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MAKING CONTROL SMARTER

MEM40 ENGINE MONITORING CONTROLLER USER MANUAL



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Table 1 Version History

Date	Version	Content
2022-10-20	1.0	Original release.

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1 OVERVIEW

MEM40 Engine Monitoring Controller, used for automatic control system of single engine, which can realize engine local/remote start/stop, data measurement, display, alarm protection and etc. With remote monitoring interface, it can connect remote monitoring module and realize engine remote start, stop and other functions.

2 PERFORMANCE AND CHARACTERISTICS

- With 32-bit ARM micro-processor as the core, 4.3-inch LCD display with 240*128 resolution, optional Chinese/English;
- Support J1939 communication interface, dozens of ECU engines monitoring can be realized;
- With one RS485 interface supporting MODBUS RTU communication protocol, can realize remote data communication and “three remote” (remote control, remote measurement, remote communication) functions;
- With local mode and remote mode. Start/stop can be achieved via panel key in local mode and achieved via remote monitoring module in remote mode;
- With remote monitoring interface and can connect remote monitoring module, remote start/stop can be realized in remote mode;
- With override mode, when this mode is active, other alarms without shutdown except for emergency stop and overspeed stop;
- With RPU interface, RPU speed and oil pressure sensor can be connected via it. RPU oil pressure can select resistance/voltage/current type sensor;
- With 4 sensors, 3 of which support resistance/voltage/current type;
- With 2 self-check modes, when this mode is active, it can self-check setting alarm;
- With alarm self-lock function, it will automatically lock after all alarms are triggered. When alarm disappears, only press reset key can remove alarms;
- With alarm log and start/stop event log function, all warning alarm, shutdown alarm and start/stop alarm will be automatically recorded in event log, max recording can reach 200 pieces;
- It can simultaneously display up to 10 SPN alarm contents, and support up to 10 SPN alarm shielding function;
- MEM40-RM module can automatically synchronize MEM40 data and configuration information without setting any parameters, which is simple to use;
- Parameters can be set via panel or connecting PC software through USB(Type-C) interface;
- Digital regulation of all parameters - instead of analog regulation using conventional potentiometer, thus improving reliability and stability;
- Metal shell design, compact structure, small size and simple wiring with easy operation.

3 LOCAL AND REMOTE MONITORING CONFIGURATION

Table 2 Configuration List

Item	MEM40	MEM40-RM	Remark
LCD Size/Resolution	4.3" 240*128	4.3" 240*128	
Inputs	7	098333	
Outputs	6	0	
Resistance/Voltage/Current Type Multiplexed Sensors	3	0	
Resistance Type Sensors	1	0	
ECU CANBUS	•		
Remote Monitoring CANBUS	•	•	
RS485	•		
USB (Type-C)	•	•	
Start Key	•	•	
Stop Key	•	•	
Self-check Key	•		
Reset Key	•	•	
Mute Key	•	•	
Test Key	•	•	
Local/Remote Key	•		
Brightness		•	
Idle/Rated Button	•		Main engine
Override Mode Button	•	•	Main propulsion
Emergency Stop Button	•	•	

4 TECHNICAL PARAMETERS

Table 3 Technical Parameters

Item	Description
Working Voltage	DC8V to DC35V, DC reverse connection protection Resolution: 0.1V Accuracy: 1%
Overall Consumption	<4W (Standby mode: ≤2W)
Speed Sensor	Voltage Range: 1.0V~24.0V (RMS) Frequency Range: 5Hz~10000Hz
Charger (D+) Voltage	Range: DC0V~DC60V Resolution: 0.1V Accuracy: 1%
Analog Sensor	Resistance Input Range: 0Ω~1000Ω Resolution: 0.1Ω Accuracy: 1Ω (below 300Ω)
	Voltage Input Range: 0V~5V Resolution: 0.01V Accuracy: 1%
	Current Input Range: 0mA~20mA Resolution: 0.01mA Accuracy: 1%
Start Output	16A DC24V supply output (relay output)
ECU Power	16A DC24V supply output (relay output)
Digital Output 1	16A DC24V supply output (relay output)
Digital Output 2	5A DC24V supply output (relay output)
Digital Output 3	5A DC24V supply output (relay output)
Digital Output 4	5A DC24V supply output (relay output)
RS485 Interface	Isolated, half-duplex, 9600 baud rate, no parity, 1/2 stop bit
ECU CAN Interface	Isolated, 250kbps baud rate. Communication distance is less than or equal to 100m
REMOTE CAN Interface	Isolated, defaulted baud rate is 250kbps, which can be set. Communication distance is less than or equal to 100m(250kbps)/150m(125kbps)
Vibration	5Hz~8Hz: displacement±7.5 mm 8Hz~500Hz: a=4g IEC 60068-2-6
Shock	50g, 11ms, half-sine, complete shock test from three mutually perpendicular directions, totally 18 times IEC 60068-2-27
Bump	25g, 16ms, half-sine IEC 60255-21-2

Item	Description
Case Dimension	MEM40: 282mm x 160.5mm x 230mm MEM40RM: 284mm x 227mm x 107mm
Inatallation	Screw installation
Working Temperature	(-25~+70)°C
Working Humidity	(20~93)%RH
Storage Temperature	(-30~+80)°C
Protection Level	IP44
Weight	MEM40: 3.6kg MEM40RM: 2.6kg

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5 CONTROLLER INFORMATION DISPLAY

Table 4 Local & Remote Monitoring Information Display

Screen	Display	Description																												
1 st Screen	<table border="1"> <thead> <tr> <th colspan="4">Engine Data</th> </tr> </thead> <tbody> <tr> <td>Speed</td> <td>1500r/min</td> <td>Rpu Speed</td> <td>1500r/min</td> </tr> <tr> <td>Water Temp.</td> <td>82℃</td> <td>Power</td> <td>24.5V</td> </tr> <tr> <td>Oil Press.</td> <td>325kPa</td> <td>D+</td> <td>24.5V</td> </tr> <tr> <td>Oil Temp.</td> <td>80℃</td> <td>Num</td> <td>3</td> </tr> <tr> <td></td> <td></td> <td>Run Time:</td> <td>10.1h</td> </tr> <tr> <td>At Rest</td> <td></td> <td>Local Mode</td> <td></td> </tr> </tbody> </table>	Engine Data				Speed	1500r/min	Rpu Speed	1500r/min	Water Temp.	82℃	Power	24.5V	Oil Press.	325kPa	D+	24.5V	Oil Temp.	80℃	Num	3			Run Time:	10.1h	At Rest		Local Mode		<p>It displays engine speed, water temperature, oil pressure, RPU speed, oil pressure, power voltage, charger voltage, start times and accumulated running time. Status line displays current engine status and current controller mode.</p> <p>Press  or  can scroll the screen.</p>
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3 rd Screen	<table border="1"> <thead> <tr> <th colspan="2">Input Status</th> </tr> </thead> <tbody> <tr> <td>Emergency Shut.</td> <td>Open</td> </tr> <tr> <td>Idle/Rated In</td> <td>Open</td> </tr> <tr> <td>Fuel Leakage In</td> <td>Open</td> </tr> <tr> <td>Over Ride Mode</td> <td>Open</td> </tr> <tr> <td>At Rest</td> <td>Local Mode</td> </tr> </tbody> </table>	Input Status		Emergency Shut.	Open	Idle/Rated In	Open	Fuel Leakage In	Open	Over Ride Mode	Open	At Rest	Local Mode	<p>It displays controller emergency stop status and other inputs status. Input name can automatically update according to the definition. Status line displays current engine status and current controller mode.</p> <p>Press  or  can scroll the screen.</p>																
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4 th Screen	<table border="1"> <thead> <tr> <th colspan="2">Output Status</th> </tr> </thead> <tbody> <tr> <td>Ignition Control</td> <td>Close</td> </tr> <tr> <td>Crank Relay</td> <td>Open</td> </tr> <tr> <td>At Rest</td> <td>Local Mode</td> </tr> </tbody> </table>	Output Status		Ignition Control	Close	Crank Relay	Open	At Rest	Local Mode	<p>It displays controller output status. Output name can automatically update according to the definition. Status line displays current engine status and current controller mode.</p> <p>Press  or  can scroll the screen.</p>																				
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5 th Screen	<table border="1"> <thead> <tr> <th colspan="2">Information</th> </tr> </thead> <tbody> <tr> <td>Soft Ver: 1.2.0.1</td> <td>Fresh Water Press.</td> </tr> <tr> <td>Hardware: 1.2</td> <td>120kPa</td> </tr> <tr> <td>Release: 2022-10-10</td> <td>Starting Air Press.</td> </tr> <tr> <td>System Time</td> <td>150kPa</td> </tr> <tr> <td>2022-10-10(1)21:27:26</td> <td>Bearing Temp.</td> </tr> <tr> <td></td> <td>53℃</td> </tr> <tr> <td>At Rest</td> <td>Local Mode</td> </tr> </tbody> </table>	Information		Soft Ver: 1.2.0.1	Fresh Water Press.	Hardware: 1.2	120kPa	Release: 2022-10-10	Starting Air Press.	System Time	150kPa	2022-10-10(1)21:27:26	Bearing Temp.		53℃	At Rest	Local Mode	<p>The left part of this screen displays controller software version, hardware version, release date, system time. The right part displays data of Aux. sensor 1, 2, 4. When the sensor is disabled, corresponding display will be automatically masked.</p> <p>Press  or  can scroll the screen.</p>												
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6 th Screen	<table border="1"> <thead> <tr> <th>Alarm</th> </tr> </thead> <tbody> <tr> <td>No Alarm</td> </tr> </tbody> </table>	Alarm	No Alarm	<p>It displays controller real-time alarm information.</p> <p>Press  or  can scroll the screen.</p>																										
Alarm																														
No Alarm																														

Screen	Display	Description														
Event Log	<table border="1"> <thead> <tr> <th colspan="2">Log[026]</th> </tr> </thead> <tbody> <tr> <td>[001]Event Log</td> <td>2022-11-07 21:46:23</td> </tr> <tr> <td>Local Start</td> <td></td> </tr> <tr> <td>[002]Warn Alarm</td> <td>2022-11-08 22:32:17</td> </tr> <tr> <td>ECU Warn</td> <td>SPN=110, FMI=0, High</td> </tr> <tr> <td>[003]Shutdown</td> <td>2022-11-09 23:01:15</td> </tr> <tr> <td>Oil Pressure Low</td> <td>85kPa</td> </tr> </tbody> </table>	Log[026]		[001]Event Log	2022-11-07 21:46:23	Local Start		[002]Warn Alarm	2022-11-08 22:32:17	ECU Warn	SPN=110, FMI=0, High	[003]Shutdown	2022-11-09 23:01:15	Oil Pressure Low	85kPa	<p>Long press Enter for more than 1s to enter select interface to choose event log.</p> <p>One screen can display up to 3 log information, display content includes type, name, occur time.</p> <p>Besides, if ECU alarm occurs, it will display SPN alarm code of ECU alarm.</p> <p>Press  or  can scroll the screen.</p>
Log[026]																
[001]Event Log	2022-11-07 21:46:23															
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[002]Warn Alarm	2022-11-08 22:32:17															
ECU Warn	SPN=110, FMI=0, High															
[003]Shutdown	2022-11-09 23:01:15															
Oil Pressure Low	85kPa															

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6 OPERATION

6.1 PANEL DESCRIPTION

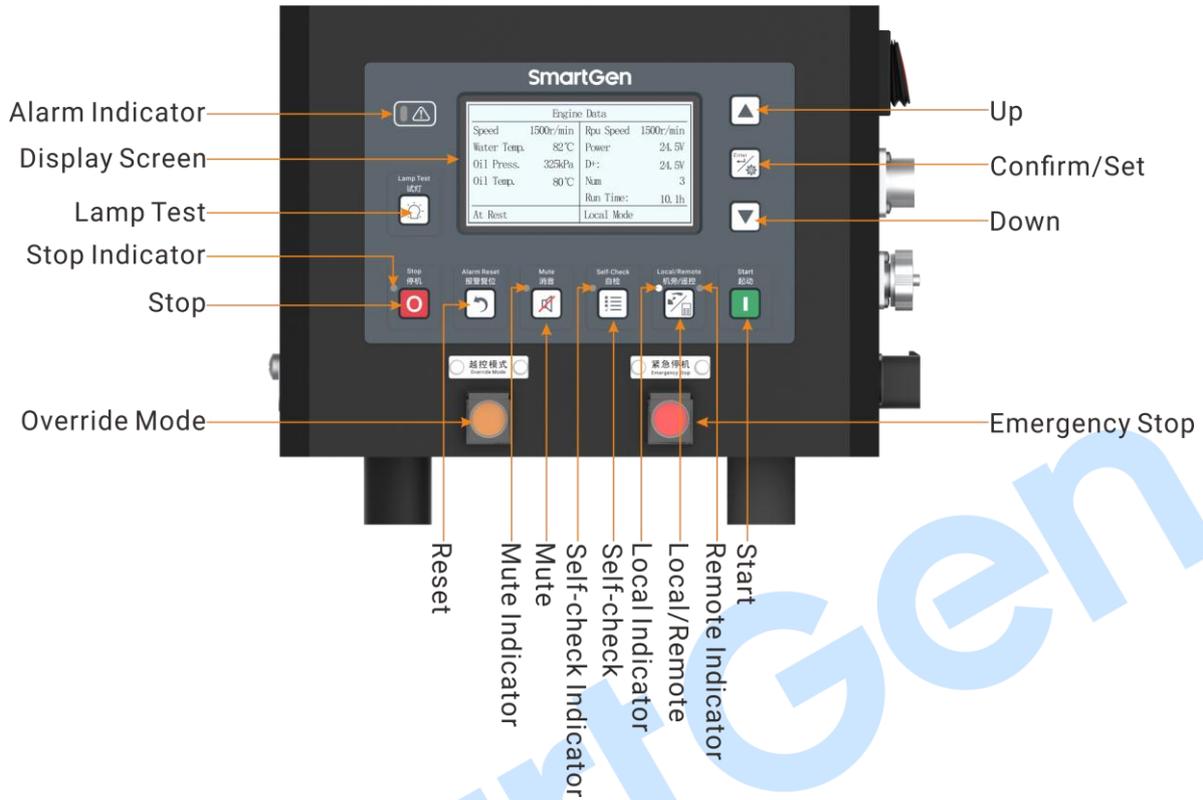


Fig.1 Main Propulsion Monitoring Controller Panel

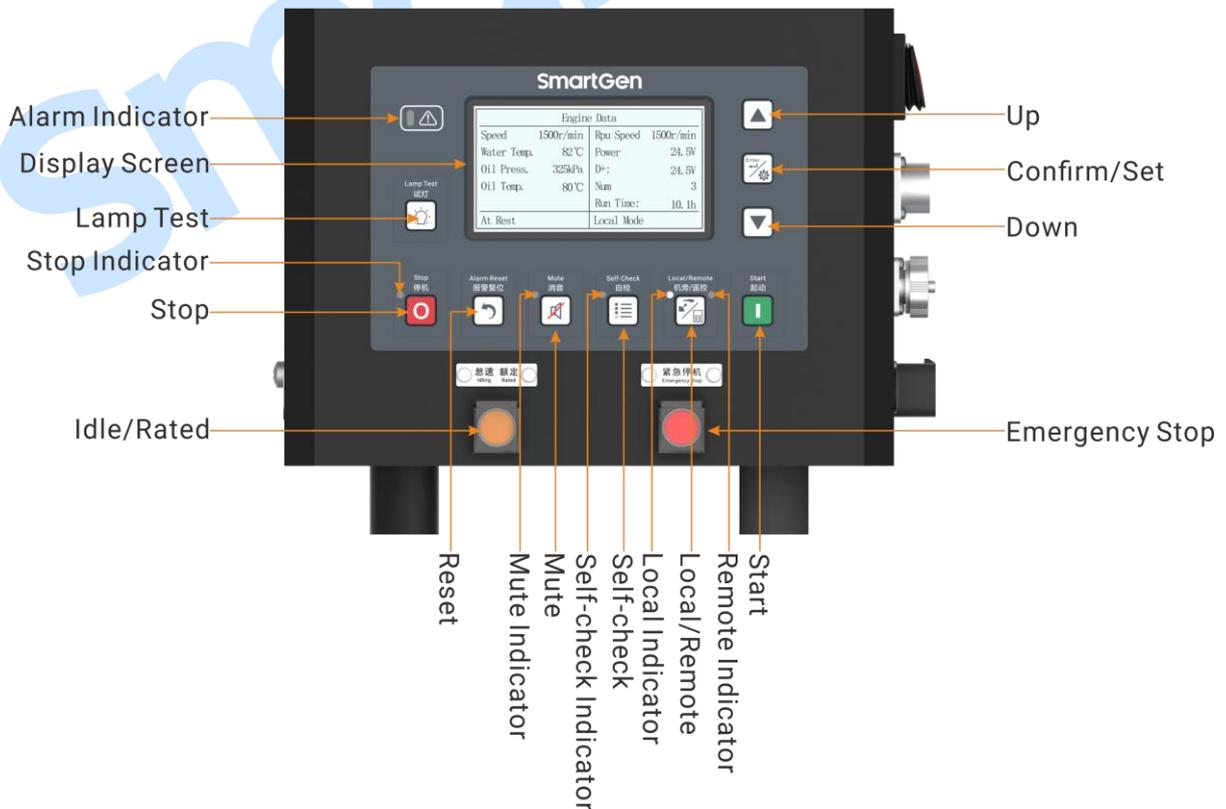


Fig.2 Main Engine Monitoring Controller Panel

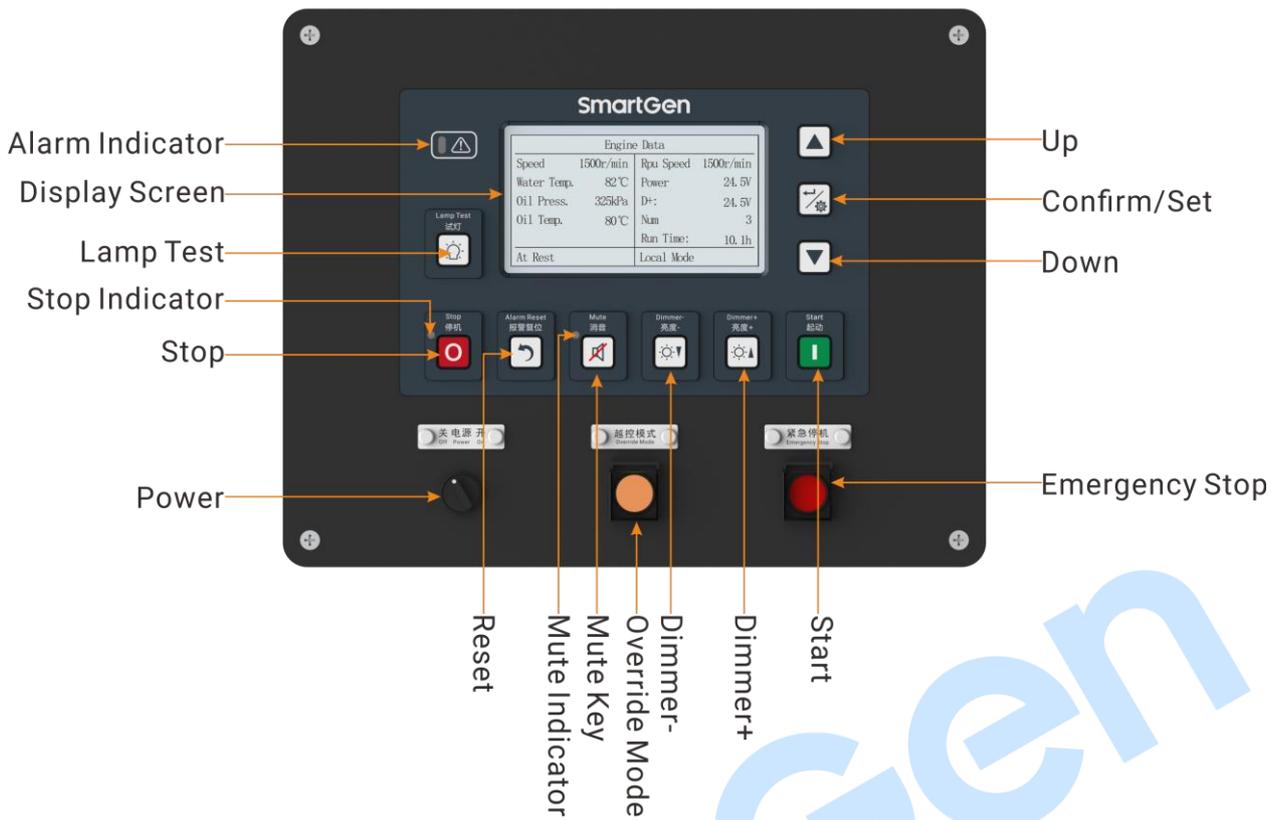


Fig.3 MEM40RM Panel

6.2 KEY FUNCTION DESCRIPTION

Table 5 Key Function Description

Key	Function	Description
	Stop	Stop running engine in local mode.
	Start	Start engine in local mode.
	Mute	It can remove controller audible alarm.
	Self-check	Press it can test alarm without speed in standby mode; Please refer to manual detailed description for self-check mode.
	Reset	Press it to reset alarms when controller has alarm.
	Up/Increase	1. Screen scroll; 2. Up cursor and increase value in setting menu.
	Down/Decrease	1. Screen scroll; 2. Down cursor and decrease value in setting menu.
	Local/Remote	Default as local mode when power on. Press it can enter remote mode, meanwhile corresponding indicator will illuminate; press it again can enter local mode, meanwhile corresponding indicator will illuminate.
	Set/Confirm	1. Press it for more than 1s to enter the parameter setting and controller information selection interface; confirm setting information;

Key	Function	Description
		2. After setting, press it can save parameters.
	Lamp Test	Press it to enter lamp test mode, screen and panel LED will illuminate.
	Dimmer+	Adjust backlight brighter, 6 kinds of lamp brightness levels.
	Dimmer-	Adjust backlight darker, 6 kinds of lamp brightness levels.
	Override Mode	Only overspeed and emergency stop can make the engine stop in override mode.
	Idle/Rated	It can control engine speed in local mode while inactive in remote mode.
	Emergency Stop	When there is emergency situation, press it can disconnect ECU ignition switch, engine will stop immediately.
	Power (MEM40RM)	It can control power on/off of remote monitoring module.

6.3 REMOTE START/STOP OPERATION

6.3.1 ILLUSTRATION

The controller has two remote start/stop methods: input start/stop and start/stop via remote monitoring module. Firstly, set controller in remote mode via , then start/stop through input port or remote monitoring module can be realized. Turn on the power switch  on the side before controller working.

6.3.2 REMOTE START SEQUENCE

- 1) When "Remote Start" is active, "Start Delay" timer is initiated; When it starts via remote monitoring module, it will enter "Preheat" period;
- 2) "Start Delay" countdown will be displayed on LCD;
- 3) When start delay is over, preheat relay energizes (if configured), "Preheat Delay XX s" will be displayed on LCD;
- 4) After the above delay, the Fuel Relay is energized, and then one second later, the Start Relay is engaged. If the engine fails to fire during this cranking attempt then the fuel relay and start relay are disengaged for the pre-set rest period; "Crank Rest Time" begins and wait for the next crank attempt;
- 5) Should this start sequence continue beyond the set number of attempts, the start sequence will be terminated, the first line of LCD display will be highlighted with black and 'Fail to Start fault' will be displayed;
- 6) In case of successful crank attempt, the "Safety On" timer is activated. As soon as this delay is over, "Start Idle" delay is initiated (if configured);
- 7) After the start idle, it will enter "High-speed Warming Up" (if configured);
- 8) When the delay is over, engine will run normally.

6.3.3 REMOTE STOP SEQUENCE

- 1) When "Stop Input" is effective, the Stop Delay is initiated. When it stops via remote monitoring module, it will enter "High-speed Cooling" period directly;
- 2) When stop delay is over, "High-speed Cooling" begins;
- 3) Once this delay has expired, "Stop Idle" is initiated (if configured), idle relay is energized;
- 4) Once this "Stop Idle" has expired, the "ETS Solenoid Hold" begins. ETS relay is energized while ignition relay and fuel relay are de-energized;
- 5) Once this "ETS Solenoid Hold" has expired, "Fail to Stop Delay" begins. Complete stop is detected automatically;
- 6) Engine is placed into its standby mode after its complete stop. Otherwise, fail to stop alarm is initiated (If engine stops successfully after "fail to stop" alarm is initiated, it will enter standby mode).

6.4 LOCAL START/STOP OPERATION

6.4.1 ILLUSTRATION

Switch to local mode through panel key, then start/stop operation is enabled.

6.4.2 LOCAL START SEQUENCE

- 1) Press , preheat relay is energized (if configured), "Preheat XX" will be displayed on LCD;
- 2) After preheat delay is over, Fuel Relay is energized, and then one second later, the Start Relay is engaged. If the engine fails to fire during this cranking attempt then the fuel relay and start relay are disengaged for the pre-set rest period; "ETS Solenoid Hold" begins;
- 3) In case of successful crank attempt, the "Safety On" timer is activated;
- 4) After the delay is over, if controller speed, water temperature and oil pressure are normal, controller will directly enter "Normal Running".

6.4.3 LOCAL STOP SEQUENCE

- 1) Press , "ETS Solenoid Hold" is energized, ETS relay is engaged, ignition relay and fuel relay are disengaged;
- 2) After ETS delay is over, "Fail to Stop Delay" begins. Complete stop is detected automatically.
- 3) Engine is placed into its standby mode after its complete stop. Otherwise, fail to stop alarm is initiated (If engine stops successfully after "fail to stop" alarm is initiated, it will enter standby mode).

Table 6 MEM40 Start/stop Illustration

Mode	Key Start	Key Stop	Remote Start	Remote Stop	MEM40RM Start	MEM40RM Stop
Local	●	●	-	-	-	-
Remote	-	-	●	●	●	●

7 ALARM

7.1 WARNING ALARM

When controller detects warning signal, it only issues warning without shutdown and displays alarm type.

Table 7 Warning Alarm

No.	Warning	Detect Range	Description
1.	Overspeed	Always active	When controller detects engine speed is greater than threshold, it will send warning signal, corresponding information will be displayed on the LCD.
2.	Underspeed	Warming up → Stop cooling	When controller detects engine speed is lower than threshold, it will send warning signal, corresponding information will be displayed on the LCD.
3.	Speed Signal Loss	Start idle delay → Stop idle	When controller detects engine speed is 0 and speed signal loss warning is enabled, it will send warning signal, corresponding information will be displayed on the LCD.
4.	Speed Wire Break	Always active	When controller detects engine speed sensor wire is broken, it will send warning signal, corresponding information will be displayed on the LCD.
5.	Start Failure	After starting in set crank attempt	If engine fails to fire in set crank attempt, controller will send warning signal, corresponding information will be displayed on the LCD. NOTE: In local mode, start attempt only has once and no alarm for start failure.
6.	Stop Failure	After engine complete stop delay	When engine complete stop delay is over, if there is speed signal, controller will send warning signal, corresponding information will be displayed on the LCD.
7.	Charging Failure	From engine normal running	When controller detects charger voltage is lower than threshold, it will send warning signal, corresponding information will be displayed on the LCD.
8.	Aux. Input 1-6	User-defined active range	When controller detects Au.x input 2-6 warning input is active, it will send warning signal, corresponding information will be displayed on the LCD.
9.	High Water Temp	Exceed set speed	When controller detects high water temperature warning is active, it will send warning signal, corresponding information will be displayed on the LCD.
10.	High Oil Temp	Exceed set speed	When controller detects high oil temperature warning is active, it will send warning signal, corresponding information will be displayed on the LCD.
11.	Low Oil Pressure	Exceed set speed	When controller detects low oil pressure warning is active, it will send warning signal, corresponding information will be displayed on the LCD.

No.	Warning	Detect Range	Description
12.	Aux. Sensor 1-4 High	Exceed set speed	When controller detects Aux. sensor 1-4 warning is active, it will send warning signal, corresponding information will be displayed on the LCD.
13.	Aux. Sensor 1-4 Low	Exceed set speed	When controller detects sensor 1-4 warning is active, it will send warning signal, corresponding information will be displayed on the LCD according to user-defined function selection.
14.	Aux. Sensor 1-4 Open	Always active	When controller detects sensor warning is active, it will send warning signal, corresponding information will be displayed on the LCD according to user-defined function selection.
15.	Power Undervoltage	Always active	When controller detects power voltage is lower than threshold and continues for more than 20s, it will send warning signal, corresponding information will be displayed on the LCD.
16.	Power Overvoltage	Always active	When controller detects power voltage is greater than threshold, it will send warning signal, corresponding information will be displayed on the LCD.
17.	MEM40RM Comm. Failure	Always active (detect after module is enabled)	When controller detects communication failure with remote monitoring module, controller will send warning signal, corresponding information will be displayed on the LCD.
18.	Fuel Leakage	Always active	When this input is active, controller will send warning signal, corresponding information will be displayed on the LCD.
19.	ECU Warn	Always active	When there is ECU warning, controller will display "ECU Warning" information, meanwhile SPN and FMI of ECU alarm will be displayed. It can display 10 SPN code of ECU alarm at most.

7.2 SHUTDOWN ALARM

When controller detects shutdown signal, it will shut down and display alarm type.

Table 8 Shutdown Alarm

No.	Shutdown	Detect Range	Description
1.	Emergency Stop	Always active	When controller detects emergency stop is active, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
2.	Overspeed Shut.	Always active	When controller detects engine speed is greater than threshold, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
3.	RPU Overspeed	Always active	When controller detects engine RPU speed is greater than threshold, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
4.	Aux. Input 1-6 Shut	User-defined active range	When controller detects Aux. input 1-6 input is active, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
5.	High Water Temp.	Exceed set speed	When controller detects high water temperature shutdown is active, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
6.	High Oil Temp.	Exceed set speed	When controller detects high oil temperature shutdown is active, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
7.	Low Oil Pressure	Exceed set speed	When controller detects low oil pressure shutdown is active, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
8.	High Water Temp. IN	Always active	When controller detects high water temperature shutdown input is active, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
9.	High Oil Temp. IN	Always active	When controller detects high oil temperature shutdown input is active, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
10.	Low Oil Pressure IN	Start idle ~ Stop idle	When controller detects low oil pressure shutdown input is active, it will send shutdown alarm signal, corresponding information will be displayed on the LCD.
11.	Aux. Sensor 1-4 High	Exceed set speed	When controller detects Aux. sensor 1-4 shutdown input is active, it will send shutdown alarm signal,

No.	Shutdown	Detect Range	Description
			corresponding information will be displayed on the LCD according to user-defined function selection.
12.	Aux. Sensor 1-4 Low	Exceed set speed	When controller detects sensor 1-4 shutdown is active, it will send shutdown alarm signal, corresponding information will be displayed on the LCD according to user-defined function selection.
13.	ECU Shutdown	Always active	When there is ECU shutdown, controller will display "ECU Shutdown" information, meanwhile SPN and FMI of ECU alarm will be displayed. It can display 10 SPN code of ECU alarm at most.

▲NOTE: Shutdown type of auxiliary inputs must be configured by users for active.

▲NOTE: Aux. sensor 1~4 must be configured by users for active.

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8 PARAMETER SETTING

Long press  for 1s to enter parameter setting and event log select screen after the controller is powered on. Correct password is necessary for parameter setting, default password is 00318.

When the password is forgotten or sensor resistance/current calibration is required, please contact the factory.

Table 9 Parameter Setting Item

Item	Range	Defaults	Remark
1 Start Delay	(1-3600)s	1	Time from remote start signal is active to start when controller in remote mode.
2 Stop Delay	(1-3600)s	1	Time from remote stop signal is active to stop when controller in remote mode.
3 Preheat Time	(0-3600)s	0	Power-on time of preheating device before starter is powered on.
4 Crank Time	(3-60)s	8	Time for each starter power-on time.
5 Crank Rest	(3-60)s	10	It is the waiting time before second power on when engine fails to start.
6 Safety On Time	(0-3600)s	10	Running time after cranking disconnect.
7 Start Idle Time	(0-3600)s	0	Genset idle running time when starting.
8 High-speed Warming Up	(0-3600)s	10	Genset high-speed warming up time.
9 High-speed Cooling Time	(0-3600)s	10	High-speed cooling time before stopping.
10 Stop Idle Time	(0-3600)s	0	Genset stop idle running time when stopping.
11 ETS Time	(0-3600)s	20	Stop electromagnet power-on time in stopping.
12 After Stop Time	(0-3600)s	0	When "ETS Hold Time" is 0, it is the time from idle delay end to after stop time; when "ETD Hold Time" is not 0, it is the time from ETS delay end to after stop time.
13 Start Key Confirm Delay	(0.2-5.0)s	0.2	When controller starts via key, it is the time from pressing start key to start.
14 Stop Key Confirm Delay	(0.2-5.0)s	0.2	When controller stops via key, it is the time from pressing stop key to stop.
15 Engine Type	(0-39)	1: Common J1939	Select corresponding type according to engine model.
16 SPN Alarm Version	(1-3)	1	SPN alarm parsing type.
17 ECU Shutdown	(0-1)	0: Disable	After it is enabled, it will shut down

Item	Range	Defaults	Remark
			when engine detects red light alarm.
18 Flyweel Teeth	(1-300)	118	Flywheel teeth installed on the engine, which is used for judging starter disconnect conditions and detecting engine speed, refer to following installation description. (Using for corresponding RPU speed computing.)
19 Rated Speed	(1-5999)r/min	1500	Provide standard for over/under speed judging.
20 Crank Attempt	(1-30)	3	Max. crank time. When it reaches set attempt, controller will send crank failure signal.
21 Crank Disconnect Condition	(0-2) 0: Speed 1: OP 2: Speed + OP	0: Speed	There are 3 conditions for starter and engine disconnect, which can be used separately or together, aiming to disconnect starter motor and engine as soon as possible.
22 Crank Disconnect OP	(10-1000)kPa	80	When oil pressure is greater than set value, starter will disconnect.
23 Crank Disconnect Speed	(0-200)%	25%	Set value is the percentage of rated speed, when speed exceeds it, starter will disconnect.
24 Overspeed Shutdown	(0-1) 0 Disable 1 Enable	1 Enable	Overspeed shutdown setting.
25 Threshold (Shutdown)	(0-200)%	115%	
26 Shutdown Delay	(0-3600)s	1	
27 Overspeed Warning	(0-1) 0 Disable 1 Enable	1 Enable	Oversped warning setting.
28 Threshold (Warning)	(0-200)%	110%	
29 Warning Delay	(0-3600)s	3	
30 RPU Overspeed Shut	(0-1) 0 Disable 1 Enable	1 Enable	RPU sopeed shutdown.
31 RPU Threshold (Shut)	(0-200)%	115%	
32 RPU Shutdown Delay	(0-3600)s	1	
33 Speed Signal Loss	(0-3600)s	3	Time from detecting speed is 0 to confirm action.
34 Loss Action	(0-2) 0: Warning 1: Shutdown 2: No Action	0: Warning	Controller
35 Charging Failure Warning	(0-60.0)V	16.0	After engine is normally running, if charger voltage is lower than it,

Item	Range	Defaults	Remark
			controller will send charging failure warning.
36 Power Rated Voltage	(0-60.0)V	24.0	Provide standard for battery over/under voltage.
37 Power Overvoltage	(0-200)%	125%	Set value is the percentage of
38 Power Undervoltage	(0-200)%	75%	
39 Heating Upper Limit	(0-100)°C	42	Disconnect when water temperature sensor value is greater than set value.
40 Heating Lower Limit	(0-100)°C	37	Close when water temperature sensor value is lower than set value.
41 Speed Wire Break	(0-1) 0 Disable 1 Enable	0 Disable	After it is enabled, it can detect wire break of engine speed sensor.
42 Equipment Address	(1-254)	1	RS485 communication address.
43 Language	(0-1) 0: Simplified Chinese 1: English	0: Simplified Chinese	Controller displays language selection.
44 Password	(0-65535)	00318	Password for entering parameter setting.
45 MEM40RM Enable	(0-1)	0 Disable	If MEM40RM is required, it should be enabled.
46 Baud Rate	(0-1) 0: 250kbps 1: 125kbps	0: 250kbps	Communication baud rate of remote monitoring module CANBUS port.
47 Self-check Mode	(0-1) 0: Self-check Mode 1 1: Self-check Mode 2	0: Self-check Mode 1	When self-check mode is 1, it can connect corresponding sensor to detect alarm without speed after self-check is active. When self-check mode is 2, system will automatically change sensor data to test alarm after self-check is active.
48 Date and Time			Controller time setting.
49 Water Temp. Sensor (ECU Data Input)	Details see 9.3.		Water temperature sensor setting.
50 Oil Temp. Sensor (ECU Data Input)	Details see 9.3.		Oil temperature sensor setting.
51 OP Sensor (ECU Data Input)	Details see 9.3.		Oil pressure sensor setting.
52 Aux. Sensor 1 Set (Resistance/Voltage/Current Input)	Details see 9.3. NOTE: Resistance/voltage input is inactive.)		Aux. sensor 1 setting.
53 Aux. Sensor 2 Set (Resistance/Voltage/Current Input)	Details see 9.3. NOTE: Resistance/voltage input is inactive.)		Aux. sensor 2 setting.

Item	Range	Defaults	Remark
54 Aux. Sensor 3 Set (Resistance/Voltage/Current Input)	Details see 9.3. NOTE: Resistance/voltage input is inactive.)		Aux. sensor 3 setting. Default as RPU oil pressure sensor.
55 Aux. Sensor 4 Set (Resistance Input)	Details see 9.3.		Aux. sensor 4 setting.
56 Input 1 Configuration	(0-50)	4: Idle/High Speed Input	See 9.1.2.
57 Input 1 Active Type	(0-1)	0: Closed for Active	Set input port as closed or opened.
58 Input 2 Configuration	(0-50)	11: Fuel Leakage	See 9.1.2.
59 Input 2 Active Type	(0-1)	0: Closed for Active	Set input port as closed or opened.
60 Input 3 Configuration	(0-50)	8: Not Used	See 9.1.2.
61 Input 3 Active Type	(0-1)	0: Closed for Active	Set input port as closed or opened.
62 Input 4 Configuration	(0-50)	0: Not Used	See 9.1.2.
63 Input 4 Active Type	(0-1)	0: Closed for Active	Set input port as closed or opened.
64 Input 5 Configuration	(0-50)	0: Not Used	See 9.1.2.
65 Input 5 Active Type	(0-1)	0: Closed for Active	Set input port as closed or opened.
66 Input 6 Configuration	(0-50)	0: Not Used	See 9.1.2.
67 Input 6 Active Type	(0-1)	0: Closed for Active	Set input port as closed or opened.
68 Output 1 Configuration	(0-100)	1: Start Output	See 9.2.2.
69 Output 1 Active Type	(0-1)	0: Normally Open	Set output port as normally closed or opened.
70 Output 2 Configuration	(0-100)	7: Ignition Control	See 9.2.2.
71 Output 2 Active Type	(0-1)	0: Normally Open	Set output port as normally closed or opened.
72 Output 3 Configuration	(0-100)	0: Not Used	See 9.2.2.
73 Output 3 Active Type	(0-1)	0: Normally Open	Set output port as normally closed or opened.
74 Output 4 Configuration	(0-100)	0: Not Used	See 9.2.2.
75 Output 4 Active Type	(0-1)	0: Normally Open	Set output port as normally closed or opened.
76 Output 5 Configuration	(0-100)	0: Not Used	See 9.2.2.
77 Output 5 Active Type	(0-1)	0: Normally Open	Set output port as normally closed or opened.
78 Output 6 Configuration	(0-100)	0: Not Used	See 9.2.2.
79 Output 6 Active Type	(0-1)	0: Normally Open	Set output port as normally closed or opened.

9 INPUT PORT & OUTPUT PORT DEFINITION

9.1 AUXILIARY INPUT PORT 1-6 FUNCTION DEFINITION

9.1.1 DEFINED CONTENTS OF DIGITAL INPUT PORT

Table 10 Defined Contents of Digital Input Port

No.	Item	Contents	Description
1	Input Port Function Setting	(0- 50)	See 9.1.2 Input Port Function Definition.
2	Input Port Active Type	(0-1)	0: Closed 1: Opened
3	Input Port Active Range	(0-3)	0: From Safety On 1: From Cranking 2: Always 3: Inactive
4	Input Port Active Action	(0-2)	0: Warning 1: Shutdown 2: Indication
5	Input Delay	(0-20.0)s	
6	Display Character String	Custom input port name	20 English characters or 10 Chinese.characters

9.1.2 INPUT PORT FUNCTION DEFINITION

Table 11 Input Port Function Definition

No.	Item	Description
0.	Not Used	Not used.
1.	User-defined	Input port content can be defined.
2.	Alarm Mute	“Audible Alarm” in output configuration can be prohibited when it is active.
3.	Alarm Reset	Reset all alarms when it is active.
4.	Remote Emergency Stop	When it is active, controller will send stop command and display “Remote Emergency Stop” on the LCD.
5.	Reserved	
6.	Reserved	
7.	Reserved	
8.	Reserved	
9.	Idle/High Speed	Engine will not automatically enter high speed mode after cranking under local mode. Only when controller sends high speed command after idle/high speed signal is active can engine enters high speed running.
10.	Barring Gear Interlock	Engine is prohibited to start after it is active.
11.	Fuel Leakage	Fuel leakage alarm occurs when it is active.
12.	Reserved	
13.	Reserved	
14.	Reserved	

No.	Item	Description
15.	High Water Temp. Shut	Connects sensor digital input. When it is active, controller will send stop command and display corresponding information on the LCD.
16.	Reserved	
17.	Low Oil Pressure Shut.	Connects sensor digital input. When it is active, controller will send stop command and display corresponding information on the LCD.
18.	Local Mode	System enters local mode when it is active.
19.	Remote Mode	System enters remote mode when it is active.
20.	Remote Start	When it is active in remote mode, controller will send start command.
21.	Remote Stop	When it is active in remote mode, controller will send stop command.
22.	Remote Start/Stop	In remote mode, when it is active, controller will start while stop when it is inactive. It can't be used simultaneously with remote start and remote stop.
23.	Override Mode	When it is active, shutdown alarms are disabled except for overspeed shutdown and emergency stop.
24.~ 50.	Reserved	

NOTE: The defined name of input port 1-6 only can be configured via computer software.

9.2 OUTPUT PORT DEFINITION

9.2.1 DEFINED CONTENTS OF DIGITAL OUTPUT PORT

Table 12 Defined Contents of Digital Output Port

No.	Item	Content	Remark
1	Function Configuration	(0-100)	
2	Active Method	0 Normally Open 1 Normally Close	
3	Active Period	Bit1: At Rest Bit2: Preheat Bit3: Fuel Output Bit4: Cranking Bit5: Crank Rest Bit6: Safety On Bit7: Start Idle Bit8: Warming Up Bit9: Wait for Load Bit10: Normal Running Bit11: Cooling Down Bit12: Stop Idle Bit13: ETS Hold Bit14: Wait Stop Bit15: Stop Failure	
5	Delay Output Time	(0-100.0)S	
6	Continuous Output Time	(0-3600)S	

9.2.2 FUNCTION DEFINITION OF OUTPUT PORT 1-6

Table 13 Function Definition of Output Port 1-6

No.	Item	Description
0.	Not Used	It is not used.
1.	User-defined	See table 12.
2.	Air Flap Control	It can close the air flap in overspeed alarm shutdown and emergency stop.
3.	Audible Alarm	Action in warning and shutdown. It can externally connect the annunciator. When "Alarm Mute" is active, it can't output.
4.	Crank Relay	It is active in generator cranks and inactive after crank disconnect.
5.	Fuel Relay	It is active in generator starts and inactive in waiting for stop.
6.	ETS Output	Action in ETS delay.
7.	ECU Power	ECU power output end. When the monitoring controller is powered on, it will output and deactivate in power off.
8.	Ignition Control	ECU ignition control. It will output in power on and deactivate in stop.
9.	Loss of Speed Signal	Action when speed is 0 after safety on.
10.	Reserved	
11.	Override Mode	Output when it is in override mode.
12.	Standby Engine (1)	Output when controller in standby status and no sensor open alarm. It is only active in remote mode.
13.	Heating Control	It is controlled by heating upper and lower limit of temperature sensor.
14.	Idle Control	Action in crank-start idle and stop idle-wait for stop. It is inactive in local mode.
15.	Common Alarm	Action in common warning, common shutdown alarm occurs.
16.	Common Shutdown Alarm	Action in common shutdown alarm occurs.
17.	Common Warning Alarm	Action in common warning alarm occurs.
18.	Input 1 Active	Action in digital input 1 is active.
19.	Input 2 Active	Action in digital input 2 is active.
20.	Input 3 Active	Action in digital input 3 is active.
21.	Input 4 Active	Action in digital input 4 is active.
22.	Input 5 Active	Action in digital input 5 is active.
23.	Input 6 Active	Action in digital input 6 is active.
24.	Crank Success	It is active when engine speed is greater than 500rpm and inactive when it is lower than 100rpm.
25.	Normal Running	It is active when engine speed is greater than 85% of rated speed and inactive when it is lower than 75%.
26.	Remote Mode	Output when controller in remote mode
27.	Local Mode	Output when controller in local mode
28.	Standby Engine (2)	Output when there is no shutdown alarm, it is only active in remote mode.

No.	Item	Description
29.	Reserved	
30.	Stop Status	Output when controller in standby status.
31.	Power Undervoltage	Output when controller detects power voltage is lower than set value.
32.	Power Overvoltage	Output when controller detects power voltage is greater than set value.
33.	Reserved	
34.	Reserved	
35.	Overspeed Warning	Action in engine overspeed warning occurs.
36.	Oversped Shutdown	Action in engine overspeed shutdown alarm occurs.
37.	Emergency Stop Alarm	Action in emergency stop alarm occurs.
38.	Charging Failure	Action in charging failure alarm occurs.
39.	Start Failure Alarm	Action in start failure alarm occurs.
40.	Stop Failure Alarm	Action in stop failure alarm occurs.
41.	Reserved	
42.	Reserved	
43.	High Water Temp. Warn	Action in high water temperature warning occurs.
44.	High Water Temp. Shut.	Action in high water temperature shutdown occurs.
45.	Reserved	
46.	High Oil Temp. Warn	Action in high oil temperature warning occurs.
47.	High Oil Temp. Shut.	Action in high oil temperature shutdown occurs.
48.	Reserved	
49.	Low OP Warn	Action in low oil pressure warning occurs.
50.	Low OP Shut.	Action in low oil pressure shutdown occurs.
51.	Aux. Sensor 1 Open	Action in Aux. sensor 1 open alarm occurs.
52.	Aux. Sensor 1 Warn	Action in Aux. sensor 1 warning alarm occurs.
53.	Aux. Sensor 1 Shut	Action in Aux. sensor 1 shutdown alarm occurs.
54.	Aux. Sensor 2 Open	Action in Aux. sensor 2 open alarm occurs.
55.	Aux. Sensor 2 Warn	Action in Aux. sensor 2 warning alarm occurs.
56.	Aux. Sensor 2 Shut	Action in Aux. sensor 2 shutdown alarm occurs.
57.	Aux. Sensor 3 Open	Action in Aux. sensor 3 open alarm occurs.
58.	Aux. Sensor 3 Warn	Action in Aux. sensor 3 warning alarm occurs.
59.	Aux. Sensor 3 Shut	Action in Aux. sensor 3 shutdown alarm occurs.
60.	Reserved	
61.	Oil Pre-supply Output	Output in crank-safety on.
62.	Fuel Pre-supply Output	Output in preheat-safety on.
63.	Aux. Sensor 4 Open	Action in Aux. sensor 4 open alarm occurs.
64.	Aux. Sensor 4 Warn	Action in Aux. sensor 4 warning alarm occurs.
65.	Aux. Sensor 4 Shut	Action in Aux. sensor 4 shutdown alarm occurs.
66.	Fuel Leak Alarm	Output in fuel leak alarm occurs.
67.	Reserved	
68.	Reserved	
69.	Lamp Test	Output in lamp testing.
70.	Overspeed Shutdown	Output in RPU overspeed shutdown occurs.

No.	Item	Description
	(RPU)	
71.	Remote Emergency Stop	Output in remote emergency stop occurs.
72.	Reserved	
73.	Reserved	
74.	Reserved	
75.	Alarm Blink	Output when monitoring controller detects alarm. When there is alarm again, this output port will deactivate for 2s and continue to output continuously.
76~100	Reserved	Reserved.

9.3 SENSOR FUNCTION DEFINITION

9.3.1 SENSOR CUSTOM LIST

Table 14 Sensor Custom List

No.	Item	Content	Remark
1.	Sensor Type	(0-3) 0: Not Used 1: Pressure Sensor 2: Temp. Sensor 3: Level Sensor	Water temperature, oil temperature, oil pressure sensor types are not selected, data is read by ECU.
2.	Sensor Curve	Sensor type list	See 9.3.2/9.3.3/9.3.4 curve list (water temperature, oil temperature, oil pressure data is read by ECU, so curve is not selected.)
3.	Alarm Speed	(0-200)%	Detect when speed is greater than it.
4.	Range	(0-6000)	It is active in (4~20)mA sensor. Pressure sensor unit is kPa Level sensor unit is % (water temperature, oil temperature, oil pressure data is read by ECU, so there is no this item)
5.	Display Unit	Temperature 0: °C 1: °F Pressure 0: kPa 1: bar 2: psi Level unit is fixed as “%”	Displayed unit on the controller interface, displayed data will be automatically converted after selecting unit.
6.	Sensor High Shutdown	(0-1) 0: Enable 1: Disable	
7.	Set Value	(0-6000)	
8.	Delay	(0-3600)s	

No.	Item	Content	Remark
9.	Sensor Low Shutdown	(0-1) 0: Enable 1: Disable	
10.	Set Value	(0-4000)	
11.	Delay	(0-3600)s	
12.	Sensor High Warning	(0-1) 0: Enable 1: Disable	
13.	Set Value	(0-6000)	
14.	Delay	(0-3600)s	
15.	Sensor Low Shutdown	(0-1) 0: Enable 1: Disable	
16.	Set Value	(0-4000)	
17.	Delay	(0-3600)s	
18.	1 st point X (Resistance)	Resistance type (non-PT100)	Customer can define sensor curve, X-axis is 8 points, Y-axis is 8 points. (water temperature, oil temperature, oil pressure data is read by ECU, so there is no this item)
19.	2 nd Point X (Resistance)	Resistance type (non-PT100)	
20.	3 rd Point X (Resistance)	Resistance type (non-PT100)	
21.	4 th Point X (Resistance)	Resistance type (non-PT100)	
22.	5 th Point X (Resistance)	Resistance type (non-PT100)	
23.	6 th Point X (Resistance)	Resistance type (non-PT100)	
24.	7 th Point X (Resistance)	Resistance type (non-PT100)	
25.	8 th Point X (Resistance)	Resistance type (non-PT100)	
26.	1 st point Y (Value)	Resistance type (non-PT100)	
27.	2 nd Point Y (Value)	Resistance type (non-PT100)	
28.	3 rd Point Y (Value)	Resistance type (non-PT100)	
29.	4 th Point Y (Value)	Resistance type (non-PT100)	
30.	5 th Point Y (Value)	Resistance type (non-PT100)	
31.	6 th Point Y (Value)	Resistance type (non-PT100)	
32.	7 th Point Y (Value)	Resistance type (non-PT100)	

No.	Item	Content	Remark
		(non-PT100)	
33.	8 th Point Y (Value)	Resistance type (non-PT100)	
34.	Custom Character String	User can define sensor name	It only can be set through upper computer software.

9.3.2 TEMPERATURE CURVE LIST

Table 15 Temperature Curve List

No.	Item	Remark
0	Not Used	Resistance range of custom resistance type input is (0-1000) Ω .
1	PT100	
2	Custom Resistance Curve	
3	VDO	
4	CURTIS	
5	VOLVO-EC	
6	DATCON	
7	SGX	
8	SGD	
9	SGH	
10	Reserved	
11	Cu50	
12	Reserved	
13	Reserved	
14	Reserved	
15	Reserved	

NOTE: The division value of PT100 resistance type temperature sensor is fixed as 0.385 (0.385 Ω corresponds to 1 $^{\circ}$ C).

9.3.3 PRESSURE CURVE LIST

Table 16 Pressure Curve List

No.	Item	Remark
0	Not Used	Resistance range of custom resistance type input is (0-1000) Ω .
1	(4~20)mA	
2	Custom Resistance Curve	
3	VDO 10bar	
4	CURTIS	
5	Voltage Type (0.5V-4.5V)	
6	DATCON 10bar	
7	SGX	
8	SGD	
9	SGH	
10	Voltage Custom Curve	
11	Reserved	
12	Reserved	
13	Reserved	
14	Reserved	
15	Reserved	

NOTE: If pressure signal is current type, no need for setting curve but for range.

9.3.4 LEVEL CURVE LIST

Table 17 Level Curve List

No.	Item	Remark
0	Not Used	Resistance range of custom resistance type input is (0-1000) Ω .
1	(4~20)mA	
2	Custom Resistance Curve	
3	SGD	
4	SGH	
5	Reserved	
6	Reserved	
7	Reserved	
8	Reserved	
9	Reserved	
10	Reserved	
11	Reserved	
12	Reserved	
13	Reserved	
14	Reserved	
15	Reserved	

NOTE: If pressure signal is current type, no need for setting curve but for range.

10 PARAMETER SETTING

10.1 CONFIGURATION CAUTION

Long press  for 1s can enter parameter setting and controller information selection interface after controller is powered on. Correct password is required for parameter setting, which is defaulted as 00318.

If the password is forgotten or sensor resistance/voltage/current calibration is necessary, please contact the factory.

- Please modify controller internal parameters (crank disconnect conditions selection, Aux. input, output configuration, various delay, etc.) in standby status, otherwise shutdown alarm or other abnormal situations may occur.
- Sensor high alarm threshold must be greater than low alarm threshold, otherwise alarm may occur simultaneously.
- Overspeed threshold must be greater than underspeed threshold, otherwise overspeed and underspeed may occur simultaneously.
- When setting crank disconnect conditions, engine crank disconnect speed threshold should be set as lower value as soon as possible, so as to disconnect starter quickly.
- Aux. input port can't be set as same item, otherwise function may have fault; Aux. output port can be set as same item.

10.2 SENSOR SETTING

- When reselect sensor, the standard value of the selected sensor curve is called. If defaulted temperature sensor is PT100, then sensor curve is PT100 curve; if selected as SGD (120°C resistance type), temperature sensor curve is SGD curve.
- If there is difference between standard sensor curve and used sensor, “custom sensor” can be selected, then enter custom sensor curve.
- When enter sensor curve, X value (resistance type) must be entered in descending order, otherwise an error will occur.
- The ordinates of the first or last points can be set same, as shown in the figure below:

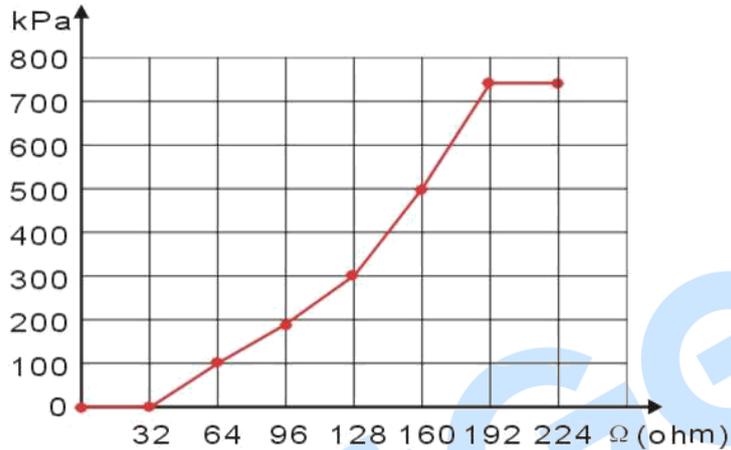


Fig.4 Sensor Setting Curve

Table 18 Common Pressure Unit Conversion

	N/m ² (Pa)	kgf/cm ²	bar	psi
1Pa	1	1.02x10 ⁻⁵	1x10 ⁻⁵	1.45x10 ⁻⁴
1kgf/cm ²	9.8x10 ⁴	1	0.98	14.2
1bar	1x10 ⁵	1.02	1	14.5
1psi	6.89x10 ³	7.03x10 ⁻²	6.89x10 ⁻²	1

11 MEM40 SYSTEM APPLICATION AND INTERFACE DESCRIPTION

11.1 MEM40 SYSTEM APPLICATION DIAGRAM

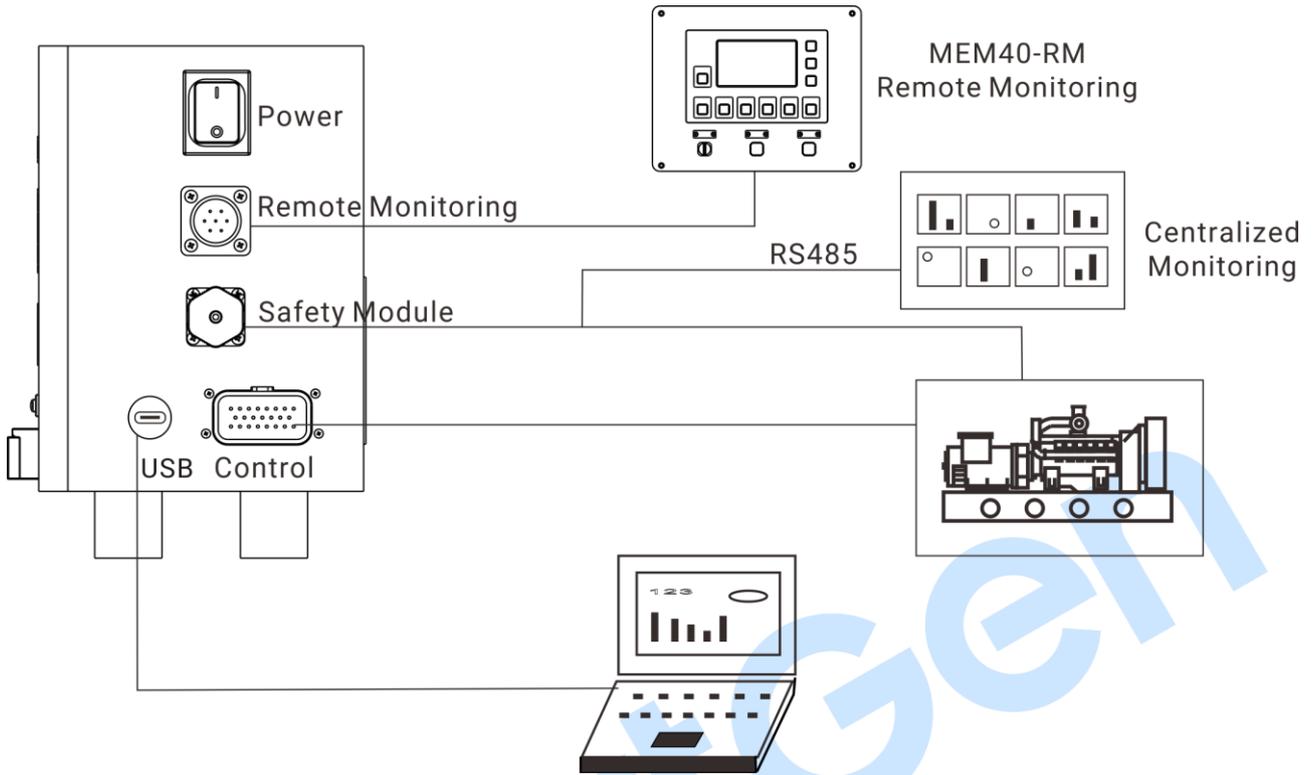


Fig.5 MEM40 System Application Diagram

11.2 MEM40 INTERFACE

11.2.1 MEM40 SIDE PANEL DIAGRAM

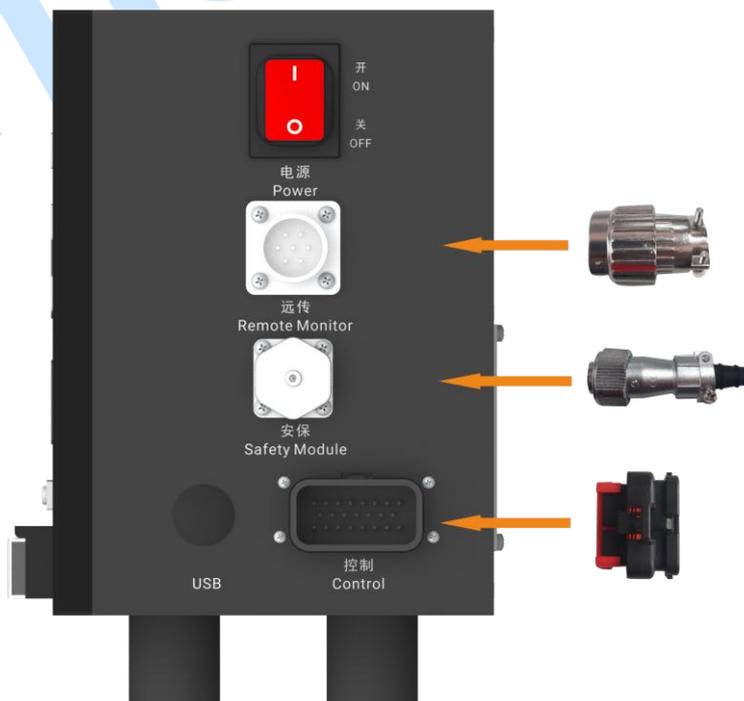


Fig.6 MEM40 Side Panel Diagram

11.2.2 INTERFACE PARAMETER

Table 19 Interface Parameter

Parameter	RM Interface	RPU Interface	Control Interface
Number	7	7	23
Rated Current (A)	10	5	8
Diameter (mm)	1.5	1	1.3
Working Voltage (AC.V)	500	400	250
Withstand Voltage (AC.V)	1500	1200	1000
Contact Resistance (MΩ)	5	5	Max 20
Insulation Resistance (MΩ)	>=1000	2000	>=100
Wire Gauge (mm ²)	1.0	0.75	1.0

11.2.3 INTERFACE DIMENSION DIAGRAM

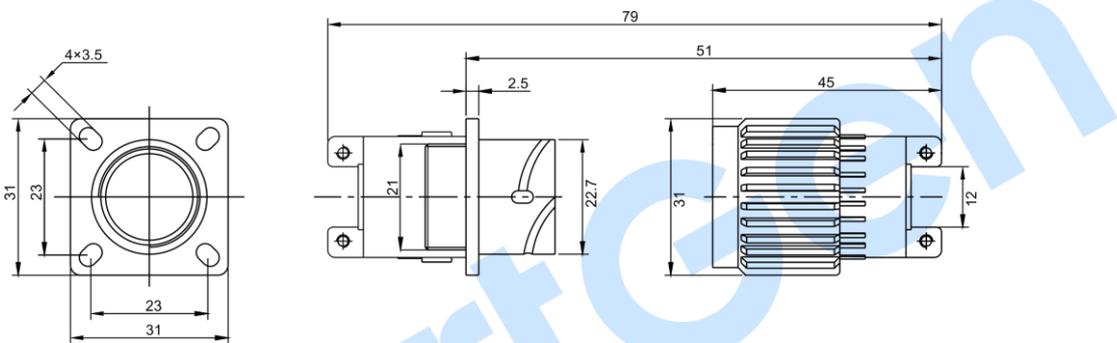


Fig.7 Remote Monitoring Interface Dimension Diagram

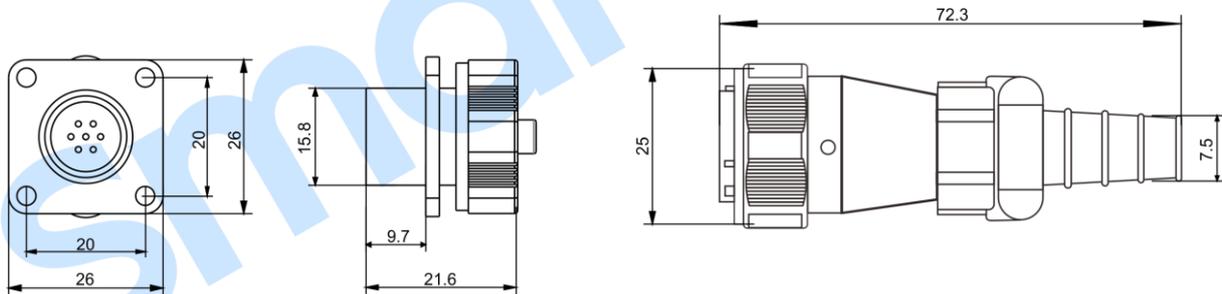


Fig.8 RPU Interface Dimension Diagram

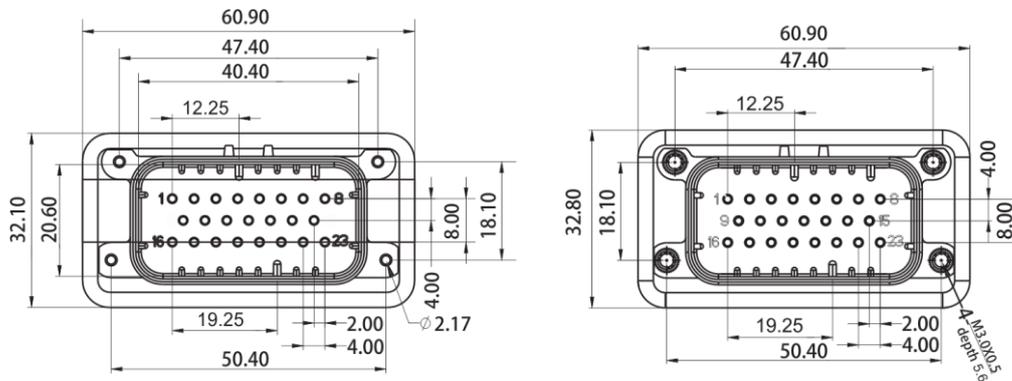
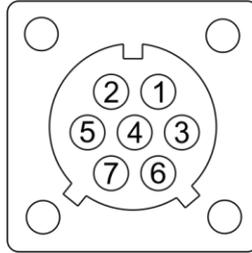


Fig.9 Control Interface Dimension Diagram

11.5 REMOTE MONITORING INTERFACE DESCRIPTION

RPU interface is shown as the following:

Remote Monitoring Interface



Pin	1	2	3	4	5	6	7
Definition	POWER+	POWER-	NC	Emergency Stop	CANL	CANH	NC

Fig.12 Remote Monitoring Interface

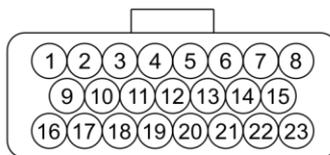
Table 21 Remote Monitoring Interface Definition

Pin	Definition	Size	Description
1	Power+	1.0mm ²	Remote monitoring power B+.
2	Power-	1.0mm ²	Remote monitoring power B-.
3	NC		Backup.
4	Emergency Stop	0.5mm ²	Remote emergency stop input.
5	CANL	0.5mm ²	It is used for connecting remote monitoring module, 120Ω has been internally installed between CANH and CANL.
6	CANH	0.5mm ²	
7	NC		Backup

11.6 CONTROL INTERFACE DESCRIPTION

Control interface is shown as the following:

Control Interface



1 Backup	2 Power+	3 Start+	4 Ignition Control+	5 Fuel Leak A	6 ECU Power+	7 ECU Power+	8 CANH
	9 Backup	10 Power+	11 Start+	12 Backup	13 Backup	14 Backup	15 Backup
16 Power-	17 Power-	18 Charger D+	19 Backup	20 Fuel Leak B	21 Backup	22 Backup	23 CANL

Fig.13 Control Interface

NOTE: This control interface is used for connecting Yuchai engine. If it can't meet demand, please contact manufacturer to re-customize the interface.

Table 22 Control Interface Terminal Definition

Pin	Definition	Size	Description
1	Backup		Backup interface, no wiring.
2	Power +	1.5mm ²	DC power positive input.
3	Start Output	1.5mm ²	Output when engine starts, 16A DC24V supply output
4	Ignition Control	1.5mm ²	Connect ignition switch of engine ECU, 16A DC24V supply output.
5	Fuel Leak A	0.5mm ²	Alarm input of fuel leak switch.
6	ECU Power+	1.5mm ²	ECU power supply, 16A DC24V supply output.
7	ECU Power+	1.5mm ²	
8	CANH	0.5mm ²	Monitoring controller connects engine CANBUS interface via it.
9	Backup		Backup interface, no wiring.
10	Power+	1.5mm ²	DC power positive input.
11	Start Output	1.5mm ²	Output when engine starts, 16A DC24V supply output.
12	Backup		Backup interface, no wiring.
13	Backup		Backup interface, no wiring.
14	Backup		Backup interface, no wiring.
15	Backup		Backup interface, no wiring.
16	Power-	1.5mm ²	DC power negative input.
17	Power-	1.5mm ²	DC power negative input.
18	Charger D+	0.5mm ²	Charger D+ interface, which can excite for charging generator and conduct charging failure voltage detection in starting.
19	Backup		Backup interface, no wiring.
20	Fuel Leak B	0.5mm ²	Negative input of fuel leak.
21	Backup		Backup interface, no wiring.
22	Backup		Backup interface, no wiring.
23	CANL	0.5mm ²	Monitoring controller connects engine CANBUS interface via it.

NOTE: Power input, start output, ECU power output all need two wires to ensure max. 16A current outputting.

NOTE: 120Ω has been connected inside CANBUS interface that connecting ECU of monitoring controller internally.

11.7 MEM40 POWER SWITCH



is controller power switch, turn the switch to “On” position when it is working, while “Off” position when it is not working.

11.8 USB COMMUNICATION INTERFACE

This interface is designed for USB communication, which is Type-C with dust plug. When using, please pull it, connect USB data line, then connect PC can configure parameter and monitor data.

11.9 MEM40RM REAR PANEL

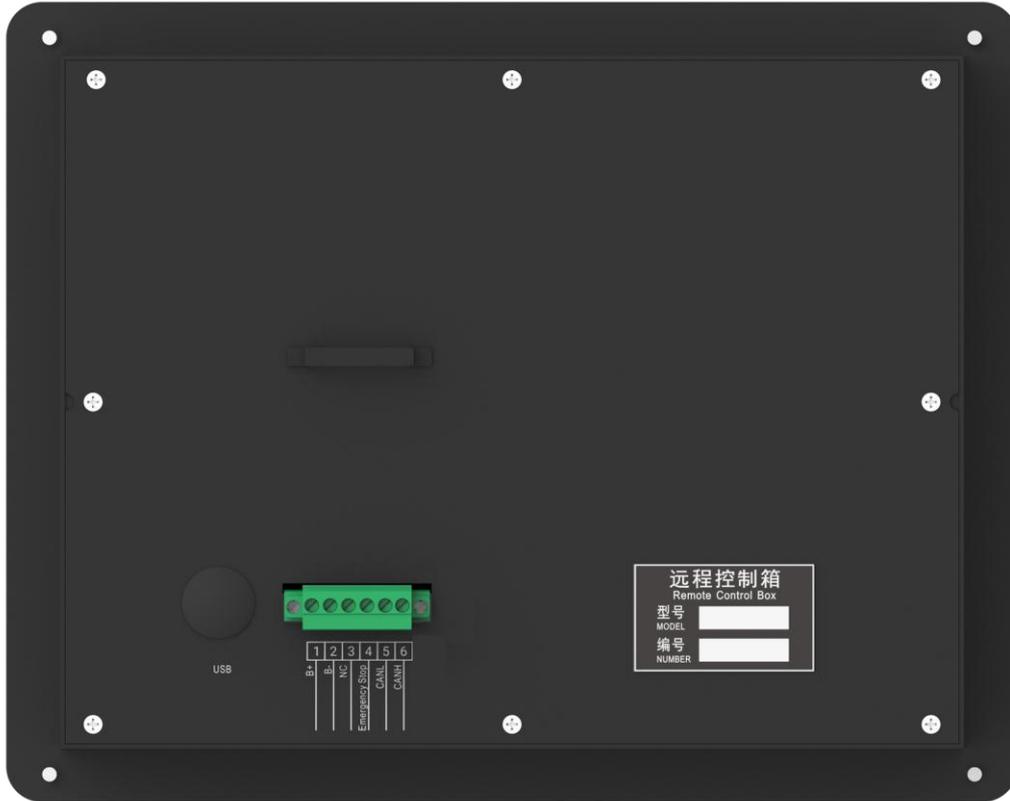


Fig.14 Remote Monitoring Module Rear Panel

Table 23 Remote Monitoring Interface Definition

Pin	Definition	Size	Description
1	Power+	mm ²	Power B+.
2	Power-	mm ²	Power B-.
3	NC		NC.
4	Emergency Stop	0.5mm ²	Emergency stop input.
5	CANL	0.5mm ²	It is used for connecting local monitoring controller, 120Ω has been internally installed between CANH and CANL.
6	CANH	0.5mm ²	

12 COMMISSIONING

It is suggested to do the following examination before formal system operation:

- Check all the connections are correct and wire diameter is suitable;
- Controller's positive and negative are correctly connected to starting battery and power switch is closed;
- Set controller in local mode. Press "Start", engine will start, it will automatically enter ETS after starting failure;
- Connect ignition control of controller to ECU power interface and engine ECU correctly;
- Test wire of remote monitoring module. In remote mode, press "Start" key of remote monitoring module, engine will start;
- If there is any other question, please contact SmartGen's service.

SmartGen

13 INSTALLATION

13.1 MEM40 DIMENSION AND INSTALLATION DIAGRAM

The monitoring controller comes with 4 shock absorbers with screw holes. 4 M8 screws (come with or add flat and spring washers) are required to be tightened from the mounting plate.

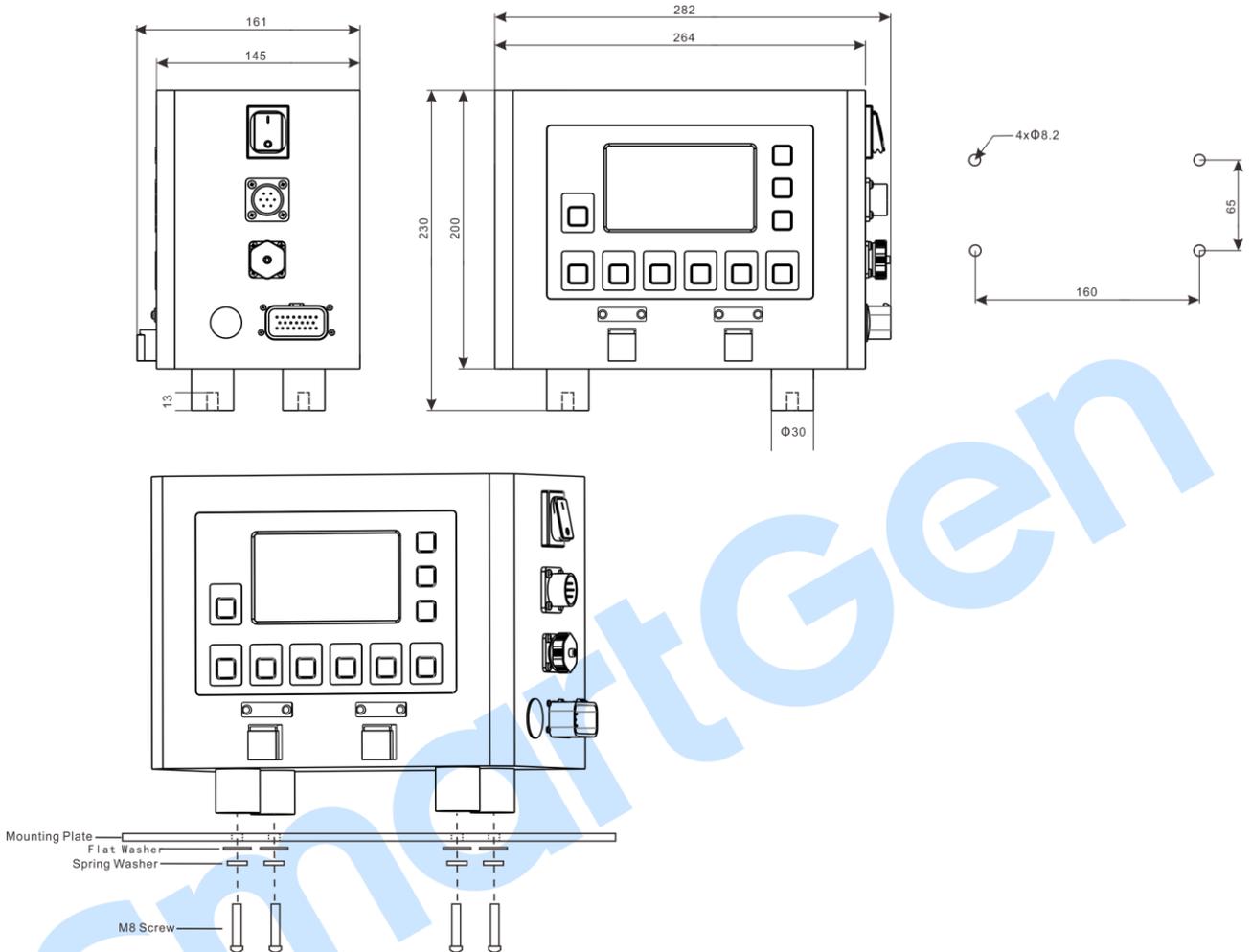


Fig.15 Dimension and Installation Diagram

13.2 MEM40RM DIMENSION AND INSTALLATION DIAGRAM

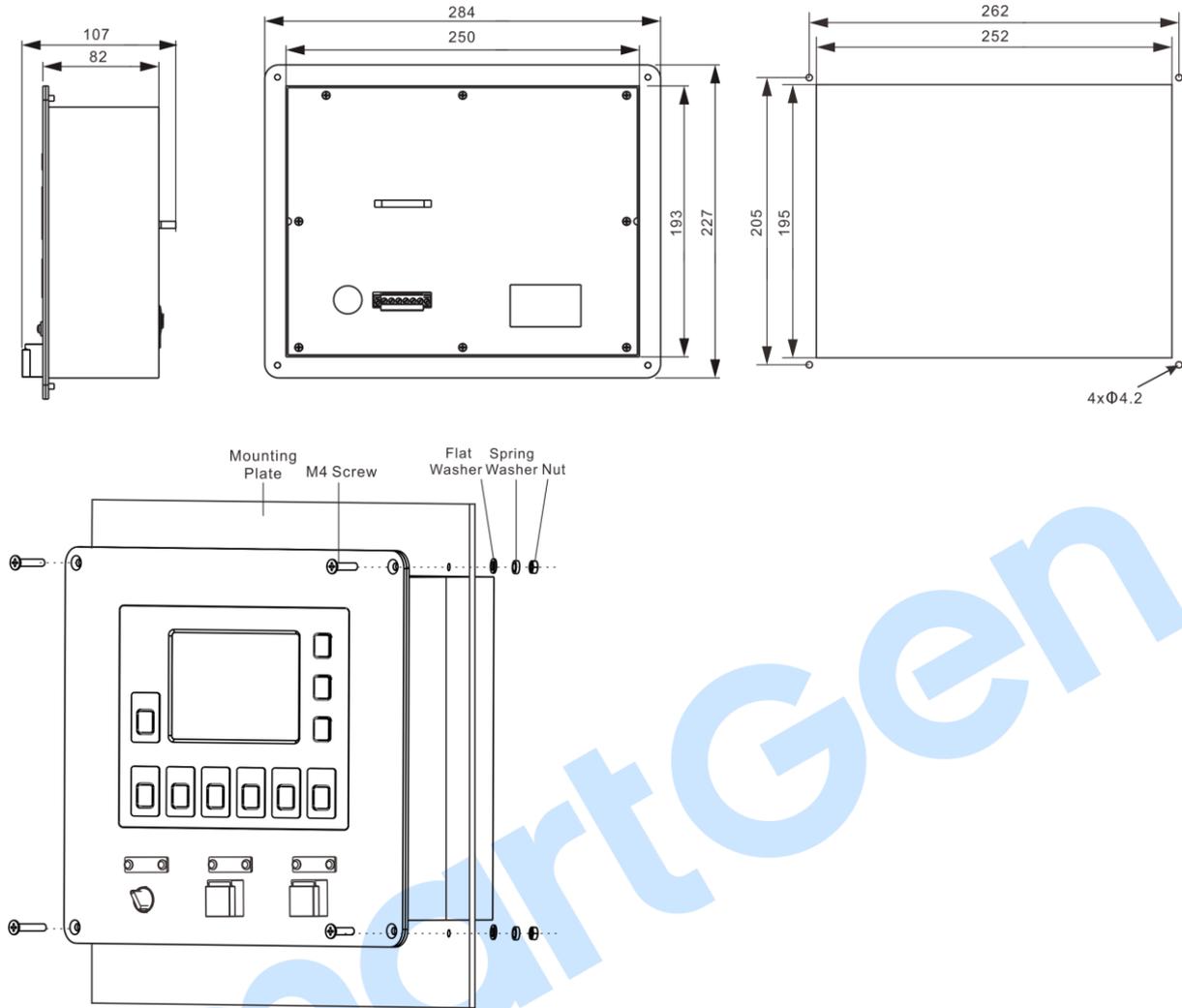


Fig.16 MEM40RM Dimension and Installation Diagram

Mounting cautions:

4 M4 screws (flat and spring washers are required) and nuts for each are tightened from mounting plate in accordance with corresponding position. Select screws of appropriate length according to the thickness of the mounting plate.

13.3 BATTERY VOLTAGE INPUT

MEM40 monitoring controller can suit for battery voltage (8~35) VDC. The battery negative and positive wire connecting controller power B+/B- must be over 2.5mm². If floating charger is configured, please firstly connect output wires of charger to battery’s positive and negative directly, and then connect wires from battery’s positive and negative to controller’s positive and negative input ports separately in order to prevent the charger from disturbing the controller’s normal working.

13.4 RPU SPEED SENSOR INPUT

RPU speed sensor is the magnetic equipment installed on the engine to detect flywheel teeth number. The wires used to connect with the controller shall be 2-core shielding wires. The shielding layer shall be single-grounded, and the other two signal wires shall be connected to No.6 and No.7 terminals of RPU interface. The output voltage of the speed sensor shall be within (1~24) VAC (effective value) in the range of full speed and 12VAC is recommended (at rated speed). As to RPU

speed sensor installation, the sensor can be firstly spun to the connection flywheel, then invert 1/3 lap, and finally tighten up the nut on the sensor.

13.5 SENSOR INPUT

Aux. sensor 1,2,3 of MEM40 monitoring controller can be configured as current/voltage/resistance type sensor, please select corresponding sensor input signal according to engine sensor type.

14 TROUBLESHOOTING

Table 38 Troubleshooting

Problem	Possible Solution
Controller no response with power	Check starting batteries; Check controller wirings; Check DC fuse.
Controller emergency stop	Check if emergency stop button function is correct.
Sensor open alarm	Check if sensor and its wirings are correct; Check if the configured sensor type is correct.
Alarm shutdown in running	Check related switches and wirings according to LCD information; Check Aux. input ports.
Crank failure	Check fuel circuit and its wirings; Check starting batteries; Check speed sensor and its wirings; Check engine manual.
Starter no response	Check starter wirings; Check starting batteries.
RS485 communication failure	Check wirings; Check if RS485's A and B wires are connected in the opposite way; Check if PC's communication port is damaged; Putting a 120Ω resistor between RS485's A and B is recommended.
CANBUS communication failure	Check wirings; Check if CANBUS CANH and CANL wires are connected in the opposite way.