GM50H MK3
ENGINE METER
USER MANUAL



Software Version

No.	Version	Date	Note
1	V1.0	2020-11-11	Original release.
2	V1.1	2025-03-06	Add 'Display description after timing exceeds 1000'.
3	V1.2	2025-05-26	Add low RPM warning function.
4	V1.3	2025-10-11	Add Host and slave mode; Alarm output method; TTL communication;

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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 meter, please read the entire instruction manual first.
3. Any maintenance and commissioning of the equipment must be familiar with all the equipment.
4. t, safety standards and precautions in advance, otherwise it may cause personal injury or damage to related equipment.
5. The engine must have an over-speed protection device independent of the meter system to avoid casualties or other damage caused by engine out of control.
6. After the installation of the meter is completed, please verify that all protection functions are valid.


Be Care

1. Please keep the good connection of the power supply of the meter. 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 meter.

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1. Summary

GM50H MK3 is one light and low price-orientated module used for demonstrating engine RPM,coolant temperature, oil temperature,oil pressure, battery voltage and Hours. The users can adjust and set the parameters by the button on the front face in order to meet the different requests.

Besides, it uses the European-style terminals for connection which is more convenient for installation and detachment.

2. Main Features

There are two models for GM50H MK3 series Meter:

GM50H MK3: monitor and display RPM, Oil Pressure, coolant temperature, oil temperature, Battery voltage and Accumulation Time with Alarm function added.

GM50HR MK3: Based on the functions of GM50H MK3, RS485 Port is added to support MODBUS Protocol.

- ◆ 32bit high performance single chip microcomputer.
- ◆ 5 screens high-light digital tube can demonstrate the parameters.
- ◆ Various kinds of protections.
- ◆ Input frequency is available to check RPM.
- ◆ Variety of sensor curves' parameters is set inside.
- ◆ Sensor curve can be self-defined by buttons.
- ◆ It has three analog input channels of sensors, among which the oil pressure sensor is compatible with voltage signal input;
- ◆ The parameters can be set and adjusted by the button on the front face.
- ◆With RS485 port, remote data monitoring can be realized by using Modbus Protocol (only GM50HR has it);
- ◆It has high current alarm relay, one normally open and one normally closed output, which is convenient for users to use;
- ◆ Standard coolant-proof rubber gasket. The coolant proof can reach IP65.
- ◆ All the connections are adapted with European connectors so that installation, connection, repair and replacement can be more easily.

3. Parameters Display

- ◆ Engine speed
- ◆ Engine oil pressure
- ◆ Engine coolant temperature
- ◆ Engine oil temperature
- ◆ Engine battery voltage
- ◆ Total running time

4. Protection

- ◆ Over speed
- ◆ Low oil pressure
- ◆ High coolant temperature
- ◆ High oil temperature
- ◆ Sensor open
- ◆ Battery under voltage warning

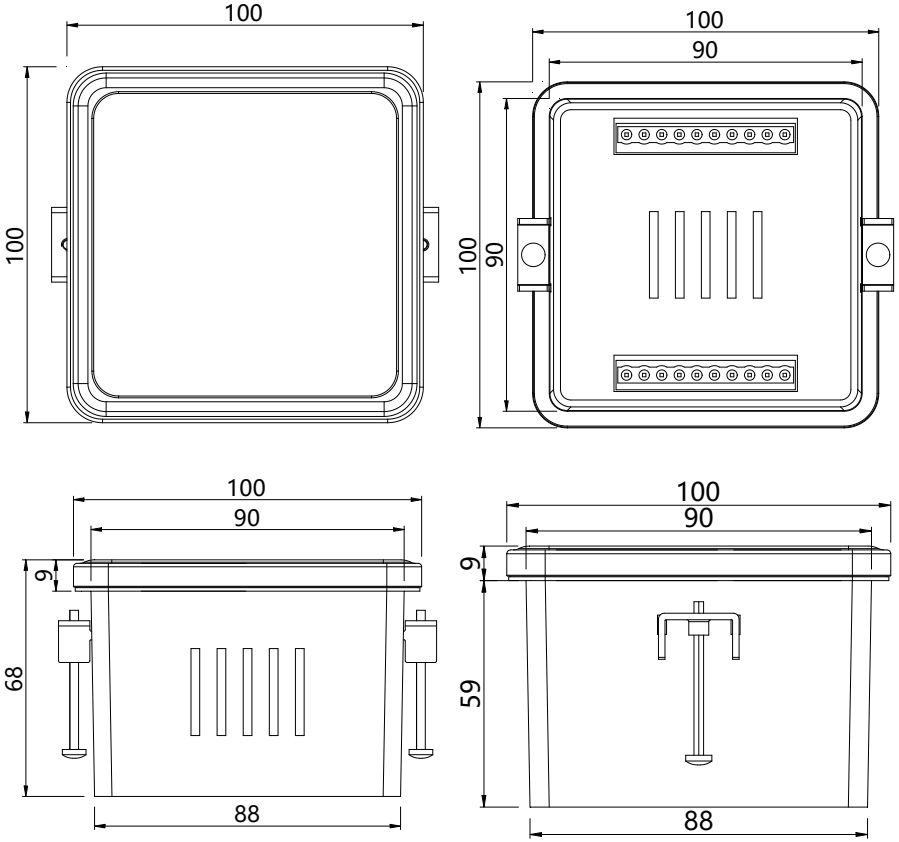
5. Parameters

Options	Parameters
Working voltage	DC8V----36V Continuous
Power consumption	Standby：24V：MAX 1W
	Working：24V：MAX 1.5W
AC Voltage Input	1P2W 30VAC-360VAC

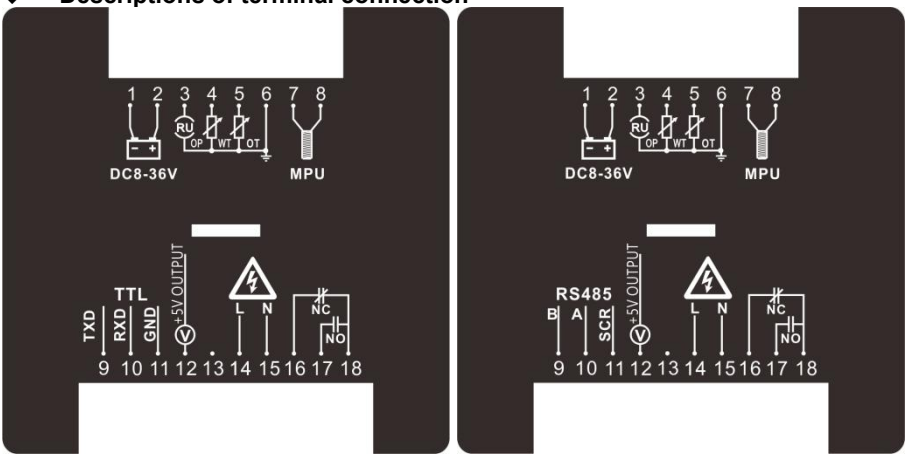
Rotate speed sensor Frequency	50-10000Hz(AC3～65V)
MAX Accumulating Time	99999.9Hours（Min storage time:6min）
Relay Output	5AMP Non-contact normal open & normal close output
Working condition	-30-70℃
Storage condition	-40-85℃
Protection Level	IP65：when coolant proof rubber gasket is added between meter 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	100mm*100mm*77mm
Panel cutout	91mm*91mm
Weight	0.15Kg

6. Overall Dimension and Wiring Diagram

◆ **Overall Dimension:**



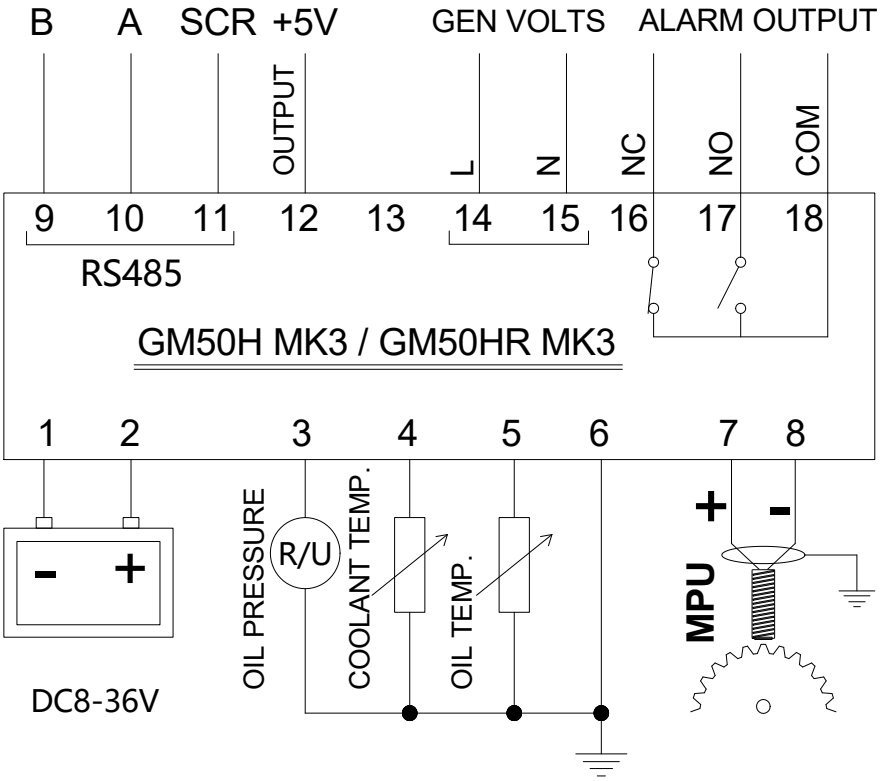
◆ **Descriptions of terminal connection**



No.	Function	Description	Cable cross sectional area
1	Battery Negative Input B-	meter power supply input B-.	1.5mm^2
2	Battery Negative Input B+	meter power supply input B+.	1.5mm^2
3	Oil pressure sensor	Connect sensor input.	1.0mm^2
4	Temperature Sensor		1.0mm^2
5	Oil temperature sensor		1.0mm^2
6	Sensor common GND	Connect the battery negative or outer.	1.0mm^2
7	Speed sensor +	Use a shielded wire to connect the speed sensor.	1.0mm^2
8	Speed sensor -		1.0mm^2
9	RS485 B TXD	A 120 Ω shielded wire and good grounding are recommended. (GM50H MK3 features TTL GM50HR MK3 features RS485)	1.0mm^2
10	RS485 A RXD		1.0mm^2
11	RS485 SCR GND		1.0mm^2
12	+5V Output	Connect the power supply of the oil pressure sensor with the output voltage signal, with a maximum of 50mA.	1.0mm^2
13	Reserved		
14	AC Voltage L	Connected to the generator set output L phase.	1.0mm^2
15	AC Voltage N	Connected to the generator set output N.	1.0mm^2

16	Alarm relay Normal close	Passive Output, Max 5Amp.	1.5mm^2
17	Alarm relay Normal open		1.5mm^2
18	Alarm relay Common		1.5mm^2

◆ **GM50H MK3 typical Wiring Diagram**

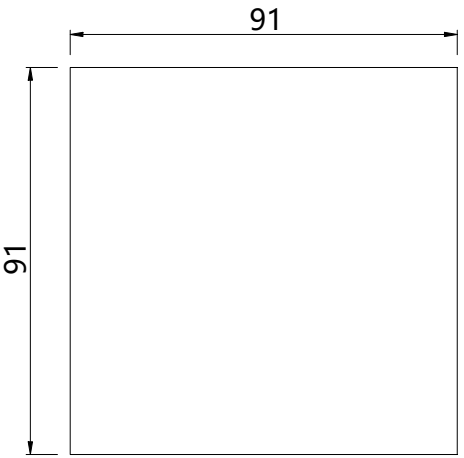


Note: Please don't move during running status or it may cause the meter broken!

7. Installation instruction

◆ The meter is fixed by two special fixing members and screws, and the screws of the metal fasteners cannot be too tight.

◆ Panel Cutout: W91mm*H91mm.



Note: If the meter is installed directly in the genset shell or other fluctuated equipment, the rubber pad must be installed.

◆Battery Voltage Input

GM50H MK3 is suitable for 8-36V DC battery voltage. Battery negative must be reliably connected to the enclosure of the engine. The meter power supply B+ and B- must be connected to battery positive and negative, and the wire size must not be less than 1.5mm^2.

NOTE:

In case of floating charger connect charger output to battery positive and negative directly, then, connect battery positive and negative poles to meter positive and negative power supply.

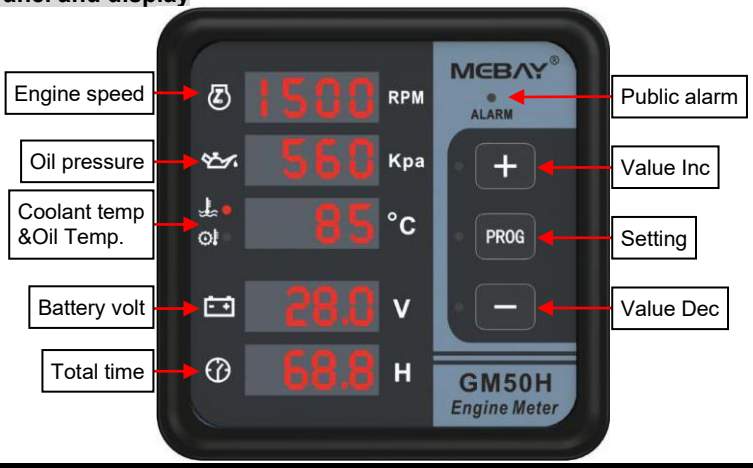
◆Output and relay expansion

Note: All outputs of the meter are relay contacts. The maximum current capacity is described in the "Parameters" in this manual. Please use it in the relay current capacity. If an extended relay is needed, add a continuous current diode (when the extended relay coil is DC) or a resistance-capacitance loop (when the extended relay coil is AC) to both ends of the coil to prevent interference with the meter or other equipment.

◆Withstanding voltage test

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

8. Panel and display



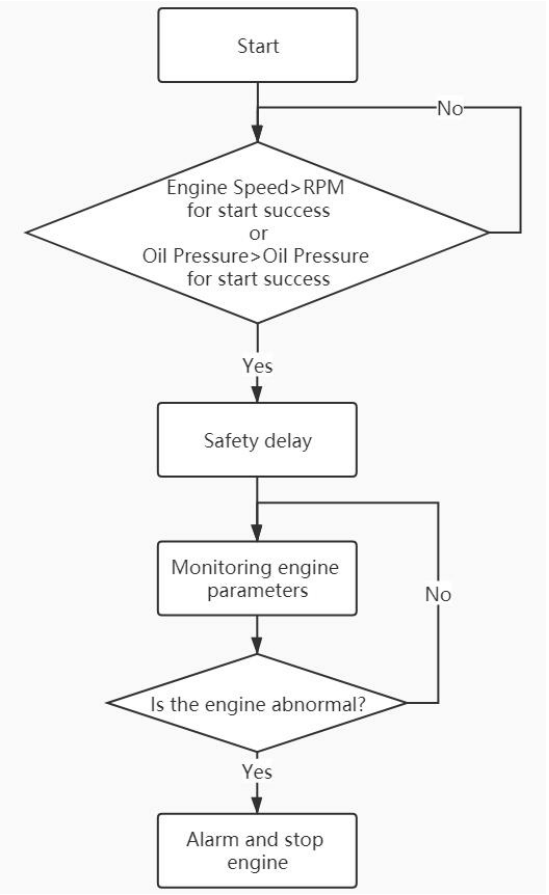
ICON	NAME	Meaning
	Engine speed	The LED screen displays the engine speed in RPM.
	Engine oil pressure	The LED screen displays the engine oil pressure in kPa.
	Engine coolant temperature	The LED screen shows the cooling coolant temperature of the engine in centigrade ℃.
	Oil temperature	The LED screen shows the oil temperature of the engine in centigrade ℃.
	Battery voltage	The LED screen displays the battery voltage of the engine in volts.
	Total running time	The LED screen displays the accumulated working time of the engine in hours H.After more than 1000 hours, the decimal point will not be displayed.After more than 10000 hours, the high and low positions will be displayed alternately, with the symbol "H" added before the high position.

◆ **Key Function Description**

KEYS	NAME	Main Function
PROG	Setting	Press for 4 seconds to enter the parameter setting mode. In the parameter browsing interface of setting mode, press to enter the parameter modification interface. In the parameter browsing interface of setting mode, press to enter the parameter modification interface.
+	+	Under display mode, parts of the page can move up. Under edition mode, pressing this key to move the digit or increase the numbers. In the display mode, the coolant temperature and oil temperature change pages.
−	-	Under display mode, parts of the page can move down. Under edition mode, pressing this key to move the digit or decrease the numbers. In the display mode, the coolant temperature and oil

		temperature change pages.
PROG + +	Custom sensor curve	Press the PROG and + together for more than 4 seconds, can enter the sensor parameter setting interface.
PROG + −	Check the software version	Press PROG key and - key together to check the software version of the meter.
+ + −	LED Test	Test if all LED lights are ok, pressing this key to test if all lighted, all off when loosen it.
PROG + + + −	Restore default	Press PROG key, + key and - key together,then all the parameters can be set as defaults.

◆ **Work flow chart**



Note: within the safety delay time, only the overspeed alarm will be responded, and other alarms will not respond.

9. Warnings and Shutdown Alarms

◆ Warnings

Notes: Warning is a non-serious failure state, which will not harm the engine 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 engine does not stop. Once the fault is removed, the warning is automatically canceled.

Under battery voltage warning
When the meter detects that the battery voltage is lower than the "**Under battery voltage warning"**, the warning of Under battery voltage warning is reported, battery display flashing.

Low Speed Warning
When the Meter **'P18'** is set to '**Low Speed Warning Only**', If the engine speed is detected to be less than the **'Low Speed Warning'**, the low speed warning delay will start and continue for a period of **'Sensor Alarm Delay'**, and if the RPM is still not higher than the **'Low Speed Warning'**, then the low speed warning will be reported, the ALARM lamp will be lit, and the RPM display screen will blink.
During the low speed warning period, if the meter detects the RPM is still higher than the **'Low Speed Warning Return'** after the **'Sensor Alarm Delay'**, the meter cancels the low speed warning. Then the meter cancels the low speed warning.

◆ Shutdown Alarms

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

Notes：When the shutdown alarm failure occurs, the "**ALARM**" lights will light up and the engine automatically stops.

Over speed alarm
When the meter detects that the engine speed is higher than "**Over speed alarm**", Then start alarm delay and the duration (Emergency delay) have not returned to normal, the alarm of over speed is reported.The alarm light ALARM flashes, the speed display screen locks the alarm speed value, and the alarm relay outputs.

Low oil pressure alarm
When the meter detects that the engine oil pressure is lower than "**Low oil pressure alarm**", Then start alarm delay and the duration (Normal alarm delay) have not returned to normal, the alarm of low oil pressure is reported.The alarm light ALARM flashes, the oil pressure display screen locks the alarm oil pressure value, and the alarm relay outputs.

High coolant temperature sensor alarm
When the meter detects that the coolant temperature value is higher than the "**High**

coolant temperature alarm", Then start alarm delay and the duration (Normal alarm delay) have not returned to normal, the alarm of High coolant temperature alarm is reported. The alarm light ALARM flashes, the coolant temperature display screen locks the alarm coolant temperature value, and the alarm relay outputs.

Oil pressure sensor disconnected alarm

When the oil pressure sensor is detected to be disconnected,Then start alarm delay and the duration (Normal alarm delay) have not returned to normal, the alarm of Oil pressure sensor disconnected alarm is reported. The alarm light ALARM flashes,the oil pressure display shows "---" and flashes.

Coolant temperature sensor disconnected alarm

When the coolant temperature sensor is detected to be disconnected,Then start alarm delay and the duration (Normal alarm delay) have not returned to normal, the alarm of coolant temperature sensor disconnected alarm is reported. The alarm light ALARM flashes,the coolant temperature display shows "---" and flashes.

10. Parameters setting

◆ Enter the edition page

Please set the parameters according to below steps:

1) Press PROG for 4 sec, loose it when “P-00”displayed, which means system comes into setting page and display the first option.

2) Press + or − to choose the options and press PROG to set. Press + or − again to set the right value. Then press PROG to revert back to last layer and press PROG again for more than 4 sec to save the value.

3) Press PROG and + simultaneously for more than 4sec: when “nu.1” is displayed, it means system comes into curve setting page. Press + or − to choose the curve needed to be modified (1-Oil pressure,2-coolant temperature,3-oil temperature).Then press PROG to set, choose the value of resistance(A) and sensor value(d) by pressing + or − ,press PROG again to set. Then press PROG to revert back to last layer and press PROG and + for more than 4 sec to save the value.

4) Resistance input data: from min to max.

Note: after the parameter is modified, it will take effect immediately!

◆ Parameter setting

Code	Parameter	Range***(defaults)***	Notes
P00	Flywheel teeth	0-300***(0)***	If the setting is 0, RPM sensor Disabled, then RPM is resulted by Hz.
P01	Gens poles	0:2 ***1:4*** 2:6 3:8	When the flywheel teeth is set as 0,the RPM will be resulted by frequency. Pole 2: 50Hz---3000RPM. Pole 4: 50Hz---1500RPM. Pole 6: 50Hz---1000RPM. Pole 8: 50Hz---750RPM.
P02	Oil pressure sensor	0: Disabled **1: *VD0 0-10bar*** 2: MEBAY-003B 3: SGH 4: SGD 5: SGX 6: CURTIS 7: DATCON 10Bar 8: VOLVO_EC 9: 3015237 10Bar 10: WEICHAI 0-6Bar 11: ZYDQ 0-8Bar 12: SIQIANG 0-10Bar 13: User defined-Resistance 14: Volt In 1MPa-0-5V 15: Volt In 1MPa-0.5-4.5V 16: User defined-Voltage 17: Normally closed oil pressure alarm switch	Choose the usual oil pressure sensor, if the sensor users choose is not these types, it can be User-defined.
P03	Coolant temperature sensor	0: Disabled ***1: VD0 40℃-120℃*** 2: MEBAY-001B 3: SGH 4: SGD 5: SGX 6: CURTIS 7: DATCON 8: VOLVO_EC 9: 3015238 10: PT100 11:MEBAY-Mier 12: WEICHAI 40-120℃ 13: CC073 25-125℃ 14: SIQIANG 30-120℃ 15: Self-defined	Choose the usual coolant temperature sensor, if the sensor users choose is not these types, it can be User-defined.
P04	Oil temperature sensor	0:Disabled ***1:VD0 40℃-120℃*** 2:MEBAY-001B 3:SGH	Choose the usual oil temperature sensor, if the sensor users choose is not these types, it can be User-defined.

		4:SGD 5:SGX 6:CURTIS 7:DATCON 8:VOLVO_EC 9:3015238 10:PT100 11:MEBAY-Mier 12:WEICHAI 40-120℃ 13:CC073 25-125℃ 14:SIQIANG 30-120℃ 15:Self-defined	
P05	Over speed alarm	0-6000RPM ***(1650RPM)***	if the value is set as 6000, then the over speed alarm is disabled.
P06	Over speed delay	0.0-5S***(0.5S)***	When the engine speed is higher than the preset value, it is regarded as over speed.
P07	Low oil pressure alarm	0-500 KPA***(100KPA)***	if the value is set as 0, then the low oil pressure alarm is disabled.
P08	High coolant temperature alarm	50-150℃***(95℃)***	if the value is set as 150, then the high coolant temperature alarm is disabled.
P09	High oil temperature alarm	50-250℃***(105℃)***	if the value is set as 250, then the over speed alarm is disabled.
P10	Sensor alarm delay	0-15.0S***(5.0S)***	Sensor alarm delay.
P11	Under battery voltage warning	8.0-36.0V***(9.0V)***	if the value is set as 5, then the under battery voltage is disabled.
P12	Page-change delay	1.0-120.0S***(5.0S)***	Interval time for coolant temperature and oil temperature, the max time is manually change.
P13	RPM for start success	200-1000RPM ***(600RPM)***	When the RPM is over than the pre-set value once on power, then it is regarded that engine crank successfully.
P14	Oil Pressure for start success	138-412KPA ***(206KPA)***	When the oil pressure is over than the pre-set value once on power, then it is regarded that engine crank successfully.
P15	Safety delay	3-300S***(10S)***	**Low oil pressure, high coolant temperature, high oil temperature, Under battery voltage are all invalid during this time except for over speed.**
P16	Alarm output time	0~120S***(30S)***	Alarm relay output setting. 0:alarm output disabled; 120:alarm output all the time.
P17	RS485 ID	1-254***(16)***	RS485 ID setting,only for GM50HR MK3.

P18	Alarm function	***0:Disabled*** 1:Available 2:Low Speed Warning Only	**All the alarm indications and outputs are forbidden if it is set as 0.**
P19	Low Speed Warning	200-6000RPM***(1800RPM)***	Below this RPM value is a low RPM warning.
P20	Low Speed Warning Return	200-6000RPM***(2000RPM)***	After the low RPM warning is triggered, the low RPM warning is exited when the RPM is above this RPM value.
P21	Alarm output method	***0: Not reversed*** 1:Reverse	Relay output mode. **0-Not reverse:** the relay does not act after power-on, COM is disconnected from the normally open contact; the relay opens during alarm, COM is connected to the normally open contact; **1-Reverse:** the relay operates after power-on, COM is connected to the normally open contact; the relay closes in alarm, COM is disconnected from the normally open contact;
P22	Host and slave mode	***0: Host mode*** 1: Slave mode	Select the instrument communication mode, the slave can read and display the parameters of the host through the RS485 port.
P23	Accumulated time conditions	***0:Engine running*** 1:Power on	0: Start counting after the engine is running; 1: Start counting after the meter is powered on.

11. Fault finding

Symptoms	Possible Solutions
Meter no response with power	Check DC voltage. Check DC fuse. Check if the terminal 1 and 2 is with battery voltage.
Speed display error	Check whether the speed sensor is normal; Check whether the number of teeth of the instrument flywheel is set normally.
Oil pressure display error	Check whether the oil pressure sensor is normal; Check the wiring of oil pressure sensor; Check whether the common ground wire of the sensor is well connected to the negative pole of the battery; Check whether the oil pressure sensor type parameters selected by the instrument are consistent with the actual use.
Coolant temperature display error	Check whether the coolant temperature sensor is normal; Check the wiring of coolant temperature sensor; Check whether the common ground wire of the sensor is well connected to the negative pole of the battery; Check whether the type parameters of coolant temperature

	sensor selected by the instrument are consistent with the actual use.
Engine shutdown	Check whether the engine temperature is too high; Check whether the engine oil pressure is too low; Check the alternator voltage; Check whether the fuel circuit of the engine is normal.
Low oil pressure alarm	Check oil pressure sensor and its wiring. Check the oil pressure sensor type and meter settings must be consistent. Check whether the low oil pressure sensor is normal.
High coolant temperature alarm	Check coolant temperature sensor and its wiring. Check the coolant temperature sensor type and meter settings must be consistent. Check whether the temperature sensor is normal.
Shutdown Alarm in running	Find the fault according to the LED display information.
The meter does not alarm	The instrument does not alarm Check whether the rotating speed is normal; Check whether the oil pressure is normal; Check that the alarm value is set correctly and whether the corresponding alarm function is enabled.
RS485 cannot communicate normally	Check the connection. Check if the communication ID number setting is correct. Check if the A and B lines of RS485 are reversed. Check if the RS485 communication line driver is installed or not. Check if the communication port of the PC is damaged. Add a 120 Ω resistor between the AB of the meter RS485.