SmartGen

MAKING CONTROL SMARTER

HED200

ENGINE MONITORING MODULE

USER MANUAL

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Table 1 Software Version

Date	Version	Note
2024-7-3	1.0	Original release.
2024-9-18	1.1	Modify the description in the Overview, and the aux. outputs content in the Wiring Connection.

Table 2 Notation Clarification

Sign	Instruction
 NOTE	Highlights an essential element of a procedure to ensure correctness.
 CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 WARNING!	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

CONTENTS

1 OVERVIEW

HED200 Engine Monitoring Module is used for monitoring of single engine, which can realize functions of data measurement, maintenance, alarm protection, and “Three Remote" for engines. The module is fitted with an RS485 port, various parameters can be flexibly configured via host PC to enable a digital and intelligent engine control system. It has an LCD screen, which can visually display all engine operation parameters, and enable simple operation and reliable running.

2 PERFORMANCE AND CHARACTERISTICS

Main characteristics are as follows:

— 132x64 LCD display with backlight; optional Chinese and English display interface for simple operation;
— Customized theme function allows users to flexibly configure the display content in the main screen;
— With an RS485 communication port, it can realize “‘Three Remote” function (remote control/measurement/communication);
— Touch key design with backlight on the panel prolongs key’s life;
— With four analog sensor inputs, one can be configured as resistance type, and others can be flexibly configured as resistance or current type;
— Four analog sensor inputs can be reconfigured as digital inputs;
— With maintenance function, alarm will be issued for maintenance time due;
— Suitable for non-ECU engines;
— Wide power supply range of (8-35)VDC enables it be compatible with different starting battery voltages;
— Fully sealed design makes the protection level of entire module reach IP66;
— With event log function, it can store up to 499 pieces of logs;
— Modular design, high-quality anti-flaming shell, specified connector, embedded mounting, compact structure and easy installation.

3 SPECIFICATION

Table 3 Technical Parameters

Items	Contents
Operating Voltage	DC8V~DC35V, DC reverse connection protection Resolution: 0.1V Accuracy: 1%
Power Consumption	<1.1W (Standby mode: ≤0.4W) (liquid crystal heating: <9.2W)
Analog Sensor	Resistance Input Range: 0Ω ~ 6000Ω Resolution: 0.1Ω Accuracy: 1Ω (below 300Ω)
	Current Input Range: 0mA ~ 20mA Resolution: 0.01mA Accuracy: 1%
RS485 Port	Isolated, half-duplex, 9600 baud rate, max communication distance 1,000m
CM-EMC Certificate	EN 55032, EN 55024
Vibration	Displacement ±17mm 8Hz~100Hz: Acceleration ±4g 100Hz~500Hz: Acceleration ±2g IEC 60068-2-6
Shock	50g, 11ms, half-sine, complete shock test from three mutually perpendicular directions, and 18 shocks for each test IEC 60068-2-27
Bump	20g, 16ms, half-sine IEC 60255-21-2
Case Dimensions	116mm x 98mm x 49mm
Panel Cutout	See details in cutout dimensions
Working Temperature	(-40~+70)°C
Working Humidity	(20~93)%RH
Storage Temperature	(-40~+80)°C
Protection Level	IP66
Meeting Standard	GB/T 37089 Reciprocating internal combustion engine driven alternating current generating sets controller
Weight	215g

4 OPERATION

4.1 CONTROLLER PANEL

Fig.1 HED200 Front Panel Indication

Table 4 Indicator Description

Type	Description
Alarm	Flashing slowly (1 time/s), indicating warning alarm; Flashing quickly (5 times/s), indicating shutdown alarm (Red).
Running	Always illuminating in running (Green).
LOGO Backlight	LOGO backlight lights on and brightness can be configured (White).

4.2 KEY FUNCTION DESCRIPTION

Table 5 Key Description

Icon	Buttons	Function Description
	Menu/Return	1. Press it can enter menu in the main screen; 2. Press it can return to previous menu in parameter setting.
	Left/Decrease	1. Scroll screen; 2. Move up cursor or decrease the value in parameter setting.
	Right/Increase	1. Scroll screen; 2. Move down cursor or increase the value in parameter setting.
	Confirm	1. Press it can move cursor and confirm setting information in parameter setting; 2. Hold down it for more than 3s can turn on all indicators on the panel in the main screen (lamp test).

5 MAIN SCREEN DISPLAY PARAMETER SETTING

The display theme of main screen can be set as single, two, four and six parameters.

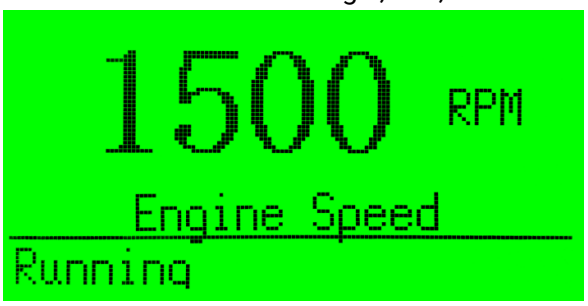


Fig.2 Single Parameter Display

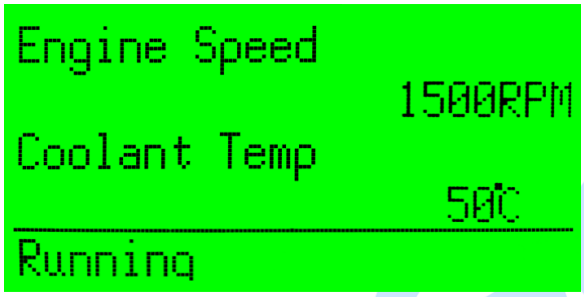


Fig.3 Two Parameters Display

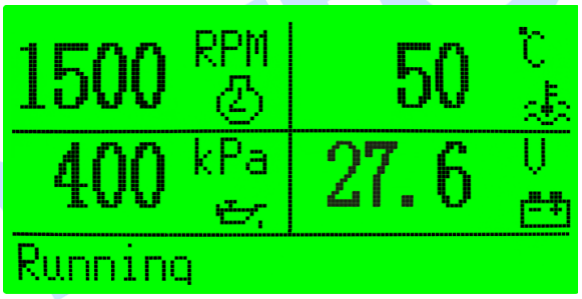


Fig.4 Four Parameters Display

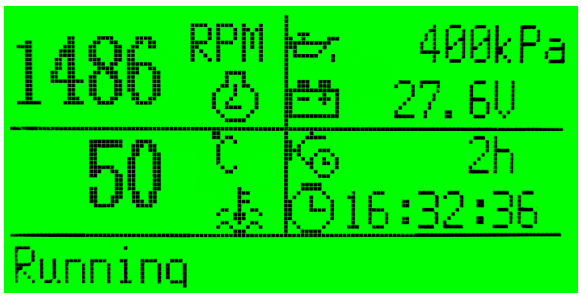


Fig.5 Six Parameters Display

The parameters displayed can be set by PC software. The following is the optional parameters list:

Table 6 Optional Parameters List

No.	Content	Icon
1	Engine speed	
2	Coolant temperature	
3	Oil pressure	

No.	Content	Icon
4	Battery voltage	
5	Charger voltage	D+
6	Output status	
7	Sensor 1 (Digital input 1)	
8	Sensor 2 (Digital input 2)	
9	Date and time	
10	Accumulated running hours	

6 USER MENU AND PARAMETER SETTING

Press in the main screen, it will enter user menu, items are as follows:

>Return
>Parameter Setting
>Maintenance
>Language
>LCD Backlight
>Module Info
>Event Log

Enter correct password (default: 0318) to get into the parameter setting.

Detailed parameter setting method is as follows:

Parameter Setting >Return >Module Set >Engine Set >Sensor Set	Screen 1: After entering setting item, press , to change setting items, then press to enter setting (screen 2), press to return to previous screen. Select the return item, press to return to previous screen.
Module Set >Return >Comm. Address >Password of Parameters >Stop Bit	Screen 2: Press , to change setting items, press to enter setting (screen 3), press to return to previous screen (screen 1). Select the return item, press to return to previous screen (screen 1).
Comm. Address 00001	Screen 3: Press to move cursor and select the value needs to be modified, press , to change parameter value, after finish it, press to save the parameter. Then press to return to previous screen (screen 2).
Module Set >Return >Comm. Address >Password of Parameters >Stop Bit	Screen 4: Press to select item needs to be modified, setting method is same as method of screen 2, 3.
Too High Warn Set Set: Enable Set +00098 Return +00080 Delay 00003s	Screen 5: Set sensor stop parameters. Select >Too High Warn Set, press to enter set value screen, press again to enter screen 5. Press , to select setting item, press to save setting, meanwhile move cursor down, which is shown as screen 6.

Too High Warn Set Set: Enable Set +00098 Return +00080 Delay 00003s	Screen 6: Press ◀, ▶ to change the positive and negative number of parameter value, press ↵ to set the next bit value until setting is finished, then press ↵ to set delay value, if don't need to change, press ⊞ to return to previous screen.

NOTE:

- Please modify the parameters in standby mode (crank disconnect speed, aux. sensor and speed control setting, etc.) otherwise shutdown alarm or other abnormal conditions may appear.
- Over threshold must be greater than the under threshold; otherwise over and under condition may occur at the same time.
- Please set the return value correctly in setting warning alarm, otherwise abnormal alarm will occur. When setting over warning, return value should be less than setting value while return value should be greater than setting value in setting under warning.

7 PARAMETER SETTING RANGE AND DEFINITION

Table 7 Parameter Setting Content and Range

No.	Item	Range	Default	Description
Language Setting				
1	Language	(0-1)	0	0: Simplified Chinese; 1: English
LCD Backlight Setting				
2	LCD Backlight	Contrast(0-10)	5	When delay value is set to 0min, backlight is always illuminated.
		Brightness(0-5)	5	
		Delay (0-3600)min	5	
		Always On Brightness (0-5)	0	
Module Setting				
1	Comm. Address	(1-254)	1	Controller address in remote monitoring.
2	Password	(0-9999)	0318	The password is for entering advanced parameter setting. ⚠**CAUTION:** Default password is "0318", operator can change the password to prevent others from changing the advanced configuration randomly. Please remember it after changing, if forget it, please contact the company service personnel.
3	Stop Bit	(0-1)	0	0: 1-bit; 1: 2-bit
4	485 Baud Rate	(0-2)	0	0: 9600bps 1: 19200bps 2: 38400bps
5	Local/Remote Select	(0-1)	0	0: Local Mode; 1: Remote Mode
6	LOGO & Key Backlight Brightness	(0-10)	5	The higher the setting value, the brighter the backlight.
7	Boot Screen Duration	(0-3600)s	2	The duration for boot screen.
8	Date and Time			User can calibrate the date and time by themselves.
9	Maintenance Password	(0-9999)		The password is for entering the maintenance setting
Engine Setting				
1	Flywheel Teeth	(1.0-300.0)	118.0	The number of the engine flywheel teeth, which is used to determine the crank disconnection condition of the starter and to detect the engine speed, see details in the following installation instructions.
2	Crank Disconnect Speed	(0-1000)RPM	350	The crank of starter will disconnect when the speed is over the set value.

No.	Item		Range	Default	Description
3	Idle Speed		(0-1000)RPM	800	
4	Rated Speed		(0-6000)RPM	2000	Standard for over/under speed.
5	Over Speed Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-200.0)%	110.0	Set value is the percentage of rated speed, return value and delay value can be set.
		Return	(0-200.0)%	108.0	
		Delay	(0-3600)s	5	
6	Battery Rated Voltage		(0-60.0)V	24.0	Standard for battery over/under voltage.
7	Overvolt Warn	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-200)%	120	Set value is the percentage of battery rated voltage, return value and delay value can be set.
		Return	(0-200)%	115	
		Delay	(0-3600)s	60	
8	Undervolt Warn	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-200)%	85	Set value is the percentage of battery rated voltage, return value and delay value can be set.
		Return	(0-200)%	90	
		Delay	(0-3600)s	60	
9	Charging Failure Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-60.0)V	8.0	During the normal operation of the engine, when the charger D+ voltage is lower than this value, the charging failure warning will be issued.
		Return	(0-60.0)V	10.0	
		Delay	(0-3600)s	10	
Sensor Setting					
Aux. Sensor 1					
1	Sensor Select		(0-5)	5	0: Not Used; 1: Temp. Sensor; 2: Pressure Sensor; 3: Level Sensor; 4: Digital Input; 5: Engine fuel level. See digital input configurations in Table 10.
2	Curve Type		(0-15)	11	Change according to sensor type.
3	Open Action		(0-1)	1	0: Warning; 1: No Action
4	Display Unit		(0-2)	0	0: °C; 1:°F; (Temperature) 0: kPa; 1: bar; 2: psi; (Pressure) 0: %; 1: m; (Level) **NOTE:** Display unit varies from sensor type.
5	Over Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-9000)	90	When external sensor value exceeds it, warning alarm is issued. Alarm, delay value and return value can be set.
		Return	(0-9000)	80	
		Delay	(0-3600)s	5	
6	Under Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-9000)	20	When external sensor value is less than it, warning alarm is issued. Alarm, delay value and return value can be set.
		Return	(0-9000)	30	
		Delay	(0-3600)s	5	
7	Alarm Protection Active Range		(0-1)	0	0: Always active; 1: After normal running.
8	Custom Curve Set				Corresponding curves needs to be set when selecting custom resistance

No.	Item		Range	Default	Description
					/voltage/current type.
Aux. Sensor 2					
1	Sensor Select		(0-5)	0	0: Not Used; 1: Temp. Sensor; 2: Pressure Sensor; 3: Level Sensor; 4: Digital Input; 5: Engine fuel level. See digital input configurations in Table 10.
2	Curve Type		(0-15)	0	Change according to sensor type.
3	Open Action		(0-1)	0	0: Warning; 1: No Action
4	Display Unit		(0-1)	0	0: °C; 1:°F; (Temperature) 0: kPa; 1: bar; 2: psi; (Pressure) 0: %; 1: m; (Level) **NOTE:** Display unit varies from sensor type.
5	Over Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-9000)	90	When external sensor value exceeds it, warning alarm is issued. Alarm enable, delay value and return value can be set.
		Return	(0-9000)	80	
		Delay	(0-3600)s	5	
6	Under Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-9000)	20	When external sensor value is less than it, warning alarm is issued. Alarm enable, delay value and return value can be set.
		Return	(0-9000)	30	
		Delay	(0-3600)s	5	
7	Alarm Protection Active Range		(0-1)	0	0: Always active; 1: After normal running.
8	Custom Curve Set				Corresponding curves needs to be set when selecting custom resistance /voltage/current type sensor.
Coolant Temperature Sensor Setting					
1	Sensor Select		(0, 1, 4)	1	0: Not used; 1: Temperature sensor; 4: Digital input.
2	Curve Type		(0-15)	9	See details in Table 12
3	Open Action		(0-1)	0	0: Warning; 1: No Action.
4	Display Unit		(0-1)	0	0: °C; 1: °F
5	Over Warn Set	Enable	(0-1)	1	0: Disable; 1: Enable
		Set	(0-300)°C	95	When engine temperature exceeds it, warning alarm is issued. Alarm enable, delay value and return value can be set.
		Return	(0-300)°C	93	
		Delay	(0-3600)s	5	
6	Under Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-300)°C	20	When engine temperature is less than it, warning alarm is issued. Alarm enable, delay value and return value can be set.
		Return	(0-300)°C	30	
		Delay	(0-3600)s	5	
7	Alarm Protection Active Range		(0-1)	0	0: Always active; 1: After normal running.
8	Custom Curve Set				Corresponding curves needs to be set when selecting custom resistance type sensor.
Engine Oil Pressure Setting					

No.	Item		Range	Default	Description
1	Sensor Select		(0, 2, 4)	0	0: Not used; 2: Pressure sensor; 4: Digital input.
2	Curve Type		(0-15)	9	See details in Table 12
3	Open Action		(0-1)	0	0: Warning; 1: No Action.
4	Display Unit		(0-2)	0	0: kPa; 1: bar; 2: psi
5	Over Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-300)kPa	90	When engine oil pressure exceeds it, warning alarm is issued. Alarm enable, delay value and return value can be set.
		Return	(0-300)kPa	80	
		Delay	(0-3600)s	5	
6	Under Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-300)kPa	124	When engine oil pressure is less than it, warning alarm is issued. Alarm enable, delay value and return value can be set.
		Return	(0-300)kPa	138	
		Delay	(0-3600)s	5	
7	Alarm Protection Active Range		(0-1)	0	0: Always active; 1: After normal running.
8	Custom Curve Set				Corresponding curves needs to be set when selecting custom resistance type sensor.
Aux. Output Setting					
1	Output Content		(0-29)	0	Custom period output, see details in Table 8
2	Output Active Type		(0-1)	0	0: Normally open; 1: Normally closed.
Maintenance Setting					
1	Maintenance 1 Set		(0-1)	0	0: Disable; 1: Enable It can set maintenance time, time due action, pre-alarm A and B time, action and timing method, reset maintenance time simultaneously. After genset maintenance, it can reset time due alarm by resetting maintenance time. See details in Table 9.
2	Maintenance 2 Set		(0-1)	0	
3	Maintenance 3 Set		(0-1)	0	
4	Maintenance 4 Set		(0-1)	0	
5	Maintenance 5 Set		(0-1)	0	
Aux. Input Setting					
Aux. Input 1					
1	Input Content		(0-15)	0	See details in Table 10.
2	Input Active Type		(0-1)	0	0: Closed; 1: Open.
Aux. Input 2					
1	Input Content		(0-15)	0	See details in Table 10.
2	Input Active Type		(0-1)	0	0: Closed; 1: Open.
Aux. Input 3					
1	Input Content		(0-15)	0	See details in Table 10.
2	Input Active Type		(0-1)	0	0: Closed; 1: Open.
Aux. Input 4					
1	Input Content		(0-15)	0	See details in Table 10.
2	Input Active Type		(0-1)	0	0: Closed; 1: Open.

Table 8 Definable Functions of Aux. Outputs

No	Type	Functions
0	Not Used	
1	Custom Period Output	
2	Custom Combination Output	
3	Input 1 Active	Take action when Input 1 is active.
4	Input 2 Active	Take action when Input 2 is active.
5	Normal Running Output	The relay draws to output when it is in normal running.
6	Common Alarm	Take action when there are engine common alarms.
7	Common Warning	Take action when there are engine common warnings.
8	Battery Overvoltage	Take action when there are battery overvoltage warnings.
9	Battery Undervoltage	Take action when there are battery undervoltage warnings.
10	Overspeed Warning	Take action when there are engine overspeed warnings.
11	High Temperature Warning	Take action when engine coolant temperature is high.
12	Low Temperature Warning	Take action when engine coolant temperature is low.
13	Temperature Sensor Open Warning	Take action when engine temperature sensor is open.
14	High Oil Pressure Warning	Take action when oil pressure is high.
15	Low Oil Pressure Warning	Take action when oil pressure is low.
16	Oil Pressure Sensor Open	Take action when engine oil pressure sensor is open.
17	Sensor 1 High Warning	Take action when value of sensor 1 is over the set value.
18	Sensor 1 Low Warning	Take action when value of sensor 1 is under the set value.
19	Sensor 1 Open Warning	Take action when sensor 1 is open.
20	Sensor 2 High Warning	Take action when value of sensor 2 is over the set value.
21	Sensor 2 Low Warning	Take action when value of sensor 2 is under the set value.
22	Sensor 2 Open Warning	Take action when sensor 2 is open.
23	Charging Failure	Take action when charging failure occurs.
24	Idle Speed Output	For engines with idle speed, it outputs when engine is running at idle speed.
25	ETS Control	It is used for some engines with stop electromagnet, it takes action when there are shutdown events in the controller.
26	Overload Output	Take action when overload occurs.
27	Input 3 Active	Take action when Input 3 is active.
28	Input 4 Active	Take action when Input 4 is active.
29	Common Shutdown	Take action when there are common shutdown events in the controller.

Table 9 Maintenance Setting

Item	Content	Description
Enable Set	0: Disable; 1: Enable	It is used for enabling current maintenance function.
Maintenance Time	(0-30000)h	Hours for maintenance after it is enabled.
Time Due Action	0: No Action 1: Warning	Alarm takes action when remaining maintenance time is 0.
Pre-alarm A Time	(0-30000)h	Remaining maintenance time.
Pre-alarm A Action	Same as time due action	Take action when remaining time reaches pre-alarm A time.
Pre-alarm B Time	(0-30000)h	Remaining maintenance time.
Pre-alarm B Action	Same as time due action	Take action when remaining time reaches pre-alarm B time.
Timing Method	0: Running Time 1: Real Time Clock	Timing method for maintenance time.
Reset Maintenance Time		After maintenance, reset the maintenance time via it.
Description Name		User can configure maintenance name via PC, such as “Change oil”.

Table 10 Definable Functions of Aux. Inputs

No	Type	Functions
0	User self-configured	User can configure the follow functions: Inactive: Input is invalid. Always active: Input is always under detection. Normal running active: Input is under detection after it is normal running.
1	High Temperature Warning Input	Connect with the sensor digital input.
2	Low Oil Pressure Warning Input	Connect with the sensor digital input.
3	Idle Speed Input	Active when idle speed outputs.
4	Alarm Reset	
5-15	Reserved	

7.1 CUSTOM PERIOD OUTPUT

Custom period output is composed by 2 parts: period output S1 and condition output S2.

While S1 and S2 are TRUE at the same time, OUTPUT;

While S1 or S2 is FALSE, DON’T OUTPUT.

Period output S1 can set generator’s one or more period outputs, the delay time and the output time after entering period.

Condition output S2 can be set as any conditions in outputs’ functions.

NOTE: When delay time and output time both are 0 in period output S1, it is TRUE in this period.

Example:

Output period: Normal running

Delay output time: 2s

Output time: 3s

Condition output contents: input 1 is active

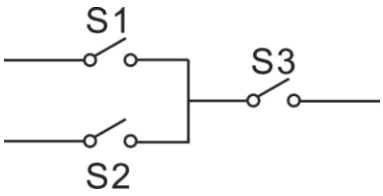
Close when condition output is active/inactive: close when active (open when inactive);

Input 1 active: after enter “normal running” and 2s delay is over, this self-defined period outputs, after 3s, stop output;

Input 1 inactive: self-defined output period doesn’t output.

7.2 CUSTOM COMBINATION OUTPUT

Custom combination output is composed by 3 parts, OR condition output S1, OR condition output S2, and AND condition output S3.



S1 or S2 is TRUE, and S3 is TRUE, custom combination output will output;

S1 and S2 are FALSE, or S3 is FALSE, custom combination output will not output.

NOTE: S1, S2, S3 can be set as any contents except for “custom combination output” itself in the output setting.

NOTE: Three parts of custom combination output (S1, S2, S3) couldn’t include or recursively include themselves.

Example:

Contents of OR condition output S1: Input 1 is active;

Close when OR condition output S1 is active /inactive: close when active (open when inactive);

Contents of OR condition output S2: Input 2 is active;

Close when OR condition output S2 is active /inactive: close when active (open when inactive);

Contents of AND condition output S3: High Temperature Warning Input;

Close when AND condition output S3 is active /inactive: close when active (open when inactive);

When input 1 is active or input 2 is active, if input 3 is active, the custom combination output will output; If high temperature warning input is inactive, custom combination output will not output;

When input 1 and input 2 is inactive, no matter whether high temperature warning input is active or not, custom combination output will not output.

8 CONTROLLER INFORMATION

This screen can display controller development information, such as software version, hardware version, issue date.

9 EVENT LOG

Enter “Event Log” via menu, press  , can scroll page to view the log, press  , can return to previous menu.

Table 11 Event Log Screen

Event Log 001/110 Engine Overspeed Warn 1500rpm 2023-10-30 11:20:09	First line: display current event log no. and total logs; Second line: this log type is “Engine Overspeed”; Third line: alarm value when the event occurs; Fourth line: time stamp, it records the date and time of the event.

10 AUXILIARY SENSOR CURVE SETTING

— When external sensor is required, sensor type needs to be set, default sensor to “Not Used”.

— When there is difference between standard sensor curves and used sensor curves, users can select “Custom Sensor”, and input sensor curve.

— When the sensor curve is inputted, x value must be inputted from small to large, otherwise, mistake occurs.

— If sensor type is selected as “Not Used”, sensor curve is not working.

— The headmost or backmost values in the vertical coordinates can be set as the same as below.

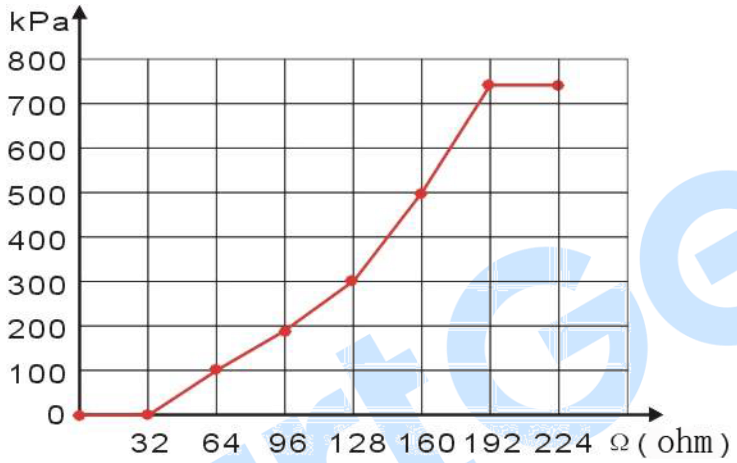


Fig.6 Curve Setting

Table 12 Sensor Selection

No.	Sensor	Curve Type	Remark
1	Temperature Sensor	0 Not Used 1 Custom Resist. Curve 2 Custom (4-20)mA Curve 3 Reserved 4 VDO 5 CURTIS 6 VOLVO-EC 7 DATCON 8 SGX 9 SGD 10 SGH 11 PT100 12 Cu50 13 PT1000 14-15 Reserved	Custom resistance type input range is (0~1)kΩ.
2	Pressure Sensor	0 Not Used 1 Custom Resist. Curve 2 Custom (4-20)mA Curve 3 Reserved	Custom resistance type input range is (0~1)kΩ.

No.	Sensor	Curve Type	Remark
		4 VDO 10bar 5 CURTIS 6 VOLVO-EC 7 DATCON 10bar 8 SGX 9 SGD 10 SGH 11-15 Reserved	
3	Level Sensor	0 Not Used 1 Custom Resist. Curve 2 Custom (4-20)mA Curve 3 Reserved 4 SGD 5 SGH 6-Reserved 7 180-10Ω 8 10-180Ω 9 10-120Ω 10 70-10Ω 11 4-126Ω 12 126-4Ω 13-15 Reserved	Custom resistance type input range is (0~1)kΩ.

11 PROTECTION

Warning alarms. When controller detects warning signal, it only issues warning, not shutdown. When alarm is removed, warning alarm is cleared automatically.

Please note that protection is not enabled by default, so please configure it by yourself.

Table 13 Warning Alarms

No.	Warning	Description
1	Sensor 1 Open	When controller detects sensor is open and action type is “Warning”, it issues warning signal.
2	Sensor 1 High	When controller detects sensor value is above pre-set upper limit of warning values, it issues warning signal.
3	Sensor 1 Low	When controller detects sensor value is below pre-set lower limit of warning values, it issues warning signal.
4	Sensor 1 Error	When sensor parameter configuration is wrong, it issues warning signal.
5	Sensor 2 Open	When controller detects sensor is open and action type is “Warning”, it issues warning signal.
6	Sensor 2 High	When controller detects sensor value is above pre-set upper limit of warning values, it issues warning signal.
7	Sensor 2 Low	When controller detects sensor value is below pre-set lower limit of warning values, it issues warning signal.
8	Sensor 2 Error	When sensor parameter configuration is wrong, it issues warning signal.
9	Maintenance 1	When maintenance countdown is 0, and time due action is “Warning”, it issues warning signal.
10	Maintenance 2	
11	Maintenance 3	
12	Maintenance 4	
13	Maintenance 5	
14	Battery Undervoltage	When controller detects engine battery voltage is lower than pre-set threshold, it issues warning alarm signal.
15	Battery Overvoltage	When controller detects engine battery voltage is higher than pre-set threshold, it issues warning alarm signal.
16	Engine Overspeed	When controller detects speed is above the pre-set over speed warning threshold, it issues warning signal.
17	Charging Failure	When the charger fails to charge, it issues warning signal.
18	Input 3 Warning	Take action when input 3 is active.
19	Input 4 Warning	Take action when input 4 is active.
20	Reserved	
21	Reserved	
22	Input 1 Warning	Take action when input 1 is active.
23	Input 2 Warning	Take action when input 2 is active.
24	High Coolant Temperature Input	When the input is configured as this function and is active, the controller issues warning signal.
25	Low Oil Pressure Input	When the input is configured as this function and is active, the controller issues warning signal.

No.	Warning	Description
26	Reserved	
27	Coolant Temperature High	When controller detects coolant temperature is higher than pre-set high threshold, it issues warning signal.
28	Coolant Temperature Low	When controller detects coolant temperature is lower than pre-set low threshold, it issues warning signal.
29	Coolant Temperature Open	When controller detects coolant temperature is open, it issues warning signal.
30	Oil Pressure High	When controller detects oil pressure value is above pre-set high threshold, it issues warning signal.
31	Oil Pressure Low	When controller detects oil pressure value is below the pre-set low threshold, it issues warning signal.
32	Oil Pressure Open	When controller detects oil pressure is open, it issues warning signal.

12 WIRING CONNECTION

The back panel of HED200 is as follows:

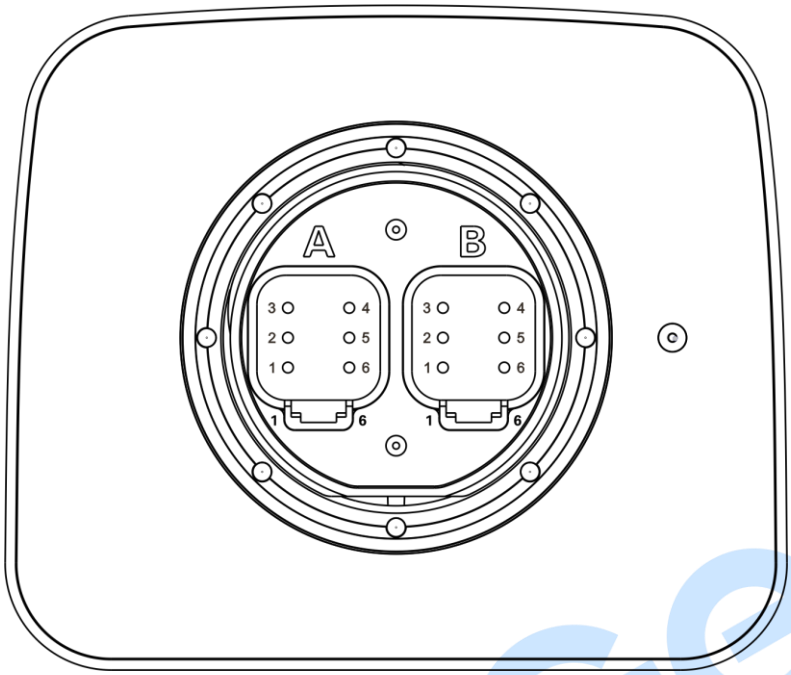


Fig.7 Controller Back Panel

Table 14 Connection Terminal Description

No.	Function	Size	Remark
Connector A			
1	DC Power Input B+	1.0mm²	Connect starter battery positive.
2	Speed Sensor Input (MP1)	0.5mm²	Connect with the engine speed sensor, and shielded cable is recommended.
3	Temperature Sensor	0.5mm²	Connect with temperature sensor (Resistance type). When it is reconfigured as digital input, it is active when it is grounded (B-).
4	Oil Pressure Sensor	0.5mm²	Connect with pressure sensor, which supports resistance type and current type sensors. When it is reconfigured as digital input, it is active when it is grounded (B-).
5	Aux. Sensor 1	1.0mm²	When it is used as analog sensor, it supports resistance type and current type sensors; Active after grounded (B-) when it is reconfigured as digital input.
6	DC Power Input B-	1.0mm²	Connect starter battery negative.
Connector B			
1	Charger D+ Input	1.0mm²	Connect the D+ terminal of charger. If D+ terminal is not available on the charger, the terminal is vacant.
2	Aux. Output	1.0mm²	Continuous output is 3A, and short-time output is 5A (no longer than 10 seconds).
3	RS485+	0.5mm²	120Ω shielded cable is recommended; one end of cable is grounded.
4	RS485-	0.5mm²	

No.	Function	Size	Remark
5	Aux. Sensor 2	1.0mm^2	When it is used as analog sensor, it supports resistance type and current type sensors; Active after grounded (B-) when it is used as digital sensor
6	DC Power Input B-	1.0mm^2	Connect starter battery negative.

NOTE: Terminal 6 (B-) of connector A and connector B has been connected inside the module.

13 TYPICAL APPLICATION

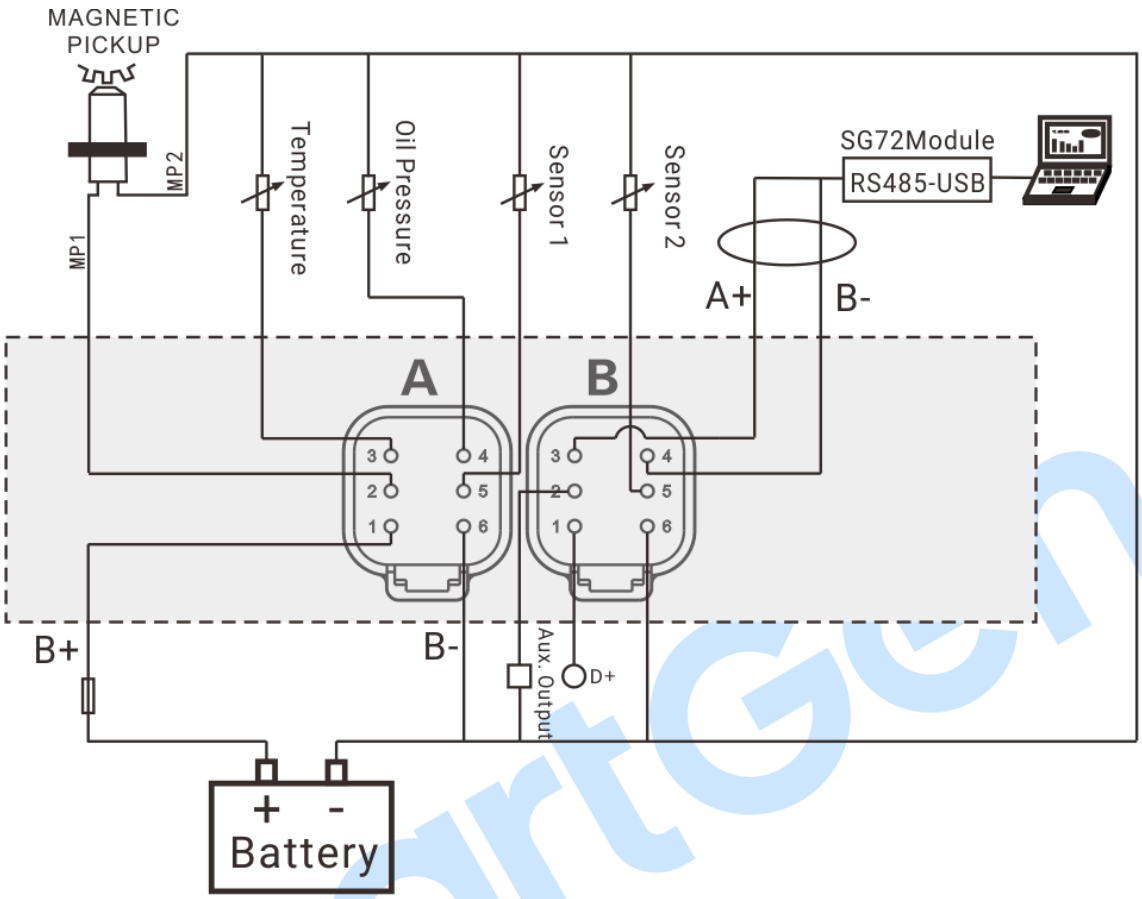


Fig.8 HED200 Typical Application Diagram

14 INSTALLATION

Unit: mm

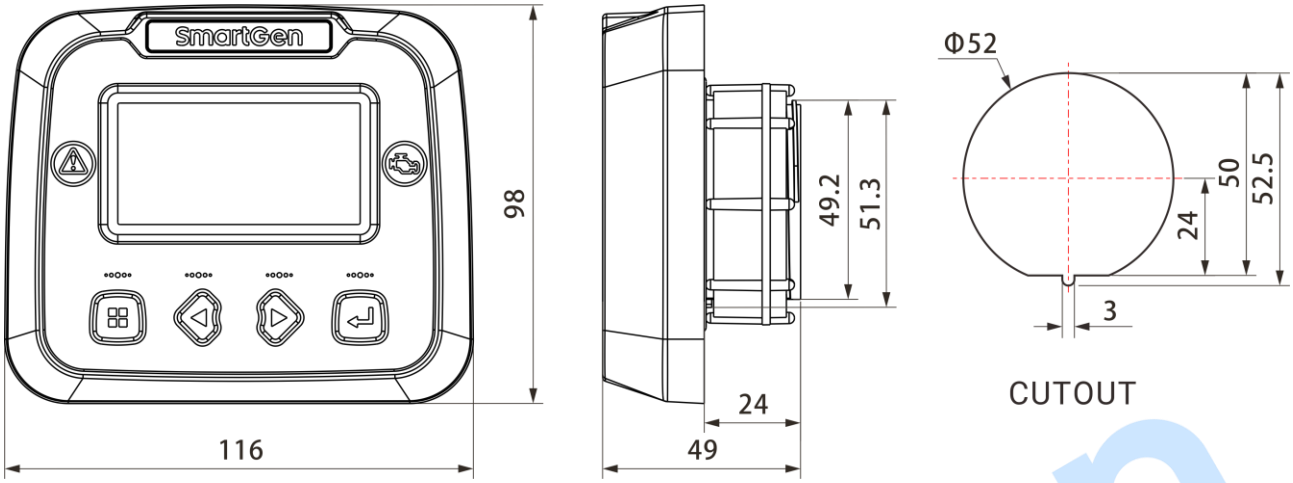


Fig.9 Overall & Cutout Dimensions

15 TROUBLE SHOOTING

Table 15 Troubleshooting

Symptoms	Possible Solutions
Controller no response after power-on	Check starting battery; Check controller wirings; Check DC fuse.
Oil pressure low alarm after crank disconnection	Check oil pressure sensor and its wirings.
Water temp. high alarm after crank disconnection	Check water temperature sensor and its wirings.
Alarm in running	Check related switches and wirings according to LCD display information.
RS485 communication abnormal	Check wirings; Check COM port settings are correct or not; Check RS485 A and B cable are connected reversely or not; Check PC communication port is damaged or not; Check communication stop bit and baud rate setting is correct or not; Check RS485 communication termination resistor is connected or not.