HED300

ENGINE CAN MONITORING MODULE

USER MANUAL

SmartGen **Registered trademark**

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Table 1 Software Version

Date	Version	Note
2023-11-29	1.0	Original release.

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.

CONTENT

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1 OVERVIEW

HED300 Engine CAN Monitoring Module can be used for single engine monitoring and suitable for ECU of different manufacturers with CANBUS (SAE J1939) port. It integrates digital, intelligent function and can display Chinese, English with LCD. All engine operation parameters can be visually displayed on the screen, it enables 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;
— With RS485 communication port, can set baud rate and adjust parameters via PC;
— Touch key design with backlight on the panel prolongs key life;
— With CANBUS port, can set baud rate, connect ECU with J1939 and monitor ECU common data (water temperature, oil pressure, speed, fuel consumption, aftertreatment data etc.);
— With 2-way analog sensor input port that can be flexibly configured as resistance, current type;
— Speed control function enables to control speed raise/drop via CANBUS port;
— With maintenance function, alarm will be issued for maintenance time due;
— Support non-road China Ⅳ engine;
— Wide power supply range DC (8-35)V, which can suit different starting battery voltage environment;
— Full-sealing design makes the protection level can reach IP68;
— ECU current fault analysis function is fitted;
— With event log function, max 499 pieces of logs can be stored;
— 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
CAN Port	Isolated, max communication distance 250m, using Belden 9841 cable or equivalent
CM-EMC Certificate	EN 55032, EN 55024
Vibration	Displacement: ±17mm 8Hz~100Hz: a: ±4g 100Hz~500Hz: a: ±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 cutout size diagram
Working Temperature	(-40~+70)°C
Working Humidity	(20~93)%RH
Storage Temperature	(-40~+80)°C
Protection Level	IP68
Meeting Standard	GB/T 37089 Reciprocating internal combustion engine driven alternating current generating sets controller
Weight	215g

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4 OPERATION

4.1 CONTROLLER PANEL

Fig.1 HED300 Front Panel Indication

Table 4 Indicator Description

Type	Description
Alarm	Flashing slowly (1 time/s), indicating warning alarm.
Running	Always illuminating in running.
LOGO Backlight	LOGO backlight and brightness can be configured.

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 to single, two and four parameter display.

Fig.2 Single Parameter Display
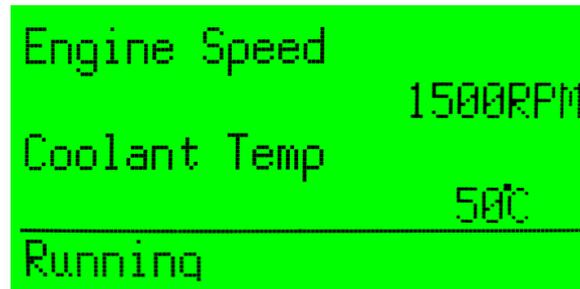
Fig.3 Two Parameters Display

Fig.4 Four Parameters Display

The displayed parameters 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	
4	Battery voltage	
5	Running hours	
6	Instantaneous fuel consumption	
7	Sensor 1	
8	Sensor 2	
9	Load percentage	
10	Manifold temperature	
11	Manifold pressure	
12	Accumulated fuel consumption	

No.	Content	Icon
13	Throttle pedal	
14	Fuel pressure	
15	Fuel filter pressure difference	
16	Water in fuel	
17	Lubricating oil level	
18	Lubricating oil filter pressure difference	
19	Lubricating oil temperature	
20	Crankcase pressure	
21	Inlet pressure	
22	Coolant pressure	
23	Coolant level	
24	Gearbox pressure	
25	Rail pressure	
26	Exhaust temperature	
27	Transmission oil temperature	
28	Urea level	
29	Date and time	

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6 USER MENU AND PARAMETER SETTING

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

>Return
>Parameter Setting
>DPF Regeneration
>Language
>LCD Backlight
>Module Info
>Event Log

Input correct password (default: 0318) can enter 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 >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 >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　AFTERTREATMENT STATUS INDICATION

For engines meeting Euro V standard, they all have DPF regeneration function.

Usually engine can clear the particulates in DPF by automatic regeneration function. However, engine is usually at short-time running, no-load running or low load speed running state, automatic regeneration cannot completely clear out the DPF particulates, and then particulate may block and exceed the limitation. Under this circumstance, DPF manual regeneration operation is required.

The controller supports manual regeneration function and meets the requirements of Euro V engine. It can realize DPF manual regeneration operation.

Table 7 DPF Regeneration Panel Icon Description

Icon	Description
	Engine fault indicator, indicating that engine is in fault status.
	Driver warning indicator, indicating that driver needs to add engine aftertreatment fluid.
	DPF exhaust temperature indicator, indicating that engine is in regenerating.
	DPF manual regeneration request indicator, indicating that currently manual regeneration is required for engine.
	DPF regeneration inhibition indicator, indicating that DPF regeneration is prohibited.

Press ⊞ on controller panel and enter parameter setting menu. Press ▶ and select "DPF Regeneration", and press ⏎ again to enter DPF regeneration. Controller display is shown as Fig.5:
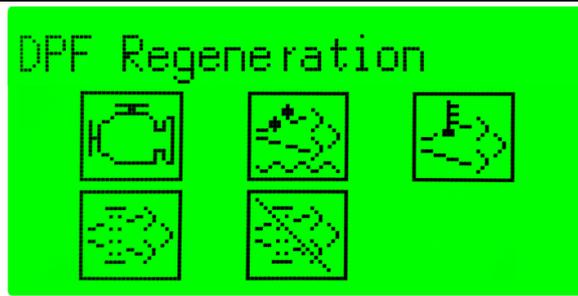
Fig.5 DPF Regeneration

When manual regeneration is required, DPF regeneration condition is generated. When request indicator is always illuminated on the panel, it means that regeneration preparation is well. Controller display is shown as Fig.6:
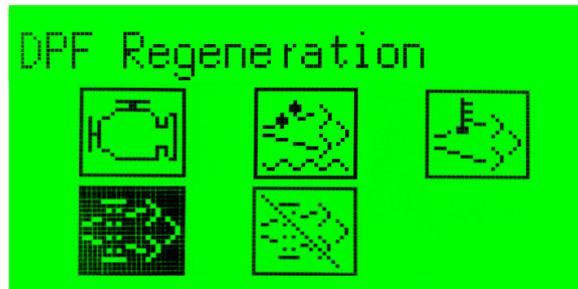
Fig.6 DPF Regeneration Preparation OK

After manual regeneration starting, DPF regeneration request indicator is extinguished, DPF exhaust temperature indicator is always illuminated. Controller screen is shown as Fig.7:
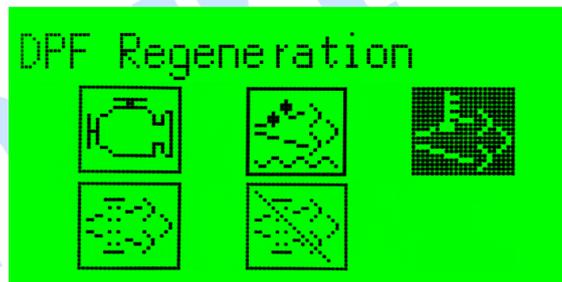
Fig.7 DPF Regeneration Start

When manual regeneration is completed, DPF exhaust temperature indicator is extinguished. Controller screen is shown as Fig.5.

8 PARAMETER SETTING RANGE AND DEFINITION

Table 8 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 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	RS485 Resistor	(0-1)	0	0: Disable; 1: Enable
6	CAN Resistor	(0-1)	0	0: Disable; 1: Enable
7	Local/Remote Select	(0-1)	0	0: Local Mode; 1: Remote Mode
8	CAN Baud Rate	(0-1)	0	0: 250kbps; 1: 500kbps
9	LOGO & Key Backlight Brightness	(0-10)	5	The higher the setting value, the brighter the backlight.
10	Boot Screen Duration	(0-3600)s	2	The duration for boot screen.
11	Date and Time			User can calibrate the date and time by themselves.
Engine Setting				
1	Engine Type	(1-39)	1	Default: general unit. Select corresponding engine model for connecting different J1939 units.
2	ECU Comm. Address	(1-254)	3	Engine speed control address.
3	Crank Disconnect	(0-1000)RPM	350	

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No.	Item		Range	Default	Description
	Speed				
4	Idle Speed Value		(0-1000)RPM	700	
5	Rated Speed		(0-6000)RPM	1500	Standard for over/under speed.
6	Over Speed Warn Set	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	
7	Battery Rated Voltage		(0-60.0)V	24.0	Standard for battery over/under voltage.
8	Overvolt Warn	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	
9	Undervolt Warn	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	
Sensor Setting					
Aux. Sensor 1~2					
1	Sensor Select		(0-3)	0	0: Not Used; 1: Temp. Sensor; 2: Pressure Sensor; 3: Level Sensor.
2	Curve Type				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 **NOTE:** Display unit varies from sensor to sensor.
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	Custom Curve Set				Corresponding curves needs to be set when selecting custom resistance /voltage/current type.
Engine Temperature Setting (ECU)					
1	Display Unit		(0-1)	0	0: °C; 1: °F
2	Min. Active Speed		(0-6000)RPM	1200	Alarm detects when it exceeds the set value.
3	Over Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-300)°C	90	When engine temperature exceeds it, warning alarm is issued. Alarm, delay value and return value can be set.
		Return	(0-300)°C	80	
		Delay	(0-3600)s	5	
4	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, delay
		Return	(0-300)°C	30	

No.	Item		Range	Default	Description
		Delay	(0-3600)s	5	value and return value can be set.
Engine Oil Pressure Setting (ECU)					
1	Display Unit		(0-1)	0	0: kPa; 1: bar; 2: psi
2	Min. Active Speed		(0-6000)RPM	1200	Alarm detects when it exceeds the set value.
3	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, delay value and return value can be set.
		Return	(0-300)kPa	80	
		Delay	(0-3600)s	5	
4	Under Warn Set	Enable	(0-1)	0	0: Disable; 1: Enable
		Set	(0-300)kPa	20	When engine oil pressure is less than it, warning alarm is issued. Alarm, delay value and return value can be set.
		Return	(0-300)kPa	30	
		Delay	(0-3600)s	5	
Speed Control Setting					
1	Speed Control Port		(0-1)	0	0: Not Used; 1: Resistance Speed Control
2	Start Resistance		(0-5000)Ω	0	Start resistance in resistance speed control.
3	Max Resistance		(0-5000)Ω	0	Max. resistance in resistance speed control.
4	Speed Control Channel		(0-2)	0	0: Not Used; 1: Sensor 1 Channel; 2: Sensor 2 Channel.
5	Speed Raise Rate		(0-2000)r/s	100	Change rate of engine speed raise.
6	Speed Drop Rate		(0-2000)r/s	100	Change rate of engine speed drop.
7	Rated Speed PCT of Upper Limit		(0-300)%	110	Max speed control value based on rated speed.
Maintenance Setting					
1	Maintenance 1 Set		(0-1)	0	0: Disable; 1: Enable
2	Maintenance 2 Set		(0-1)	0	It can set maintenance time, time due action, pre-alarm A and B time, action and timing method, reset maintenance time simultaneously. After unit maintenance, it can reset time due alarm by resetting maintenance time, details refer to Table 9.
3	Maintenance 3 Set		(0-1)	0	
4	Maintenance 4 Set		(0-1)	0	
5	Maintenance 5 Set		(0-1)	0	

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 action in maintenance left time is 0.

Item	Content	Description
Pre-alarm A Time	(0-30000)h	Maintenance left time.
Pre-alarm A Action	Same as time due action	Action in left time reaching pre-alarm A time.
Pre-alarm B Time	(0-30000)h	Maintenance left time.
Pre-alarm B Action	Same as time due action	Action in left time reaching 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		User can configure maintenance name via PC, such as "change oil".

9 CONTROLLER INFORMATION

This screen can display controller development information, such as software version, hardware version, issue date.
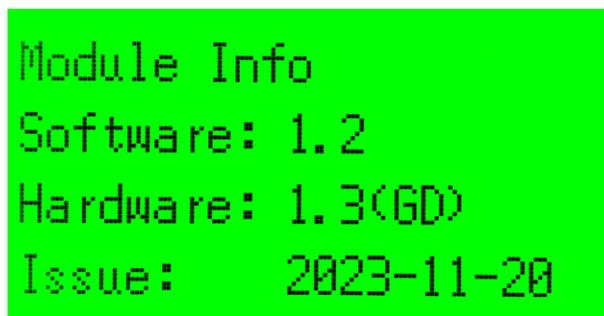
Fig.8 Controller Information

10 EVENT LOG

Enter "Event Log" via menu, press ◀, ▶ can scroll page to view the log, press ↵, ⊞ can return to previous menu.

Table 10 Event Log Screen

Event Log 001/100 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 in the event occurring; Fourth line: time stamp, it records occurring date and time.
Event Log 002/100 ECU Warn Alarm SPN=629,FMI=12 2023-10-30 11:21:07	First line: display current event log no. and total logs; Second line: this log type is "ECU Warn Alarm"; Third line: SPN value and FMI value in the alarm occurring; Fourth line: time stamp, it records occurring date and time.

11   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.
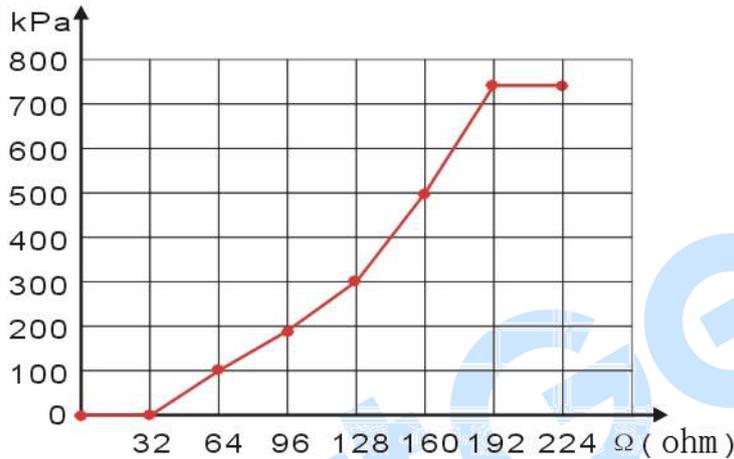
Fig.9 Curve Setting

Table 11 Sensor Selection

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

No.	Sensor	Curve Type	Remark
		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 Custom Volt Curve 4 SGD 5 SGH 6-15 Reserved	Custom resistance type input range is (0~1)kΩ.

12 PROTECTION

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

Table 12 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	ECU Warning	When controller receives warning signal of engine by J1939, it issues warning signal.
18	ECU Shutdown	When controller receives shutdown signal of engine by J1939, it issues warning signal.
19	DPF Regeneration	When controller receives DPF regeneration warning signal of engine by J1939, it issues warning signal.
20	DPF Fault	When controller receives DPF fault warning signal of engine by J1939, it issues warning signal.
21	DEF Level Low	When controller receives DEF level low warning of engine by J1939, it issues warning signal.
22	Coolant Temperature High	When controller detects coolant temperature is higher than pre-set high warning value, it issues warning signal.

No.	Warning	Description
23	Coolant Temperature Low	When controller detects temperature is lower than pre-set low warning value, it issues warning signal.
24	Oil Pressure High	When controller detects oil pressure value is above pre-set high warning value, it issues warning signal.
25	Oil Pressure Low	When engine is running, controller detects oil pressure value is below pre-set low warning value, it issues warning signal.

13 WIRE CONNECTION
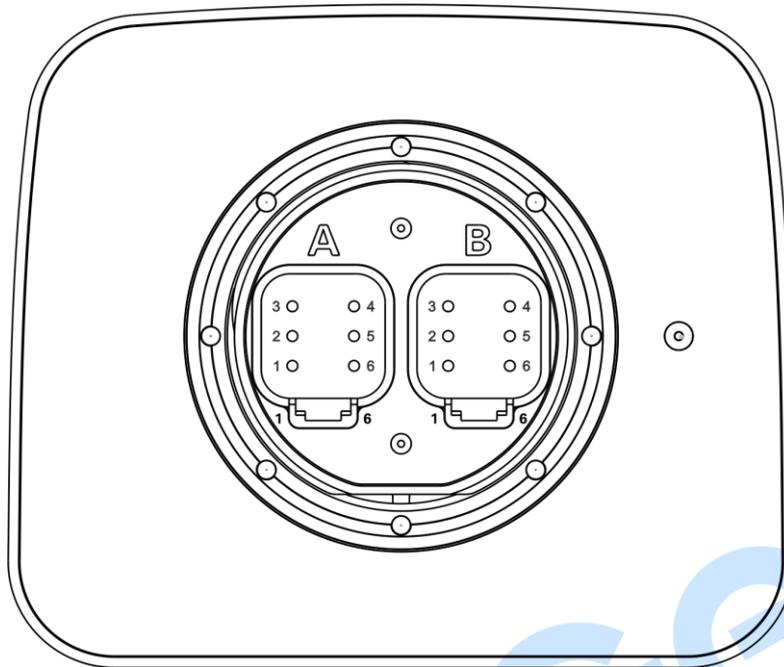
Fig.10 Controller Back Panel

Table 13 Connection Terminal Description

No.	Function	Size	Remark
Connector A			
1	DC Power Input B+	1.0mm^2	Connect starter battery positive.
2	ECU CAN H	0.5mm^2	120Ω shielding line is recommended; single end is grounded. 120Ω matching resistor is built in between terminal CAN L and CAN H, which can be determined to be connected or not via parameter setting.
3	ECU CAN L	0.5mm^2	
4	CAN Shielding Layer	0.5mm^2	Single end of shielding line is grounded.
5	Aux. Sensor 1	1.0mm^2	Support resistance type and current type sensors.
6	DC Power Input B-	1.0mm^2	Connect starter battery negative.
Connector B			
1	DC Power Input B+	1.0mm^2	Connect starter battery positive.
2	NC		Null
3	RS485+	0.5mm^2	120Ω shielding line is recommended; single end is grounded. 120Ω matching resistor is built in between terminal CAN L and CAN H, which can be determined to be connected or not via parameter setting.
4	RS485-	0.5mm^2	
5	Aux. Sensor 2	1.0mm^2	Support resistance type and current type sensors.
6	DC Power Input B-	1.0mm^2	Connect starter battery negative.

⚠**NOTE:** B+, B- of connector A and B+, B- of connector B have been connected inside the module.
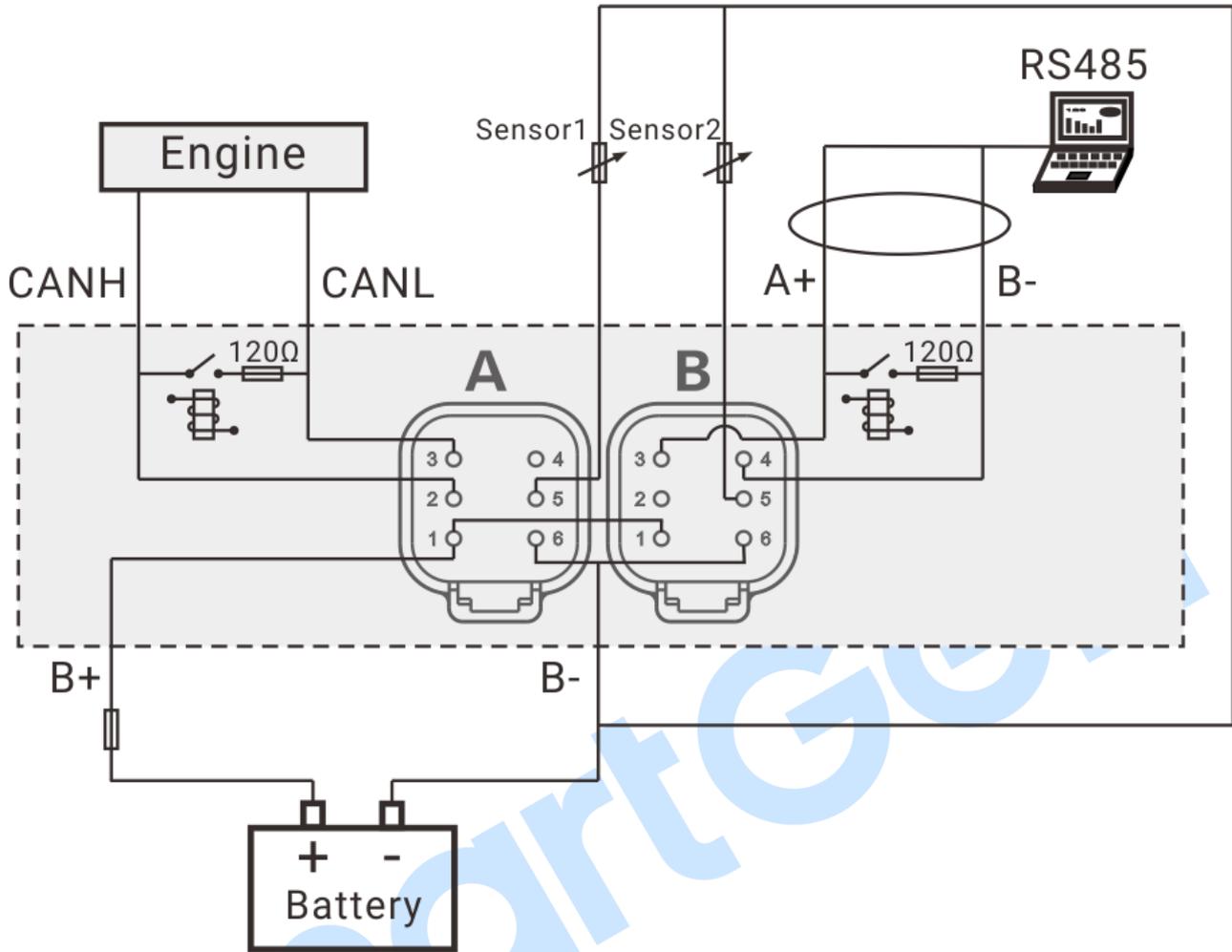
Fig.11 HED300 Typical Application Diagram

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15 INSTALLATION

Unit: mm
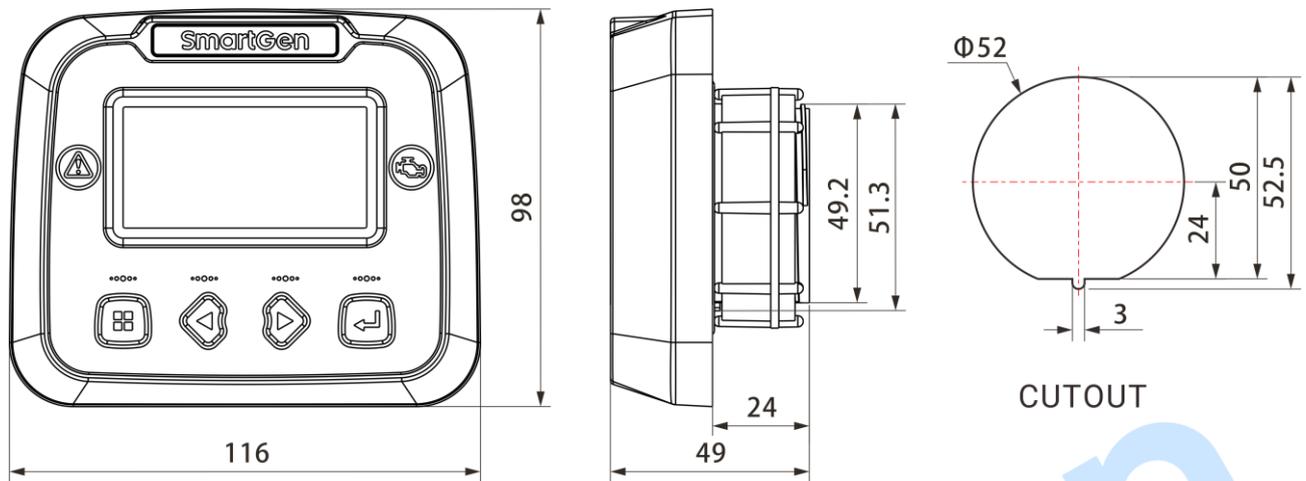
Fig.12 Overall & Cutout Dimensions

16 CONNECTIONS OF CONTROLLER WITH J1939 ENGINE

16.1 CUMMINS ISB/ISBE

Engine type: Cummins ISB.

Table 14 9-pin Connector

Terminals of controller	9 pins connector	Remark
CAN_SCR	SAE J1939 shield	CAN communication shielding line (connect with ECU terminal only).
CAN(H)	SAE J1939 signal	Using impedance 120Ω connecting line.
CAN(L)	SAE J1939 return	Using impedance 120Ω connecting line.

16.2 CUMMINS QSL9

Suitable for CM850 engine control module; Engine type: Cummins-CM850.

Table 15 9-pin Connector

Terminals of controller	9 pins connector	Remark
CAN_SCR	SAE J1939 shield-E	CAN communication shielding line (connect with ECU terminal only).
CAN(H)	SAE J1939 signal-C	Using impedance 120Ω connecting line.
CAN(L)	SAE J1939 return-D	Using impedance 120Ω connecting line.

16.3 CUMMINS QSM11 (IMPORT)

Suitable for CM570 engine control module; Engine type is QSM11 G1, QSM11 G2; Engine type: Cummins ISB.

Table 16 3-pin Data Link Connector

Terminals of controller	3 pins data link connector	Remark
CAN_SCR	C	CAN communication shielding line (connect with ECU terminal only).
CAN(H)	A	Using impedance 120Ω connecting line.
CAN(L)	B	Using impedance 120Ω connecting line.

16.4 CUMMINS QSX15-CM570

Suitable for CM570 engine control module; Engine type is QSX15 etc. Engine type: Cummins QSX15-CM570.

Table 17 9-pin Connector

Terminals of controller	9 pins connector	Remark
CAN_SCR	SAE J1939 shield-E	CAN communication shielding line (connect with ECU terminal only).
CAN(H)	SAE J1939 signal-C	Using impedance 120Ω connecting line.
CAN(L)	SAE J1939 return-D	Using impedance 120Ω connecting line.

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16.5 CUMMINS GCS-MODBUS

Suitable for GCS engine control module; Use RS485-MODBUS to read information of engine. Engine types are QSX15, QST30, QSK23/45/60/78 and so on. Engine type: Cummins QSK-Modbus, Cummins QST-Modbus, Cummins QSX-Modbus.

Table 18 D-SUB Connector 06

Terminals of controller	D-SUB connector 06	Remark
RS485 GND	20	Communication shielding line (connect with ECU this terminal only).
RS485+	21	Using impedance 120Ω connecting line.
RS485-	18	Using impedance 120Ω connecting line.

16.6 CUMMINS QSM11

Engine type: Common J1939.

Table 19 Engine OEM Connector

Terminals of controller	OEM connector of engine	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	46	Using impedance 120Ω connecting line.
CAN(L)	37	Using impedance 120Ω connecting line.

16.7 CUMMINS QSZ13

Engine type: Common J1939.

Table 20 Engine OEM Connector

Terminals of controller	OEM connector of engine	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	1	Using impedance 120Ω connecting line.
CAN(L)	21	Using impedance 120Ω connecting line.

16.8 DETROIT DIESEL DDEC III / IV

Engine type: Common J1939.

Table 21 Engine CAN Port

Terminals of controller	CAN port of engine	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	CAN(H)	Using impedance 120Ω connecting line.
CAN(L)	CAN(L)	Using impedance 120Ω connecting line.

16.9 DEUTZ EMR2

Engine type: VolvoEDC4.

Table 22 F Connector

Terminals of controller	F connector	Remark
-	1	Connect to battery negative pole.
CAN_SCR	-	CAN communication shielding line.
CAN(H)	12	Using impedance 120Ω connecting line.
CAN(L)	13	Using impedance 120Ω connecting line.

16.10 JOHN DEERE

Engine type: John Deere.

Table 23 21-pin Connector

Terminals of controller	21 pins connector	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	V	Using impedance 120Ω connecting line.
CAN(L)	U	Using impedance 120Ω connecting line.

16.11 MTU MDEC

Suitable MTU engine types are 2000 series, 4000 series; Engine type: mtu-MDEC-303.

Table 24 X1 Connector

Terminals of controller	X1 connector	Remark
CAN_SCR	E	CAN communication shielding line (connect with one terminal only).
CAN(H)	G	Using impedance 120Ω connecting line.
CAN(L)	F	Using impedance 120Ω connecting line.

16.12 MTU ADEC (SMART MODULE)

Suitable for MTU engine with ADEC (ECU8) and SMART module; Engine type: mtu-ADEC.

Table 25 SMART (X4 Port)

Terminals of controller	SMART (X4 port)	Remark
CAN_SCR	X4 3	CAN communication shielding line.
CAN(H)	X4 1	Using impedance 120Ω connecting line.
CAN(L)	X4 2	Using impedance 120Ω connecting line.

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16.13 MTU ADEC (SAM MODULE)

Suitable for MTU engine with ADEC (ECU7) and SAM module; Engine type: Common J1939.

Table 26 SAM (X23 Port)

Terminals of controller	SAM (X23 port)	Remark
CAN_SCR	X23 3	CAN communication shielding line.
CAN(H)	X23 2	Using impedance 120Ω connecting line.
CAN(L)	X23 1	Using impedance 120Ω connecting line.

16.14 PERKINS

Suitable for ADEM3/ADEM4 engine control module; Engine model is 2306, 2506, 1106, and 2806. Engine type: Perkins.

Table 27 Connector

Terminals of controller	Connector	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	31	Using impedance 120Ω connecting line.
CAN(L)	32	Using impedance 120Ω connecting line.

16.15 SCANIA

Suitable for S6 engine control module; Engine model is DC9, DC12, and DC16. Engine type: Scania.

Table 28 B1 Connector

Terminals of controller	B1 connector	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	9	Using impedance 120Ω connecting line.
CAN(L)	10	Using impedance 120Ω connecting line.

16.16 VOLVO EDC3

Suitable engine control mode is TAD1240, TAD1241 and TAD1242; Engine type: Volvo.

Table 29 "Data bus" Connector

Terminals of controller	"Data bus" connector	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	1	Using impedance 120Ω connecting line.
CAN(L)	2	Using impedance 120Ω connecting line.

⚠**NOTE:** When this engine type is selected, preheating time should be set to at least 3 seconds.

16.17 VOLVO EDC4

Suitable engine models are TD520, TAD520 (optional), TD720, TAD720 (optional), TAD721, TAD722, and TAD732. Engine type: VolvoEDC4.

Table 30 Connector

Terminals of controller	Connector	Remark
-	1	Connected to negative of battery.
CAN_SCR	-	CAN communication shielding line.
CAN(H)	12	Using impedance 120Ω connecting line.
CAN(L)	13	Using impedance 120Ω connecting line.

16.18 VOLVO-EMS2

Volvo Engine models are TAD734, TAD940, TAD941, TAD1640, TAD1641, and TAD1642. Engine type: Volvo-EMS2.

Table 31 Engine CAN Port

Terminals of controller	Engine's CAN port	Remark
-	3	Power negative pole.
-	4	Power positive pole.
CAN_SCR	-	CAN communication shielding line.
CAN(H)	1(Hi)	Using impedance 120Ω connecting line.
CAN(L)	2(Lo)	Using impedance 120Ω connecting line.

⚠**NOTE:** When this engine type is selected, preheating time should be set to at least 3 seconds.

16.19 YUCHAI

Suitable for Yuchai BOSCH common rail electronic-controlled engine. Engine type: BOSCH.

Table 32 Engine 42-pin Port

Terminals of controller	Engine 42 pins port	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	1.35	Using impedance 120Ω connecting line.
CAN(L)	1.34	Using impedance 120Ω connecting line.

Table 33 Engine 2-pin Port

Battery	Engine 2 pins port	Remark
Battery negative	1	Wire diameter 2.5mm^2.
Battery positive	2	Wire diameter 2.5mm^2.

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16.20 WEICHAI

Suitable for Weichai BOSCH common rail electronic-controlled engine. Engine type: GTSC1.

Table 34 Engine Port

Terminals of controller	Engine port	Remark
CAN_SCR	-	CAN communication shielding line.
CAN(H)	1.35	Using impedance 120Ω connecting line.
CAN(L)	1.34	Using impedance 120Ω connecting line.

⚠**NOTE:** If there is any question of connection between controller and ECU communication, please feel free to contact SmartGen's service.

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17 TROUBLE SHOOTING

Table 35 Troubleshooting

Symptoms	Possible Solutions
Controller no response with power	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 switch and wirings according to LCD display information.
Crank failure	Check fuel circuit and related wirings; Check starting battery; Check speed sensor and its wirings; Refer to engine manual.
None response for starter	Check starter wirings; Check starting battery.
RS485 communication abnormal	Check wirings; Check COM port settings are correct or not; Check RS485 A and B line are connected reversely or not; Check PC communication port is damaged or not; Recommend to enable 120Ω resistor between A and B of RS485.

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