GV27VS Digital Meter User Manual

Chongqing Mebay Technology Co.,Ltd
Add: No6-2,Building 4, Gangan Rd, Jiangbei District, Chongqing.
Tel:+86-23-6869 3061
Fax:+86-23-6765 8207
Web:http://www.mebay.cn
http://www.cqmb.cn
E_mail:sales@mebay.cn

Software Version

No.	Version	Date	Note
1	V1.0	2020-5-30	Original release.
2	V1.3	2020.11.11	Skip v1.1 and 1.2 and keep the same version as the quick manual
3	V1.4	2021.03.02	Add generator type 127V / 220V
4	V1.5	2021.03.31	Change the maximum current setting and calculation method of three-phase current alarm value under two equal power modes
5	V1.6	2021.07.16	Add 4-pin function selection
6	V1.7	2022.06.09	Add TTL interface
7	V1.8	2022.07.25	Add 4-pin function emergency stop switch and water level switch, and add code meaning

Symbol Description

Symbol	Description
 Note	Remind operators to operate correctly, otherwise it may cause the equipment not to work correctly.
 Be care	It is indicated that potential hazards can damage equipment without proper precautions.
 Warning	It is indicated if appropriate preventive measures are not taken, potentially dangerous situations may result in death, serious personal injury or significant property losses.

Warning

1. The installation of this equipment must be carried out by professionals.
2. When installing and operating the controller, please read the entire instruction manual first.
3. Any maintenance and commissioning of the equipment must be familiar with all the equipmen.
4. After the installation of the controller is completed, please verify that all protection functions are valid.

Be Care

1. Please keep the good connection of the power supply of the controller. Do not share the connection lines of the positive and negative electrodes of the battery with the floating charger.
2. During the operation of the engine, do not disconnect the battery,otherwise it may cause damage to the controller.

CATALOG

Note:

1. Summary

GV27VS is a light and low-cost module used to measure and display AC voltage, frequency, current, power, battery voltage and accumulated operation time. It can replace the traditional pointer instrument and realize multi-purpose meter.

It has over frequency, under frequency, over voltage, under voltage, over current and over power alarm protection functions, which can stop the unit in time in case of failure and effectively protect the safety of the unit. The alarm output adopts relay, which can bear large output current.

The instrument can set parameters by pressing keys, and can also write parameters quickly through the upper computer and TTL interface, so as to meet the application in different occasions. It is equipped with waterproof ring as standard. After installation, the panel can reach IP65 protection.

2. Main Features

- High performance single chip microcomputer control is adopted;
- Capable of measuring and displaying multiple parameters at the same time;
- 3-display, Highlight LED digital tube displaying the measured value;
- It has alarm protection function;
- The transformer ratio of current transformer can be set;
- Collect and display battery voltage V, cumulative working time h and other parameters;
- Collect and display generator frequency Hz, voltage V, current a, power kw;
- 2 relay outputs;
- 2 switch value input;
- Standard water-proof rubber gasket. The waterproof can reach IP65;
- Module design: All the connections are adapted with European connectors so that installation, connection, repair and replacement can be more easily.

3. Parameters Display

- Battery voltage of engine;
- Generator frequency Hz;
- Generator voltage V;
- Generator current A;
- Active power of generator KW;
- Cumulative operation time of the unit.

4. Alarm protection

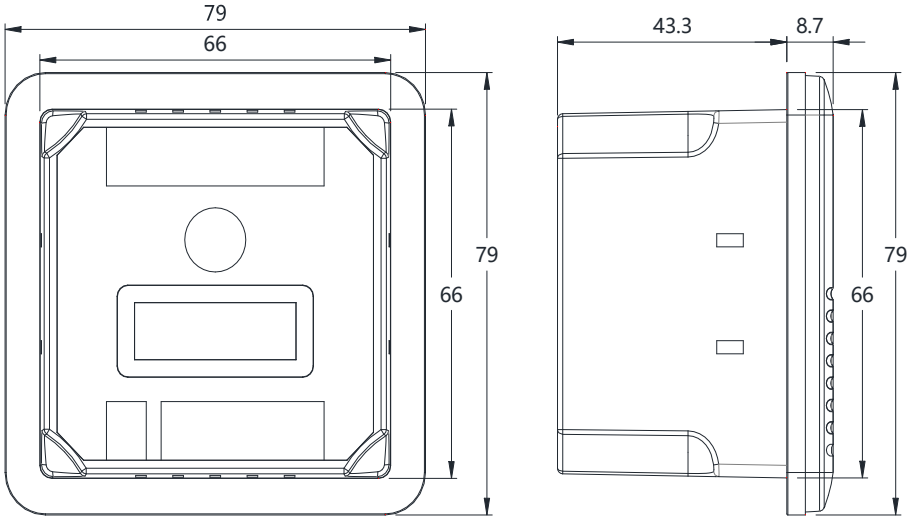
- Low oil pressure;
- Over speed;
- Under speed;
- Over voltage;
- Under voltage;
- Over current;
- Over power;
- Battery under voltage warning.

5. Parameters

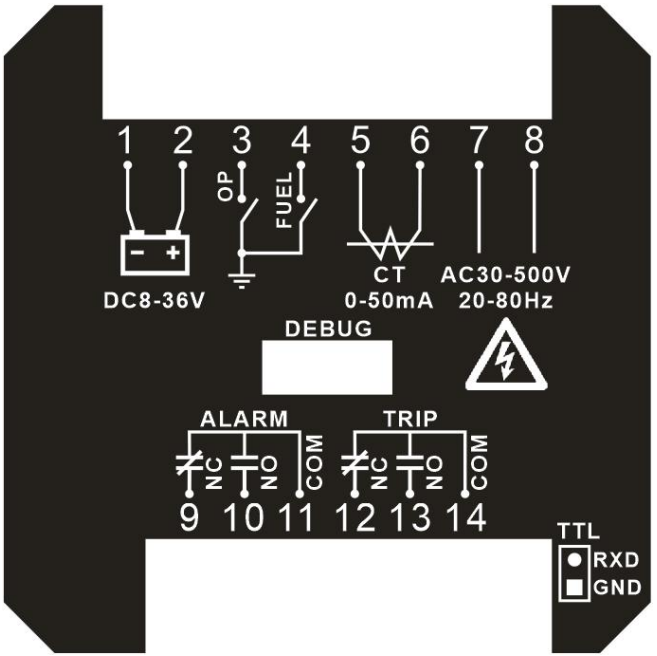
Options	Parameters
Operation Voltage	DC8-36V Continuous
Power Consumption	Standby:24V:MAX 1W
	Working:24V:MAX 1.5W
AC Voltage Input	1P2W(L-N input) 30VAC-360VAC(ph-N)
AC current input	Transformer secondary input MAX 50mA
MAX Accumulating Time	99999Hours(Min Store time:6min)
Output 1	Passive contact output max DC3A
Output 2	Passive contact output max DC3A
Switch value input	Available if connecting with Battery -
Working condition	-30-70℃
Storage condition	-40-85℃
Protection Level	IP65:when waterproof rubber gasket is added between controller and its panel
Insulation strength	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal; The leakage current is not more than 3mA within 1min.
Overall dimension	78mm×78mm×63mm
Panel cutout	67mm×67mm
Weight	0.23Kg

6. Overall Dimension and Wiring Diagram

◆ **Overall Dimension:**



◆ **GV27VS Wiring port**



No.	Function	Description	Cable cross sectional area
1	Battery Negative Input B-	Controller power supply input B-.	1.5mm^2
2	Battery Negative Input B+	Controller power supply input B+.	1.5mm^2
3	Low oil pressure switch input	effective if connecting with Battery negative pole	1.0mm^2
4	Low fuel level alarm switch input	effective if connecting with Battery negative pole	1.0mm^2
5	Load CT Secondary I (in)	Current transformer secondary rating 5A	1.5mm^2
6	Load CT Secondary I (in)		1.5mm^2
7	Generator Voltage L	Connect to generator set output L line	1.0mm^2
8	Generator Voltage N	Connect to generator set output N line	1.0mm^2
9	Alarm relay normally closed pin	Passive contact output max DC3A	1.0mm^2
10	Alarm relay normally open pin		1.0mm^2
11	Alarm relay common pin		1.0mm^2
12	Trip relay normally closed pin	Passive contact output max DC3A	1.0mm^2
13	Trip relay normally open pin		1.0mm^2
14	Trip relay public pin		1.0mm^2
-	RXD	Pin of TTL interface to write data to the module	1.0mm2
-	GND	TTL 接口的接地脚	1.0mm2

Be care:During the operation of the unit, it is forbidden to disconnect the battery, otherwise the instrument will be damaged!

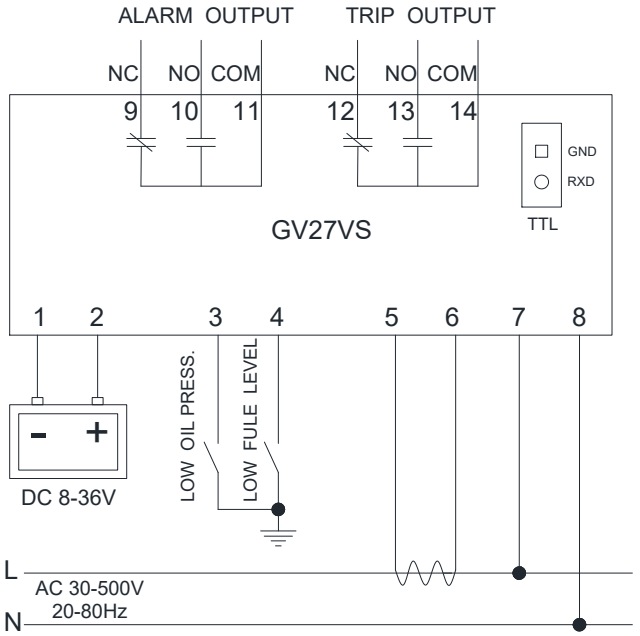
Be care:If the external actuator current is too large, the large capacity relay should be expanded!

Be care:Switch value input pin, Ungrounded indicates high level, prohibit Connect battery positive!

Be care:The wiring of current transformer shall not be connected to Zero line N,Otherwise, the instrument may be damaged!

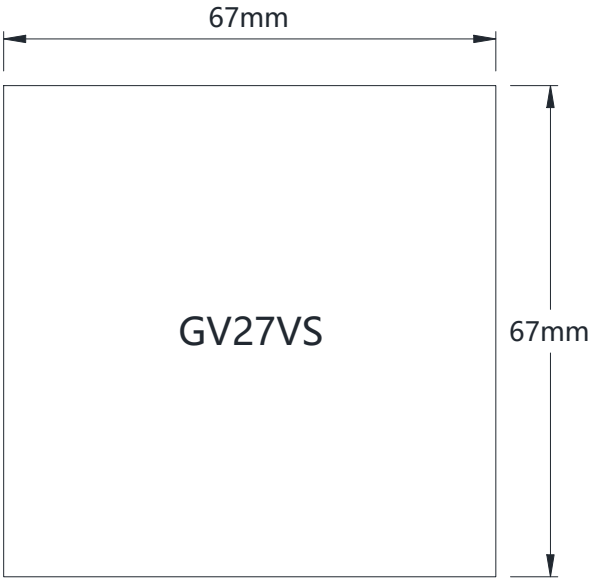
Warning:When generator is on-load, C. T. secondary must not be open circuit, Otherwise, the high voltage generated will pose a danger to personal safety!

- **Typical Wiring Diagram**



7. **Installation guide**

- The instrument is fixed by two special fixings and screws, and the screws of the clamp shall not be over tightened.
- **Panel Cutout:W67mm*H67mm,As shown below:**



Note:If the casing installed by the instrument is directly installed on the fuselage of the generator set and other equipment with severe vibration, a shock absorber (such as rubber shock pad) must be installed!

◆Battery Voltage Input

GV27VS instrument is suitable for 8-36 VDC battery voltage. Battery negative must be reliably connected to the enclosure of the engine. The instrument power supply B+ and B- must be connected to battery positive and negative, and the wire size must not be less then 1.5mm².

Be care:In the system with floating charge charger, please connect the output line of the charger directly to the positive and negative poles of the battery, and do not share the positive and negative wires of the power supply with the instrument, otherwise the charger may interfere with the normal operation of the instrument!

◆ Output and relay extension

Be care:All outputs of the instrument are relay contact outputs with a maximum current capacity of 3A. Please use within the current capacity of the relay. If it is necessary to extend the relay, add a continuous current diode (when the coil of the extension relay is energized with DC) or a resistance capacitance loop (when the coil of the extension relay is energized with AC) at both ends of the coil of the extension relay to prevent interference with the instrument or other equipment!

◆ AC current input

The instrument current input must be connected with an external current transformer, and the current at the secondary side of the current transformer must be 5A. At the same time, the phase of the current transformer and the input voltage must be correct, otherwise the sampled current and active power may be incorrect.

Be care:The wiring of current transformer shall not be connected to Zero line N,Otherwise, the instrument may be damaged!

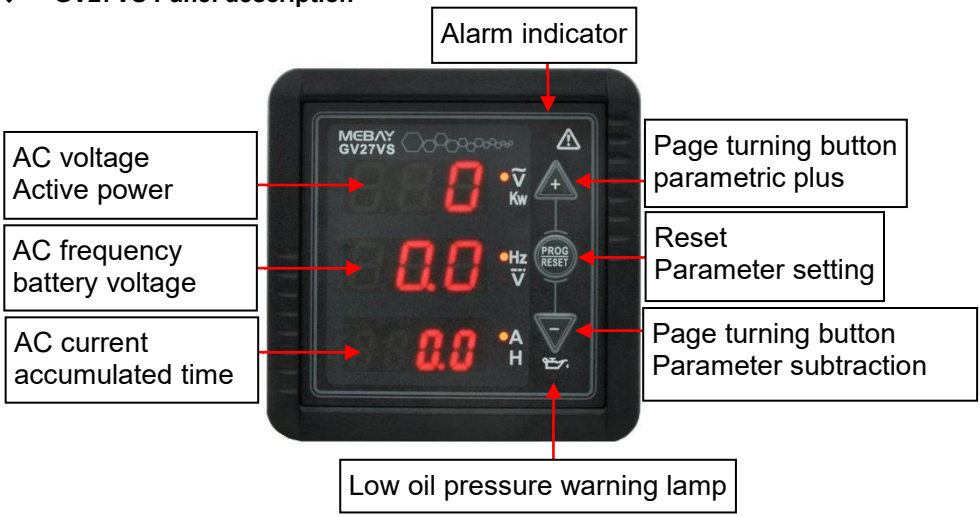
Warning:When generator is on-load, C. T. secondary must not be open circuit, Otherwise, the high voltage generated will pose a danger to personal safety!

- **Withstanding voltage test**

Be care:If withstanding voltage test is conducted after the controller has already been installed onto the control panel, please unplug all controller terminal connections in order to prevent high voltage from damaging it!

8. Panel and display

- **GV27VS Panel description**



9. Control and operation instructions

- **Push-button Function description:**

Button	Name	Main function
	Page turning button parametric plus	◆ In standby or running mode, press this key to turn pages; ◆ In the setting mode, it is used to increase the parameter value.

	Reset Parameter setting	◆ Press and hold this key for a long time, and the instrument will enter the setting mode; ◆ In the setting interface, long press this key to exit the setting mode; ◆ In the alarm state, press this key to clear the alarm.
	Page turning button Parameter subtraction	◆ In standby or running mode, press this key to turn pages; ◆ In setting mode, used to reduce parameter value.

◆ **Notices in Starting Process**

Note:After power on initialization is completed, when the frequency is detected to be higher than the "start success frequency value", that is Confirm that the generator enters the operation state, and start the "safety delay" timing. After the delay, when the fault is detected, the alarm will act!

Be care:In the safety delay, only response to over frequency and over voltage. Other alarms do not respond!

Note:Press  **after alarm protection to clear the alarm!**

10. Warning and shutdown alarm

◆ **Warning**

Be care:Warning is a non-serious failure state, which will not harm the gensets system for the time being. It only reminds operators to pay attention to the situation that does not meet the requirements and solve it in time to ensure the continuous operation of the system. When the warning occurs, the gensets does not stop. Once the fault is removed, the warning is automatically canceled!

Note:When the warning fault occurs, the corresponding display value flashes to remind, but does not stop the generator!

Under Battery Voltage Warning

When the instrument detects that the battery voltage is less than the "low battery voltage warning value" and the battery voltage is still not greater than the "low battery voltage warning value" for a period of time, it will alarm the battery low voltage warning, the battery voltage display value will flash, and there is no alarm output. When the battery voltage returns to the normal value, the warning will be cancelled automatically.

Low Fuel Level Switch Warning

When the instrument detects that the "low fuel level alarm input" switch at the input port is valid, the alarm delay of the low fuel level switch starts and lasts for a period of time "general fault delay". If the "low fuel level alarm input" switch at the programmable input port is still valid, the low fuel level alarm will be reported, and the third screen will display and flash.

Low fuel level switch trip warning

When the instrument is reporting "low fuel level switch warning", the third screen displays FUEL and flashes, and then delays and lasts for a period of time "low fuel level trip delay". If the programmable input port "low fuel level alarm input" switch is still valid, the low fuel level switch trip warning will be reported and the trip action will be executed. In "low fuel level trip delay", if the "low fuel level alarm input" switch of programmable input port is invalid, the alarm will exit.

◆ **Shutdown Alarms**

Warning: After the Shutdown Alarm occurs, the system will be locked immediately and the generator set will be stopped.Only after troubleshooting, press PROG RESET key to clear the alarm, can it be re-operated!

Note:When the shutdown fault occurs, the alarm indicator light is on, and the corresponding parameter display value flashes. According to different settings, tripping and alarm output can be executed!

Low oil pressure switch alarm

When the instrument detects that the input port "low oil pressure alarm switch input" is valid, the alarm delay of low oil pressure switch starts and lasts for a period of time "emergency fault delay", the input port "low oil pressure alarm switch input" switch is still valid, the engine low oil pressure switch alarm will be reported, the third screen will lock and flash to display OIL , indicator lights and indicator lights will flash synchronously, and the trip and alarm will be executed output.

Temperature switch alarm

When the instrument detects that the input port "temperature switch input" is valid, the temperature switch alarm delay starts and lasts for a period of time "general fault delay". If the input port "temperature switch input" switch is still valid, the temperature switch alarm is reported, and the third screen is locked and flashes HIGH , indicator lights flash synchronously to execute tripping and alarm output.

Emergency stop switch alarm

When the instrument detects that the "emergency stop switch input" at the input port is valid, the alarm time of the emergency stop switch starts and lasts for more than 0.5 seconds, and the "emergency stop switch input" at the input port is still valid,, the emergency stop switch alarm is reported, and the third screen is locked and flashes ES , indicator lights flash synchronously to execute tripping and alarm output.

Oil level switch alarm

When the instrument detects that the "oil level switch input" at the input port is valid, the oil level switch alarm delay starts and lasts for a period of time "general fault delay". If the "oil level switch input" switch at the input port is still valid, the oil level switch alarm is reported, and the third screen is locked and flashes LC , indicator lights flash synchronously to execute tripping and alarm

output.

Low fuel level switch alarm

When the instrument is reporting "trip warning of low fuel level switch", delay again and continue for a period of time "shutdown delay of low fuel level", the programmable input port "alarm input of low fuel level" switch is still valid, then the alarm of low fuel level switch shutdown will be reported, the third screen will lock and flash to display FUEL ,  indicator lights flashing synchronously, and trip and alarm output will be executed.

Over Frequency Alarm

When the instrument detects that the frequency exceeds the "generator over frequency alarm value" and the over frequency alarm delay starts and lasts for a period of time, the "emergency fault delay" is still not less than the "generator over frequency value", it will alarm the generator over frequency alarm, the frequency value will lock and flash, the  indicator light will flash synchronously, and the trip and alarm output will be executed.

Under Frequency Alarm

When the instrument detects that the frequency is lower than the "generator under frequency alarm value", the under frequency alarm delay starts and lasts for a period of time, and the "general fault delay" is still not greater than the "generator under frequency value", it will alarm the generator under frequency alarm, the frequency value will lock and flash, the  indicator light will flash synchronously, and the trip and alarm output will be executed.

Over Voltage Alarm

When the instrument detects that the output voltage of the generator exceeds the "over voltage alarm value of the generator" and the over-voltage alarm delay starts and lasts for a period of time, the "emergency fault delay" is still not less than the "over voltage value of the generator", it will alarm the over-voltage alarm of the generator, the voltage value will lock and flash, the  indicator light will flash synchronously, and the trip and alarm output will be executed.

Under Voltage Alarm

When the instrument detects that the output voltage of the generator is lower than the "alarm value of generator under voltage" and the start of the under voltage alarm delay lasts for a period of time and the "general fault delay" is still not greater than the "value of generator under voltage", it will alarm the generator under voltage, lock and flash the voltage value, the  indicator light will flash synchronously, and perform tripping and alarm output.

Phase current crosscurrent alarm

When the instrument detects that the output phase current of the generator is higher than the "load over-current alarm value" and the start phase current overload alarm delay lasts for a period of time and the "general fault delay" is still not less than the "load over-current alarm value", it will alarm the generator over-current alarm, the current value will lock and flash, the  indicator light will flash synchronously, and the tripping action will be executed (it can be set to trip and stop).

Total power overload alarm

When the instrument detects that the total output power of the generator is higher than the "over total power alarm value" and the over total power alarm delay starts and lasts for a period of time and the "general fault delay" is still not less than the "over total power alarm value", it will alarm the over total power of the generator, lock and flicker the power value, the  indicator light will flash synchronously, and perform the tripping action (it can be set to trip and stop).

11. Parameter setting

◆ **Enter setup mode**

Please set the parameters according to below steps:

Press and hold key  for 3 seconds,Release when the first screen shows  ,Indicates that the setting mode has been entered;The first screen displays the serial number of the parameter,The second screen displays the value of the current parameter.When the first screen flashes,Press  or  to select the option to be modified,Press key  to enter the modification status, and the second screen starts to flash;Press  or  to change the parameter value of the current option;After changing to target value,Press the  to save and return to the parameter browsing interface,Back to the first screen flashing.After parameter setting,Keep pressing key  for 4 seconds,Save and exit setup mode.

Note:Parameters will take effect immediately after being saved and modified!

◆ **Parameter setting table**

No.	Parameter	Range *(default)*	Notes
P00	Alarm function	0:Disabled 1:***Available***	Turn on and off alarm protection function
P01	Gens AC system	0:1ph 220V 1:3ph 380V 2:120V/240V ***3:220V/380V*** 4:127V/220V	0: Power=voltage * current, Current=phase current; Rated phase= 230V. 1: Power=voltage/1.732 * current*P20, Current=phase current*P19; Rated phase= 230V. 2:Input≤165V:Power=voltage*current*2, Current=phase current*2; Input>165V: Power=voltage * current , Current=phase current ;Rated phase= 230V. 3:Input≤300V:Power=voltage*current, Current=phase current; Input>300V: Power=voltage/1.732*current *P20, Current=phase current*P19;Rated phase= 230V. 4:Input≤165V:Power=voltage*current, Current=phase current; Input>165V:Power=voltage/1.732*current *P20, Current=phase current*P19;Rated phase= 127V.
P02	Rated frequency	***50Hz*** 60Hz	Set the rated frequency of the generator to calculate the over frequency alarm value.
P03	Maximum total power	0-50.0KW ***(6.3 KW)***	Set the maximum total power of the generator to calculate the over power alarm value.
P04	Maximum current	0-150.0A ***(25.2A)***	Set the maximum current of the generator to calculate the over current alarm value.When the generator type is 400V three-phase, it is set to single-phase maximum current;When the generator is 230V / 400V or 127V / 220V, the maximum single-phase current * 0.9 when the generator is set to 230V or 127V;When the generator is equal power 120V / 240V,,The set voltage is the maximum single-phase current at 240V;The maximum total current is set when the generator is single phase.
P05	Over freq alarm	0－200% ***(114%)***	Over frequency alarm value = rated frequency × over frequency alarm percentage.When the frequency is greater than the over frequency alarm value, the start delay and the duration "emergency fault delay" are still not less than the over frequency alarm value, then the over frequency alarm stops the generator set.If the frequency reduction is less than the

			"over frequency alarm value" within the "emergency fault delay" time, it is considered as the normal fluctuation of the generator, and the alarm delay is cancelled.If the value is set as 200, then the alarm is disabled.
P06	Under freq alarm	0－200% (**85%**)	Under frequency alarm value = rated frequency × under frequency alarm percentage.When the frequency is less than the under frequency alarm value, the start delay and the duration "general fault delay" are still not greater than the under frequency alarm value, then the under frequency alarm stops the generator.If the frequency rise is greater than the "under frequency alarm value" within the "general fault delay" time, it is considered as the normal fluctuation of the generator and the alarm delay is cancelled.When set to 0, under frequency alarm is disabled.
P07	Over voltage alarm	0－200% (**115%**)	Over voltage alarm value = rated phase voltage × over voltage alarm percentage.When the AC voltage is greater than the over-voltage alarm value, the over-voltage alarm stops the generator when the start delay and the "emergency fault delay" for a period of time are not less than the over-voltage alarm value.If the voltage is less than the "over voltage alarm value" within the "general fault delay" time, it is considered as normal fluctuation of the generator, and the alarm delay is cancelled.If the value is set as 200, then the alarm is disabled.
P08	Under voltage alarm	0－200% (**85%**)	Under voltage alarm value = rated phase voltage × under voltage alarm percentage.When the AC voltage is less than the under voltage alarm value, the startup delay lasts for a period of time "general fault delay" and is still not greater than the under voltage alarm value, then the under voltage alarm stops the generator.If the voltage rise in "general fault delay" is greater than "under voltage alarm value", it is considered as normal fluctuation of generator, and the alarm delay is cancelled.When set to 0, the under voltage alarm is disabled.
P09	Current over-load alarm	0－200% (**100%**)	1.When the generator type is set to single-phase 230V, three-phase 400V and equal power 120V / 240V,Over current alarm value

			= maximum current × over current percentage; 2.When the generator type is set to equal power 230V / 400V, the single-phase and three-phase will be identified automatically according to the voltage, and the over-current alarm value will be calculated automatically,The formula is as follows: **Single phase 230V:** over current alarm value = maximum current × over current percentage; **Three phase 400V:**Over current alarm value = (maximum current *1.09/ 3) × over current percentage; If the current phase current is greater than the over-current alarm value, the over-current alarm will stop if the start delay and the duration (over-current fault delay) are not less than this value. If the current phase current is less than the over-current alarm value within the "over-current fault delay", the generator will be considered to be in normal fluctuation and jump out of the alarm program.If the value is set as 200, then the alarm is disabled.
P10	Over total power alarm percentage	0—200% (**100%**)	Over total power alarm value = maximum total power × over total power alarm percentage.When the total power is greater than the over power alarm value, the start delay and the duration (over-current fault delay) are still not less than this value, then the over power alarm stops the generator. If the power is less than the "alarm value of total power" within the "over current fault delay", the generator will be considered as normal fluctuation, and the alarm program will jump out.If the value is set as 200, then the alarm is disabled.
P11	Low battery voltage warning value	0-32.0V (**8.0V**)	When the battery voltage is less than the low-voltage warning value of the battery and the start delay lasts for a period of time (general warning delay) is still not greater than the low-voltage warning value of the battery, the low-voltage warning of the battery will be carried out and the generator will not be stopped. When the battery voltage value is greater than the battery low voltage warning value, the warning is released. When set to 0, the low battery voltage warning is disabled.

P12	Emergency delay	0-10.0s (**1.5s**)	Over frequency, over pressure and low oil pressure alarm delay time.
P13	General fault delay	2.0-20.0s (**5.0s**)	The delay time of under frequency, under voltage alarm, low fuel level warning, low battery voltage warning, and water level switch alarm.
P14	Over current delay	0-3600s (**10s**)	When the load current or power is greater than the set value and lasts for this set time, it is regarded as an alarm.
P15	Automatic screen change time	1-120s (**120S**)	Set the interval time of automatic screen change for parameter display, and set it as 120s for manual screen change.
P16	Frequency disconnect	0-70% (**40%**)	Starting success frequency value = rated frequency × starting success frequency percentage.After the instrument is powered on, when the frequency exceeds the starting success frequency value, it is deemed that the generator is started successfully, the safety delay timing is started, and the protection procedure is entered.
P17	Safety delay	3-300s(**10s**)	During this time, only over frequency and over-voltage alarms are responded.
P18	Alarm output time	0-120 (**120s**)	Set the duration of alarm relay output action.Disable the alarm output when it is set to 0;When set to 120, the alarm is always output.
P19	Current display multiple	1 multiple ***3 multiple***	Set the parameter display of three-phase current, current display = phase current × display multiple.
P20	Power display multiple	1 multiple ***3 multiple***	Set the parameter display of three-phase power, power display = phase power × display multiple.
P21	Transformer ratio	5-150A(**50A**)	Set the primary current of current transformer.
P22	Secondary current of transformer	**50mA** 62.5mA	Set the secondary current of current transformer.
P23	Alarm protection action	0:Shutdown **1:Tripping operation**	**When set to 0:**All alarms stop the generator directly (alarm relay acts); **When set to 1:**In case of over pressure, under voltage, low frequency and low oil pressure alarm, trip first, delay for 1s and then shut down;In case of over-current and over-power alarm, the generator will trip but not stop. In case of over frequency alarm, directly trip to stop the generator.
P24	Low fuel level trip delay	0-3600s **(20s)**	When the low fuel level warning is effective, the trip relay will act after delaying the set time.
P25	Shutdown	0-3600s	When the low fuel level warning and trip, and

	delay of low fuel level	**(30s)**	then delay this setting time, the shutdown relay acts.
P26	4-pin function selection	0:Disabled ***1:Oil level switch*** 2:Water temperature switch 3:Emergency stop switch 4:Water level switch	Select the function of module pin 4. (the emergency stop switch and water level switch are effective when they are in standby, and the low oil pressure switch and temperature switch and oil level switch are effective only after they are started.) The delay of emergency stop switch is 0.5 seconds
Meaning of alarm code: OIL : low oil pressure switch alarm. FUEL : The oil level switch alarms. HIGH: Temperature switch alarm. ES : Emergency stop alarm. LC : Low water level alarm.			

12. Common troubleshooting

Symptoms	Possible Solutions
The power on screen of the instrument is not on	◆ Check whether the 1 and 2 pins of the instrument have battery voltage; ◆ Check whether the battery voltage is normal; ◆ Check whether the DC fuse is broken.
Unit fails to start	◆ Check whether the instrument has given an alarm; ◆ Check whether the instrument wiring affects the necessary conditions for engine starting; ◆ Check whether the battery voltage is normal;
Alarm stop after start	◆ First, determine whether the shutdown is caused by the instrument alarm or the unit itself; ◆ Determine the cause of shutdown according to the alarm display information of the instrument.
The instrument has no parameter display or the error is too large	◆ Check whether the instrument settings are correct; ◆ Check whether the relevant wiring is correct; ◆ Measure whether the associated parameters are normal.
Sudden alarm shutdown during operation	◆ Check whether the relevant switches and wires are normal and whether the parameters are within the normal range according to the instrument alarm display information.
In case of any problem, please take a video so as to send it to the after-sales personnel to determine the cause of the fault.	