EC40CR ENGINE CONTROLLER
USER MANUAL

Software Version

No.	Version	Date	Note
1	V1.0	2024-07-25	Original release.

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Controller models to which this manual applies:

EC40CR

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 equipment.
4.Safety standards and precautions in advance, otherwise it may cause personal injury or damage to related equipment.
5.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.

Catalogue

Summary

This series of controllers are mainly used in engine control systems for water pumps, lighthouses, air compressors and engineering machinery types, applicable to stand-alone automatic control monitoring system, with remote start and stop, data measurement, alarm protection functions.

2.8 inch LCD screen display with brand new UI design is adapted in this controller can display related parameters directly. The LCD screen can display various faults at the same time. Once the unit does not run normally, it can effectively achieve protection.

There are Chinese/English interface options, more language can be set according to user's request. All the parameters can be configured through the front face buttons or use programmable interface by RS485 or USB to adjust via PC.

Main Features

- ◆ 32bit high performance single chip microcomputer.
- ◆ 2.8 inch LCD screen, It has 16 display languages including Chinese and English, user's language set if necessary.
- ◆ Indicator and number display through UI surface.
- ◆ Acrylic material is adapted to protect the screen.
- ◆ Silicone panels, waterproof, oil-proof, UV-resistant, good operation feel and long service life.
- ◆ USB Port: parameters can be set even without power through USD port to monitor in real time.
- ◆ With RS485 communication port, can achieve "Three Remote" functions via MODBUS protocol.
- ◆ Standard CAN communication port, built-in J1939 protocol.
- ◆ Various kinds of parameters display.
- ◆ Input/output function, status can be shown directly.
- ◆ More categories of surface setting.
- ◆ Real time clock inside: preset time operate and auto maintenance is available. Engine working plan can be set as per week or month.
- ◆ Protection countdown function, which can set the maintenance time or date.
- ◆ Equipped with black box function: capable of storing 100 sets of alarm records, including relevant parameters of the unit when a fault alarm occurs, facilitating the search for the cause of the fault;
- ◆ Equipped with event recording function: can save 5000 system operation logs;
- ◆ Equipped with operation record storage function: can save 5000 engine operation records for easy understanding of engine operation status;
- ◆ Totally 7 relay's output, among which 5 relay output can be self-configurable, each relay can be set as max 80 functions.
- ◆ With 6 switches input, up to 50 functions optional.
- ◆ 6 sensor simulation input connectors, 3 input types is configurable and various kinds of units can be set.
- ◆ Battery charging control function,which can protect the battery according to battery voltage status.
- ◆ Sensor can be self-defined by front face button or PC software.
- ◆ Various of crank conditions (RPM, External input , Oil Pressure,) can be chosen.
- ◆ Control Protection: Auto Start/Stop of unit, perfect failure display and protection.
- ◆ 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.

Parameters Display

- Engine RPM
- Engine oil pressure
- Engine water temperature
- AUX.sensor parameters
- Engine battery voltage
- Charging voltage
- Cumulative power-on time
- Total Crank times
- Current running time
- Total running time
- Maintenance notice
- 6 switches input status display
- Output status display of 7 relays

Protection

- Over speed
- Under speed
- RPM Lost
- Low oil pressure
- High Engine water temperature
- Low fuel level
- Crank failure
- Stop Failure
- Emergency pull over
- Sensor Open
- ECU alarm failure
- ECU communication Failure
- Low water level alarm
- Failed to charge
- Over battery voltage
- Under battery voltage
- External real-time alarm
- Maintenance expire
- All warnings
- Alarm shutdown

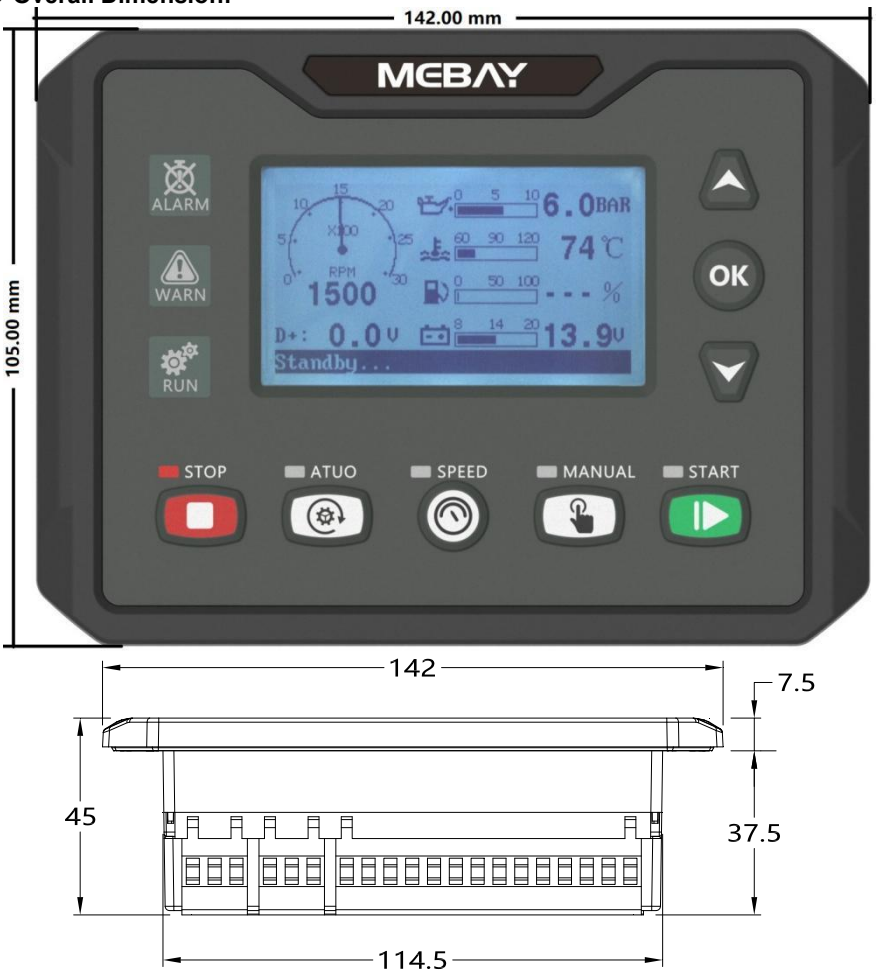
Parameters

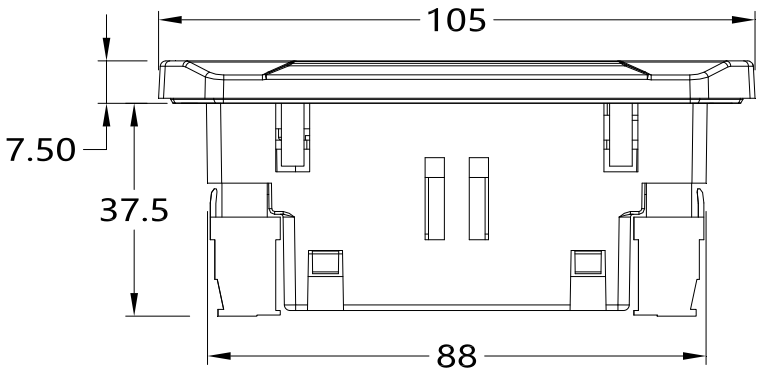
Options	Parameters
Working voltage	DC 8V----36V Continuous
Power consumption	Working: 24V MAX 1W (Standby:24V MAX 5W)
Rotate speed sensor Frequency	50-10000 Hz(AC1～70V)
MAX Accumulating Time	99999.9Hours (Min Store time:0.01H)
Crank Start Relay Output	Max 5Amp/250VAC Non-contact normally Open output
AUX. OUTPUT 1-5	Max 5Amp/250VAC Non-contact normally Open output
AUX. OUTPUT 6	Max 3AMP/250V Non-contact normally Open&Closed output
Sensor INPUT	6 configurable sensor inputs
Excitation output	DC+VE supply voltage

AUX.INPUT 1-6	Available if connecting with Battery -
Working condition	-25-70℃
Storage condition	-30-80℃
Protection Level	IP65: when waterproof rubber gasket is added between controller and its panel
Insulation strength	Apply AC 2.2kV voltage between high voltage terminal and low voltage terminal; The leakage current is not more than 3mA within 1min.
Overall dimension	142mm*105mm*45mm
Panel cutout	116mm*90mm
Weight	0.5Kg

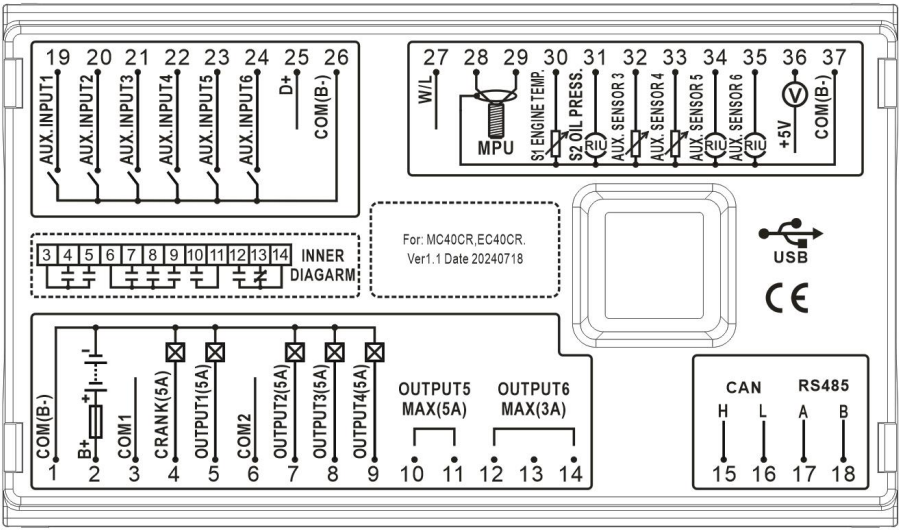
Overall Dimension and Wiring Diagram

◆ **Overall Dimension:**





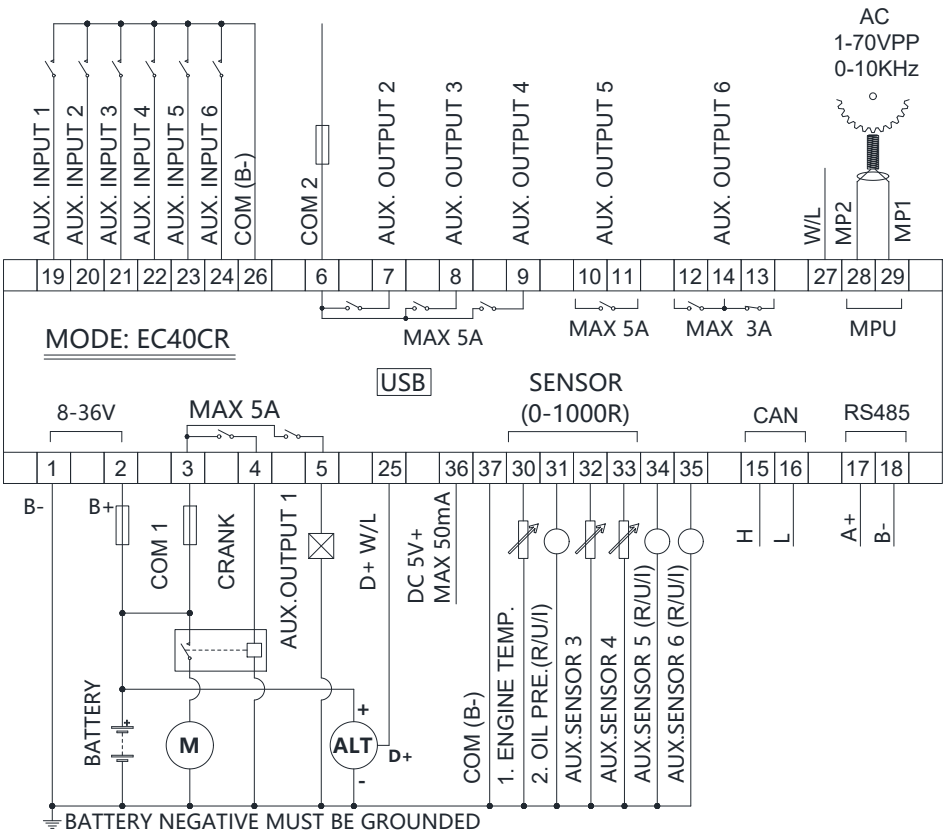
◆ **Descriptions of terminal connection**



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	COM 1 Relay Common Port	Relay output common port of No.4 and No.5.	1.5mm^2
4	Crank Output	Non-contact normally opened output, Max 5Amp.	1.5mm^2
5	Aux. Output 1	Non-contact normally opened output, Max 5Amp.	1.5mm^2
6	COM 2 Relay Common Port	Relay output common port of No.7, No.8 and No.9.	1.5mm^2
7	Aux. Output 2	Active output, Max 5Amp/250V.	1.0mm^2
8	Aux. Output 3	Active output, Max 5Amp/250V.	1.0mm^2

9	Aux. Output 4		Active output, Max 5Amp/250V.	1.0mm²
10	Aux. Output 5	Normally Open	Non-contact normally opened output, Max 5Amp/250V.	1.0mm²
11		COM		1.0mm²
12	Aux. Output 6	Normally Open	Non-contact normally opened/closed output, Max 3Amp/250V.	1.0mm²
13		Normally Close		1.0mm²
14		COM		1.0mm²
15	CAN_H		ECU communication interface : 120Ω impedance shielding wire is recommended with one end grounded.	0.5mm²
16	CAN_L			0.5mm²
17	RS485 A		RS485 communication interface : 120Ω impedance shielding wire is recommended with one end grounded.	0.5mm²
18	RS485 B			0.5mm²
19	Aux. Input 1		The grounding is valid according to the function selection switch input.	1.0mm²
20	Aux. Input 2			1.0mm²
21	Aux. Input 3			1.0mm²
22	Aux. Input 4			1.0mm²
23	Aux. Input 5			1.0mm²
24	Aux. Input 6			1.0mm²
25	Charger D+ output		Active output, Connected with D+(W/L) terminal of charger.	1.0mm²
26	Aux. Input COM		Internally connected to B-	1.0mm²
27	Charger W/L		Connect with W terminal of charging engine.	1.0mm²
28	Speed sensor MP2 (connect with B-)		Use a shielded wire to connect the speed sensor.	1.0mm²
29	Speed sensor MP1			1.0mm²
30	AUX.Sensor 1-Engine temperature sensor		Sensor inputs are configurable. (only resistive type can be configured)	1.0mm²
31	AUX.Sensor 2_Oil pressure sensor		Sensor compatible with voltage ,current and resistance.	1.0mm²
32	AUX.Sensor 3		Sensor inputs are configurable. (only resistive type can be configured)	1.0mm²
33	AUX.Sensor 4		Sensor inputs are configurable. (only resistive type can be configured)	1.0mm²
34	AUX.Sensor 5		Sensor compatible with voltage ,current and resistance.	1.0mm²
35	AUX.Sensor 6		Sensor compatible with voltage ,current and resistance.	1.0mm²
36	+5V Output		Connect the power supply of the oil pressure sensor with the output voltage signal, with a maximum of 50mA.	1.0mm²
37	Sensor common GND		Connect the battery negative or outer.	1.0mm²

◆ **EC40CR Typical Wiring Diagram**



NOTE: The Charger negative needs to be separately connected to the case or the negative terminal of the battery.

NOTE: To ensure reliable operation of the module and the measuring accuracy, Try not to share the power cord with other devices.

◆ **D-Driven pump start/stop operation and wiring diagram.**

1) Set input function: D-driven pump started, press. to suction pump.
2) Set output function: D-driven pump start, D-driven pump stop.
3) Suction pump type: D-driven.
4) D-driven pump start:

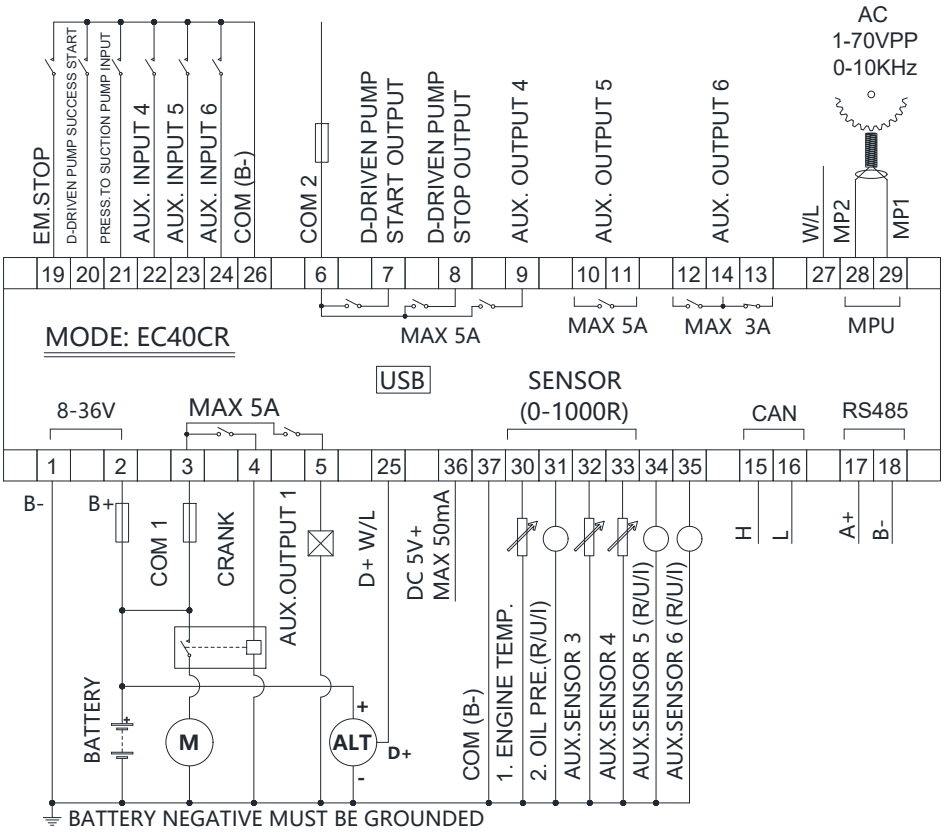
① After auto/manual mode start is active, preheat relay outputs (if configured), and LCD displays “Preheat delay XX”. After preheat delay finished, starting relay outputs (needs to be configured). If crank success input (needs to be configured) is invalid during “D-driven pump cranking Time”, starting relay stops output and it will go

to “suction pump crank rest” then waiting for next crank. If the pump doesn’t crank successfully in setting cranking times, controller will issue crank failure shutdown and in the meanwhile it will show “suction pump crank failure” in LCD display.

② In any time of cranking, if D-driven pump crank success, it will enter to “waiting press.to” delay. When delay is expired, “press. to suction pump” (needs to be configured) is invalid and controller will raise alarm and shutdown, and meanwhile “suction pump fault” will be displayed on LCD.

③ During the time of “waiting pressure to”, fuel relay output set “prestart fuel time” (default 1s) after “press. to suction pump” (needs to be configured) is valid, and then starting relay outputs. The rest starting processes are same with auto start procedure.

5) D-driven pump stop: After “safety on delay”, “D-driven pump stop” outputs (needs to be configured), and it stops to output after “Energize to stop time”.



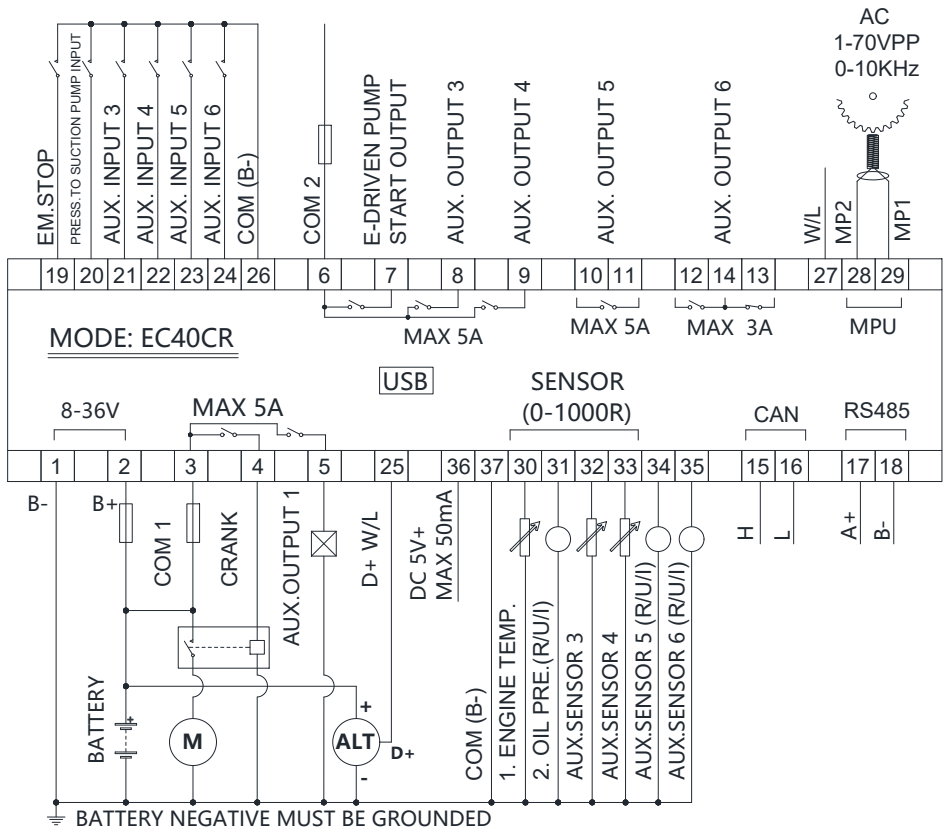
◆ **E-Driven pump start/stop operation and wiring diagram.**

1) Set input function: Press. to Suction Pump.
2) Set output function: E-driven Pump Start.
3) Suction pump type: E-driven.
4) driven Pump Start: After suction pump type is set as E-driven pump and “Safety On Delay” is over, the starting relay outputs (needs to be configured).
5) driven Pump Stop:

① While engine is between start idle and high-speed cooling time, if input is “Press. to Suction Pump” (needs to be configured) or outlet pressure is larger than the value of E-driven stop outlet pressure value, the starting relay stops output.

② While engine is in “Energize to Stop Delay”, the starting relay stops output.

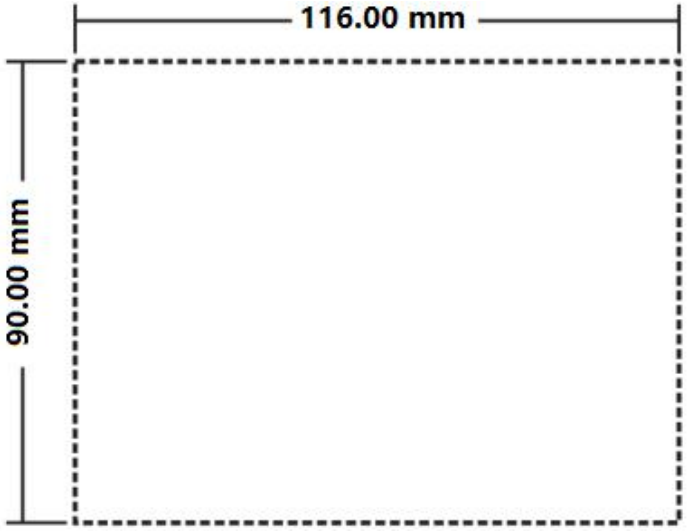
NOTE: The mentioned outlet pressure of E-driven pump needs to be set in outlet pressure correlation setting, then relate to corresponding programmable sensor.



Installation instruction

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

◆ Panel Cutout: W116mm*H90mm.



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

◆Battery Voltage Input

EC40CR controller is suitable for 8-36V DC battery voltage. Battery negative must be reliably connected to the enclosure of the engine. The controller 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:

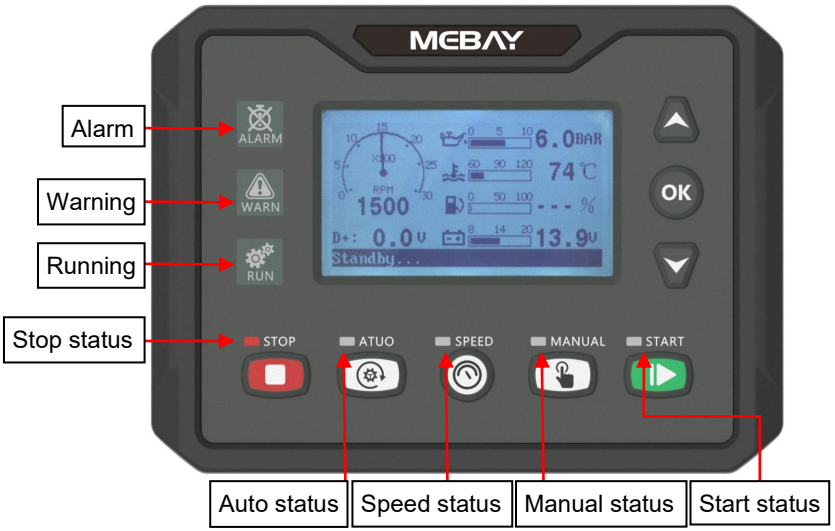
In case of floating charger connect charger output to battery positive and negative directly, then, connect battery positive and negative poles to controller positive and negative power supply.

◆Output and relay expansion

Note: All outputs of the controller 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 controller or other equipment.

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.

Panel and display



Key Function Description

KEYS	NAME	Main Function
	Stop Revert	◆ In manual/automatic mode, stop the engine when pressed.; ◆ In stopping process, press this key again to stop the engine quickly. ◆ In setup mode, cancel the modification and return to the upper menu; ◆ In setting mode parameter browsing mode, press it to exit the setting interface and save the data. ◆ In the standby state of stopping gear and without any alarm, press this key for 3 seconds to view the alarm record. ◆ In the alarm state, you can reset any alarm shutdown.
	Start	◆ In manual mode, press this key to start the engine; the ◆ In stop gear, pressing this key oil valve and ECU power will output. (Valid when engine type is configured for CAN protocol). ◆ If the idle delay is pressed after a successful unit start, the idle run time is skipped.
	Auto	◆ Pressing this key will set the module into auto mode.
	Manual	◆ Pressing this key will set the module into manual mode.
	Speed	◆ If the configuration speed control function is on, press this key to enter the speed control interface.
	Up	◆ In setup mode, it will be possible to flip up to move the cursor or increase the number where the cursor is; ◆ In the history fault screen, press and move the cursor

		upwards; ◆ In the display mode, turn the page forward. ◆ In the speed control interface, it will be possible to increase the speed.
	Down	◆ In setup mode, it will be possible to move the cursor down or decrease the number where the cursor is; ◆ In the history fault screen, press and move the cursor downwards; ◆ In the display mode, turn the page backward. ◆ In the speed control interface it will be possible to reduce the speed;.
	OK UI Change	◆ Confirm the change under edition mode. ◆ Shift right under edition mode. ◆ Page exited under records checking mode. ◆ In display mode, press to return to the display home page; ◆ In standby state, press for 3 seconds to enter the parameter setting mode.
	LED Test	◆ Test if all LED lights are OK, pressing this key to test if all lighted, all off when loosen it.
	Setting mode	◆ Pressing OK and STOP simultaneously to come into setting mode

◆ Alarm records checking

EC40CR controller can save 100 group of alarm records which contains the alarm record data includes detailed data such as alarm time,prompt status information, etc.
How to check the alarm records:

1. Enter alarm record page: Under stop mode, press this  key for 3 seconds come into alarm records page; Enter the setting mode: Select the alarm record and press  key to alarm records page;

2. Press  to turn upper digit and press  to turn lower digit in order to choose the record you need. Press  to confirm the record and come into history records checking page.

3. Press  to turn lower records under records checking page. Press  to turn upper records and press  to revert back to alarm history records page.

4. Exit from records page: In the history records page and checking page, press  to exit;

◆ System Operational Records

EC40CR controller can save 5000 system operation records, including power-on time, date, cumulative time, starting mode (manual, automatic, unknown,), running time, stopping mode (manual, automatic, alarm stop, unknown), and writing running time and mode at intervals.
The steps to view the system log are as follows:

1) Press the key OK for more than 3 seconds.Or press the stop key without releasing, press the OK key again, and then release all the keys to enter the setting menu page;
2) In the setting menu page, select "**System Operational Records**" and press the OK key once to enter the System Operational Records page;
3) In the System Operational Record page, press the up key and down key to browse the operation log, and the latest operation is recorded in the front; press the STOP key to exit the System Operational Records page.

◆ **Maintenance expiry reset password**

The controllers are equipped with a quick reset maintenance countdown function, which is operated as follows:

1) Press the key OK for more than 3 seconds to enter the setting menu interface.
2) In the setting menu interface, press key to move down, select "Maintenance Countdown Reset", and input "Maintenance Countdown Reset Password".
3) In the pop-up dialogue box, select "Yes", the controller will reset the maintenance countdown to the set value.
4) After the maintenance countdown is reset successfully, the controller will exit the setting interface automatically.

Note: The maintenance countdown password cannot be set as the same as the parameter setting password!

◆ **Idle mode:**

1) Input port is configured as : Idle Mode.
2) If engine is normally running and idle mode input is active, controller will enter into idle mode and engine will start idle running. Then idle control relay will be energized and drop speed relay will output.
3) If engine is in standby status and idle mode input is active, engine will be started in manual mode or auto mode. When “Safety On Delay” is over, engine will enter into “Start Idle Delay” (if configured), and after this delay expired, engine will start idle running. Then idle control relay energized and drop speed relay will output.
4) While in idle mode and engine is idle running, if idle mode input is inactive, controller will exit idle mode, and engine will enter into normal running. Both Idle control relay and drop speed relay stop outputing.
5) While in idle mode and engine is idle running, press to active stop operation, and then engine enters from “Idle Running” to “Stop Idle Delay” . The remaining stop process is the same as auto stop procedure.

◆ **Idle/High speed mode:**

1) Input port is configured as : Idle/High speed.
2) If engine is normally running and idle/high speed input is active, engine will start idle running. Then idle control relay will be energized and drop speed relay will output.

If speed regualtion is configured as relay adjust speed or CAN adjust speed, press raise speed key, idle control relay and drop seed relay will stop output, and speed can be adjusted during idle running.
3) If engine is in standby status and idle/high speed input is active, engine will be started in manual mode or auto mode. When “Safety On Delay” is over, engine will enter into “Start Idle Delay” (if configured), and after this delay expired, engine will start idle running. Then idle control relay energized and drop speed relay will output. If speed regualtion is configured as relay adjust speed or CAN adjust speed, press raise speed key, idle control relay and drop seed relay will stop output, and speed can be adjusted during idle running.
4) If engine is in idle running, when idle/high speed input is inactive, it will exit idle running and enter into high-speed warming up status and raise speed relay outputs. When “High-speed Warming Up Delay” expired, raise speed relay stops output, and engine enters into normal running. After speed regulation type has been configured, speed can be adjusted in normal running status.

5) While engine is in idle running status, press to  active stop operation, and then engine enters from “Idle Running” to “Stop Idle Delay” (if configured). The remaining stop process is the same as auto stop procedure.

◆ **Engine speed control**
1) In the "Speed Setting" menu, if you set the speed setting type: "0: Disable", the engine speed setting function will be disabled, and you cannot enter the speed setting interface by pressing the key;
2) In the "Speed Setting" menu, if you set the type of speed control: "1:CAN Speed Control - Key", then press key to enter the speed control interface, then press key to increase speed, press key to decrease speed, and press key to exit the speed control interface and stop speed control. As shown in the figure below:

Engine speed control
Target speed:1500RPM
Current speed:1499RPM
Increase: decrease:
Speed control: increasing speed ...

Note: When the CAN speed control type is set to "1:CAN speed control - key", the engine can be speed controlled at idle or rated operation!
3) In the menu of "Speed Setting", if you set the type of speed control: "2:CAN Speed Control - AUX input", you must set the two switching quantity inputs as **"Speed up "** and **"Speed down"**, and connect the external self-reset switch; press the key to enter the speed control interface, at this time, the engine speeds up when the speed up switch is effective, and the engine speeds down when the speed down switch is effective. **"Speed up"** and connect the external self-reset switch; press key to enter the speed control interface, at this time, the engine speeds up when the speed up switch is effective, and the engine speeds down when the speed down

switch is effective; press key again to exit the speed control interface and stop speed control.

Engine speed control
Target speed:1500RPM
Current speed:1499RPM
Increase:I3 decrease:I4
Speed control: increasing speed ...

4) In the "Speed Setting" menu, if you set the type of speed control: "3:CAN speed control-1 or 2", the speed control function of Article 2 and Article 3 above is effective, In the speed control interface, the engine speed can be controlled by the module keys or the external self-reset switch of the AUX input. As shown in the figure below:

Engine speed control
Target speed:1500RPM
Current speed:1499RPM
Increase:/I3 decrease:/I4
Speed control: increasing speed ...

Note: When the CAN speed control type is set to "3:CAN speed control-1 or 2", the engine can be speed controlled at idle or rated operation!

5) In the "Speed Setting" menu, if you set the speed control type: "4:CAN Speed Control - Potentiometer", you must configure the configurable sensor input as "1: Speed Control Potentiometer", such as Multiple configurable sensor channels are configured as "1: speed potentiometer", then the smallest channel serial number shall prevail; the minimum variable resistance value of external potentiometer is 0-100Ω, and the maximum value is 0-5000Ω; press to enter the speed control interface, and at this time, the controller controls the engine speed according to the resistance value of the potentiometer, and it is "idle speed" when the resistance value is 0. At this time, the controller controls the engine speed according to the resistance value of the potentiometer, when the resistance value is 0, it will be "idle speed", when the resistance value is maximum, it will be "maximum speed value" for the speed control; when the resistance value of the potentiometer is increased, the engine speed increases, and when the resistance value is decreased, the engine speed decreases, and the controller will exit the speed control interface by pressing the key to stop the speed control again.

Please note when setting the CAN speed control type to "4: CAN speed control - potentiometer":

(1) The engine is idling after starting, the speed can only be controlled by potentiometer, the external idle/run switch is invalid!

(2) After the engine is started, when entering the speed control interface for the first time, the resistance value of the potentiometer must be reset to less than 10Ω before the engine speed control can be carried out!

Engine speed control
Target speed:1500RPM
Current speed:1499RPM
Potentiometer resistance:1000Ω
Speed control: increasing speed ...

6) State description of the speed regulation process:
(1) In descending speed: the controller is performing descending control of the engine;
(2) Speed up in progress: the controller is performing speed up control on the engine;
(3) Speed adjustment complete: the controller is completing speed up or speed down control of the engine;
(4) Please reset the potentiometer: after the engine starts, the resistance value of the speed adjustment potentiometer is greater than 10Ω, please rotate it to the minimum position of the potentiometer;
(5) Wait for speed regulation: wait for the operator to carry out speed regulation operation.

◆ Emergency start mode:

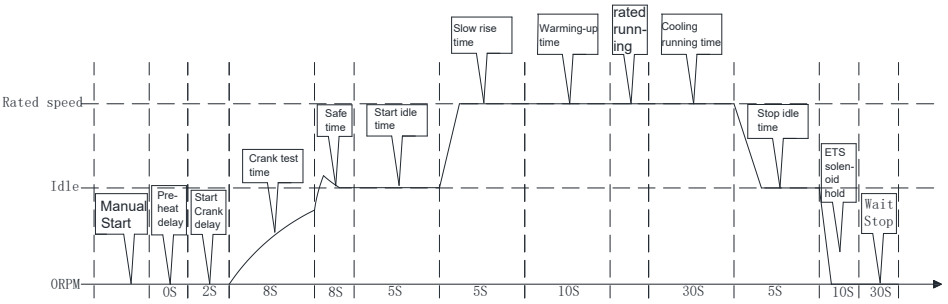
In manual mode, pressing the "  "button and the "  " button at the same time can force the engine to start. At this time, the controller will no longer automatically judge the successful start condition, and the operator will judge the separation of the starter by himself. The operator observes that the unit has started successfully. After releasing the "  " button, the starter motor will be disconnected immediately, and the controller will enter the "safety protection delay" state.

◆ Manual Start Mode

press  and make sure it is in the stop position before starting.

Press “  ” and the test file indicator is on. At this time, it is detected whether the connection of each sensor is normal. If the sensor is open, the sensor opens an alarm. If it is normal, the unit start process is executed in the following sequence after pressing the "  ". automatically switch to engine provide the power when the unit is running normally. Press “  ” The controller performs the parking process at the following timing:

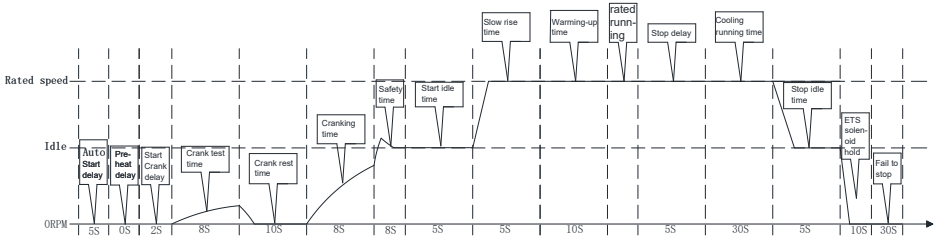
Manual start and stop process:



◆ Automatic starting mode:

Press 'Stop key  ' to ensure that the unit is in stop gear before starting. Press 'auto key  ', the indicator light of auto gear is on, at this time, it will detect whether each sensor is connected normally, if the sensor is open circuit, it will report sensor open circuit alarm, if it is normal, it will wait for the remote start signal to be valid, and then the unit will execute the starting process according to the following time sequence. When the unit enters into normal rated operation, the controller detects that the remote start signal is invalid, and the remote stop input signal is valid, then it will execute the 'loop time delay' and the subsequent shutdown process.

Auto start and stop process:



◆ Notices in Starting Process

 Note 1: During the Cranking time, the controller automatically detects the speed signal, oil pressure value or the charging voltage (according to the parameter setting) to reach the judgment condition of successful start, then the judgment is that the start is successful and the motor relay is closed.

 Note 2: Within the safety delay, only respond to emergency stop, immediate stop, over speed, ECU communication Failure, other alarms are not responded to.

 Note 3: No response to alarm and warning of under speed, low frequency, under voltage, over current, over power,non-balance of current,external instant unloading shutdown,during start idle time.

 Note 4: After entering the rated operation, the "rated operation" indicator light is on.

Note 5: In the process of shutdown, if the remote starting signal is restored to be valid within the " Cooling time", the rated operation will be entered again.

Note 6: If the stop key is pressed again during idle time, the idle time will be canceled and the stop operation will be executed directly.

◆ **sensor association settings**

Fuel level sensor correlation: if need to use fuel level function, one of flexible sensor 1~6 needs to be configured as fuel level sensor, meanwhile, curve type needs to correspond to sensor types. Then set the correlated sensor and select the corresponding flexible sensor. At this time, the flexible sensor is the fuel level sensor, which can realize fuel pump control and tank volume display.

Outlet pressure correlation: if need to calculate flow and head via water pressure gauge, one of flexible sensor 1~6 needs to be configured as outlet press sensor, meanwhile, curve type needs to correspond to sensor types. Then set the correlated sensor and select the corresponding flexible sensor. At this time, flow and head can be calculated via outlet pressure gauge.

Outlet pressure correlation also needs to be configured if E-driven suction pump needs to judge whether to stop the output according to the outlet pressure.

Temperature sensor correlation: If you need to control (heating, cooling, choke) by temperature, one of flexible sensor 1~6 needs to be configured as temperature sensor, meanwhile, curve type needs to correspond to sensor types. Then set the correlated sensor and select the corresponding flexible sensor then you can control (heating, cooling, damper) by temperature.

Commissioning and precautions

1) Ensure all the connections are correct and wires diameter is suitable;
2) Ensure that the controller DC power has fuse, controller's positive and negative connected to start battery are correct;
3) Disconnect the oil valve line and start the engine, the engine group will start to start, after the set number of starts, the controller will send a start failure signal; press the stop button to reset the controller.
4) Turn on the oil valve line and check whether the engine data is normal (speed, water temperature, oil temperature, oil pressure); if everything is normal, the unit will run at idle speed (if it is set to idle speed) to normal operation; if there is any abnormality, Stop the engine unit and check the wiring of each part referring to this manual;
5) Manual shutdown to confirm normal operation.

Warnings and Shutdown Alarms

◆ Warnings

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

Over Speed Warning
When the controller detects that the engine speed is higher than "**Over speed warning**", Then start warning delay and the duration (Normal warning delay) have not returned to normal, the warning of over speed is reported. "**WARN**" lights will light up, units will not stop, displays " **Over speed** " on the current fault screen.

Under Speed Warning
When the controller detects that the engine speed is lower than "**Under speed warning**", Then start warning delay and the duration (Normal warning delay) have not returned to normal, the warning of under speed is reported. "**WARN**" lights will light up, units will not stop, displays " **Under speed** " on the current fault screen.

(AUX Sensor 1~6) Warning
When the controller parameter "**Sensor alarm Action** " is set to "**Warning**", and the controller detects that the sensor value is lower than "**AUX Sensor Warning Threshold**", Then start warning delay and the duration have not returned to normal, the "AUX sensor warning" is reported. "**WARNING**" lights will light up, Generators will not stop, displays "**AUX sensor warning** " on the current fault screen.

(AUX Sensor 1~6) disconnected warning
When the controller parameter "**Action if sensor disconnected**" is set to "**Warning**", When the sensor is detected to be disconnected, Then start warning delay and the duration have not returned to normal, the warning of sensor disconnected warning is reported. "**WARNING**" lights will light up, Generators will not stop, displays "**(AUX Sensor open**" on the current fault screen.

External instant warning
When the controller detects that the AUX. Input "**External instant warning input"** switch is active, it starts warning delay and lasts for input warning delay. When the **"External instant warning input"** switch is enabled, the warning is reported. "**WARN**" lights will light up, units will not stop, displays "**Instant warn**" on the current fault screen.

Speed signal lost warning
When the controller parameter "**Action if RPM lost**" is set to "**warning**", the detected speed value is 0,Then start warning delay and the duration (Speed signal lost warning delay) have not returned to normal, the warning of speed signal lost warning is reported. "**WARN**" lights will light up, units will not stop, displays "**Lose speed**" on the current fault screen.

Maintenance expiration warning
When the controller parameter "**Maintenance expire**" is set to "**warning**", when the maintenance is detected as "0" or maintenance date less than current date, then start warning delay and the duration (Maintenance expire delay), the warning of maintenance expiration is reported. "**ALARM**" lights on, without stopping the engine, and displays "**Maintain end**" on the LCD screen.

ECU faults warning
When the controller detects the warning information of ECU,Then start warning delay and the duration have not returned to normal, the warning of ECU faults warning is reported. "**WARN**" lights will light up, units will not stop, displays "**ECU faults warn**" on the current fault screen.

ECU Communication Failure Warning
When the controller parameter "**CAN failure**" is set to "**warning**", and controller does not receive any message sent by ECU.It started to delay and lasted for some time, but still did not receive the message from ECU, the warning of ECU faults warning is reported."**WARN**" lights will light up, units will not stop, displays "**ECU comm. fail**" on the current fault screen.

Low coolant level switch warning
When the controller detects that the AUX. Input "**Low water level warning"** switch is active, it starts warning delay and lasts for Input warning delay. When the **"Low water level warning"** switch is enabled, the engine low coolant level switch warning is reported. "**WARN**" lights will light up, units will not stop, displays "**Low water level**" on the current fault screen.

Over battery voltage warning
When the controller detects that the battery voltage is over than the "**Over battery voltage warning"**, Then start warning delay and the duration (Over battery warning delay) have not returned to normal, the warning of over battery voltage warning is reported. "**WARN**" lights will light up, units will not stop, displays "**Over BATT volt**" on the current fault screen.

Under battery voltage warning
When the controller detects that the battery voltage is lower than the "**Under battery voltage warning"**, Then start warning delay and the duration (Under battery warning delay) have not returned to normal, the warning of Under battery voltage warning is reported. "**WARN**" lights will light up, units will not stop, displays "**Under BATT volt**" on the current fault screen.

Charging failure warning
When the gap between D+ and B+ is over than this value, and there is charging failure but still high(Charging failure warning delay), then charge failure warns. "**WARN**" lights will light up, units will not stop, displays "**Charger fault**" on the current fault screen.Once the gap is lower than the value, warns clear.

◆ Starting fault
Fail to Start
If the number of cranks exceeds the predetermined number of cranks, the failure of start-up will be reported if the start-up of the engine unit is still unsuccessful.

"**ALARM**" lights on, without stopping the engine, and displays " **Crank failure** " on the current fault screen.

◆ **Shutdown Alarms**

 Warning: After the Shutdown Alarm occurs, the system will be locked immediately and the unit set 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 unit automatically stops.

Over Speed Alarm
When the controller detects that the engine speed is higher than "**Over speed alarm**", Then start alarm delay and the duration (Over speed delay) have not lower than "**Over speed revert**", the alarm of over speed is reported. "**ALARM**" lights will light up, units stops running, and displays " **Over speed** " on the current fault screen.

Under speed alarm
When the controller detects that the engine speed is under than "**Under speed alarm**", Then start alarm delay and the duration (Under speed delay) have not returned to normal, the alarm of under speed is reported. "**ALARM**" lights flicker, engine stops running, and displays " **Under speed** " on the current fault screen.

(AUX Sensor 1~6) Alarm
When the controller parameter "**Sensor alarm Action** " is set to "**Alarm**", and the controller detects that the sensor value is lower than "**Alarm Threshold**", Then start alarm delay and the duration have not returned to normal, the "AUX sensor alarm" is reported. "**ALARM**" lights will light up, Generators stops running, displays "**AUX sensor Alarm** " on the current fault screen.

(AUX Sensor 1~6) disconnected Alarm
When the controller parameter "**Action if sensor disconnected**" is set to "**Alarm**", and the sensor is detected to be disconnected, Then start alarm delay and the duration have not returned to normal, the alarm of sensor disconnected alarm is reported. "**ALARM**" lights will light up, Generators stops running, displays "**(AUX Sensor open**" on the current fault screen.

High coolant temperature switch alarm
When the controller detects that the AUX. Input port "**High coolant temperature alarm switch"** switch is active. Start low oil pressure switch alarm delay, for a period of time "Input alarm delay" AUX. Input port "**High coolant temperature alarm switch**" is valid. Then the alarm, the public alarm light "**ALARM**" lights will light up, stop the units operation, and display **"High WT switch"** on the current fault screen.

Low fuel level switch alarm
When the controller detects that the AUX. Input "**Low fuel level alarm input"** switch is active, it starts alarm delay and lasts for Input alarm delay. When the **"Low fuel level alarm input"** switch is enabled, the engine low fuel level switch alarm is

reported. "**ALARM**" lights will light up, units stops running,and displays "**Low fuel level switch**" on the current fault screen.

External instant alarm
When the controller detects that the "**External instant alarm input"** switch of the AUX. Input port is valid, the external instant trip is started and the shutdown alarm delay is delayed for a period of time **"Input alarm delay"** AUX. Input port "**External instant alarm input"** switch When it is valid, it will alarm, the public alarm light **"ALARM"** lights will light up, units stops running, and display **"Instant parking"** on the current fault screen.

Speed signal lost alarm
When the controller parameter "**Action if RPM lost**" is set to "**alarm**", the detected speed value is 0,Then start alarm delay and the duration (Speed signal lost alarm delay) have not returned to normal, the alarm of speed signal lost warning is reported. "**ALARM**" lights will light up, units stops running, displays "**Lose speed**" on the current fault screen.

Maintenance expiration alarm
When the controller parameter "**Maintenance expire**" is set to "**alarm**", when the countdown to maintenance is detected as "0" or maintenance date less than current date, then start alarm delay and the duration (Maintenance expiration delay), the alarm of maintenance expiration is reported. "**ALARM**" lights on, without stopping the engine, and displays "**Maintain end**" on the LCD screen.

ECU faults alarm
When the controller detects the alarm information of ECU,Then start alarm delay and the duration have not returned to normal, the alarm of ECU faults alarm is reported. "**ALARM**" lights will light up, units stops running, displays "**ECU faults warn**" on the current fault screen.

ECU communication failure alarm
When the controller parameter "**CAN failure**" is set to "**alarm**", and controller does not receive any message sent by ECU.It started to delay and lasted for some time, but still did not receive the message from ECU, the alarm of ECU faults alarm is reported."**ALARM**" lights will light up, units stops running, displays "**ECU comm. fail**" on the current fault screen.

Low coolant level switch alarm
When the controller detects that the AUX. Input "**Low water level alarm"** switch is active, it starts alarm delay and lasts for Input alarm delay. When the **"Low water level alarm"** switch is enabled, the engine low coolant level switch alarm is reported. "**ALARM**" lights will light up, units stops running, displays "**Low water level**" on the current fault screen.

Louver opening exception alarm
When the controller detects that the AUX. input "**Louver status input"** switch is active, it starts alarm delay and lasts for Input alarm delay. When the **"Louver status input"** switch is enabled, the Louver status input alarm is reported. "**ALARM**" lights will light up, engine stops running, displays "**Louver abnormal**" on the current fault screen.

Emergency stop alarm
When the controller detects that the AUX. Input "**Emergency stop"** switch is active, it starts alarm delay and lasts for Input alarm delay. When the **"Emergency stop alarm"** switch is enabled, the engine Emergency stop alarm is reported. "**ALARM**" lights will light up, units stops running, displays "**Emergency stop**" on the current fault screen.

Stop failure with speed alarm
When the controller detects that the speed is not "0" after the execution of the shutdown, the alarm of stop failure is reported. "**ALARM**" lights will light up and displays "**Stop fail-RPM**" on the current fault screen.

Stop failure with pressure alarm
When the controller detects that the Oil **Pressure** is not "0" after the execution of the shutdown, the alarm of stop failure is reported. "**ALARM**" lights will light up and displays " **Stop fail-OP-A** " on the current fault screen.

Parameter setting

◆ **Enter the edition page**
Please set the parameters according to below steps:

1) The setting mode can be active after pressing and OK simultaneously, under the status of standby without any alarm. The default password is "***07623***".
2) Press and add number 1, press to reduce number 1, press OK to turn the digit into right, press OK once done. Then system comes into menu after confirmation of password setting. The screen will display error if password is wrong. The correct password should be put after pressing any button.
3) Press to turn the digit into upper position, press to turn the digit into lower position, press OK to get into parameters setting page.
4) Press to shift up the parameters, press to shift down the parameters, press OK to get into parameter changing page.
5) Press to add number 1, press to reduce number 1, press OK to turn the digit into right, press OK once done. If the parameters setting is in the valid setting range,then it can be saved, if not, it can not be saved.
6) Press OK and to save the parameters and exit from edition page.
7) Press to revert back to last class if in any setting position.

Revert back to default: put password **"97011"** when coming into parameters setting, then all the parameters can be set as defaults.

Note: the data can't be saved if the user didn't press to confirm the setting.

◆ **Parameter list.**

0) Language settings

No	Parameter	Range(defaults)	Notes
1	Language	0-English ***1-简体中文*** 2-繁体中文 3-Русский 4-Espanol 5-Türk dili 6-Français 7-Românesc 8-Polski 9-Português 10-Deutsch 11-한국어 12-Tiếng Việt 13-بالعربية 14-Bahasa Indonesia 15--فارسی;	Language option. Display language selection. 0: English, 1: Simplified Chinese, 2: Traditional Chinese, 3: Spanish, 4: Russian, 5: Turkish, 6: French, 7: Romanian, 8: Polish, 9: Portuguese, 10: German, 11: Korean, 12: Vietnamese,13:Arabic,14: Bahasa Indonesia,15:Persian.

1) Override Mode

No	Parameter	Range(defaults)	Notes
1	Override Mode	***0: Disable*** 1: Enable	All shutdown alarm quantities are disabled except emergency shutdown and overspeed.

2) Delay time setting

No	Parameter	Range ***(default)***	Notes
1	Start delay	0-6500.0s***(5.0s)***	The time during the engine starts after the remote signal is valid.
2	Return Delay	0-6500.0s***(5.0s)***	The time during deactivated to engine stop, after the remote signal is valid.
3	Preheat time	0-6500.0s ***(0.0s)***	The time needed to be preheated before the starter on power.
4	Fuel output delay	0-6500.0s ***(2.0s)***	The time the fuel valve relay outputs before the motor operates.
5	Cranking time	3.0-60.0s ***(8.0s)***	Time of starter power up.
6	Crank rest time	3.0-60.0s ***(10.0s)***	The waiting time before second power up when engine starts fail.(If diesel driven suction pump enabled, it is also can be crank rest time of diesel driven suction pump).
7	Safety delay	0-6500.0s ***(8.0s)***	Low oil pressure, high water temperature, under speed, under frequency, under voltage, charge failure are all invalid during this time except for emergency stop and over speed.
8	Start idle time	0-6500.0s ***(5.0s)***	Idle running time when crank

			successfully.
9	Warming-up time	0-6500.0s***(10.0s)***	The time needed for loading.
10	Cooling time	0-6500.0s***(30.0s)***	After unloading, the time of cooling down by radiator before stop. during the delay, if the remote start signal is valid, then engine will come into rated running.
11	Stop idle time	0-6500.0s ***(5.0s)***	Idle-speed running time.
12	E.T.S. hold time	0-6500.0s ***(10.0s)***	Stop solenoid on power time.
13	Fail to stop	0-6500.0s ***(30.0s)***	If the RPM is 0 during the stop failure time, then the stop failure time is no needed.
14	Input alarm delay	1.0-60.0s ***(5.0s)***	The alarm delay except for Aux.input.
15	Input warning delay	1.0-60.0s ***(2.0s)***	The Aux.input warning delay.
16	Pulse speed up delay	0.1-60.0s***(0.2s)***	The interval time of the pulse speed up relay change.
17	Pulse speed down delay	0.1-60.0s***(0.2s)***	The interval time of the pulse speed down relay change.

3) Engine setting

NO	Parameter	Range***(default)***	Notes
1	CAN Protocol	***0- Disabled*** 1: J1939 2: Cummins ISB 3: Cummins-CM850 4: Cummins QSX15-CM570 5: Cummins-CM850-PCC13X 6: Cummins-DCEC-QSZ13 7: Cummins-CCEC-QSN 8: Perkins 9: Perkins-1100 10: Volvo 11: Volvo-EMS2 12: Volvo-EMS2b 13: Volvo-EDC4 14: Scania 15: Scania-kw2000 16: Scania-kw2k-coo 17: John Deere 18: mtu-ADEC 19: mtu-ADEC-SAM 20: mtu-ADEC-303 21: mtu-ADEC-304 22: BOSCH 23: GTSC1 24: MTSC1 25: YUCHAI-YCECU 26: Y&C ENGINE-YC6K 27: WEICHAI-WISE15	CAN protocol Option: the Engine parameters like RPM, oil pressure, water temperature are all from ECU data after choosing the relative protocol.

		28: CHANGCHAI-ECU15 29: YUCHAI-LMB 30: MAN 31: J1939-C 32: SDEC-H/D 33: SDEC-E 34: YTO 35: DEUTZ EMR2-2001 36: DEUTZ EMR2-2012 37: DEUTZ EMR3 38: DEUTZ EMR4 39:NEWND ECU13 40:Cummins-CM2150		
2	Rated frequency	40.0-80.0Hz ***(50.0Hz)***		When used in gensets: Some CAN protocols need to send a rated frequency setting command to be converted into speed: e.g. Cummins-CM850, Volvo-EMS2, etc.
3	Rotation speed setting	Speed type	***0: Speed sensor*** 1: W/L	If the setting is 0, (RPM sensor Disabled).
		Flywheel teeth	0-300 ***(118)***	
		Rated RPM	500-4500RPM ***(1500)***	Choose the meter range and calculate the alarm value. The number of the flywheel teeth is not 0 before checking the speed loss action.
		Action if RPM lost	***Warning*** Alarm and stop	
		Loss of Speed Signal	0-3600.0s***(5.0s)***	
		Rated idle speed	500-4500rpm ***(750rpm)***	ECU idle speed value.
		Slow rise time	0-120.0S***(5.0S)***	The time of ECU from idling to high speed.
4	Engine over speed setting	Alarm value	0-200%***(114%)***	Sets the engine rated speed percentage. Disables the engine over speed alarm when set to 200. ☠: In speed control mode, the over speed alarm value is the target speed * over speed alarm percentage.
		Return value	0-200%***(110%)***	
		Alarm action	0: Warning ***1: Alarm and stop***	
		Alarm delay	0-3600.0s***(2.0s)***	
5	Engine under speed setting	Alarm value	0-200%***(80%)***	Sets the engine rated speed percentage. Disables the engine under speed alarm when the set value is 0. ☠: In speed control mode, the under speed alarm value is the target speed * under speed alarm percentage.
		Return value	0-200%***(85%)***	
		Alarm action	0: Warning ***1: Alarm and stop***	
		Alarm delay	0-3600.0S***(3.0S)***	
6	Battery setting	Rated voltage	8.0-36.0V ***(24.0V)***	When the battery voltage is lower than start value and remains 10s under non-running status, then
		Charging start	8.0-30.0***(25.6V)***	

		Charging stop	10.0-36.0 ***(27.8V)***	the relay is opened. When it is higher than the close value and remains 10s, relay is closed. Once coming into running mode, there is no output.
		Over battery	0-200%***(135%)***	Sets the percentage of rated battery voltage. Disables the battery over voltage warning when set to 200. Disables the battery under voltage warning when the set value is 0.
		Under battery	0-200%***(67%)***	
		Warning delay	0-3600.0S ***(60.0S)***	
		Charger warning	1.0-30.0V ***(30.0V)***	Detects D+ and B+ when their difference, and disables the charge failure warning when set to 30.
		Charger warning delay	0-3600.0s ***(10.0s)***	
7	Local start crank times	1-30 ***(1 time)***	Crank times under local start mode.(If diesel driven suction pump enabled, it is also can be crank attempts of diesel driven suction pump).	
8	Auto start crank times	1-30 ***(3 times)***	Crank times under auto mode.(If diesel driven suction pump enabled, it is also can be crank attempts of diesel driven suction pump).	
9	E.T.S. hold times	1-10***(2 times)***	The max E.T.S. hold on power shall be canceled once stop success under auto mode. the output interval time is " Fail to stop ".	
10	Crank disconnect	RPM Oil pressure ***RPM/Oil Pressure***	1.If there is no oil pressure sensor, please don't choose the type. 2.Oil pressure switch input is not the crank condition 3.Please check if the running status, stop condition are according with crank condition. 4.Means either of the conditions can be acceptable as crank condition. But all of them should be meet together to regard as stop condition.	
11	Crank disconnect conditions	RPM disconnect	0-200% ***(24%)***	According to the judgement of starting success conditions, the judgement conditions are met, the starting is considered successful, and the crank disconnect.
		Oil pressure disconnect	0-400kpa ***(200kpa)***	
		Oil pressure delay	0-60.0s ***(0.0s)***	
12	Pre-oil supply setting	Pre-oil supply rest Time	0-12h ***(0.0h)***	When output is configured as "Pre-oil supply", it is the interval between the completion of the pre-fuel supply output and the next Pre-oil supply output in standby status. If time is 0,Pre-oil supply is not output in standby status.
		Pre-oil supply output time	3—30.0s***(5.0s)***	It is Pre-oil supply output time when output configured as "Pre-oil supply".

4) Suction Pump setting

No	Parameter	Range(defaults)	Notes
1	Suction pump crank	***0: Disable*** 1: D-driven suction pump 2: E-driven suction pump	Select whether to start the suction pump and pump type.
2	D-driven suction pump fault shutdown delay	0-3600.0S***(90.0S)***	Time for waiting press to suction pump (“Waiting Press. to” input is active).
3	D-driven suction pump crank output time	0-3600.0S***(5.0S)***	Time for D-driven suction pump crank output.
4	D-driven suction pump stop output time	0-3600.0S***(15.0S)***	Time for D-driven suction pump stop output.
5	Outlet press when E-driven suction pump stopped	0-1000kpa***(100kpa)***	It is pressure when “E-driven Pump Start” input stops outputting.

5) Sensor setting

No	Parameters	Range***(defaults)***		Notes
1	AUX.SENSOR 1	Users Configured name	***Water Temperature Sensor***	Related Settings Please refer to User Configurable Sensor Generality Settings
		Sensor Type	***1: Temperature type sensor***	
		Signal Type	***1: Resistive type***	
		Display Unit	***1: ℃***	
		Curve Type	***2:VDO 40-120 ℃***	
		Lower range limit		
		Upper range limit		
		Sensor Disconnect Action	***1: Warning***	
		Alarm Action	***2:Alarm and stop***	
		High Alarm value	***98 ℃***	
		Low Alarm Value		
		Alarm Action Delay	***5.0S***	
		Users configured curve setting		
2	AUX.SENSOR 2	Users Configured name	***Oil Pressure Sensor***	Related Settings Please refer to User Configurable Sensor Generality Settings
		Sensor Type	***2: Pressure type sensor***	
		Signal Type	***1: Resistive type***	
		Display Unit	***2:kPa***	
		Curve Type	***2:VDO 0-10Bar***	
		Lower range limit		
		Upper range limit		
		Sensor Disconnect Action	***1: Warning***	
		Alarm Action	***2:Alarm and stop***	
		High Alarm Value		

		Low Alarm Value	***103kPa***	
		Alarm Action Delay	***5.0S***	
		Users configured curve setting		
3	AUX.SENSOR 3		***Disable***	Related Settings Please refer to User Configurable Sensor Generality Settings
4	AUX.SENSOR 4		***Disable***	
5	AUX.SENSOR 5		***Disable***	
6	AUX.SENSOR 6		***Disable***	
7	Heating Settings	Open Value	-50℃-300℃ ***(-50℃)***	Heating Control Setting Minimum Disable
		Close Value	-50℃-300℃ ***(-50℃)***	
		Maximum time	0-7200Min ***(0Min)***	
		Associated connection Sensors	AUX.SENSOR1~6	Associated Temperature Sensor Valid
8	Cooling Settings	Open Value	-50℃-300℃ ***(-50℃)***	Cooling Control Setting Minimum Disable
		Close Value	-50℃-300℃ ***(-50℃)***	
		Maximum time	0-7200Min ***(0Min)***	
		Associated connection Sensors	AUX.SENSOR1~6	Associated Temperature Sensor Valid
9	Fuel pump setting	Open Value	0-100% ***(25%)***	The fuel pump switches on when the fuel level is below the set value and lasts for 10s. The fuel pump switches off when it is higher than the set value and lasts 1s. Time minimum 0 disables the fuel pump output function.
		Close Value	0-100% ***(80%)***	
		Maximum fuel pump on time	0-65000s ***(0s)***	
		Filling detection	0-600s ***(30S)***	When the fuel pump is operating, if an increase in the sensor fuel level value of less than 3% is detected during this time, a fuel filler system fault warning is reported.
		Tank volume	0-10000L ***(0L)***	
		Associated connection Sensors	AUX.SENSOR1~6	Associated Fuel Sensor Valid
10	Outlet Pressure setting	Pump head	***0: Disable*** 1: Enable	
		Pump flow	***0: Disable*** 1: Enable	
		Static pressure	-10000-10000kpa ***(0kpa)***	Setting static pressure of water pump outlet port.
		Rated flow	**0-10000**m^3/h ***(1000m^3/h)***	Rated working flow of engine.
		Flow unit	***0: m^3/h*** 1: L/s	
		Over flow Warn	0-200% ***(110%)***	Warning if flow value is higher than this value during engine

				running. Enable alarms, delay value and return value can be set.
		Over flow shutdown	0-200%***(120%)***	Shutdown if flow value is higher than this value during engine running. Enable alarms and delay value can be set.
		Flow Curve Set		Set the relationship between the different outlet pressures and its corresponding flows.
		Associated connection Sensors	AUX.SENSOR1~6	Associated Outlet Pressure Sensor Valid
11	Choke setting	Choke closing temperature	20－200℃***(40℃)***	Used to control the choke, which operates when the engine temperature falls below this setting.
		Choke closing delay	0－200.0s***(3.0s)***	Choke closing delay time.
		Associated connection Sensors	AUX.SENSOR1~6	Associated Temperature Sensor Valid
User Configurable Sensor Generality Settings				
Users Configured name	0: Disable ; 1:Users Configured sensor name; 2:Potentiometer; 3: Temperature sensor; 4: Oil Pressure Sensor; 5: Liquid level sensor 6: Fuel level sensor; 7: Pipe Network pressure sensors 8: Inlet pressure sensor; 9: Outlet pressure sensor 10: Torque converter oil temperature sensor; 11: Water level sensor; 12: water pressure sensor; 13: Coolant temperature sensor; 12: Exhaust gas temperature sensor; 13: Exhaust gas pressure sensor; 14: Intake pressure sensor; 15: Primary pressure sensor; 16: Secondary pressure sensor; 17: System pressure sensor; 18: Flow sensor.			
Sensor Type	0: Disable 1: Temperature type sensor 2: Pressure type sensor 3: Percentage sensor 4: Flow rate type			
Signal Type	1: Resistive type 2: Voltage type 3: Current type			
Display Unit	Resistive type	1:℃ 2:℉		
	Voltage type	1:Bar 2:kPa 3:PSI 4:MPa		
	Current type	1:%		
	Flow rate type	1: m^3/h 2: L/s		
Curve Type	Resistive type	Pressure type	1:Users Configured Resistive Pressure Sensor 2:VDO 0-10Bar 3:MEBAY-003B 4:SGH	

			5:SGD 6:SGX 7:CURTIS 8:DATCON 10Bar 9:VOLVO-EC 10:3015237 11:WEICHAI 0-0.6Mpa 12:GENCON 0-10Bar
		Temperature type	1:Users Configured Resistive Temperature Sensor 2:VDO 40-120℃ 3:MEBAY-001B 4:MEBAY-Mier 5:SGH 6:SGD 7:SGX 8:CURTIS 9:DATCON 10:VOLVO-EC 12:3015238 12:PT100 13:WEICHAI 40-120℃ 14:GENCON 40-120℃
		Percentage	1:Users Configured Resistive Percentage Sensor 2:0-100Ω 3:100-0Ω 4:0-107Ω 5:107-0Ω 6:0-180Ω 7:180-0Ω 8:10-180Ω 9:180-10Ω 10:10-120Ω 11:120-10Ω 12:0-90Ω 13:90-0Ω 14:0-30Ω 15:30-0Ω 16: 73-10Ω 17:240-33Ω 18:33-100Ω 19:0-200Ω 20:200-0Ω 21: 0-190Ω 22: 190Ω-0Ω
	Voltage type	1: Users Configured voltage type 2: 0-5V 3: 0.5-4.5V	
	Current type	1: Users Configured current type	

		2: 4-20mA	
Lower/Upper Range limit setting	Pressure type sensor	0-60MPa	
	Temperature type sensor	lower limit	-100 - 1000℃
		upper limit	-100 - 1000℃
	Percentage sensor	lower limit	0-200%
		upper limit	5-200%
	Flow rate type	0 - 6000m³/h	
Sensor Disconnect Action	1:Disable 2:Warning 3:Alarm and stop		
Alarm Action	1: Warning 2:Alarm and stop 3:Stop after heat dissipation		
High Alarm Value	0 - 6000		
Low Alarm Value	0 - 6000		
Alarm Action Delay	0 - 6000s		
Users configured curve setting	***:Sensor curve can be Users Configured by panel buttons, resistance and according value should be input,MAX 15 groups ,MIN 2 groups. Rule: resistance should be input from small to large.***		

6) Input setting

No	Parameters		Range***(defaults)***	Notes
1	AUX. INPUT 1 (Pin19)		***13.Emergency shutdown***	
2	AUX. INPUT 2 (Pin20)		***29:Remote start***	
3	AUX. INPUT 3 (Pin21)		***4:High water temperature alarm switch***	
4	AUX. INPUT 4 (Pin22)		***2:Low oil pressure alarm switch***	
5	AUX. INPUT 5 (Pin23)		***0:Disable***	
6	AUX. INPUT 6 (Pin24)		***0:Disable***	
7	AUX. INPUT setting	Function	0-50	**Fixed projects: Only fixed functions and valid methods can be selected**
		Valid Type	***Normal close*** Normal open	
		Action	Warning Alarm	**Users Configured projects:** All options can be set when valid when **(Function 1: Users Configured)**.is selected.
		Point	Disable Standby From crank From safety on After rated running Always	
		Delay	0-3600S	

AUX. input function table

0.Disable.
1.Users Configured.
2.Low oil pressure alarm.
3.Low oil pressure warning.
4.High water temperature alarm.
5.High water temperature warning.
6.Low water level alarm.

7.**Low water level warning.**
8.**Low fuel level alarm.**
9.**Low fuel level warning.**
10.**Lamp Test:** When the input is valid: the indicator lights are all on.
11.**Louver status input.**
12.**Meter mode:** all output are disabled, alarm and warns are invalid.
13.**Emergency stop.**
14.**Reset Alarm:** Can reset shutdown alarm when input is active.
15.**Silent alarm:** audio alarm output is disabled if there is signal output.
16.**External instant warning.**
17.**External instant alarm.**
18.**Reserved**.
19.**Reserved**.
20.**Reserved**.
21.**Panel lock:** any button except for page button is disabled if there is signal output.
22.**Auto stop inhibit:** In auto mode, during engine normal running, when input is active, inhibit engine shutdown automatically.
23.**Auto start inhibit:** In auto mode, inhibit engine start automatically when input is active.
24.**Scheduled run inhibit:** In auto mode, inhibit scheduled run engine when input is active.
25.**Crank success input:** When this function is active, it means the engine is started successfully. If this function is configured, the speed and oil pressure crank success conditions will be invalid.
26.**Idle/High speed:** Enter into idle mode when input is active; return back to high-speed running when input is inactive.
27.**Idle/High Speed (Manual):** In auto mode, it doesn't return back to idle mode when input is active; In manual mode, it enters idle mode when input is active; return back to high-speed running when input is inactive.
28.**Idle/High speed (Memory):** In the normal running, it enters idle mode when input is active; return back to last adjusted high-speed value when input is inactive. It is only active for the current start and still run to rated speed for next start.
29.**Remote start:** In auto mode, when input is active, engine can be started automatically.
30.**Remote stop:** In auto mode, when input is active and remote start input is inactive, engine can be stopped automatically.
31.**Manual Start Input:** In auto mode, when input is active, engine can be started automatically; when input is inactive, engine can be stopped automatically.
32.**Simulate Stop key:** An external button (unlatched) can be connected and pressed as simulate panel.
33.**Simulate Manual key:** An external button (unlatched) can be connected and pressed as simulate panel.
34.**Simulate Auto key:** An external button (unlatched) can be connected and pressed as simulate panel.
35.**Simulate Start key:** An external button (unlatched) can be connected and pressed as simulate panel.
36.**Simulate Speed Regulation key:** An external button (unlatched) can be connected and pressed as simulate panel.
37.**Reset maintenance time:** Controller will set maintenance time and date as default when input is active.
38.**External charging failure:** When input is active, charging failure warning alarm occurs.
39.**Speed up:** When the input is valid: the speed increases according to the set acceleration step;
40.**Speed down:** When the input is valid: the speed decelerate according to the set

deceleration step;

41. **D-driven suction pump started:** When input port is active, it indicates diesel driven suction pump started successfully.
42. **Press. to suction pump:** When input port is active, it indicates pressure has been to suction pump.
43. **Water gun On/Off input:** (1,Normal status: if input is active, bypass control is output between start idle to stop idle period.)(2, Idle running status: if input is active, engine operates idle running to normal running, meanwhile, bypass control starts output (if configured).
44. **High water level input:** In auto mode, when input is active, engine can be started automatically (drain flood).
45. **Low water level input:** In auto mode, when input is active and high water level input is inactive, engine can be stopped automatically (drain flood)
46. **-50 Reserved.**

7) Output setting

No	Parameters		Range***(defaults)***	Notes
1	AUX.OUTPUT 1 (Pin5)	Function	0-80***(24:Fuel output)***	Set the default value (please refer to the AUX. Output function table) **Set the state when the AUX. output is valid.**
		Valid Type	***0-Normal open*** 1-Normal close	
2	AUX.OUTPUT 2 (Pin7)	Function	0-80***(13:Public warning output)***	
		Valid Type	***0-Normal open*** 1-Normal close	
3	AUX.OUTPUT 3 (Pin8)	Function	0-80***(14:Public alarm output)***	
		Valid Type	***0-Normal open*** 1-Normal close	
4	AUX.OUTPUT 4 (Pin9)	Function	0-80***(34:E.S.T. hold)***	
		Valid Type	***0-Normal open*** 1-Normal close	
5	AUX.OUTPUT 5 (Pin10,11)	Function	0-80***(0:Disable)***	
		Valid Type	***0-Normal open*** 1-Normal close	
6	AUX.OUTPUT 6 (Pin12,13,14)	Function	0-80***(0:Disable)***	
		Valid Type	***0-Normal open*** 1-Normal close	

AUX. Output function table

0.Disable

1. **Input 1 valid:** Action when input 1 is valid.
2. **Input 2 valid:** Action when input 2 is valid.
3. **Input 3 valid:** Action when input 3 is valid.
4. **Input 4 valid:** Action when input 4 is valid.
5. **Input 5 valid:** Action when input 5 is valid.
6. **Input 6 valid:** Action when input 6 is valid.
7. **Associated connection AUX.SENSOR 1 :** The association can users configured outputs of sensor 1 (Disconnect, warning, alarm, etc.).
8. **Associated connection AUX.SENSOR 2 :** The association can users configured outputs of sensor 2 (Disconnect, warning, alarm, etc.).
9. **Associated connection AUX.SENSOR 3 :** The association can users configured outputs of sensor 3 (Disconnect, warning, alarm, etc.).

10. **Associated connection AUX.SENSOR 4 :** The association can users configured outputs of sensor 4 (Disconnect, warning, alarm, etc.).
11. **Associated connection AUX.SENSOR 5 :** The association can users configured outputs of sensor 5 (Disconnect, warning, alarm, etc.).
12. **Associated connection AUX.SENSOR 6 :** The association can users configured outputs of sensor 6 (Disconnect, warning, alarm, etc.).
13. **Public warning output:** when there is any warning output.
14. **Public alarm output:** Action when engine common warning, common shutdown, common trips alarm.
15. **Audio alarm:** when there is any alarm output, the Audio controls.
16. **Lamp Test Output:** Output when lamp test is in progress.
17. **Preheat mode 1:** preheat before start.
18. **Preheat mode 2:** preheat before crank success.
19. **Preheat mode 3:** preheat after safety delay.
20. **Louver control:** Outputs when the engine is switched on, and stops when the engine is stopped.
21. **Choke control:** choke will be started after crank success and off after delay.
22. **Fuel Pre-supply Output:** 1)In standby status, “Fuel Pre-supply” output is active, it will cycle output based on the pre-set “Fuel Pre-supply Rest Time” and “Fuel Pre-supply Time”; if “Fuel Pre-supply Rest Time” is set as 0h, it will not output. 2)“Fuel Pre-supply Time” is outputting before starting. If the pre-heat time is not configured, the fuel pre-supply phase outputs; if pre-heat time is configured, the preheat phase outputs.
23. **Oil Pre-lubrication output:** Action in period of pre-heating, cranking and crank rest time.
24. **Fuel output:** output once engine starts and off till stable.
25. **Crank output:** output once cranking, no output in other mode.
26. **Crank Success Output:** Close when detects crank success signal.
27. **Engine block running:** output under running, off once RPM is lower than cranking RPM. The crank success condition can be set.
28. **Idle speed control:** used for speed controller, there is output under idle but no output under high speed.
29. **Speed-up control:** there is output when coming into high speed warming up, which time is **Longest RPM-up time**.
30. **High speed control:** The output is valid after idle delay is completed, and the output is closed after high-speed heat dissipation.
31. **Speed-down control:** the output time is shutdown idle delay during shutdown idle or shutdown on power procession.
32. **Pulse speed up output:** the pulse shall be sent out in the interval of “Pulse speed up delay” under speed –up.
33. **Pulse speed down output:** the pulse shall be sent out in the interval of “Pulse speed down delay” under stop idle speed.
34. **E.S.T. hold:** shutdown output, it is used for engine with stop solenoid. when the setting value of shutdown delay is over, then it is off.
35. **Reserved**.
36. **Rated running:** there is output under rated running.
37. **Heating output:** output according to the heating condition setting;
38. **Cooling output:** output according to the cooling condition setting;
39. **Fuel pump output:** output according to fuel pump setting conditions;
40. **Oil pump control:** when the CAN protocol is Yuchai LMB. When the engine is in the standby state, the oil pump controls the output every 30 minutes. If the oil pressure is higher than 100kPa or the output is 1 minute (whichever comes first), the oil pump

control output will stop; when the engine is in the preheating state, the oil pump control will always output.

41. **Battery charging control:** there is output if the voltage is lower than the preset value under standby status and shutdown after start and in running status.
42. **System in stop:** there is output under stop mode.
43. **System in manual:** there is output under manual mode.
44. **System in auto:** there is output under auto mode.
45. **Override output:**The controller output when it is in Override mode.
46. **ECU power:** apply to electrical ECU engine, used for control ECU power.
47. **ECU stop:** apply to electrical ECU engine, used for control ECU shutdown.
48. **ECU warning:** there is a warn signal from ECU.
49. **ECU alarm:** there is an alarm signal from ECU.
50. **ECU communication failure alarm:** Cannot communicate with ECU.
51. **Reserved**.
52. **ECU communication failure warning:**Output when ECU Communication Failure Warning.
53. **Fail to start alarm:**Output when the engine fails to start.
54. **Stop failure alarm:**Output when the engine shutdown fails to alarm.
55. **Under battery voltage warning output :**Output when the battery voltage is low warning.
56. **Over battery voltage warning:**Output when the battery voltage is low warning.
57. **Charging failure warning:**Output when the engine charger fails to charge.
58. **Floating charger fault warning:**Output when the floating charger fails to charge.
59. **Emergency stop alarm:**Output when emergency stop alarm.
60. **Over speed warning:**Output when Over Speed Warning.
61. **Over speed alarm:** Output when Over Speed alarms.
62. **Under speed warning:**Output when engine under speed warning.
63. **Under speed alarm:**Output when engine under speed alarm.
64. **D-driven Pump Start:** Output when suction pump set as diesel-driven suction pump.
65. **D-driven Pump Stop:** Output when suction pump set as diesel-driven suction pump.
66. **E-driven Pump Start:** Output when suction pump set as electronic-driven suction pump. It stops output when engine stopped.
67. **Bypass Control Output:** The input port is configured as “Water Gun On/Off Status Input” and is output between the “Start Idle” and “Stop Idle” when input is active.
68. **Over Flow Shutdown:** Action when engine over flow shutdown alarm occurs.
69. **Over Flow Warning:** Action when engine over flow warning alarm occurs.
70. **-100 Reserved.**

8) CAN communication

No	Parameter	Range***(default)***	Notes
1	ECU failure	Disable Warning ***Alarm and Stop***	ECU communication failure.
2	ECU warning	Disable***/Enable***	ECU warnings enable.
3	ECU alarm	Disable***/Enable***	ECU alarms enable.
4	Mask SPN	0-12	Up to 12 sets of alarm codes can be input, and the controller will not respond to the input alarm codes.
5	ECU speed control address	0-255***(3)***	The TSC1 message ID address sent by the controller to the ECU, and the

			communication protocol must be 31: J1939-C.
6	CAN communication rate	0-Automatic detection 1-125Kbps ***2-250Kbps*** 3-500Kbps	CAN communication rate
7	Low oil pressure Alarm from ECU	0-999kpa ***(103kpa)***	When the oil pressure data comes to the ECU, set the low oil pressure alarm value.
8	Coolant temperature high alarm from ECU	20-200℃ ***(98℃)***	When the Coolant temperature data comes to the ECU, set the coolant temperature high alarm value.

9) Adjust Speed Setting

No	Parameter	Range***(default)***	Notes
1	Speed control type	***0:Disable*** 1:CAN speed control-keypad 2:CAN speed-switching 3:CAN speed - 1 or 2 4:CAN speed - potentiometer	Selecting the speed control method.
2	Maximum speed	500-4500RPM ***(2500RPM)***	Sets the maximum speed for the engine speed control.
3	Speed up step	1-200RPM ***(50RPM)***	Sets the step of speed increase when the key is pressed once or the acceleration switching amount is actuated once.
4	Speed down step	1-200RPM ***(50RPM)***	Set the step size of the speed reduction when the key is pressed once or the deceleration switching volume is actuated once.
5	Potentiometer resistance	100-5000Ω ***(4700Ω)***	Set the resistance value of the external speed potentiometer; the potentiometer adjusts the engine speed from "electronically controlled idle value" to "maximum speed value".

A) Module settings

No	Parameter	Range(defaults)	Notes
1	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.
2	User password	00000-65535 ***(07623)***	Change the password.
3	Controller ID	1-255***(16)***	The IP built by controller and PC.
4	RS485 baud rate	0-4800 1-9600 ***2-19200*** 3-38400 4-57600 5-115200	RS485 communication baud rate.
5	Start screen display time	0-20.0s ***(5.0s)***	Start screen display time,0: No-display.

6	LCD contrast	50-127***(106)***	Set the LCD display contrast.
7	Saving mode	5.0-6000.0s ***(600.0s)***	LCD light will be closed automatically without any button pressed after delay. If setting as 6000.0s, back light always lighted.
8	Homing display	5.0-600.0s ***(600.0s)***	The time when the page reverts back to the home page. If setting as 600.0s: disabled.
9	LOGO delay display under standby	5.0-6000.0 ***(6000.0s)***	Start screen will be opened without any button pressed after delay. If setting as 6000.0s: disabled.
10	ECU page	Disable/***Enable***	Set whether the ECU page is displayed.
11	Date/Time	2000/01/01-2099/12/31	Internal calendar, please calibrate regularly.
12	Current time	00:00-23:59	

B) Automatic maintenance

No	Parameter	Range***(defaults)***	Notes
1	Working plan format	***Disable*** Every month Every week	This mode must be under auto mode. Working plan is disabled once setting as disable. The working plan will be executed according the chosen date when setting as every month. The working plan will be executed according the chosen date when setting as every week.
2	Maintenance date per month	From 1st to 31st ***Default: the first day***	The date chosen for every month.
3	Maintenance date per week	Monday to Sunday ***Default: Sunday***	The date chosen for every week.
4	Reserved		
5	Maintenance start time	00:00-23:59***(00:00)***	Maintenance start time setting.
6	Maintenance running time	1-120m***(5min)***	Maintenance running time setting.

C) Maintenance Plan

NO	Parameter	Range***(default)***	Notes
1	Countdown to oil change	0-5000h***(5000h)***	When it is set as 5000, then this function is disabled.
2	Air filter H	0-5000h***(5000h)***	
3	Fuel filter H	0-5000h***(5000h)***	
4	Oil filter replacement date	***2000/01/01***-2099/12/31	When it is set as 2000/01/01, this function is disabled.
5	Air filter D	***2000/01/01***-2099/12/31	
6	Fuel filter D	***2000/01/01***-2099/12/31	
7	engine oil filter expires action	***Warn*** Delayed alarm stop Alarm and stop	engine action after the oil expires.
8	Air filter expiration	***Warn*** Delayed alarm stop	engine action after the air filter expires.

	action	Alarm and stop	
9	Fuel filter expiration action	***Warn*** Delayed alarm stop Alarm and stop	engine action after the fuel filter expires.
10	Maintenance due delay time	0-500.0h***(1.0h)***	If after the maintenance expires, after the engine starts successfully, after the set time, the maintenance expired shutdown alarm will be reported.
11	Maintenance expiry reset password	0-65535（***06869***）	When the maintenance countdown time arrives, enter the password to reset the maintenance countdown time, this password cannot be the same as the parameter setting password.

D) Limited time function

NO	Parameter	Range***(default)***	Notes
1	Factory limited time	0-5000h***(5000h)***	Set the accumulated time allowed by the manufacturer to run the engine. After the timer expires, the engine will not run. Entering a temporary password can ensure that the engine will start at one time. When set to 5000, this function is disabled.
2	Temporary password one	0-65535***(11111)***	After the manufacturer's time limit is set, the temporary password 1 will become invalid after one use;
3	Temporary password two	0-65535***(22222)***	After the manufacturer's time limit is set, the temporary password 2 will become invalid after one use;
4	Temporary password three	0-65535***(33333)***	After the manufacturer's time limit is set, the temporary password 3 will become invalid after one use;
5	Factory release password within a limited time	0-65535***(44444)***	After the manufacturer's time limit is set, enter this password to permanently unlock the password;

Fault finding

Symptoms	Possible Solutions
Controller no response with power	Check DC voltage. Check DC fuse. Check if the terminal 1 and 2 is with battery voltage.
Units shutdown	Check the water/cylinder temperature is too high or not. Check DC fuse.
Emergency Stop	Check the emergency stop button. Check that the voltage of the controller's 3 feet to the ground should be the battery voltage. Check the controller connection.
Low oil pressure alarm	Check oil pressure sensor and its wiring. Check the oil pressure sensor type and controller settings must

	be consistent. Check whether the low oil pressure sensor is normal.
High temperature alarm	Check temperature sensor and its wiring. Check the temperature sensor type and controller settings must be consistent. Check whether the temperature sensor is normal.
Shutdown Alarm in running	Check related switch and its connections according to the information on LCD. Check programmable inputs.
Fail to start	Check the engine fuel circuit and its connecting wires; Check whether the starting battery voltage is normal; Check the speed sensor and its connecting wire;
Starter motor does not respond	Check the wiring to the starter. Check start battery.
USB communication is abnormal	Check the USB connection. Check whether the USB port of the computer is normal. Check whether the USB driver is installed.
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 controller RS485.
ECU warning or stop	Get information from LCD of alarm page; If there is detailed alarm, check engine according to description. If not, please refer to engine manual according to SPN alarm code.