEED ADJUST".</p>
<p>Shutdown Alarm (FAILURE) LED The LED will illuminate when pre-alarm occurs. The LED will illuminate permanently when shutdown alarm occurs.</p>	 <p>The image shows a yellow triangular warning symbol with a black border and a black exclamation mark in the center.</p>

4 Control and Operation Instruction

The controller has two control modes, manual and automatic, which are selected through the "Auto mode button" on the operation panel.

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 Start Sequence:

The engine is in standby mode. The engine start process will only start if the following conditions occur:

- I Definable input port for the remote control load a definition.
- I Definable input port for the remote control no-load a definition
- I Built-in scheduler activates and issues a start request

The Start delay timer is activated, when it times out 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 energized and the starter motor engages and begins to crank the engine. When the engine speed reaches the crank disconnect speed the start relay output is de-energised and the safety-on delay time starts. When the safety-on times out if the controller detects that the parameters of the Genset such as speed, oil pressure, coolant temperature are normal and no other failure is detected this indicates the Genset has successfully started and running normally. The LCD displays the Genset Measurement Parameters..

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



NOTE:

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

- I The speed reaches **crank cut off speed**;
- I Charger voltage reaches **crank cut off value** (optional);
- I Cutout P-delay time's up (optional);
- I Cranking time's up.

Controller can not implement crank procedure in one of following conditions:

- I The speed reaches **crank cut off speed**;
- I Oil pressure switch is opened or oil pressure is higher than **crank cut off value** (optional).

Repeat Crank: During the crank period, if the engine does not fire the start relay output de-energises and crank rest timer begins. 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 it was successful start up or reaches the configured number of crank cycles.

If any shutdown alarm occurs during crank the controller will stop cranking immediately the genset only can be restarted after clearing the failure.

Start Failure: The above procedure will be repeated until it reaches the configured number of crank cycles. The crank relay output is then de-energised and locks out as **Fail to Start**. The failure LED illuminates and the LCD displays fail to Start.

**CAUTION:**

- I If Fail to Start occurs the operator must check the whole Genset system to find reason for failure, only after clearing the failure can “STOP / RESET” button to reset fault lock out status, and restart the Genset.

Load process:

When the speed of the engine reaches the preset speed of the clutch closing speed, the load relay delays the output automatically and the “close/open” lights illuminated, after which the engine runs at the rated speed.

**NOTE:**

- I The configurable input port of the remote-controlled no-load starter is valid, or the dispatch mode is set to no-load, and the engine is only no-load running and not closing to power supply.
- I The issuing of the load command must be started after the safety supervision delay time expires.

Generator stopping sequence:

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

- I Remote Control the load boot definable invalid input.
- I The scheduling procedures boot request is invalid

Load relay delay disconnected after engine is unloaded, cooling delay start countdown, when it times out, the controller Fuel solenoid relay output action, immediately disconnect the fuel solenoid valve ,into standby generator.

Stop Failure: When cool down times out, the fuel relay opens and the timer for stop delay begins. If the controller detects that the speed of engine is greater than the cutout values or LOP switch is open, when it times out, the failure LED illuminates and the LCD displays **Fail to stop**.

**NOTE:**

- I After stop failure, the controller will not energise the crank relay output if the failure has not been removed and the controller reset.

4.3 MAN control Sequence

The controller is running in “MANUAL” mode.

Generator starting sequence:

Pressing “START” button the fuel relay energises, and operates the fuel solenoid of 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 speed, oil pressure, coolant temperature are normal, and no other failure is detected this indicates the Genset has successfully started and running normally. The LCD displays the Genset Measurement Parameters.

After the speed of the engine reaches the preset normal value range, the normal engine indicator lights and the engine load relay will not automatically close the output.

Press “C/O” key, the load relay closes output, and the indicator light on the key is on; press “C/O” key again, the load relay will be disconnected and the indicator light on the key will be off;

**NOTE:**

- I In the manual operation mode, the manual load output is required, and the engine must be normal, otherwise the C/O key is invalid.

Generator stopping sequence:

Press the "Stop" button, the controller immediately executes the shutdown program, disconnects the load, the engine is unloaded, and the cooling delay begins to count down. When the time is up, the controller's throttle relay is activated, the fuel solenoid valve is immediately disconnected, and the engine is shutdown to standby mode.

If during the cooling process, press the "Stop" button again, the engine does not pass the cooling delay time, and the machine stops immediately.

4.4 Throttle solenoid valve is a normally-open type engine starting and stopping process:

There are two types of engine throttle solenoid valves, one of which is a normally closed valve. The solenoid valve is closed when the engine is not running, and is opened when power is enabled. One type is a normally open type. The solenoid valve is open when not in operation and closed when energized and enabled. The above description is the control process of the normally closed solenoid valve.

Normally open start control process:

When running, the throttle relay of the controller is not closed, the throttle solenoid valve has no power supply, then the throttle solenoid valve electromagnet does not actuate, and the valve opens.

Normally open shutdown control process:

At the beginning of the stop control process of the controller, the throttle relay of the controller is closed, the throttle solenoid valve is energized, the throttle solenoid valve is activated, the valve is closed, the engine starts to stop, and the throttle relay is opened after the delay (with the stoppage time) , disconnected the throttle solenoid valve power.

Other control processes with the throttle solenoid valve are normally closed engines

4.5 Idle function:

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

**NOTE:**

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

4.6 Preheat function:

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

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

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

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

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

Mode 5 —the T-sensor use is defined as **Preheat**, preheat relay output energises when the temperature falls below the **Preheat ON** value, and de-energises until the temperature reaches the **Preheat OFF** value.

Mode 6 —the A-sensor 1 use is defined as **Preheat**, preheat relay output energises when the temperature falls below the **Preheat ON 1** value, and de-energises until the temperature reaches the **Preheat OFF 1** value.

Mode 7 —the A-sensor 2 use is defined as **Preheat**, preheat relay output energises when the temperature falls below the **Preheat ON 2** value, and de-energises until the temperature reaches the **Preheat OFF 2** value.

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 7, preheat function is active immediately when the controller is switched on power.

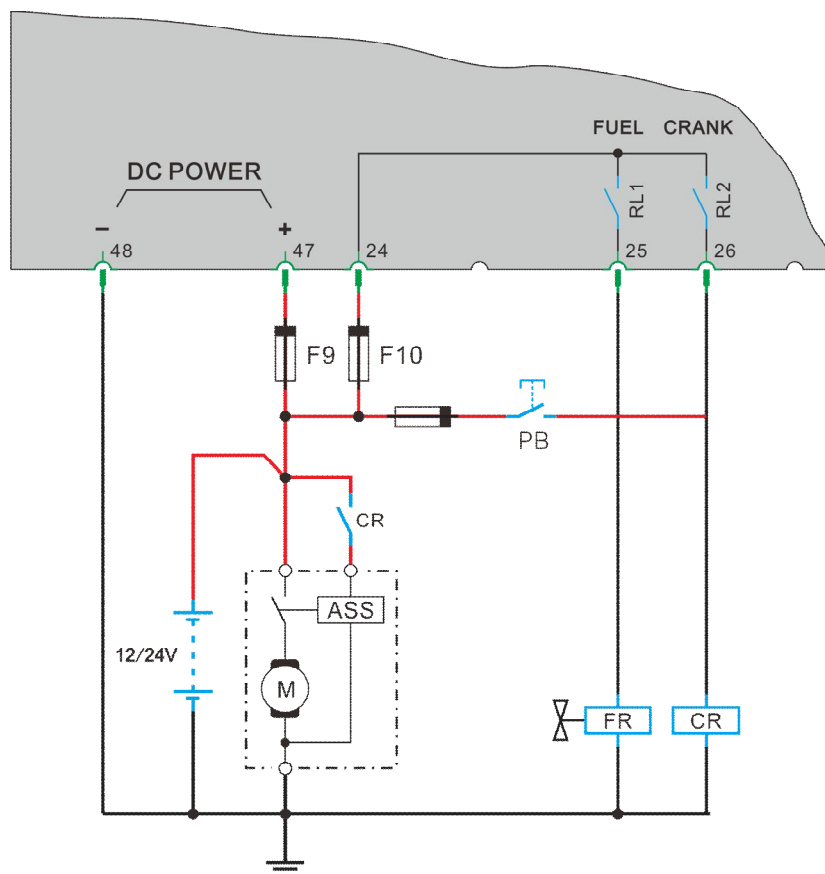
During crank period, the preheat relay output will not energise in any of above modes.

4.7 The function of forcing start:

Reason to add this function to the controller is that when the engine under abnormal conditions, e.g. the battery voltage is too low or ambient temperature is too low, the Genset cannot be started successfully when it implements the build-up cranking process of controller. There are 2 methods to solve these conditions in the controller:

First method: when controller is running in “MANUAL” mode, normally the crank time will not exceed the pre-set value, but you can press “START” button and hold without changing the related parameters until it has started, the crank time depends on the holding time on the button. Safety-on timer begins after it has successfully started. The other processes and protections are the same as for a normal start.

Second method: when controller is running in “MANUAL” mode, configure the “EX. Crank permit” as “1”, shown as schematic below, a PB switch is externally mounted to control cranking. Close PB switch, engine cranks, when the speed reaches 150RPM, then controller functions are triggered, the fuel relay output is energised, safety-on timer begins after the speed reaches crank cutout value, the other processes and protections are the same as normal start. If the speed falls below 150RPM within safety-on time, controller will be reset and return to standby status.



CAUTION:

- I We normally don't recommend using the second method to solve this condition.
- I Pay attention to the installation of PB switch to avoid cranking when the Genset is running

5 Measurement display data

Engine operating speed RPM (signal from engine speed sensor or ECU)

Engine oil pressure Bar/PSI (signal from engine oil pressure sensor or ECU)

Engine temperature °C / °F (signal from engine temperature sensor or ECU)

Auxiliary sensor 1

Auxiliary sensor 2

3 voltage sensor for temperature, pressure and other parameter measurement

3 current sensor for temperature, pressure and other parameter measurement

Battery voltage Vdc

Unit operating time Hour

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 illuminate Sound sirens	Power generation load switch GCB disconnect	"Fault" LED illuminate Close generators
A1 Silence Warning	Y	N	N	N
	Warning: 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.			
A2 Voice and light Warning	Y	Y	N	N
	Warning: 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.			
A3 Unload Warning	Y	Y	Soft Uninstall	N
	Warning: 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.			
B1 Silence Shutdo wn	Y	Y	Soft Uninstall	Cooling timing
	Shutdown failure: 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.			
B2 Voice and light Shutdo wn	Y	Y	Immediately	Cooling timing
	Shutdown failure: 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.			
B3 Unload Shutdo wn	Y	Y	Immediately	Immediately
	Shutdown failure: 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.			
Control	N	N	N	N
	Control: only as a control condition to trigger related control command.			



NOTE:

- I Thewarning non-serious fault state to defer any generator system which is harmful, just to remind the attention of the operator does not match the requirements of the situation and resolved in a timely manner to ensure the continuous operation of the system. When a warning occurs, the warning indicator light, the fault is not locked unit without stopping the machine once the fault is removed warning automatic discharge.
- I 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		
1.1	Language	0 to 2	
1.2	Password	0000 to 9999	
1.3	Pressure unit	Bar/psi	Bar
1.4	Temperature unit	°C/°F	°C
1.5	Comm. address	1 to 247	1
1.6	Startup mode	Man/Auto/Last	Man
1.7	Display contrast	1 to 9%	5
1.8	Auto scroll time	1 to 60 s / Not used	Not used
1.9	Starting alarm	否/是	否
1.10	Default settings		
1.11	Firmware Update		

Menu descriptions:

Language

- I Used to select the Language which is displayed on the LCD

Password

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

Pressure unit

- I Used to define oil pressure unit which is displayed on the LCD, Bar or PSI.
- I Transfer formula: $P[\text{psi}] = P[\text{bar}] * 14.503$.

Temperature unit

- I Used to define temperature unit which is displayed on the LCD, °C or °F.
- I Transfer formula: $T[°\text{F}] = (T[°\text{C}] * 1.8) + 32$.

Comm. address

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

Startup mode

- I Used to configure the Startup mode of controller when it is powered up.
- I When parameter is configured as “Manual”, the controller will be in Manual mode when it is powered up.
- I When parameter is configured as “Automatic”, the controller will be in Automatic mode when it is powered up.
- I When parameter is configured as “Last”, the controller will be in the mode which is the same as last time when it is powered up.

Display contrast

- I Used to adjust the controller LCD display contrast.

Auto scroll time

- I Use to setting the interval of LCD screen display scroll page, any button will start auto scroll page after 30 seconds.
- I When the parameter is set to " not use" , press manually scroll.

Starting alarm

- I When the parameter is set to "NO", the controller will not audible alarm before the generator set start.
- I When the parameter is set to "Yes" in the automatic operation mode, to start the generator set during the start-up delay and the warm-up, an audible alarm.

Default settings

- I Parameters returned to the factory default.

Firmware Update

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

7.2 ENGINE

NO.	Items	Setting Range	Preset
2.0	QUIT		
2.1	Engine type	1 Diesel /2 ECU/3 Gas	1
2.2	ECU type	1 to 20	4
2.3	Engine rated speed	99 to 9999RPM	1500
2.4	Fly wheel teeth	5 to 300	120
2.5	Fuel mode	0 N.C/1 N.O	0
2.6	Start delay	0 to 999S	10S
2.7	Crank attempts	1 to 10	3
2.8	Critical C-attempt	1 to 20 次	6 次
2.9	Crank time	1 to 99S	5S
2.10	Crank time add	1 to 99s / Not used	Not used
2.11	Crank pause time	1 to 300s	15s
2.12	Ignition speed	1 to 9999 RPM	200RPM
2.13	Ignition start DLY	1 to 999s	5s
2.14	Gas valve on DLY	0 to 999s	5s
2.15	Crank cutout RPM	1 to 9999 RPM	300RPM
2.16	Crank cutout ALT-V	1.0 to 40.0 V Not used	Not used
2.17	Crank cutout Oil-P	0.1 to 150.0 Not used	2.2
2.18	Crank cutout P-DLY	1 to 60S Not used	Not used
2.19	Idle time	1 to 9999S Not used	Not used
2.20	Pre-heat mode	1 to 7	1
2.21	Pre-heat time	1 to 9999S Not used	3 S
2.22	Safety-on delay	0 to 600S	10 S
2.23	Cool down mode	0 Full speed /1 Idle	Idle
2.24	Cool down time	0 to 9999S	300S
2.25	Stop time	0 to 60S	20S
2.26	EX. Crank permit	0 N/1 Y	NO
2.27	Charge failure		
	Function	0 N/1 Y	1
	Limit	1.0 to 40.0 V	8.0V
	ALM. class	0 to 6	2
2.28	Pickup signal		
	Function	0 N/1 Y	1
	Delay	0 to 999s	1s
	Delay by	0 to 3	1
	ALM. class	0 to 6	2
2.29	Overspeed level1		
	Function	0 N/1 Y	1
	Limit	1 to 9999 RPM	1600 RPM
	Delay	0 to 999s	1s
	Delay by	0 to 3	1
	ALM. class	0 to 6	2

2.30	Overspeed level2		
	Function	0 N/1 Y	1
	Limit	1 to 9999 RPM	1710 RPM
	Delay	0 to 999s	0s
	Delay by	0 to 3	1
	ALM. class	0 to 6	5
2.31	Underspeed level1		
	Function	0 N/1 Y	1
	Limit	1 to 9999 RPM	1440RPM
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
2.32	Underspeed level2		
	Function	0 N/1 Y	0
	Limit	1 to 9999 RPM	1350RPM
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	3
2.33	Start failure		
	Function	0 N/1 Y	1
	ALM. class	0 to 6	6
2.34	Stop failure		
	Function	0 N/1 Y	1
	ALM. class	0 to 6	3
2.35	Batt. Overvolt		
	Function	0 N/1 Y	1
	Limit	1.0 to 40.0 V	35.0 V
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	2
2.36	Batt. Undervolt		
	Function	0 N/1 Y	1
	Limit	1.0 to 40.0 V	8.0 V
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	2
2.37	Maintenance		
	Function	0 N/1 Y	0
	Limit	1 to 9999 hour	1000
	ALM. class	0 to 6	2
2.38	ECU Data fail		
	Function	0 N/1 Y	1
	Delay	0 to 999s	30s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2

2.39	ECU Warning		
	Function	0 N/1 Y	1
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
2.40	ECU Shutdown		
	Function	0 N/1 Y	1
	Delay	0 to 999s	5s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
2.41	Water in fuel		
	Function	0 N/1 Y	0
	Delay	0 to 999s	30s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2

Menu description:**Engine type**

- I Used to select the controller controls the object type of engine.
- I When the parameter is set to "1", is a traditional diesel engine;
- I When the parameter is set to "2", is used ECU of the engine;
- I When the parameter is set to "3", is a conventional gas engine.
- I When the control object is ECU engine, the controller will be activated "ECU warning", "ECU fault shutdown", " ECU data failure" and "oil inlet water" protection function at the same time.

ECU type

- I Used to define J1939 interface functions of controller and ECU type;
- I The controller has built-in several common ECU type:

Code	Description
1	Cummins GCS / (MODBUS) information
2	Cummins CM570 / Cummins QSX15 information
3	Cummins CM2150
4	VOLVO EMS2
5	Iveco
6	MTU ADEC
7	Scania EMS S6
8	Jichai 140
9	Reverse
10	Reverse
11	Deutz EMR2
12	Perkins
13	Caterpillar
14	MTU MDEC
15	Volvo Penta
16	Cummins CM850
17	John Deere
18	Scania EMS
19	Detroit Diesel
20	Generic J1939

Engine rated speed

- I Used to define the rated speed of engine running.
- I As a baseline reference value of speed control.

Fly wheel teeth

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

Fuel mode

- I Use to configure the type of engine fuel supply valve (details refer to section 5.7).
- I N.C. type means the fuel channel when fuel can not be used: N.O. type means the fue channel is opened when fuel can not be used.

Start delay

- I Used to define the time between the activation of remote start signal and crank control output.

Crank attempts

- I Used to configure how many times the controller repeat to crank the engine; this value is equal to the maximum crank times.

Critical C-attempt

- I When the critical mode is activated, controller can be repeated attempts to crank the engine, this value is equal to the maximum crank times.

Crank time

- I Use to configure the time of duration of engine crank command issued.
- I 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 time add

- I Used to adjust the time permit of the repeat cranking.
- I The second time of crank time is equal to the first crank time plus the extra time. For example: "crank time" set at 5s, "Crank time add" set at 3s, then since the second crank, the maximum crank time permit is 8s.

**Caution:**

The maximum crank time permit can not exceed the range of the equipment safety.

Crank pause time

- I The time between last crank and next crank.
- I Engine only can be cranked again after the crank pause time has expired .

Ignition speed

- I Used to define can be issue the minimum engine speed of Ignition command .
- I This parameter is valid only in the application of gas engine.

Ignition start DLY

- I Used to define the lag time of ignition output.
- I This parameter is only valid only on the application of the gas engine, from crank command output and start to timing at the same time.

Gas valve on DLY

- I Used to define the lag time of gas valve open command issued.
- I This parameter is only valid only on the application of the gas engine from the ignition command issued and start to timing at the same time.

Crank cutout RPM

- I The crank cutout speed.

Crank cutout ALT-V

- I The crank cutout Charger voltage, signal is from the W/L terminal of charger.
- I When parameter is configured as “not used”, this function is inactive.

Crank cutout Oil-P

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

Crank cutout P-DLY

- I Used to configure the period from engine LOP-switch opened or oil pressure reaches oil Pressure Crank cutout value to crank disconnection.
- I 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.

Idle time

- I The duration of engine idle running.
- I When controller in manual control mode, press the start button, the idle time timer starts to timing; when test control mode is valid, idle time timer is beginning; when controller in the automatic control mode, the end of the start-up delay timer, idle time timer is started. Is defined within the idle time of idle output relay closed output ,time out, the relay restore the disconnected state.
- I When parameter is configured as “not used”, idle function is inactive.

Pre-heat mode

- I Used to configure the mode of preheat.
- I There are 7 pre-heat modes for selection, please read the description of preheat function for details.

Pre-heat time

- I The preheating duration of the engine before start of crank;
- I When parameter is configured as “not used”, pre-heat function is inactive.

Safety-on delay

- I Used to configure the period from engine started successfully to Genset stable running.
- I The protection of under speed, under voltage, under frequency, low oil pressure is disabled by the controller during safety-on time delay.

**CAUTION:**

As 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, or it may cause engine damage.

Cool down mode

- I Used to configure the mode of cool down..
- I When parameter is configured as “full speed”, the engine will run at rated speed during cooling down. When parameter is configured as “idle”, the engine will run in idle during cooling down.

Cool down time

- I The time permit for running without load before engine stop.
- I 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

- I The maximum time permit for the engine stop.
- I After the fuel relay output is de-energised (fuel relay output is energised for N.O. type fuel valve), fail to stop delay timer begins, when it time's out if controller detects engine speed exceeds crank cutout RPM, or LOP switch is open, or oil pressure exceeds crank cutout oil pressure, then stop failure occurs.
- I If the fuel valve is N.O. type, the fuel relay output is de-energised after Stop delay has expired.

EX. Crank permit

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

Charge failure

- I Controller through the "WL" port detection auxiliary AC charger excitation voltage, to determine the AC charger whether working properly, when the detection voltage is lower than the set limit, charging failure protection function triggered. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "!W:Charge failure"; if select 4/5/6 alarm level when protection function triggered, LCD display "!W:Charge failure".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Use to defined charging failure protection threshold. When detection voltage reaches or falls below this threshold, the duration exceeds over than delay time, the define operation of alarm levels are triggered.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Pickup signal

- I When using the speed sensor, the controller can through speed signal monitoring, to determine the speed sensor whether there is. When the sensor signal is lost, if select 1/2/3 alarm level when protection function triggered, LCD displays "!W:Pickup signal"; if select 4/5/6 alarm level when protection function triggered, LCD display "!A:Pickup signal".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Delay	If the speed signal loss time of duration longer than the delay time value set, the define operation of alarm levels are triggered; if the speed signal loss recovery before the time delay 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.

Overspeed level1&2

I Controller provides two levels of speed monitoring for users to choose for warning, fault shutdown and control. If you choose to A1/A2 alarm level when the protection function triggered, LCD displays "!W:Overspeed level1" or "!W:Overspeed level2"; If you choose to B1/B2/B3 alarm level when protection function triggered, LCD displays"!A:Overspeed level1 "or" !A:Overspeed level2".

Function	Select "1", the monitoring function is active; Select "0", 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) DB0: always effective; Set (1) DB1: starting from crank, monitoring effectively at the same time; Set (2) DB2: from safety supervision delay time over, start effective; Set (3) DB3: 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.

Underspeed level1&2

I Controller provides two levels of low-speed monitoring for users to choose for warning, fault shutdown and control. If you choose to A1/A2 alarm level when the protection function triggered, LCD displays "!W:Underspeed level1" or "!W:Underspeed level2"; If you choose to B1/B2/B3 alarm level when protection function triggered, LCD display "!A:Underspeed level1 "or" !A:Underspeed level2 ".

Function	Select "1", the monitoring function is active; Select "0", 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) DB0: always effective; Set (1) DB1: starting from crank, monitoring effectively at the same time; Set (2) DB2: from safety supervision delay time over, start effective; Set (3) DB3: 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.

Start failure

I If the engine number of start reaches a pre-set number of starts is still not running, which happened Startup Failure. If you choose to A1/A2 alarm level when protection function triggered, LCD display "!W:Start failure"; if select B1/B2/B3 alarm level protection function triggered when LCD displays "!A:Start failure ".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Stop failure

- I When the controller to execute the shutdown command, the throttle control relay to disconnect the output (N.O. throttle, control relay output is closed), engine downtime timer is started, after the end of the counting time, if the controller detects to the generator voltage greater than crank cutout voltage, or the speed is greater than crank cutout RPM, or oil pressure switch is open, or oil pressure greater than crank cutout oil pressure, that is shutdown failed. If you choose to A1/A2 alarm level when protection function triggered, LCD display "!W:Stop failure"; if select B1/B2/B3 alarm level when protection function triggered, LCD displays "!A:Stop failure".

Function	Select "1", the monitoring function is active. Select "0", the monitoring function is invalid.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

Batt. overvolt

- I The controller detects the battery voltage, and provide a high limit protection for users to choose for warning, fault shutdown and control. If you choose to A1/A2 alarm level when the protection function triggered, LCD displays "!W:Batt.Overvolt"; such as select B1/B2/B3 alarm level when protection function triggered, LCD displays "!A:Batt.Overvolt".

Function	Select "1", the monitoring function is active; Select "0", 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) DB0: always effective; Set (1) DB1: starting from crank, monitoring effectively at the same time; Set (2) DB2: from safety supervision delay time over, start effective; Set (3) DB3: 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.

Batt. undervolt

- I 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 choose to A1/A2 alarm level when protection function triggered, LCD display "!W:Batt.Undervolt", If you choose to B1/B2/B3 alarm level when protection function triggered, LCD displays "!A:Batt.Undervolt".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define the low 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 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) DB0: always effective; Set (1) DB1: starting from crank, monitoring effectively at the same time; Set (2) DB2: from safety supervision delay time over, start effective; Set (3) DB3: 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.

Maintenance

- I The controller can be provided on the running time of the generator to be accumulated, and the default parameters with this comparison, there is provided a protection unit maintenance time limit for the user to select for warning, downtime and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "!W: maintenance"; ifselect 4/5/6 alarm level protection function triggered, LCD display" !A: maintenance".

Function	Select "1", the monitoring function is active. Select "0", the monitoring function is invalid.
Limit	Use to definition of the threshold value of the maintenance time. When this parameter is set to the effective and start to accumulate the running time of the generator at the same time, when the cumulative time greater than this setting value, the define operation of alarm levels are triggered.
ALM. class	Used to define the protection is triggered, and what is the controller will do. Details refer to the alarm level configuration table.

ECU Data fail

- I Controller and the the ECU communication on the engine, the delay time controller to accept less than the normal data from the ECU, to trigger an alarm action. If you choose to 1/2/3 alarm level when protection function triggered, LCD display "warning: ECU data failure"; if select 4/5/6 alarm level when protection function triggered, LCD display fault: "ECU data failure".

Function	Select "1", the monitoring function is active. Select "0", the monitoring function is invalid.
Delay	If the low voltage duration exceeds the set delay time value, the define operation of alarm levels are triggered, if the 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:

- I When the engine shutdown, ECU closed, which means that is normal conditions, ECU no communication, but will not trigger fault protection..
- I This protection function effective when only choose the engine type "ECU".

ECU Warning

- I When the engine ECU shutdown, this is a warning level of fault, the engine continues to run, engine manufacturers sometimes called the "yellow alert". After receiving this signal, the controller can trigger an alarm action. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "warning: ECU warning"; if select 4/5/6 alarm level when protection function triggered, LCD display failure: ECU warning.

Function	Select "1", the monitoring function is active. Select "0", the monitoring function is invalid.
Delay	If the low voltage duration exceeds the set delay time value, the define operation of alarm levels are triggered, if the 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:

- I ECU warning to the ECU itself is only a warning level of fault, the engine continues to run. If the controller uses this signal to trigger 4/5/6 alarm level, the control of the controller can turn off the engine.
- I This protection function effective when only choose the engine type "ECU".

ECU Shutdown

- I When the engine ECU shutdown failure, the engine shutdown, engine manufacturers, sometimes called "red light alarm. After receiving this signal, the controller can trigger an alarm action. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "Warning: ECU shutdown fault; if select 4/5/6 alarm levels when protection function triggered, LCD display " failure: ECU downtime failure".

Function	Select "1", the monitoring function is active.; Select "0", the monitoring function is invalid..
Delay	If the low voltage duration exceeds the set delay time value, the define operation of alarm levels are triggered, if the 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.

Water in fuel

- I When the controller receives a signal from the ECU of oil influent, can trigger an alarm ation. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "warning: oil inlet"; if select 4/5/6 alarm levels when protection function is triggered, LCD displays: oil inlet.

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Delay	If the low voltage duration exceeds the set delay time value, the define operation of alarm levels are triggered, if the 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:**

- I Controller received "water in fuel" of ECU signal, may also receive "ECU warning" or "ECU shutdown fault" signal at the same time.
- I This protection function effective when only choose the engine type "ECU".

7.3 Analog INPUT

No.	Parameter	Setting range	Preset
3.0	QUIT		
3.1	P-sensor type	1 to 15 / Not used	4
3.2	Oil-P low level1		
	Function	0 N/1 Y	1
	Limit	0.0 to 150.0 Bar/PSI	1.4Bar
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.3	Oil-P low level2		
	Function	0 N/1 Y	1
	Limit	0.0 to 150.0 Bar/PSI	1.1Bar
	Delay	0 to 999s	0s
	Delay by	0 to 3	3
	ALM. class	0 to 6	6
3.4	T-sensor type	1 to 15 / Not used	3
3.5	High temp. level1		
	Function	0 N/1 Y	1
	Limit	50 to 320°C/°F	92°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.6	High temp. level2		
	Function	0 N/1 Y	1
	Limit	50 to 320°C/°F	100°C
	Delay	0 to 999s	0s
	Delay by	0 to 3	3
	ALM. class	0 to 6	6
3.7	Heater on level	-20 to 320°C/°F	50°C
3.8	Heater off level	-20 to 320°C/°F	60°C
3.9	Cooler on level	-20 to 320°C/°F	80°C
3.10	Cooler off level	-20 to 320°C/°F	70°C
3.11	AUX sensor1 use	not used /1 fuel /2 temp.	1
3.12	AUX sensor1 type	1 to 15	3
3.13	Low fuel level1		
	Function	0 N/1 Y	0
	Limit	0 to 100%	20%
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.14	Low fuel level 2		
	Function	0 N/1 Y	0
	Limit	0 to 100%	10%
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2

3.15	High fuel level1		
	Function	0 N/1 Y	0
	Limit	0 to 100%	90%
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.16	High fuel level2		
	Function	0 N/1 Y	0
	Limit	0 to 100%	100%
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.17	Fuel pump ON	0 to 100%	20%
3.18	Fuel pump OFF	0 to 100%	70%
3.19	AUX1 low T level1		
	Function	0 N/1 Y	0
	Limit	-20 to 320°C/°F	60°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.20	AUX1 low T level2		
	Function	0 N/1 Y	0
	Limit	-20 to 320°C/°F	50°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.21	AUX1 high T level1		
	Function	0 N/1 Y	0
	Limit	-20 to 320°C/°F	90°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.22	AUX1 high T level2		
	Function	0 N/1 Y	0
	Limit	-20 to 320°C/°F	100°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.23	Heater1 on level	-20 to 320°C/°F	50°C
3.24	Heater1 off level	-20 to 320°C/°F	60°C
3.25	Cooler1 on level	-20 to 320°C/°F	80°C
3.26	Cooler1 off level	-20 to 320°C/°F	70°C
3.27	AUX sensor2 use	not used /1 pressure /2 temp.	2
3.28	AUX sensor2 type	1 to 15	3

3.29	AUX2 low P level1		
	Function	0 N/1 Y	0
	Limit	0.0 to 150.0 Bar/PSI	1.1Bar
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.30	AUX2 low P level2		
	Function	0 N/1 Y	0
	Limit	0.0 to 150.0 Bar/PSI	1.4Bar
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.31	AUX2 high P level1		
	Function	0 N/1 Y	0
	Limit	0.0 to 150.0 Bar/PSI	8.0Bar
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.32	AUX2 high P level2		
	Function	0 N/1 Y	0
	Limit	0.0 to 150.0 Ba /PSI	10.0Bar
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.33	AUX2 low T level1		
	Function	0 N/1 Y	0
	Limit	-20 to 320°C/°F	60°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.34	AUX2 low T level2		
	Function	0 N/1 Y	0
	Limit	-20 to 320°C/°F	50°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.35	AUX2 high T level1		
	Function	0 N/1 Y	0
	Limit	-20 to 320°C/°F	90°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.36	AUX2 high T level2		
	Function	0 N/1 Y	0
	Limit	-20 to 320°C/°F	100°C
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.37	Heater2 on level	-20 to 320°C/°F	50°C
3.38	Heater2 off level	-20 to 320°C/°F	60°C
3.39	Cooler2 on level	-20 to 320°C/°F	80°C

3.40	Cooler2 off level	-20 to 320°C/°F	70°C
3.41	V1 sensor use	not used /1 pressure /2 temp.	Not used
3.42	V1 range Min	-50.0 to 500.0	0
3.43	V1 range Max	-50.0 to 500.0	10.0
3.44	V1 low level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.45	V1 low level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.46	V1 high level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.47	V1 high level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.48	V2 sensor use	not used /1 pressure /2 temp.	Not used
3.49	V2 range Min	-50.0 to 500.0	0
3.50	V2 range Max	-50.0 to 500.0	10.0
3.51	V2 low level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.52	V2 low level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.53	V2 high level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.54	V2 high level2		
	Function	0 N/1 Y	0

	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.55	V3 sensor use	not used /1 pressure /2 temp.	Not used
3.56	V3 range Min	-50.0 to 500.0	0
3.57	V3 range Max	-50.0 to 500.0	10.0
3.58	V3 low level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.59	V3 low level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.60	V3 high level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.61	V3 high level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.62	A1 sensor use	not used /1 pressure /2 temp.	Not used
3.63	A1 range Min	-50.0 to 500.0	0
3.64	A1 range Max	-50.0 to 500.0	10.0
3.65	A1 low level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.66	A1 low level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2

3.67	A1 high level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.68	A1 high level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.69	A2 sensor use	not used /1 pressure /2 temp.	Not used
3.70	A2 range Min	-50.0 to 500.0	0
3.71	A2 range Max	-50.0 to 500.0	10.0
3.72	A2 low level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.73	A2 low level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.74	A2 high level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.75	A2 high level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.76	A3 sensor use	not used /1 pressure /2 temp.	Not used
3.77	A3 range Min	-50.0 to 500.0	0
3.78	A3 range Max	-50.0 to 500.0	10.0
3.79	A3 low level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.80	A3 low level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	0

	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.81	A3 high level1		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2
3.82	A3 high level2		
	Function	0 N/1 Y	0
	Limit	-50.0 to 500.0	10.0
	Delay	0 to 999s	1s
	Delay by	0 to 3	3
	ALM. class	0 to 6	2

Menu descriptions:**P-sensor type**

- I Used to configure the type of pressure sensor.
- I 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		
15		

**CAUTION:**

- I The P-sensor is used to measure the oil pressure, its accuracy is very important to the protection of the Genset, so please match the right type of the sensor or configure the right curve of the sensor. Otherwise it may cause engine damage.

- I 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(Ω)	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(Ω)	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(Ω)	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(Ω)	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(Ω)	195	155	127	107	88	72	61	54	48		

**NOTE:**

- I "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.
- I When configuring, please input the "resistance- measured value" from small to big one by one.

Oil-P low level 1&2

- I Controller provides two levels of low oil pressure limit monitoring for users to choose for warning, fault shutdown and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD 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, LCD displays " !A: Oil-P low level 1" or " !A: Oil-P low level 2".

Function	Select "1", the monitoring function is active; Select "0", 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 engine 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.

T-sensor type

- I Used to configure the type of HET sensor.
I Optional kinds of built-in HET sensors in the controller.

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	

**CAUTION:**

The HET sensor is used to measure the coolant temperature, its accuracy is very important to the protection of the Genset, so please match the right type of the sensor or configure the right curve of the sensor. Otherwise it may cause engine damage.

I 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:

- I “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.
- I When configuring, please input the “resistance-value” from small to big one by one

High temp. level 1&2

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

Function	Select "1", the monitoring function is active; Select "0", 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.

Heater on level

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

Heater off level

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

Cooler on level

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

Cooler off level

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

AUX sensor1 use

- I This parameter is used to set the auxiliary sensor port 1 function.
- I When the parameter is set to "0", this port is not used.
- I When the parameter is set to "1", this port is connected to the oil level sensor to detects the engine fuel oil level.
- I When the parameter is set to "2", this port connected temperature sensor.

AUX sensor1 type

- I Used to define the type of the auxiliary sensor 1.
- I When its oil level sensor, the controller built-in below oil level sensor types to choose, such as following the oil level sensor type table:

Code	Type	Remark
0	Not use	
1	Close for LOL	Closed (low) is valid
2	Open for LOL	Disconnect (high) is valid
3	Configurable 1	
4	Configurable 2	

Low fuel level 1&2

- I The controller provides two levels of low oil level limit monitoring for users to choose for warning, fault shutdown and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "!W:Low fuel level1 " or "!W:Low fuel level2"; if select 4/5/6 alarm levels, when protection function is triggered, LCD displays "!A:Low fuel level1 or "!A:Low fuel level2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define engine low oil level protection threshold. When the oil level is at or lower than this threshold, time of duration over than delay time, the define operation of alarm levels are triggered.
Delay	If the low oil level time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the low oil level over 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.

High fuel level 1&2

- I The controller provides two levels of low oil level limit monitoring for users to choose for warning, fault shutdown and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "!W: High fuel level1 " or "!W: High fuel level2"; if select 4/5/6 alarm levels, when protection function is triggered, LCD displays " !A: High fuel level1 or " !A: High fuel level2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define engine high oil level protection threshold. When the oil level 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 oil level time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the high oil level 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.

Fuel pump ON

- I When the auxiliary sensor 1 uses parameter is set to "1", this parameter is set to be effective.
- I This parameter is used to set is defined as "fuel pump control" relays closed of the fuel level low limit.
- I The controller through oil level sensor detects oil level of engine daily fuel tank, when the oil level is lower than the set value, "pump control" relay closure outputs.

Fuel pump OFF

- I When the auxiliary sensor 1 uses parameter is set to "1", this parameter is set to be effective.
- I This parameter is used to set is defined as the high limit of the fuel pump control relays disconnect bit.
- I Daily fuel tank through the oil level sensor detects engine oil level controller, disconnect the output when the oil level is higher than the set value, the pump control relays.

AUX1 low T level 1&2

- I When the auxiliary sensor 1 uses parameter is set to "2", this parameter is set to be effective.
- I Controller to auxiliary 1 temperature sensor provides two levels of the low-temperature limit monitoring for users to choose for warning, fault shutdown and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "!W:AUX1 low T level1" or "!W:AUX1 low T level2"; if select 4/5/6 alarm levels, when protection function is triggered, LCD displays "!A:AUX1 low T level1" or " !A:AUX1 low T level1".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define auxiliary T-sensor 1 low limit protection threshold. When the temperature is at or lower than this threshold, time of duration over than delay time, the define operation of alarm levels are triggered.
Delay	If the low temperature time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the temperature over 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.

AUX1 high T level 1&2

- I When the auxiliary sensor 1 uses parameter is set to "2", this parameter is set to be effective;
- I Controller to auxiliary 1 temperature sensor provides two levels of high-temperature limit monitoring for users to choose for a warning, fault shutdown and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays " !W:AUX1 high T level1" or " !W:AUX1 high T level2"; if you choose 4/5/6 alarm level when protection function is triggered, LCD displays !A:AUX1 high T level1" or "!A:AUX1 high T level2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define auxiliary T-sensor 1 high limit protection threshold. When the 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 temperature time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the 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.

Heater1 on level

- I This parameter is used to set the controller to select the preheat mode 6 is defined as a "warm-up" relay action of the temperature low limit, and set " preheat 1 control" relay action of the temperature low limit.
- I To this parameter effective, the auxiliary sensor 1 type can not be set to " not use" and "switch".

Heater1 off level

- I This parameter is used to set the controller to select the preheat mode 6 is defined as a "warm-up" relay stop action of the temperature high limit, and set "heat 1 control" relay stop action of the temperature high limit.
- I To this parameter is effective, the auxiliary sensor 1 type can not be set to "not use" and "switch".

Cooler1 on level

- I This parameter is used for setting is defined as a "cooling 1 control" relay action of in the temperature high limit.
- I To This parameter is valid, auxiliary temperature sensor types can not be set to "not use" and "switch".

Cooler1 off level

- I This parameter is used to set is defined as a "cooling 1 control" relay to stop the action of temperature low limit.
- I To This parameter is valid, auxiliary temperature sensor types can not be set to "not use" and "switch".

AUX sensor2 use

- I This parameter is used to set the auxiliary sensor port 2 function.
- I When the parameter is set to "0", this port not use.
- I When the parameter is set to "1", this port is connected to the pressure sensor.
- I When the parameter is set to "2", this port connected temperature sensor.

AUX sensor2 type

- I Used to define the type of auxiliary sensor 2.
- I When its temperature sensor, the controller built-in a variety of temperature sensor types to choose, refer to the temperature sensor type table.
- I When the pressure sensor, the controller built-in variety of pressure sensors types to choose, refer to the pressure sensor type table.

AUX2 low P level 1&2

- I When the auxiliary sensor 2 uses parameter is set to "1", this parameter is set to be effective.
- I Controller for the auxiliary 2 pressure sensor provides two levels of the low- pressure limit monitoring for users to choose for warning, fault shutdown and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "!W: AUX2 low P level 1" or "!W: AUX2 low P level 2"; if select 4/5/6 alarm levels,when protection functions trigger, LCD displays "!A: AUX2 low P level 1" or "!A: AUX2 low P level 2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define auxiliary P-sensor 2 low limit protection threshold. When the pressure 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 low pressure time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the pressure over 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.

AUX2 high P level 1&2

- I When the auxiliary sensor 2 uses parameter is set to "1", this parameter is set to be effective.
- I Controller for auxiliary 2 pressure sensor provides two levels of high- pressure limit monitoring for users to choose for a warning, fault shutdown and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "!W: AUX2 high P level 1" or "!W: AUX2 high P level 2"; if you choose 4/5/6 alarm level when protection function is triggered, LCD displays "!A: AUX2 high P level 1" or "!A: AUX2 high P level 2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define auxiliary P-sensor 2 low limit protection threshold. When the pressure 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 pressure time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the pressure over 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.

AUX2 low T level 1&2

- I When the auxiliary sensor 2 uses parameter is set to "2", this parameter is set to be effective.
- I Controller for the auxiliary 2 temperature sensor provides two levels of the low-temperature limit monitoring for users to choose for warning, fault shutdown and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays "!W: AUX2 low T level 1" or "!W: AUX2 low T level 2"; if select 4/5/6 alarm level, when protection functions triggered, LCD displays "!A: AUX2 low T level 1" or "!A: AUX2 low T level 2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define auxiliary T-sensor 2 low limit protection threshold. When the 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 low temperature time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the temperature over 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.

AUX2 high T level 1&2

- I When the auxiliary sensor 2 uses parameter is set to "2", this parameter is set to be effective.
- I Controller to auxiliary 1 temperature sensor provides two levels of high-temperature limit monitoring for users to choose for a warning, fault shutdown and control. If you choose to 1/2/3 alarm level when protection function triggered, LCD displays " !W: AUX2 high T level 1" or " !W: AUX2 high T level 2"; if select 4/5/6 alarm level,when protection function triggered, LCD display " !A: AUX2 high T level 1" or " !A: AUX2 high T level 2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define auxiliary T-sensor 2 high limit protection threshold. When the 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 temperature time of duration over than the set time delay value, the define operation of alarm levels are triggered; if the 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.

Heater2 on level

- I This parameter is used to set the controller to select the preheat mode 7 is defined as a "warm-up" relay action of the temperature low limit, and set " preheat 2 control" relay action of the temperature low limit.
- I To this parameter is valid, auxiliary temperature sensor types can not be set to " not use" and "switch".

Heater2 off level

- I This parameter is used to set the controller to select the preheat mode 7 is defined as a "warm-up" relay stop action of the temperature high limit, and set " preheat 2 control" relay stop action of the temperature high limit.
- I To this parameter is valid, auxiliary temperature sensor types can not be set to " not use" and "switch".

Cooler2 on level

- I This parameter is used for setting is defined as a "cooling 2 control " relay action of high temperature limit.
- I To This parameter is valid, auxiliary temperature sensor types can not be set to " not use" and "switch".

Cooler2 off level

- I This parameter is used for setting is defined as the "cooling 2 control" relay to stop action of low temperature limit.
- I To this parameter is valid, auxiliary temperature sensor types can not be set to " not use" and "switch".

V1 sensor use

- I This parameter is used to set the function of the V1 sensor port. The measurement signal is 0-10V signal.
- I When the parameter is set to "0", not use of this port.
- I When the parameter is set to "1", this port is connected to the pressure sensor.
- I When the parameter is set to "2", this port is connected to the temperature sensor.

V1 range Min

- I This parameter is used to define the minimum value of the measurement range when the V1 sensor has no input signal.

V1 range Max

- I This parameter is used to define the maximum value of the measuring range when the V1 sensor's maximum input signal.

V1 low level 1&2

- I This parameter setting is valid when the V1 sensor use parameter is set to "1".
- I The controller provides two levels of low limit monitoring for the V1 sensor for the user to select for warning, fault shutdown, and control. If you select 1/2/3 alarm level, the protection function is triggered, the LCD screen displays “W: V1 Low Level 1” or “W: V1 Low Level 2” ; If you select 4/5/6 alarm level, the protection function is triggered. , LCD screen shows "F: V1 low level 1" or "F: V1 low level 2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define the low limit protection threshold for V1 sensors. When it reaches or falls below this threshold and the duration exceeds the delay time, the action defined by the alarm level triggers.
Delay	If the low limit pressure duration exceeds the set delay time value, the action defined by the alarm level triggers; if the measurement value is higher than the limit before the delay expires, 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.

V1 high level 1&2

- I This parameter setting is valid when the V1 sensor use parameter is set to "1".
- I The controller provides two levels of high limit monitoring for the V1 sensor for the user to select for warning, shutdown and control. If 1/2/3 alarm level is selected, the protection function is triggered, LCD will display “W : V1 High Level 1” or “W: V1 High Level 2” . If 4/5/6 alarm level is selected, the protection function will be triggered. , LCD screen shows "F: V1 high level 1" or "F: V1 high level 2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	It is used to define the threshold of high limit protection for the V1 sensor. When the time is above or above the threshold, the duration is longer than the delay time, and the action defined by the alarm level triggers.
Delay	If the duration of the high limit exceeds the set delay time value, the action triggered by the alarm level is triggered; if the measured value is lower than the limit before the delay is terminated, the time delay time is 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.

A1 sensor use

- I This parameter is used to set up the function of A1 sensor port and measure the signal as 4-20mA signal.
- I This port is useless when the parameter is set to "0".
- I When the parameter is set to "1", the port is connected to the pressure sensor.
- I When the parameter is set to "2", the port is connected with the temperature sensor.

A1 range Min

- I This parameter is used to define the minimum value of the A1 sensor minimum input signal (4mA).

A1 range Max

- I This parameter is used to define the maximum value of A1 sensor maximum input signal (20mA).

A1 low level 1&2

- I This parameter setting is valid when the A1 sensor use parameter is set to "1".
- I The controller provides two levels of low limit monitoring for the A1 sensor for the user to select for warning, fault shutdown, and control. If you select 1/2/3 alarm level, the protection function is triggered, the LCD screen displays “W: A1 Low Level 1” or “W: A1 Low Level 2” ; If you select 4/5/6 alarm level, the protection function is triggered. The LCD screen shows "F: A1 Low Level 1" or "F: A1 Low Level 2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define the low limit protection threshold for A1 sensors. When it reaches or falls below this threshold and the duration exceeds the delay time, the action defined by the alarm level triggers.
Delay	If the low limit pressure duration exceeds the set delay time value, the action defined by the alarm level triggers; if the measurement value is higher than the limit value before the delay expires, 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.

A1 high level 1&2

- I This parameter setting is valid when the V1 sensor use parameter is set to "1".
- I The controller provides two levels of high limit monitoring for the A1 sensor for the user to select for warning, fault shutdown and control. If 1/2/3 alarm level is selected, the protection function is triggered, LCD will display “W: A1 High Level 1” or “W: A1 High Level 2” . If 4/5/6 alarm level is selected, the protection function will be triggered. The LCD screen shows "F: A1 High Level 1" or "F: A1 High Level 2".

Function	Select "1", the monitoring function is active; Select "0", the monitoring function is invalid.
Limit	Used to define the threshold of A1 sensor high limit protection. When the threshold is reached or exceeded and the duration exceeds the delay time, the action defined by the alarm level triggers.
Delay	If the high limit duration exceeds the set delay time value, the action defined by the alarm level triggers; if the measurement value falls below the limit before the delay expires, 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.

7.4 Discrete IN/OUT

No.	Parameter	Setting range	Preset
4.0	QUIT		
4.1	D-Input 1 config		
	Function	0 to 30	6
	Logic	0 close/1 open	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	6
4.2	D-Input 2 config		
	Function	0 to 30	2
	Logic	0 close/1 open	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	6
4.3	D-Input 3 config		
	Function	0 to 30	3
	Logic	0 close/1 open	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	6
4.4	D-Input 4 config		
	Function	0 to 30	4
	Logic	0 close/1 open	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	6
4.5	D-Input 5 config		
	Function	0 to 30	0
	Logic	0 close/1 open	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	6
4.6	D-Input 6 config		
	Function	0 to 30	0
	Logic	0 close/1 open	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	6
4.7	D-Input 7 config		
	Function	0 to 30	0
	Logic	0 close/1 open	0
	Delay	0 to 999s	1s
	Delay by	0 to 3	0
	ALM. class	0 to 6	6

4.8	Relay 1 Config		
	Function	0 to 120	2
	Logic	0 N.O/1 N.C	0
4.9	Relay 2 Config		
	Function	0 to 120	1
	Logic	0 N.O/1 N.C	0
4.10	Relay 3 Config		
	Function	0 to 120	0
	Logic	0 N.O/1 N.C	0
4.11	Relay 4 Config		
	Function	0 to 120	0
	Logic	0 N.O/1 N.C	0
4.12	Relay 5 Config		
	Function	0 to 120	0
	Logic	0 N.O/1 N.C	0
4.13	Relay 6 Config		
	Function	0 to 120	0
	Logic	0 N.O/1 N.C	0
4.14	Relay 7 Config		
	Function	0 to 120	0
	Logic	0 N.O/1 N.C	0
4.15	Relay 8 Config		
	Function	0 to 120	0
	Logic	0 N.O/1 N.C	0

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

I Used to define the D-input function.

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.
Delay	If the discrete input is valid duration time over than the set delay time value, the define operation of alarm levels are triggered; if the discrete input change to invalid 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): from turning, monitoring and effective; Set (2): from the end of the delay time of the safety supervision, began to be effective; Set (3): from running after.
ALM. class	Used to define the protection is triggered, the controller action. Details see the alarm level table.

**Note:**

I 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.

I definable switch input menu is as follows:

code	Function	Note
0	Not used	
1	User configured	When you select this function, the user can use the the discrete input user-defined 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 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 configuration tables to choose.
4	Emergency stop	Select this function of discrete input port external an emergency stop switch, when this input valid, the controller close all control output, trigger the alarm level "6", the engine shutdown immediate.

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 automatic operation mode is invalid.
6	Remote with load	After the engine start is running normally, the controller will issue a clutch closing command. This signal is only valid in automatic operation mode.
7	Reserve	
8	Reserve	
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. The function equivalent to the control panel "lamp test" button.
11	Lower speed	When selecting this digital input signal of function is active, the controller will issue a underspeed signal.
12	Raise speed	When selecting this digital input signal of function is active, the controller will issue overspeed signal.
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 warm-up 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. LCD 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 "anechoic" 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. LCD 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 Load	When selecting this digital input signal of function is active, the controller prohibits the load relay from closing.
27	Speed priority 1	When the user sets a "priority speed 1" switch input, the controller controls the engine to run at the speed set in this parameter.
28	Speed priority 2	When the user sets the input of a "priority speed 2" switch, the controller controls the engine to run at the speed set by this parameter.
29	Speed priority 3	When the user sets the input of a "priority speed 3" switch, the controller controls the engine to run at the speed set by this parameter.
30	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.

Relay * Config

I 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.

I Configure relay output function table:

code	Function	Note
0	Not used	
1	Crank	Select this function, 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, 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, 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, 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, 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, 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	Speed raise	Select this function of output relay, its activated when the running speed of the engine speed is lower than the rated speed, this is a pulse speed control signal.
10	Speed lower	Select this function of output relay, its activated when the running speed of the engine speed is higher than the rated speed, this is a pulse speed control signal..
11	Fuel pump control	Select this function, the output relay action when the fuel level is lower than the setting of lower limit of the pump open level value, and keep until the setting of high limit of fuel level reaches the pump stop level value .
12	Genset running	Select this function, 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	Maintenance due	Select this function of output relay, the accumulation time of engine reaches the time limit value of maintenance parameter set, it s action, and stopping action in the re-set maintenance time or press the reset button.
17	Reserve	
18	Reserve	
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	On loadl	This output relay is used to control the closing and disengagement of the engine clutch.
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	Can data fail	At the end of the safety monitoring time timing has not receive the data from engine ECU, choose this function of the output relay action.
26	Ecu warning	The output relay operation of select this function when receive the warning signal from ECU
27	Ecu alarm	The output relay operation of select this function when receive the fault signal from ECU
28	Charge failure	When charging failure occurs, the output relay action.
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 over speed 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 level 2	When the cooling temperature of engine is higher than the setting of high temperature level 2 while delay confirm, its action.
39	Fuel low level1	When the engine fuel level lower than the setting of low oil level 1 while delay confirm, its action.
40	Fuel low level2	When the engine fuel level lower than the setting of low oil level 2 while delay confirm, its action.
41-52	Reserve	
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,
55-60	Reserve	
61	Oil-P sensor open	Select this function, the output relays action after the controller detect oil pressure sensor .
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	Scheduled run	Select this function if the output relay is valid in regularly run, its action.
64	Blinds control	Select this function 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 preheat stop level of setting, its stop.
66	Cooler1 control	Select this function of output relay, when from auxiliary temperature sensor 1 measuring the temperature is higher than the low limit of cooling 1 open level level value of setting, its action, and keeping until the temperature is lower than the high limit of cooling 1 stop level value of setting, its stop action.
67	Cooler2 control	Select this function of output relay, when from auxiliary temperature sensor 2 measuring the temperature is higher than the low limit of cooling 2 open level level value of setting, its action, and keeping until the temperature is lower than the high limit of cooling 2 stop level value of setting, its stop action.
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	Heater1 control	Select this function of output relay, when from auxiliary temperature sensor 1 measuring the temperature is lower than the low limit of preheat 1 open level level value of setting, its action, and keeping until the temperature is higher than the high limit of preheat 1 stop level value of setting, its stop action.
70	Heater2 control	Select this function of output relay, when from auxiliary temperature sensor 2 measuring the temperature is lower than the low limit of preheat 2 open level level value of setting, its action, and keeping until the temperature is higher than the high limit of preheat 2 stop level value of setting, its stop action.
71-79	Reserve	
80	Reserve	
81	Off load	It is action when the controller is in no-load mode.
82	Test without load	It is action when the controller is in test mode and is set to "idle".
83	Test with load	The controller is in test mode and set to "Load" action.
84	Emergency stop	When this function is enabled, the throttle output will be generated when the generator is stopped immediately.
85	Reserve	
86	Reserve	

87	Reserve	
88	Reserve	
89	AUX1 low level1	When the generator auxiliary 1 sensor value is lower than the setting value of the auxiliary 1 sensor low value 1 and the delay is action when confirmed.
90	AUX1 low level2	When the generator auxiliary 1 sensor value is lower than the setting value of the auxiliary 1 sensor low value 2 and the delay is action when confirmed.
91	AUX1 high level1	When the generator auxiliary 1 sensor value is higher than the setting value of the auxiliary 1 sensor higher value 1 and the delay is action when confirmed.
92	AUX1 high level2	When the generator auxiliary 1 sensor value is higher than the setting value of the auxiliary 1 sensor higher value 2 and the delay is action when confirmed.
93	AUX2 low level1	When the generator auxiliary 2 sensor value is lower than the setting value of the auxiliary 2 sensor low value1 and the delay is action when confirmed.
94	AUX2 low level2	When the generator auxiliary 2 sensor value is lower than the setting value of the auxiliary 2 sensor low value 2 and the delay is action when confirmed.
95	AUX2 high level1	When the generator auxiliary 2 sensor value is higher than the setting value of the auxiliary 2 sensor higher value 1 and the delay is action when confirmed.
96	AUX2 high level2	When the generator auxiliary 2 sensor value is higher than the setting value of the auxiliary 2 sensor higher value 2 and the delay is action when confirmed.
97	ECU water in fuel	The generator action when detects ECU oil into the water.
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	D-Input 5 alarm	D-input 5 is set to "1 user configured", when a warning or fault input is active
103	D-Input 6 alarm	D-input 6 is set to "1 user configured", when a warning or fault input is active
104	D-Input 7 alarm	D-input 7 is set to "1 user configured", when a warning or fault input is active
105	Reserve	
106	Reserve	
107	Reserve	
108-118	Reserve	
119	Fuel high level1	When the generator oil level is higher than the set value of fuel high level 1 and the delay is action when confirmed.
120	Fuel high level2	When the generator oil level is higher than the set value of fuel high level 1 and the delay is action when confirmed

7.5 DEFINE SENSORS

No.	Item	Setting range	Presets
5.0	QUIT		
5.1	PRES. Sensor 1		
5.2	PRES. Sensor 2		
5.3	TEMP. Sensor 1		
5.4	TEMP. Sensor 2		
5.5	Fuel Level Sensor		

Menu descriptions:**PRES. Sensor 1:**

I Corresponds to the “configurable 2” in the “LOP Sensor type”.

PRES. Sensor 2:

I Corresponds to the “configurable 3” in the “LOP Sensor type”.

TEMP. Sensor 1:

I Corresponds to the “configurable 2” in the “HET Sensor type”.

TEMP. Sensor 2:

I Corresponds to the “configurable 3” in the “HET Sensor type”.

Fuel Level Sensor:

I Corresponds to the “configurable 2” in the “Fuel level sensor selection”.

**NOTE:**

I “Configurable sensor data” means user can input the data manually according to the sensor curve. When configuring, please input the “resistance - measured value” from small to big one by one as following:

Oil pressure sensor 1

Fix Point	1	2	3	4	5	6	7	8	9	10
Resistance	10.0	30.0	48.0	65.0	82.0	99.0	116.0	134.0	151.0	184.0
Measured	0.0	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	10.0

Oil pressure sensor 2

Fix Point	1	2	3	4	5	6	7	8	9	10
Resistance	33.0	50.0	67.0	83.5	100.0	123.0	153.0	189.0	240	240
Measured	13.8	12.1	10.3	8.6	6.9	5.2	3.5	1.8	0	0

Temperature sensor 1

Fix Point	1	2	3	4	5	6	7	8	9	10
Resistance	7.0	17.0	24.0	30.0	40.0	58.0	80.0	110.0	140.0	210.0
Measured	140	120	110	100	90	80	70	60	50	40

Temperature sensor 2

Fix Point	1	2	3	4	5	6	7	8	9	10
Resistance	15.6	18.9	23.1	30.0	43.7	65.0	110.0	160.0	240.0	240.0
Measured	120	113	105	95	85	75	60	50	40	40

Fuel sensor

Fix Point	1	2	3	4	5	6	7	8	9	10
Resistance	1.7	7.0	12.0	17.0	24.0	30.0	38.0	50.0	63.0	106.0
Measured	100	90	80	70	60	50	40	30	20	1

6、 MAINTENANCE

No.	Parameter	Setting range	Presets
6.0	QUIT		
6.1	DATE/ TIME	YY-MM-DD HH:MM:SS	
6.2	Scheduler period	1 to 52 weeks	1
6.3	Scheduler mode	0 Unoad / 1 load	Unoad
6.4	Start time		HH:MM
6.5	Run duration	1 to 1440 min	60
6.6	MON active	0 N /1 Y	0
6.7	TUE active	0 N /1 Y	0
6.8	WED active	0 N /1 Y	0
6.9	THU active	0 N /1 Y	0
6.10	FRI active	0 N /1 Y	0
6.11	SAT active	0 N /1 Y	0
6.12	SUN active	0 N /1 Y	0

Menu Notes:

DATE/TIME

- I Used to configure the date / time: YY-MM-DD HH:MM:SS.
- I The date displayed on LCD, the pre-alarm (warning) and alarm events with time stamp.

Scheduler period

- I Used to set the controller of the scheduling function effective time period.
- I "Weeks" as a unit.

Scheduler mode

- I Used for the controller in the scheduling model was activated, what kind of the control function to choose;
- I When you select "unload" controller running in test mode, the generator start running, transfer switch does not convert, that mains continue to supply, generator unload operation; if choose "load" controller running in test mode, the generator start running, the transfer switch is converted.

Start time

- I Used to configure the start time when controller is active in exercise run scheduler.

Run duration

- I Used to configure the duration when controller is active in exercise run schedule, the scheduler mode will be reset after run duration has expired.

MON active

- I The cycle of exercise run scheduler is one week. This menu is used to configure the exercise run schedule on Monday active or not.

TUE active

- I Used to configure the exercise run schedule on Tuesday active or not.

WED active

- I Used to configure the exercise run schedule on Wednesday active or not.

THU active

I Used to configure the exercise run schedule on Thursday active or not.

FRI active

I Used to configure the exercise run schedule on Friday active or not.

SAT active

I Used to configure the exercise run schedule on Saturday active or not.

SUN active

I Used to configure the exercise run schedule on Sunday active or not.

7.6 Speed control

No.	Parameter	Setting range	Presets
7.0	QUIT		
7.1	Control mode	1-6 linear /7 fixation	fixation
7.2	Set point	-50 to 500	50
7.3	Proportional gain	0.1 to 100.0	2.0
7.4	Integral time	0.1 to 100.0	5.0S
7.5	Derivative time	0.0 to 100.0	0.0S
7.6	Time pulse minimum	0.1 to 2.0S	0.5S
7.7	Clutch engage	1 to 4000RPM / Not used	Not used
7.8	Clutch disengage	1 to 4000RPM / Not used	Not used
7.9	Speed priority1	1 to 4000RPM / Not used	Not used
7.10	Speed priority2	1 to 4000RPM / Not used	Not used
7.11	Speed priority3	1 to 4000RPM / Not used	Not used
7.12	Upper RPM limit	1 to 4000RPM / Not used	Not used
7.13	Lower RPM limit	1 to 4000RPM / Not used	Not used
7.14	Speed raise rate	1 to 100%/S	2%/S
7.15	Speed lower rate	1 to 100%/S	2%/S
7.16	S-Bias start value	-10.0 to 10.0V	3.0V
7.17	S-Bias output range	-20.0 to +20.0V	3.0V
7.18	S-Bias control range	0.1 to 50.0% / Not used	5.0%

Menu descriptions:

Control mode

- I Used to set the engine speed control mode.
- I When the parameter is set to "linear", the controller can select the measured value of the parameter from the V1/V2/V3/A1/A2/A3 sensor (only one can be selected) as the target parameter of the speed control.
- I When the parameter is set to "fixed", the controller controls the engine speed according to the preset values such as "rated speed", "priority speed 1", "priority speed 2", "priority speed 2" and other parameters.

Set point

- I When the control mode parameter is set to a non-fixed control mode, this parameter is used to set the speed control target value of the controller. The controller measures the value of the selected sensor and outputs the speed control signal to change the operating speed of the engine and stabilize the measured value of the sensor. Within this parameter setting range.

Proportional gain

- I Used to define the P part of the PID controller parameters.
- I Increasing the proportional gain will increase the response range of the speed control, the greater the response to the target range adjustment, the greater the speed error will be. If the parameter setting is too large, it may cause overshoot.

Integral time

- I Used to define part I parameters of the PID controller.
- I The integration time automatically corrects any offsets and smoothes the control. The integration time constant must be greater than the derivative time constant. If the integral time constant is too large, the unit will oscillate continuously; if it is too small, the unit will take a long time to enter the steady state.

Derivative time

- I Used to define the D part parameter of the PID controller.
- I By increasing this parameter value, the stability of the speed control system increases.

Time pulse minimum

- I Used to define the minimum maintenance time of the speed control signal output when the controller selects the frequency control mode of "relay", that is, the minimum closing time of the speed regulating relay.

Clutch engage

- I Used to set the engine speed when the clutch can be closed.

Clutch disengage

- I Used to set the engine speed when the clutch can be separated.

Speed priority1

- I Used to set the speed of an engine, the user controls the engine by setting a "priority speed 1" of the custom switch input, and let it run at the speed set in this parameter.

Speed priority2

- I Used to set the speed of an engine, the user controls the engine by setting a "priority speed 2" for the input value of the custom switch. The controller runs the speed set in this parameter.

Speed priority3

- I Used to set the speed of an engine, the user controls the engine by setting a "priority speed 3" with a custom switch input. The controller runs the speed set in this parameter.

Upper RPM limit

- I Defines the high limit for the speed of the engine during normal operation.

Lower RPM limit

- I Defines the low limit of the speed of the engine during normal operation.

Speed raise rate

- I When a switch of the controller is preset to "upload", this parameter is used to define the ratio of the loading speed to the effective time of the switch.

Speed lower rate

- I When a switch of the controller is preset to "reduced load", this parameter is used to define the ratio of the unloading speed to the effective switching time.

S-Bias start value

- I Used to set the start voltage value of the controller speed control analog output.
- I After the controller is connected to the operating power supply, the speed control analog output remains at the set start value. When the safety monitoring time timer ends and the engine speed reaches the set load speed respectively, the controller starts to measure the speed, load, and settings. The parameter comparison then outputs the adjusted speed bias voltage signal.

S-Bias output range

- I Used to define the range of both sides of the speed bias voltage signal with the start voltage value set by the speed bias range as the center.
- I The parameters have positive and negative values. When the value is positive, the output of the voltage is proportional to the speed of the engine. When the value is negative, the output of the voltage is inversely proportional to the speed of the engine.

S-Bias control range

- I Used to define the range that can be controlled by one-sided control of the speed change based on the "Speed Bias Output Range" setting value with the "Speed Bias Start Value" as the center.

7.7 Send SMS

No.	Parameter	Setting range	Presets
8.0	QUIT		
8.1	Telephone 1 NO.	00000000000 / Not used	Not used
8.2	Telephone 2 NO.	00000000000 / Not used	Not used
8.3	Telephone 3 NO.	00000000000 / Not used	Not used
8.4	Power up SMS	0 N /1 Y	0
8.5	Engine start SMS	0 N /1 Y	0
8.6	Engine stop SMS	0 N /1 Y	0
8.7	Warn reset SMS	0 N /1 Y	0
8.8	Alarm reset SMS	0 N /1 Y	0
8.9	F-pump ON SMS	0 N /1 Y	0
8.10	F-pump OFF SMS	0 N /1 Y	0
8.11	Shutdown alarm SMS	0 N /1 Y	1
8.12	Warn SMS	0 N /1 Y	1
8.13	Maintenance SMS	0 N /1 Y	0
8.14	Alarms SMS count	1 to 999 times	3
8.15	Alarms SMS period	1 to 999 minute	5
8.16	Warn SMS count	1 to 999 times	3
8.17	Warn SMS period	1 to 999 minute	5

Menu descriptions:

Telephone 1 NO.

- I Used to define the mobile phone number which the Text Message will be sent to.
- I There are total 3 mobile phone numbers can be configured.
- I When the number is set, it is shifted by the mode key.

Telephone 2 NO.

- I With the above.

Telephone 3 NO.

- I With the above.

Power up SMS

- I Used to define the controller in the power-on operation, whether need to SMS to inform changes of state.
- I When the parameter is set to "Yes", the controller is connected to working power, control GPRS module send SMS to inform this state change; When the parameter is set to "No", the controller is connected to working power, not control the GPRS module send to SMS.

Engine start SMS

- I Used to define the controller in the engine start command is issued, whether need to SMS to inform changes of state.
- I When the parameter is set to "Yes", the controller in the engine start command is issued, control GPRS module send SMS to inform this state change; When the parameter is set to "No", controller in the engine start command is issued, not control the GPRS module to send SMS.

Engine stop SMS

- I Used to define the controller in the engine stop command is issued, whether need to SMS to inform changes of state.
- I When the parameter is set to "Yes", the controller in the engine stop command is issued, control GPRS module send SMS to inform this state change; When the parameter is set to "No", controller in the engine stop command is issued, not control the GPRS module to send SMS.

Warn reset SMS

- I Used to define the controller to warning status return to normal, whether need to SMS to inform changes of state.
- I When the parameter is set to "Yes", the controller in the warning status return to normal, control GPRS module send SMS to inform this state change; When the parameter is set to "No", controller in the warning status return to normal, not control the GPRS module to send SMS.

Alarm reset SMS

- I Used to define the controller to shutdown fault status return to normal, whether need to SMS to inform changes of state.
- I When the parameter is set to "Yes", the controller in the shutdown fault status return to normal, control GPRS module send SMS to inform this state change; When the parameter is set to "No", controller in the shutdown fault status return to normal, not control the GPRS module to send SMS.

F-pump ON SMS

- I Used to define the controller in a defined as pump control relay closure outputs, whether need to SMS to inform changes of state.
- I When the parameter is set to "Yes", the controller in a defined as pump control relay closure outputs, control GPRS module send SMS to inform this state change; When the parameter is set to "No", controller in a defined as pump control relay closure outputs, not control the GPRS module to send SMS.

F-pump OFF SMS

- I Used to define the controller in a defined as pump control relay from closure become open outputs, whether need to SMS to inform changes of state.
- I When the parameter is set to "Yes", the controller in a defined as pump control relay from closure become open outputs, control GPRS module send SMS to inform this state change; When the parameter is set to "No", controller in a defined as pump control relay from closure become open outputs, not control the GPRS module to send SMS.

Shutdown alarm SMS

- I Used to define the controller in shutdown failure occurred, whether need to SMS to inform changes of state.
- I When the parameter is set to "Yes", the controller in shutdown failure occurred, control GPRS module send SMS to inform this state change; When the parameter is set to "No", controller in shutdown failure occurred, not control the GPRS module to send SMS.

Warn SMS

- I Used to define the controller in warning occurred, whether need to SMS to inform changes of state.
- I When the parameter is set to "Yes", the controller in warning occurred, control GPRS module send SMS to inform this state change; When the parameter is set to "No", controller in warning occurred, not control the GPRS module to send SMS.

Maintenance SMS

- I Used to define the controller in trigger the maintenance alarm limit protection, whether need to SMS to inform changes of state.

Alarms SMS count

- I Used to define the controller in shutdown fault occurred , the number of times message send.

Alarms SMS period

- I Used to define the controller in shutdown fault, the time interval of per twice message send.
- I When the shutdown fault counts parameter is set to "1", this parameter is useless.

Warn SMS count

- I Used to define the controller in warning occurred , the number of times message send.

Warn SMS period

- I Used to define the controller in warning, the time interval of per twice message send.
- I When the warning message counts parameter is set to "1", this parameter is useless.

7.8 CALIBRATION

No.	Parameter	Setting range	Presets
9.0	QUIT		
9.1	V1 offset	-9.9% to 9.9%	
9.2	V2 offset	-9.9% to 9.9%	
9.3	V3 offset	-9.9% to 9.9%	
9.4	A1 offset	-9.9% to 9.9%	
9.5	A2 offset	-9.9% to 9.9%	
9.6	A3 offset	-9.9% to 9.9%	
9.7	Pressure offset	-9.9% to 9.9%	
9.8	Temperature offset	-9.9% to 9.9%	
9.9	Batt. V offset	-9.9% to 9.9%	
9.10	AUX. sensor1 offset	-9.9% to 9.9%	
9.11	AUX. sensor2 offset	-9.9% to 9.9%	

Menu descriptions:

V1 offset

- I Used to modify the measurement display value of V1 sensor.
- I Take the rated voltage as the reference value.

V2 offset

- I Used to modify the measurement display value of V2 sensor.
- I Take the rated voltage as the reference value.

V3 offset

- I Used to modify the measurement display value of V3 sensor.
- I Take the rated voltage as the reference value.

A1 offset

- I Used to modify the measurement display value of A1 sensor.
- I Take the rated voltage as the reference value.

A2 offset

- I Used to modify the measurement display value of A2 sensor.
- I Take the rated voltage as the reference value.

A3 offset

- I Used to modify the measurement display value of A3 sensor.
- I Take the rated voltage as the reference value.

Pressure offset

- I Used to modify the measured value display of LOP sensor.

Temperature offset

- I Used to modify the measured value display of HET sensor.

Bat. V offset

I Used to modify the measured value display of battery voltage.

AUX. sensor1 offset

I Used to modify the measured value display of auxiliary sensor #1.

AUX. sensor2 offset

I Used to modify the measured value display of auxiliary sensor #2.

8 Installation Guide

8.1 The cutout dimensional drawing installed on panel as follows:



Cutout dimension: 173mm (W) x 125mm (H). Dashed box dimensions for the controller.
The controller is fixed by 4 special fittings.

**NOTE:**


- I The shock-proof equipment must be mounted if the enclosure is mounted on Genset or other heavy vibrant device.
- I In order to ensure the degrees of protection of the mounted controller meet IP65, the cutout dimension on the panel must be correct.


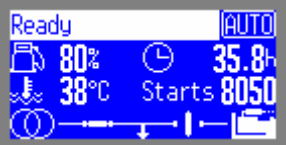
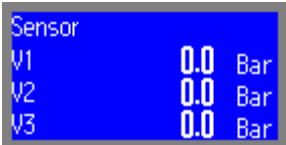
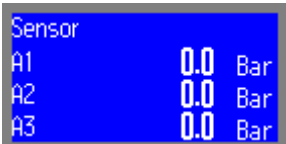
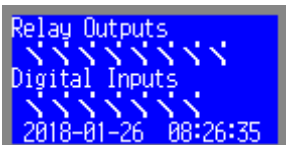
Wiring


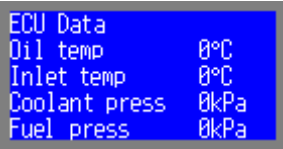
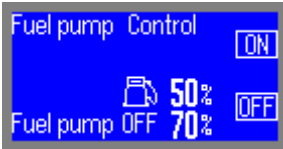
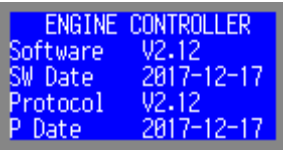
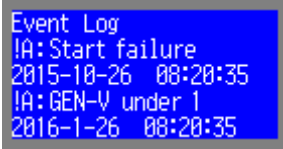

Please refer to the above Typical Wiring Diagram for connection.

9 LCD displays and Menu System












LCD displays measuring parameters:

Use a back-light graphic LCD to display data and information. Each LCD screen can display simultaneously plurality of data, uppermost is state information, all the status data nformation displayed by multiple screens, manual press  can scroll the screen to view the information, the controller can also be set to auto scroll, the timing auto switch the various display screen, (Only the first five pages can auto) , when failure occurs, the LCD immediately shows the fault information in the status bar.













Frist page	Description
	<ul style="list-style-type: none"> Engine speed Battery voltage Engine oil pressure, do not use pressure sensors, this project is not displayed Engine coolant temperature when the temperature sensor is not used, this project is not displayed
Second page	Description
	<ul style="list-style-type: none"> This page shows the measured value of the auxiliary sensor. The cumulative operating time of the engine. Crank attempt of accumulative number of engines.
Third page	Description
	<ul style="list-style-type: none"> 3 voltage sensor
Four page	Description
	<ul style="list-style-type: none"> 3 current sensor
Five page	Description
	<ul style="list-style-type: none"> This page shows the status of the controller digital inputs and relay outputs.

Six page	Description
	<ul style="list-style-type: none"> I This page shows the maintenance preset time and remaining hours. I When the maintenance monitoring function is set to "No", this page is not displayed.
Seven page	Description
	<ul style="list-style-type: none"> I These parameters come from the ECU of the engine. When the engine type is not set to "ECU", the ECU display content is automatically hidden. I The displayed parameter ECU must be supported, otherwise the parameter is not displayed.
Eight page	Description
	<ul style="list-style-type: none"> I This page shows the fuel pump control information
Nine page	Description
	<ul style="list-style-type: none"> I This page shows the controller version and other information
Ten page	Description
	<ul style="list-style-type: none"> I This page shows the most recent controller event record
Eleven page	Description
	<ul style="list-style-type: none"> I In the manual speed adjustment interface, the rise or fall of the engine speed can be adjusted by "INC" and "DEC" on the controller panel.

9.1 Setting running parameter

Parameter settings are modified by increment or decrement, press and hold on any page  button 2sec to enter into setting state, then press  or  to scroll page in the same menu list, press  enter into submenu, need to modify the parameters first enter to menu 1.2 "password" enter the permission password to modify; or select the items to be modified, press  enter to menu to modify mode, press  or  to changes, when prompted for password , At this time can press  or  enter the password, set the password value to 1111 and then press  confirm entry, modify the parameters. Otherwise re-prompt for a password. After changing the parameters, press and hold  for 2seco quit parameter settings mode.

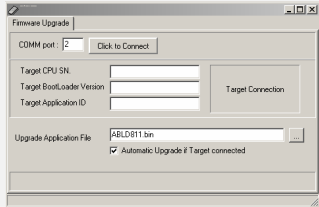
FOR EXAMPLE: (SETTING CONTROLLER CRANK ATTEMPT AT 2)





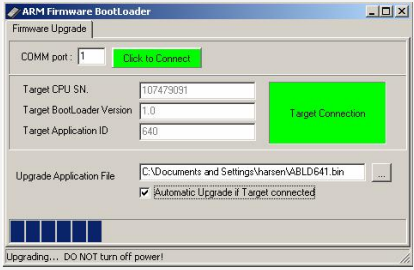
Operation	Description
Press and hold  2sec, enter into parameters settings menu, then LCD displays:	[SETTING] 0. QUIT 1. SYSTEM 2. GENERATOR 3. SETTING
Press  once and then press  , then LCD displays:	[ENGINE] 0. QUIT 1. ENGINE TYPE 2. ECU TYPE 3. ENGINE RUN SPEED
Press  6 times and then press  LCD displays :	[Crank attempt] 3
Press  or  prompted enter password: 1111, press  to enter.	[Crank attempt] Password: <input type="text" value="0000"/>
Press  or  to change parameters, change at 2	[Crank attempt] 2
Press  to confirm, press and hold  2sec will quit parameter settings menu, LCD displays:	Ready

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

Operation	Description
Press and hold "▶" 2sec, enter into parameters settings menu, then LCD displays:	[SETTING] 0. QUIT 1. Parameters 2. GENERATOR 3. Analog Inputs
Press "▶" button and then press "▲" 3 times, then LCD displays:	[Parameters] 8. Automatic scroll 9. Start alarm 10. [Default settings 11. Online update
Press "▶" button, prompted enter password: 2222, press "▶" button to confirm after entering password.	[[Default settings] Password:0000
Press "▶" to default settings, press and hold "▶" 2sec will quit parameter settings menu.	[Parameters] DONE

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 LCD displays:	[SETTING] 0. QUIT 1. Parameters 2. GENERATOR 3. Analog Inputs
Press "▶" button, then press "▲" 2 times, LCD displays:	[Parameters] 8. Automatic scroll 9. Start alarm 10. Default settings 11. Online update

<p>Press “” button, prompted enter password: 2222, then press “” to confirm</p>	<p>[[Default settings] Password:0000</p>
<p>Press “” to confirm enter the programming mode, then the controller LCD disappears, later click computer software "ABLDs.exe" serial port “  ” , then it will automatically upgrade.</p> <p>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.</p> <p>If the operation failure, you can disconnect the power and try again.</p>	 <p>The screenshot shows the 'ARM Firmware BootLoader' application window. It has a title bar with standard window controls. The main area is titled 'Firmware Upgrade' and contains several input fields and buttons. At the top, there's a 'CDMM port' dropdown set to '1' and a green 'Click to Connect' button. Below that are three text boxes: 'Target CPU SN' with the value '107473081', 'Target BootLoader Version' with '1.0', and 'Target Application ID' with '640'. To the right of these is a large green 'Target Connection' button. At the bottom, there's an 'Upgrade Application File' field with a file path 'C:\Documents and Settings\Narsen\ABLD641 bin' and a checkbox for 'Automatic Upgrade if Target connected' which is checked. A progress bar is visible at the bottom left, and a status bar at the bottom right says 'Upgrading... DO NOT turn off power!'.</p>

10 Technical Specification

10.1 Voltage sensor:

Number	3
Sensor type	Voltage
Resolution	10 bits
Range	0 to 10 V
Accuracy	2% When full scale, except for sensor error

10.2 Current sensor:

Number	3
Sensor type	Current
Resolution	10 bits
Range	4 to 20 mA
Accuracy	2% When full scale, except for sensor error

10.3 Power supply:

Voltage range	12V/24V (8-35V) continuous
Max. operating current	@12V 150mA, @24V 75mA
Max. standby current	@12V 60mA, @24V 30mA
Cranking drop outs	As before cranking voltage $\geq 10V$, can be maintained 80 ms at 0V, after the voltage is restored $\geq 5V$. the controller can work without to install additional auxiliary power.
Accuracy	1%
Display	0 to 40V

10.4 D-input:

Quantity	7
Max. contact resistance	10K Ω
Types	Isolation
Max. contact current per line	1mA

10.5 Configurable relay outputs

Relay	16A/30Vdc, total 2
Relay	3A/30Vdc, total 6

10.6 Charge failure input

Voltage range	0 to 35Vdc
Accuracy	1%
Max output current	@12V 200mA , @24V 400mA

10.7 Analog Inputs

Number	4
Sensor type	Resistance
Resolution	10 bits
Range	0 to1 K Ω
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 and IEC60068-2-2
Storage ambient temperature Standards	-30 to 80°C IEC60068-2-1 and IEC60068-2-2
Humidity Standards	40°C, 93%RH, 96 hours 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