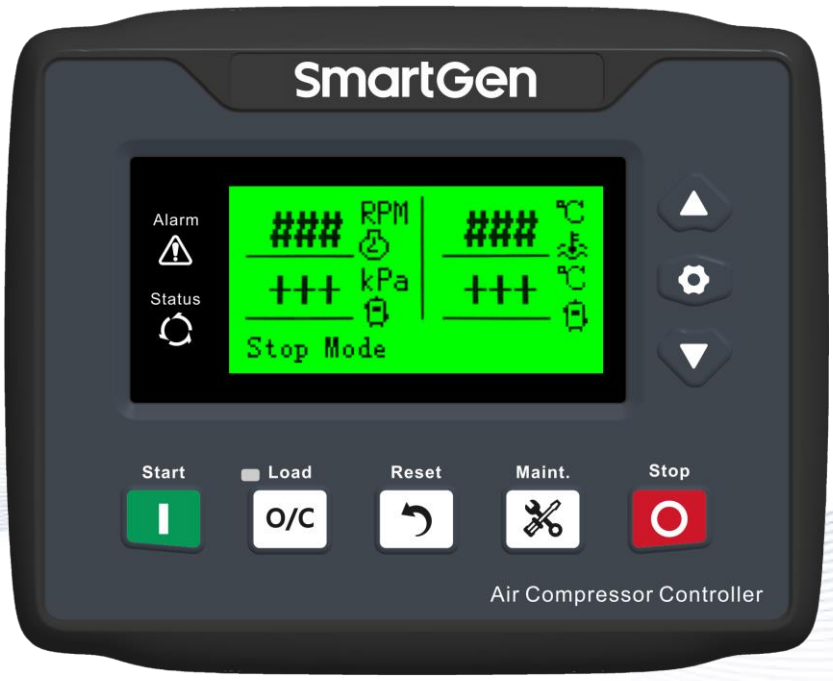
SmartGen

MAKING CONTROL SMARTER

ACC4100B

DIESEL AIR COMPRESSOR CONTROLLER

USER MANUAL



郑州众智科技股份有限公司
SMARTGEN(ZHENGZHOU)TECHNOLOGY CO.,LTD.

SmartGen Registered trademark
No. 28 Xuemei Street, Zhengzhou, Henan, China
Tel: +86-371-67988888/67981888/67992951
+86-371-67981000(overseas)
Fax: +86-371-67992952
Web: www.smartgen.com.cn/
www.smartgen.cn/
Email: sales@smartgen.cn

All rights reserved. No part of this publication may be reproduced in any material form (including photocopying or storing in any medium by electronic means or other) without the written permission of the copyright holder.
SmartGen reserves the right to change the contents of this document without prior notice.

Table 1 Software Version

Date	Version	Note
2025-02-28	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.

SmartGen

CONTENT

1 OVERVIEW 6
2 PERFORMANCE AND CHARACTERISTICS 7
3 SPECIFICATION 8
4 OPERATION 9
4.1 KEY FUNCTION DESCRIPTION 9
4.2 CONTROLLER PANEL 10
4.3 START/STOP OPERATION 10
4.3.1 START SEQUENCE 10
4.3.2 STOP SEQUENCE 11
4.4 START OPERATION FOR FUEL PRE-SUPPLY OUTPUT SETTING 11
4.5 EMERGENCY START 11
4.6 LOAD/UNLOAD SPEED REGULATION PROCESS OF AIR COMPRESSOR 12
5 MANUAL DPF REGENERATION 13
5.1 ILLUSTRATION 13
5.2 PANEL ICON DESCRIPTION OF DPF REGENERATION 13
5.3 DPF MANUAL REGENERATION OPERATION 13
6 PROTECTION 15
6.1 WARNINGS 15
6.2 SHUTDOWNS 16
7 WIRE CONNECTION 19
8 CONFIGURATION PARAMETER RANGE AND DEFINITION 21
8.1 PARAMETER RANGE AND DEFINITION 21
8.2 DEFINABLE CONTENTS OF AUXILIARY OUTPUT PORTS 1~6 39
8.2.1 DEFINABLE CONTENTS OF AUXILIARY OUTPUT PORTS 1~6 39
8.2.2 CUSTOM PERIOD OUTPUT 43
8.2.3 DEFINED COMBINATION OUTPUT 43
8.3 DEFINED CONTENTS OF DIGITAL INPUT PORTS 44
8.4 SELECTION OF SENSORS 46
8.5 CONDITIONS OF CRANK DISCONNECT SELECTION 47
8.6 MAINTENANCE SETTING 47
9 PARAMETERS SETTING 48
10 SENSOR SETTING 50
11 COMMISSIONING 51
12 TYPICAL APPLICATION 51
13 INSTALLATION 52

13.1 CLIPS 52
13.2 OVERALL & CUTOUT DIMENSIONS 52
14 CONNECTIONS OF CONTROLLER WITH J1939 ENGINE 53
14.1 CUMMINS ISB/ISBE 53
14.2 CUMMINS QSL9 53
14.3 CUMMINS QSM11(IMPORT) 54
14.4 CUMMINS QSX15-CM570 54
14.5 CUMMINS GCS-MODBUS 55
14.6 CUMMINS QSM11 55
14.7 CUMMINS QSZ13 55
14.8 DETROIT DIESEL DDEC III / IV 56
14.9 DEUTZ EMR2 56
14.10 MTU MDEC 56
14.11 MTU ADEC (SMART MODULE) 57
14.12 MTU ADEC (SAM MODULE) 57
14.13 PERKINS 58
14.14 SCANIA 58
14.15 VOLVO EDC3 58
14.16 VOLVO EDC4 59
14.17 VOLVO-EMS2 59
14.18 YUCHAI 59
14.19 WEICHAI 60
15 TROUBLE SHOOTING 61
16 PACKING LIST 62

SmartGen

1 OVERVIEW

ACC4100B Diesel Air Compressor Controller is used for air compressor with diesel-driven engine in order to realize air compressor start/stop, data measurement, maintenance, alarm protection and “three remotes”. It has speed regulator function, and CANBUS (SAE J1939) port, which can control various ECU or non-ECU diesel air compressors.

ACC4100B Diesel Air Compressor Controller applies 32-bit ARM micro-processor technology, which can realize functions of precise measurement for many parameters, set-point adjustment, timing and threshold setting etc. A majority of parameters can be adjusted from the control panel. All parameters can be adjusted and monitored on PC by RS485 or USB port. It can be widely used for diesel-driven air compressor control system with compact structure, simple wiring, and high reliability.

SmartGen

2 PERFORMANCE AND CHARACTERISTICS

Main characteristics are as follows:

- 132x64 LCD display with backlit; Optional Chinese and English languages; Simple operation interface;
- Screen protection is hard screen of acrylic material with better wear-resisting and scratch resistant qualities;
- Silicon panel and buttons with strong adaptive capacity of high/low temperature environment;
- With RS485 communication port and can realize “three remotes” function by MODBUS protocol;
- CANBUS port can monitor ECU common data (speed, water temperature, oil pressure, engine load rate, fuel consumption etc.);
- DPF regeneration function, which meets Euro V emission standard;
- 6 ways of analog sensors, 3 ways of fixed resistance types, and 3 ways of flexible resistance/current/voltage type, which can precisely detect data of engine fuel level, air compressor discharge pressure, and discharge temperature etc.;
- Multiple temperature, pressure, and level sensor curves can be used directly, and custom sensor curve is also available;
- Precisely collects all kinds of parameters of air compressor and has complete protection functions, which provides high water temperature, low oil pressure, over speed, and under speed protection, and discharge pressure high, discharge temperature high protection etc.;
- Speed regulator function can automatically adjust speed according to discharge pressure of the air compressor;
- All outputs are relay outputs;
- Parameter setting function allows users to change and set the parameters, and at the same time they are stored in internal EEPROM memory and will not get lost at power outage;
- Crank disconnect conditions (speed, oil pressure) are optional;
- Speed can be obtained from speed sensor or charging generator W/L;
- Wide power supply range DC (8-35V), which can suit different battery voltage environment;
- Event log function can record up to 99 items of historical records;
- Real-time clock function;
- Heater, cooler and fuel pump control functions;
- Maintenance function; maintenance time due action can be set;
- All parameters apply digital adjustment, getting rid of common potentiometer's analog regulation method, and improving reliability and stability of the whole device;
- Sealing gasket is designed for enclosure and front panel with IP65 protection class;
- Metal clips are used to fix the controller, and they are especially outstanding under high temperature environment;
- Modular design, anti-flaming ABS plastic shell, pluggable terminals, built-in mounting, compact structure and easy installation.

3 SPECIFICATION

Table 3 Technical Parameters

Items	Contents
Operating Voltage	DC8V~DC35V, continuous power supply
Power Consumption	<3W (Standby mode: ≤2W)
Speed Sensor Voltage	1.0V~24.0V (RMS)
Speed Sensor Frequency	Max. 10, 000Hz
Charging Generator W/L	Voltage (1.0-24.0)V (RMS) Frequency (50-1,000)Hz
Starting Relay Output	5A DC28V
Programmable Output 1	5A DC28V
Programmable Output 2~6	1A DC28V
Analog Sensor	3 ways of fixed resistance type (fuel level, discharge temperature, Aux. sensor 2); 3 ways of flexible resistance/current/voltage types (discharge pressure, Aux. sensor 3, Aux. sensor 4);
Case Dimensions	135mm x 110mm x 44mm
Panel Cutout	116mm x 90mm
Working Temperature	(-25~+70)°C
Working Humidity	(20~93)%RH
Storage Temperature	(-30~+80)°C
Protection Level	IP65 front panel
Weight	0.35kg

SmartGen

4 OPERATION

4.1 KEY FUNCTION DESCRIPTION

Table 4 Key Description

Icon	Buttons	Function Description
	Start	Makes the air compressor start under stop state.
	Load/Unload	At idle speed state, press it and controller shall load and make relay output; at normal running state, press it again and controller shall unload and relay stops outputting.
	Alarm Reset	Press it and it enters alarm page fast; press it again and alarm is removed; after alarm reset, press it again and exit from alarm page.
	Maintenance	Press it and it enters maintenance page; press it again and exit from the page; press it longer at this page, it enters password interface; input password and maintenance setting is entered.
	Stop	1. Stop the running air compressor at start mode; 2. Press it for 3s or longer, test whether panel indicators are normal (lamp test); 3. Press it again in stop process and controller can be stopped faster.
	Up/Increase	1. Scroll up; 2. Move up cursor or increase the value in setting menu.
	Down/Decrease	1. Scroll down; 2. Move down cursor or decrease the value in setting menu.
	Set/Confirm	1. In main screen, press it and it enters parameter setting menu; 2. Confirm set information in parameter settings.

SmartGen

4.2 CONTROLLER PANEL

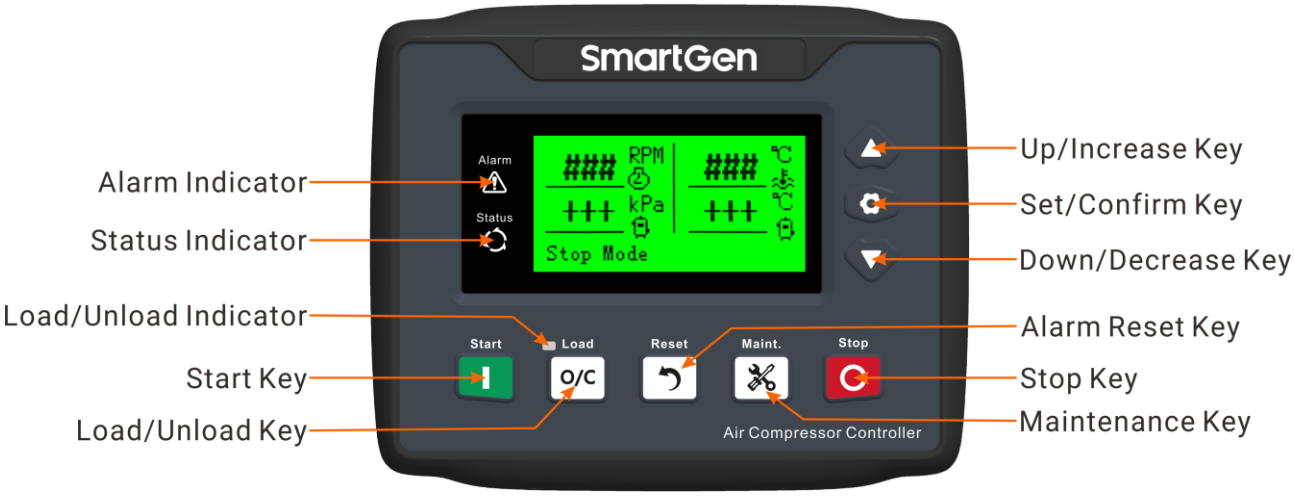


Fig.1 Front Panel Description

NOTE: Description for parts of the indicators:

Alarm Indicator: slow flash (once per second) for warning alarm; quick flash (5 times per second) for stop alarm; light off for none alarms;

Status Indicator: it illuminates always as air compressor is normally running.

4.3 START/STOP OPERATION

4.3.1 START SEQUENCE

a) Press  and start air compressor;

b) If pre-heat time is configured, then pre-heat relay outputs (if configured); LCD displays “pre-heat delay xx”;

c) After pre-heat delay is over, fuel relay outputs the pre-set fuel time before start (default: 1s), then starting relay outputs; If air compressor crank disconnect fails during “crank time”, then fuel relay and starting relay stop outputting, and enter “crank rest time”, waiting for next start;

d) After the pre-set start attempts, if air compressor doesn't succeed to start, then controller issues failed to start alarm, and meanwhile LCD alarm page displays “Failed to Start” alarm;

e) During any one of the start attempts, if crank disconnect is fulfilled, then it enters "Safety On Delay", during which oil pressure low, water temperature high, under speed, and charging failure alarms are all inactive; after safety on delay it enters “Start Idle Delay” (if configured);

f) During start idle delay, under speed alarm is inactive; after “Start Idle Time” it enters idle running; if load key is pressed, then load control outputs and it enters “Warming Up Time” (if configured);

g) When warming up time is ended, air compressor enters normal running status; if speed is abnormal, controller shall issue alarms and stops it (LCD alarm page displays alarm information).

4.3.2 STOP SEQUENCE

a) Press  , and stop the running air compressor; before stop if load control outputs, then disconnect load control;
b) If “Cooling Time” is configured, then “cooling delay” starts; when cooling delay is over, it enters “Stop Idle Delay”;
c) When it enters stop idle delay (if configured), then idle relay is energized to output;
d) It enters “ETS Solenoid Hold”, and ETS relay is energized to output; fuel relay output is disconnected;
e) It enters “Wait Stop Time”, and automatically judges whether it stops completely;
f) When air compressor stops completely, it enters “After Stop Time”; Otherwise controller enters stop failure and issues “Stop Failure” warning (after the alarm, if air compressor stops completely, then it enters “After Stop Time”, and meanwhile “Stop Failure” alarm is removed automatically);
g) When “After Stop Time” is over, it enters standby status.

4.4 START OPERATION FOR FUEL PRE-SUPPLY OUTPUT SETTING

When output port is configured to “Fuel Pre-supply Output”, and press  to start the air compressor:

If the set pre-supply time is less than or equal to pre-heat time, LCD displays “Pre-heat Delay XX”, pre-heat relay outputs (if configured) and pre-supply relay outputs (output for the set pre-supply time); after pre-heat delay is over, fuel relay outputs the set fuel time (default: 1s) before start, then starting relay outputs; the following start process is the same as the START PROCEDURE (for start process please see 4.3.1, d)~g)).

If the set pre-supply time is more than the pre-heat time, pre-supply relay outputs in pre-heat delay phase; after pre-heat delay is over, the following pre-supply time enters pre-supply phase, and LCD displays “Fuel Pre-supply Time XX” and pre-supply relay outputs; after pre-supply delay is over, fuel relay outputs the pre-set fuel time (default: 1s) before start; then starting relay outputs; the following start process is the same as the START PROCEDURE (for start process please see 4.3.1 d)~g)).

If output port is configured to “Fuel Pre-supply Output”, air compressor stays at standby status and it outputs cyclically according to the pre-set “Fuel Pre-supply Rest Time” and “Fuel Pre-supply Time”; If the pre-set “Fuel Pre-supply Rest Time” is 0h, then fuel pre-supply doesn’t output.

4.5 EMERGENCY START

NOTE: Press  and  simultaneously and air compressor can be started forcibly. At this time controller doesn't detect the unit crank disconnect by crank conditions. Starter's disconnect is controlled by the operator. When operator observes the unit has started, he/she should release the button. The starter stops outputting and controller enters Safety On Delay.

4.6 LOAD/UNLOAD SPEED REGULATION PROCESS OF AIR COMPRESSOR

Under the state of idle running, press O/C and load control relay outputs. Controller enters normal running. If current discharge pressure is less than unloading action pressure, then engine speed goes up to rated speed. If current discharge pressure is larger than rated pressure, engine speed will decrease to unloading speed. Between rated pressure and unloading action pressure, speed decreases as pressure increases. Under normal running state, press O/C and load control relay disconnects and it enters idle running. Engine speed returns to rated idle value.

For example:

Engine rated speed: 2200RPM
Engine unloading speed value: 70% (1540RPM)
Engine idle value: 60% (1320RPM)
Air compressor rated pressure: 700kPa
Air compressor unloading action pressure: 600kPa

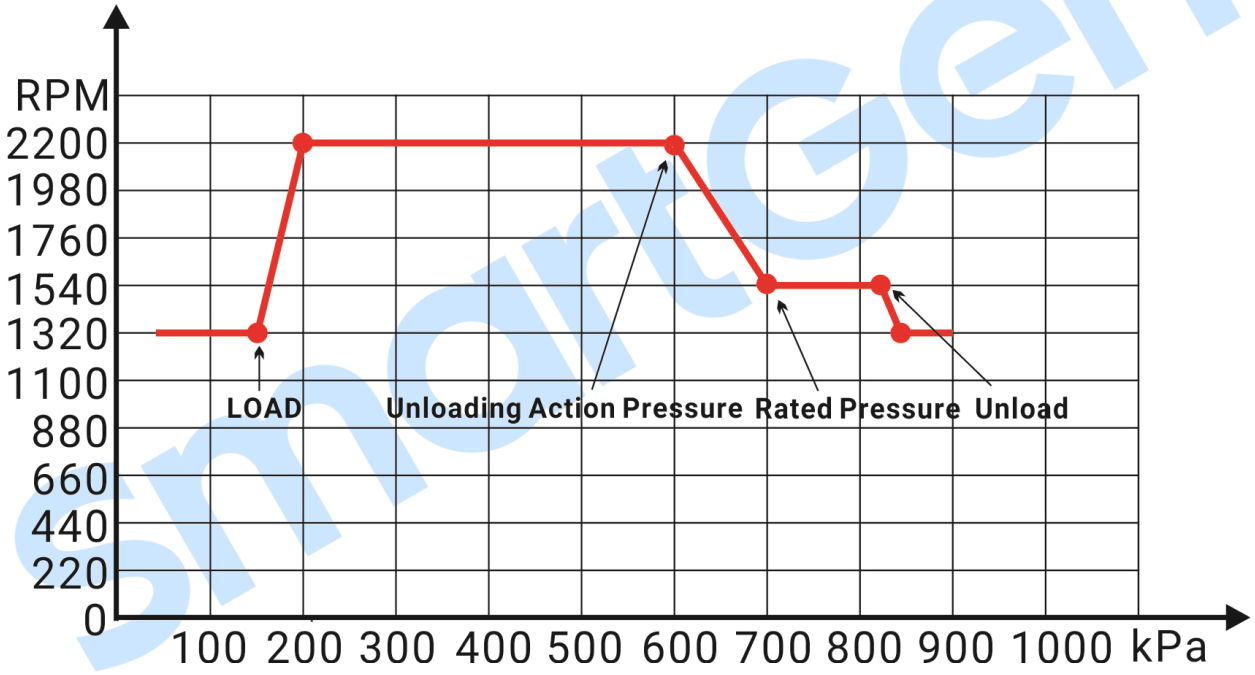


Fig.2 Speed - Pressure Curve Diagram

5 MANUAL DPF REGENERATION

5.1 ILLUSTRATION

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 usually is at short-time state, no-load running or low-speed low-load running state, automatic regeneration cannot completely clear out the DPF particulates, and there may appear particulate block, and beyond the limitation. Under this circumstance, manual DPF regeneration operation is needed.

Controller supports manual regeneration function, which meets the requirements of Euro V engine for controller. It can realize manual DPF regeneration operation.

5.2 PANEL ICON DESCRIPTION OF DPF REGENERATION

Table 5 DPF Regeneration Panel Icon Description

Icon	Description
	Engine fault indicator
	NCD state indicator
	DPF discharge temperature indicator
	DPF manual regeneration request indicator
	DPF regeneration inhibition indicator
	DPF regeneration response indicator

5.3 DPF MANUAL REGENERATION OPERATION

Configure an input port and set it to “DPF Manual Regeneration Request”, and connect a button (not self-lock) externally.

Press  on controller panel and enter parameter setting menu. Press  and select “DPF Regeneration”, and press  again to enter DPF regeneration. Controller display is as Fig.3:

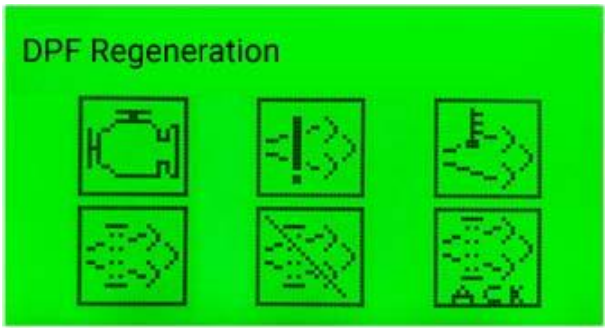


Fig.3 DPF Regeneration

When manual regeneration is needed, press “DPF Manual Regeneration Request” button. On DPF panel, DPF response indicator is light on, and it enters DPF regeneration preparation status. When request indicator is always illuminated on the panel, and response indicator flashes at the same time (once per second), it means that regeneration preparation is well. Controller display is as Fig.4:

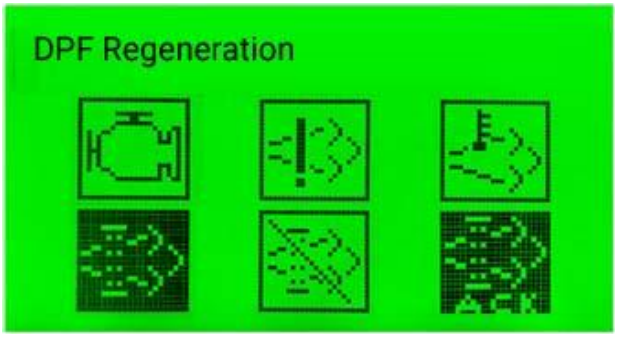


Fig.4 DPF Regeneration Preparation is Ready

Press “DPF Manual Regeneration Request” again, and manual regeneration starts. DPF regeneration request indicator is light off, DPF response indicator is always light on and DPF discharge temperature indicator is always light on. Controller screen is as Fig.5:

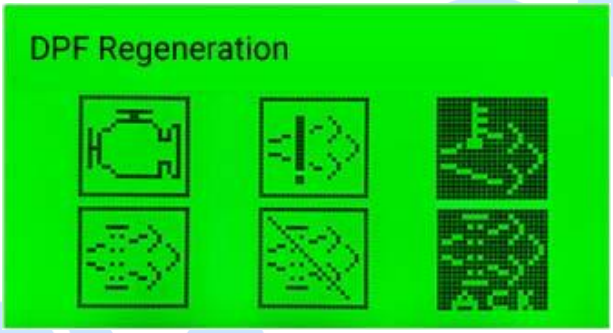


Fig.5 DPF Regeneration Start

When manual regeneration is completed, DPF response indicator is light off, and DPF discharge temperature indicator is light off. Controller screen display is as Fig. 3 shows.

6 PROTECTION

6.1 WARNINGS

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

Table 6 Warnings

No.	Type	Description
1	Over Speed Warn	When controller detects speed is above the pre-set over speed warning threshold, it issues warning signal.
2	Under Speed Warn	When controller detects speed is below the pre-set under speed warning threshold, it issues warning signal.
3	Loss of Speed Signal	When controller detects speed is 0, and speed signal loss action is selected “Warning”, it issues warning signal.
4	Failed to Stop	When engine stop delay is over and engine doesn't stop completely, controller issues warning signal.
5	Charge Alt Fail	When controller detects engine charger voltage is less than pre-set threshold, it issues warning alarm signal.
6	Battery Overvoltage	When controller detects engine battery voltage is larger than pre-set threshold, it issues warning alarm signal.
7	Battery Undervoltage	When controller detects engine battery voltage is less than pre-set threshold, it issues warning alarm signal.
8	ECU Warn	When controller receives warning signal of engine by J1939, it issues warning signal.
9	Temp Sensor Open Warn	When controller detects sensor is open and action type is selected “Warning”, it issues warning signal.
10	High Temp Warn	When controller detects temperature is higher than pre-set high temp warning value, it issues warning signal.
11	Low Temp Warn	When controller detects temperature is lower than pre-set low temp warning value, it issues warning signal.
12	OP Sensor Open Warn	When controller detects oil pressure sensor is open, and action type is selected "Warning", it issues warning signal.
13	Low OP Warn	When controller detects oil pressure value is below pre-set oil pressure warning value, it issues warning signal.
14	Fuel Level Open Warn	When controller detects fuel level sensor is open and action type is selected “Warning”, it issues warning signal.
15	Low Fuel Level Warn	When controller detects level value is below pre-set fuel level warning value, it issues warning signal.
16	Discharge Pressure Open	When controller detects discharge pressure sensor is open and action type is selected “Warning”, it issues warning signal.
17	High Discharge Press.	When controller detects discharge pressure value is above pre-set pressure warning value, it issues warning signal.
18	Low Discharge Press.	When controller detects discharge pressure value is below pre-set pressure warning value, it issues warning signal.

No.	Type	Description
19	High Discharge Temp. Open	When controller detects discharge temperature sensor is open and action type is selected “Warning”, it issues warning signal.
20	High Discharge Temp. Warn	When controller detects sensor value of discharge temperature is above pre-set discharge temperature warning value, it issues warning signal.
21	Low Discharge Temp. Warn	When controller detects sensor value of discharge temperature is below pre-set discharge temperature warning value, it issues warning signal.
22	Aux. Sensor 2~4 Open	When controller detects sensor is open, and action type is selected “Warning”, it issues warning signal.
23	Aux. Sensor 2~4 High	When controller detects sensor value is above pre-set upper limit of warning values, it issues warning signal.
24	Aux. Sensor 2~4 Low	When controller detects sensor value is below pre-set lower limit of warning values, it issues warning signal.
25	Input 1~5 Warn	When digital input port is configured to “Warning”, and when it is active, it issues corresponding input warning signal.
26	End of Mandate Time	When controller time reaches mandate time, and mandate time due action is selected “Warning”, it issues warning signal.
27	Oil Filter Time Over	When timing method is set to “Unit Running Time”, maintenance timing is due, and action type is selected “Warning”, it issues warning signal. When timing method is set to “Real Time Clock”, maintenance countdown goes to 0, and action type is selected “Warning”, it issues warning signal.
28	Oil Separator Time Over	
29	Air Filter Time Over	
30	Lubrication Time Over	
31	Engine Oil Filter Over	
32	Engine Fuel Filter Over	
33	Engine Lubrication Over	
34	Air Filter Maintenance Over	
35	Maintenance 9 Over	
36	Maintenance 10 Over	

6.2 SHUTDOWNS

When controller detects shutdown alarm signal, it immediately stops. When engine stops completely, it needs to press manually Alarm Reset button to remove alarms.

Table 7 Shutdown Alarms

No.	Type	Description
1	Emergency Stop	When controller detects emergency stop alarm signal, it issues emergency stop alarm signal.
2	Engine Overspeed Shut	When controller detects engine speed is over preset over speed stop threshold, it issues shutdown alarm signal.
3	Engine Underspeed Shut	When controller detects engine speed is below preset under speed stop threshold, it issues shutdown alarm signal.
4	Loss of Speed Signal	When controller detects speed is 0, and speed signal loss action is selected "Shutdown", it issues shutdown alarm signal.

No.	Type	Description
5	Failed to Start	When engine fails to start during pre-set start attempts, controller issues failed to start alarm signal.
6	ECU Shutdown	When controller receives shutdown alarm signal via J1939, it issues shutdown alarm signal.
7	High Temp. Shutdown	When controller input port is set to High Temp Shutdown Input and if it is active, it issues alarm signal.
8	Low Oil Press Shutdown	When controller input port is set to Low Oil Pressure Shutdown Input and if it is active, it issues alarm signal.
9	ECU Comm. Failure	When engine start is completed, but controller doesn't receive data via J1939, controller issues communication failure signal.
10	Temp Sensor Open Shut	When controller detects sensor open, and action type is selected “Shutdown”, it issues shutdown alarm signal.
11	High Temp Shutdown	When controller detects temperature value is above pre-set shutdown value, it issues shutdown alarm signal.
12	OP Sensor Open Shut	When controller detects sensor is open and action type is selected “Shutdown”, it issues shutdown alarm signal.
13	Low OP Shutdown	When controller detects oil pressure is below pre-set shutdown value, it issues shutdown alarm signal.
14	Fuel Level Open Shut	When controller detects sensor is open, and action type is “Shutdown”, it issues shutdown alarm signal.
15	Low Fuel Level Shutdown	When controller detects level is below pre-set fuel level shutdown value, it issues shutdown alarm signal.
16	Discharge Pressure Open	When controller detects pressure sensor is open, and action type is selected “Shutdown”, it issues shutdown alarm signal.
17	High Discharge Press	When controller detects sensor is above pre-set pressure shutdown value, it issues shutdown alarm signal.
18	Low Discharge Press	When controller detects sensor is below pre-set pressure shutdown value, it issues shutdown alarm signal.
19	High Discharge Temp. Open	When controller detects discharge temperature sensor is open and action type is selected “Shutdown”, it issues warning signal.
20	High Discharge Temp. Shutdown	When controller detects sensor value of discharge temperature is above pre-set discharge temperature shutdown value, it issues warning signal.
21	Low Discharge Temp. Shutdown	When controller detects sensor value of discharge temperature is below pre-set discharge temperature shutdown value, it issues warning signal.
22	Aux. Sensor 2~4 Open	When controller detects sensor is open, and action type is selected “Shutdown”, it issues shutdown alarm signal.
23	Aux. Sensor 2~4 High	When controller detects sensor value is above pre-set upper shutdown limit value, it issues shutdown alarm signal.
24	Aux. Sensor 2~4 Low	When controller detects sensor value is below pre-set lower shutdown limit value, it issues shutdown alarm signal.
25	Input 1~5 Shutdown	When digital input is configured to shutdown alarm, and if it is active, it issues corresponding input shutdown alarm signal.

No.	Type	Description
26	End of Mandate Time	When controller time reaches mandate time, and mandate time due action is selected “Warning”, it issues warning signal.
27	Oil Filter Time Over	When timing method is set to “Unit Running Time”, maintenance timing is due, and action type is selected "Shutdown", it issues shutdown signal. When timing method is set to “Real Time Clock”, maintenance countdown goes to 0, and action type is selected "Shutdown", it issues shutdown signal.
28	Oil Separator Time Over	
29	Air Filter Time Over	
30	Lubrication Time Over	
31	Engine Oil Filter Over	
32	Engine Fuel Filter Over	
33	Engine Lubrication Over	
34	Air Filter Maintenance Over	
35	Maintenance 9 Over	
36	Maintenance 10 Over	

NOTE: For ECU Warning and ECU Shutdown alarms, if detailed information is displayed, check the engine according to the information; otherwise refer to engine user manual to obtain information according to SPN alarm code.

SmartGen

7 WIRE CONNECTION

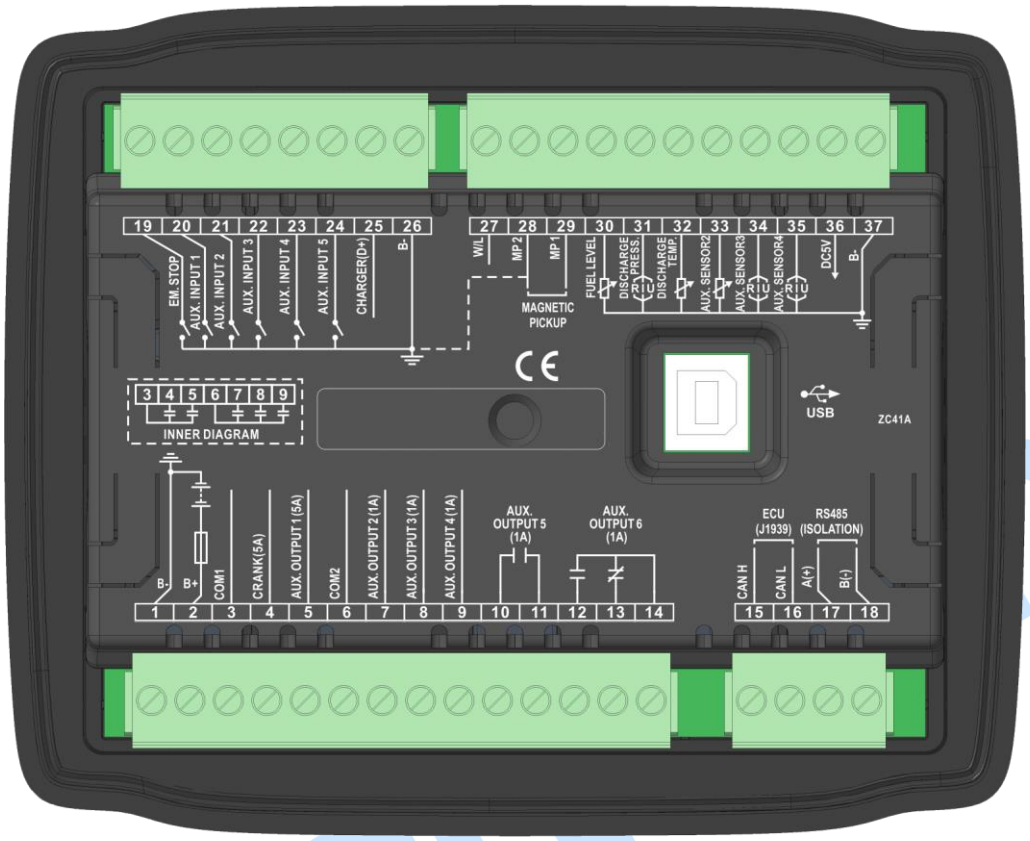


Fig.6 Controller Back Panel

Table 8 Connection Terminal Description

No.	Function	Size	Remark	
1	DC Power Input B-	1.5mm²	Connects starter battery negative.	
2	DC Power Input B+	1.5mm²	Connects starter battery positive.	
3	COM1 Relay	1.5mm²	Connects COM1 output, Rated 5A DC28V.	
4	Crank Relay Output	1.0mm²		
5	AUX. Output 1	1.0mm²		
6	COM2 Relay	1.0mm²	Connects COM2 output, Rated 1A DC28V.	Please see Table 10 for setting items.
7	AUX. Output 2	1.0mm²		
8	AUX. Output 3	1.5mm²		
9	AUX. Output 4	1.5mm²		
10	AUX. Output 5	1.0mm²	N/O volts free contact, Rated 1A DC28V.	
11		1.0mm²		
12	AUX. Output 6	1.0mm²	N/O output, Rated 1A DC28V.	
13		1.0mm²	N/C output, Rated 1A DC28V.	
14		1.0mm²	Relay COM.	
15	ECU CAN H	0.5mm²	Resistance 120Ω shielding wire is recommended; single end is ground connected.	
16	ECU CAN L	0.5mm²		
17	RS485 A(+)	0.5mm²		

No.	Function	Size	Remark	
18	RS485 B(-)	0.5mm²		
19	EM. Stop	0.5mm²	When it is active, controller shall do emergency stop.	
20	Aux. Input 1	0.5mm²	Active when ground connected (B-).	Please see Table 11 for setting items.
21	Aux. Input 2	0.5mm²	Active when ground connected (B-).	
22	Aux. Input 3	0.5mm²	Active when ground connected (B-).	
23	Aux. Input 4	0.5mm²	Active when ground connected (B-).	
24	Aux. Input 5	0.5mm²	Active when ground connected (B-).	
25	Charger D+	1.0mm²	Connects charger D+ (W/L) terminal; hung up it if the terminal doesn't exist.	
26	Aux. Input COM	0.5mm²	Connected already with B- internally.	
27	W/L	0.5mm²	Connects charger W.	
28	MP2 Speed Sensor Input; Connected with battery negative already internally;	0.5mm²	Connects engine speed sensor; shielding wire is recommended.	
29	MP1 Speed Sensor Input	0.5mm²		
30	Fuel Level Sensor	1.0mm²	Connects engine fuel level sensor (resistance).	Please see Table 12 for setting items.
31	Discharge Press. Sensor	1.0mm²	Connects discharge pressure sensor (resistance/current/voltage).	
32	Discharge Temp. Sensor	1.0mm²	Connects discharge temperature sensor (resistance).	
33	Aux. Sensor 2	1.0mm²	Users-defined (resistance).	
34	Aux. Sensor 3	1.0mm²	Users-defined (resistance/current/voltage).	
35	Aux. Sensor 4	1.0mm²	Users-defined (resistance/current/voltage).	
36	DC5V	1.0mm²	Power supply for voltage sensor.	
37	Sensor COM (B-)	1.0mm²	Sensor COM; connected with B- already internally.	
	USB	/	Communication with PC monitoring software.	

8 CONFIGURATION PARAMETER RANGE AND DEFINITION

8.1 PARAMETER RANGE AND DEFINITION

Table 9 Parameter Setting Contents and Range List

No.	Item	Range	Default	Description
Language Setting				
1	Language	(0-6)	0	0: Simplified Chinese; 1: English; 2: Russian 3: Spanish 4: French 5: Korean 6: Portuguese
Lock Setting				
1	Password	(0-9999)	1234	This password is used to access the lock settings. ⚠ Caution: the factory default password is "1234", and the operator can modify it to prevent the unauthorized changes to the controller lock configuration. Please contact company's service personnel. support if the password is forgotten.
2	Lock Setting	(0-1)	0	0: Unlock; 1: Lock
Override Mode				
1	Override Mode	(0-1)	0	0: Disable 1: Enable
LCD Backlight				
1	Contrast Ratio	(0-10)	5	Set LCD contrast ratio;
2	Brightness	(0-5)	5	Set LCD backlight brightness;
3	Delay	(0-3600)min	5	Backlight is always on when delay is set to 0min.
Module Setting				
1	Module Address	(1-254)	1	Controller address for remote monitoring;
2	Comm. Stop Bit	(0-1)	0	0: 2-bit Stop Bit 1: 1-bit Stop Bit (PC software settings)
3	Password	(0-9999)	1234	It used for advanced parameter setting;

No.	Item	Range	Default	Description
				⚠**Caution!** Default password is "1234"; It can be changed by operator for purpose of preventing others changing controller advanced configuration. If password is changed, please remember clearly. If it is forgotten, please contact company service person.
4	Date and Time			Users can calibrate date and time.
5	Maintain Password	(0-9999)	1234	Independent password for maintenance.
6	Parameter Password Setting	(0-9999)	0	It is used to access the user parameter settings.
7	Top Left Display	(0-10)	0	0: Speed; 1: Engine temperature; 2: Discharge pressure; 3: Discharge temperature; 4: Engine oil pressure; 5: Battery voltage; 6: D+ voltage; 7: Aux. sensor 2; 8: Aux. sensor 3; 9: Aux. sensor 4; 10: Fuel level.
8	Top Right Display	(0-10)	1	
9	Bottom Left Display	(0-10)	2	
10	Bottom Right Display	(0-10)	3	
11	Start/Stop Control Mode	(0-2)	0	0: Start/stop control of controller; 1: Start/stop control of external key; 2: Start/stop control of controller + key
12	Startup Screen Time	(0-3600)s	2	
Timer Setting				
1	Preheat Delay	(0-3600)s	0	Time for pre-heating plug to be energized before starter is energized.
2	Prestart Fuel Time	(0-3600)s	1	Time for fuel relay output every time before starter is energized.
3	Cranking Time	(3-60)s	8	Time for starter to be energized every time.
4	Crank Rest Time	(3-60)s	10	Waiting time before second energization when engine

No.	Item	Range	Default	Description
				fails to start.
5	Safety On Delay	(0-3600)s	10	During this time oil pressure low, temp. high, under speed, under frequency, under voltage, and charge alt failure alarms are all inactive.
6	Start Idle Time	(0-3600)s	10	Time for engine idle running in start process.
7	Warming Up Time	(0-3600)s	0	Warming up time for engine before normal running after high speed running.
8	Cooling Time	(0-3600)s	0	Cooling time before stop
9	Stop Idle Time	(0-3600)s	10	Time for engine idle running in stop process.
10	ETS Solenoid Hold	(0-3600)s	20	Time for ETS to be energized before stop.
11	Wait Stop Time	(0-3600)s	0	Time after idle running delay before complete stop when ETS Solenoid Hold is set 0; When it is not 0, it is time after ETS delay before complete stop.
12	After Stop Time	(0-3600)s	0	Time from complete stop to standby status.
13	Fuel Pre-supply Rest Time	(0-12)h	2	Interval time from this pre-supply is completed to next pre-supply is outputted when output is configured to fuel pre-supply in standby state; when it is set to 0, pre-supply will not output in standby state.
14	Fuel Pre-supply Time	(3-30)s	5	Time for pre-supply output when output is configured to fuel pre-supply.
15	Manual Preheat Time	(0-3600)s	0	In standby status, the manual preheat input is active and the outputs. If the input port is inactive or the pre-heating time dues, or engine temperature reaches the preheat correlated temperature, the preheat output is

No.	Item	Range	Default	Description
				disconnected.
16	Preset Stop Delay	(0-1)	0	0: Disable 1: Enable When pre-set stop delay enables, during stop stage, the system will operate based on the set "ETS solenoid hold time" and "Fail to stop time" for output. It will no longer automatically switch to a 10s delay after the speed drops to 0.
Engine Setting				
1	Engine Type	(0-39)	34	Default: 34: GTSC1;
2	Enable ECU Alarm Shut	(0-1)	1	0: Disable 1: Enable **NOTE:** When engine detects red light alarm, it will stop when it is enabled;
3	Source of Speed Signal	(0-1)	0	0: Speed Sensor 1: W/L
4	W/L Ratio	(0-99.99)	9.04	
5	Flywheel Teeth	(1.0-300.0)	118.0	Flywheel teeth of engine, used for starter disconnect conditions and engine speed detection; please refer to the below installation.
6	Rated Speed	(0-6000)r/min	2200	Provide standard for over speed, under speed and load speed detection.
7	Start Attempts	(1-10)times	3	Maximum start times in case of failed start; when this number is reached, controller shall issue Failed to Start signal.
8	Crank Disconnect	(0-2)	2	Please refer to Table 12; There are two kinds of disconnect conditions for engine and starter. They can be used independently or together and the purpose is to separate starter motor and engine as soon as possible.
9	Disconnect Speed	(0-200)%	24	Set value is the percentage of rated speed; when speed

No.	Item		Range	Default	Description
					is above the set value, starter shall disconnect; Please refer to the rear installation.
10	Disconnect OP		(0-1000)kPa	200	When Oil Pressure is above pre-set value, starter shall disconnect. Please refer to the rear installation.
11	Overspeed Warn	Enable	(0-1)	1	0: Disable 1: Enable Set value is the percentage of rated speed; Return value and delay value can also be set.
		Set	(0-200.0)%	110.0	
		Return	(0-200.0)%	108.0	
		Delay	(0-3600)s	5	
12	Underspeed Warn	Enable	(0-1)	0	
		Set	(0-200.0)%	55.0	
		Return	(0-200.0)%	60.0	
		Delay	(0-3600)s	5	
13	Overspeed Shutdown	Enable	(0-1)	1	0: Disable 1: Enable Set value is the percentage of rated speed; Delay value can also be set.
		Set	(0-200.0)%	114.0	
		Delay	(0-3600)s	2	
14	Underspeed Shutdown	Enable	(0-1)	0	
		Set	(0-200.0)%	50.0	
		Delay	(0-3600)s	3	
15	Loss of Speed Signal Delay		(0-3600)s	5	Time from detecting speed is 0 to confirm the action;
16	Loss of Speed Signal Action		(0-1)	0	0: Warning 1: Shutdown
17	Battery Rated Voltage		(0-60.0)V	24.0	Provide standard for battery over/under voltage detection.
18	Battery Overvolt Warn	Enable	(0-1)	1	0: Disable 1: Enable Set value is the percentage of battery rated voltage; Return value and delay value can also be set.
		Set	(0-200)%	120	
		Return	(0-200)%	115	
		Delay	(0-3600)s	60	
19	Battery Undervolt Warn	Enable	(0-1)	1	
		Set	(0-200)%	85	
		Return	(0-200)%	90	
		Delay	(0-3600)s	60	
20	Charge Alt Fail	Enable	(0-1)	1	0: Disable 1: Enable During engine normal running process, when charger D+ voltage is below this value, controller issues charge alt fail warning.
		Set	(0-60.0)V	8.0	
		Return	(0-60.0)V	10.0	
		Delay	(0-3600)s	10	
21	Engine Idle Speed		(0-100)%	70	Set value is the percentage of rated speed; when idle

No.	Item	Range	Default	Description
				running is needed, stabilize the speed at the set value.
22	Fixed Idle Speed	(0-2000) r/min	0	When the set value of fixed idle speed is above 300, the engine's idle speed will execute as the fixed idle speed and will no longer adjust based on a percentage of rated speed.
23	Engine Unload Speed	(0-100)%	70	Set value is the percentage of rated speed; when discharge pressure reaches rated pressure after load, stabilize the speed at the set value.
24	Engine Load Speed	(0-100)%	70	After pressing load key, when the current speed reaches load speed, load control will output.
25	Air Com. Rated Pressure	(0-30000)kPa	700	Adjust speed at corresponding upper pressure value after load.
26	Air Com. Unload Act Pressure	(0-30000)kPa	600	Adjust speed at corresponding lower pressure value after load.
27	Raise Speed Rate Set	(30-500)r/s	150	Increased number of turns per second;
28	Drop Speed Rate Set	(30-500)r/s	30	Reduced number of turns per second;
29	Load Valve Auto Control	(0-1)	0	0: Disable 1: Enable When the non-ECU unit setting is enabled, press the load key after that, if discharge pressure is less than air compressor unload action pressure, load control outputs; if discharge pressure is larger than air compressor rated pressure, load control stops outputting.
30	Charger Voltage Source	(0-1)	0	0: ECU 1: Analog
31	Charger Excitation Control	(0-1)	0	0: Disable 1: Enable When it is disabled, D+ control doesn't output.

No.	Item		Range	Default	Description
32	Preheat Correlated Temperature Enable		(0-1)	0	0: Disable 1: Enable
33	Preheat Correlated Temperature Setting		(0-300)°C	25	When it is enabled, when engine temperature is higher than set value in preheat period, preheat is over, preheat output stops.
34	Overpressure Auto Unload	Enable	(0-1)	0	0: Disable 1: Enable When discharge pressure is higher than target value, load control disconnects; when it is lower than set value, load outputs.
		Set	(0-200.0)%	120.0	
		Return	(0-200.0)%	110.0	
		Delay	(0-3600)s	5	
35	Start Auto Load Enable		(0-1)	0	0: Disable 1: Enable When it is enabled, engine can automatically take load and enter high speed without pressing load key after starting.
36	Discharge Temp. Protection Range		(0-1)	0	0: After Safety Delay; 1: Always
37	Temperature-correlated of Idle Delay	Enable	(0-1)	0	When the temperature-correlated idle during start process is enabled, if the selected temperature is over than the set value, start idle delay will end, the system will enter idle running and wait for loading.
		Set	(0-100)°C	40	
		Associated Sensor	(0-5)	0	0: Engine temperature; 1: Engine oil temperature; 2: Discharge temperature; 3: Aux. sensor 2; 4: Aux. sensor 3; 5: Aux. sensor 4.
38	Overload Protection Setting	Enable	(0-1)	0	When the overload protection is enabled, if the engine's load rate is detected to exceed the set value, the engine will decrease its current speed to the overload-maintained speed at the pre-set deceleration rate.
		Set	(0-200)%	90	
		Return	(0-200)%	70	
		Delay	(0-3600)s	5	
39	Overload Deceleration Rate		(30-500)r/s	30	The speed deceleration

No.	Item		Range	Default	Description
					Rate (rev/s).
40	Overload Maintained Speed		(0-100.0)%	70.0	Percentage of rated speed.
41	ECU Comm Source Add.		(0-255)	3	Set value of communication source address.
42	Shutdown Pressure Detection	Enable	(0-1)	0	When the shutdown pressure detection is enabled, if the discharge pressure is higher than the shutdown pressure value, engine will not stop. Instead, it will wait for the discharge pressure to drop below the set value before shutdown.
		Pressure	(0-30000)kPa	300	
43	Air Preheat	Enable	(0-1)	0	When air preheat is enabled, during the start process, if the temperature is below the set value, the air preheat will activate. Upon successful start enables, the air preheat output is automatically disconnected.
		Set	(0-100)°C	10	
		Associated Sensor	(0-5)	0	0: Engine temperature; 1: Engine oil temperature; 2: Discharge temperature; 3: Aux. sensor 2; 4: Aux. sensor 3; 5: Aux. sensor 4.
44	Bypass Valve Control	Enable	(0-1)	0	When the bypass valve control is enabled and after successful start, the engine speed will increase to the running speed if the Engine speed exceeds the set value and the discharge pressure remains below the set bypass pressure.
		Bypass Speed	(0-6000) r/min	1300	
		Bypass Pressure	(0-30000)kPa	300	
		Delay	(0-3600)s	0	
		Running Speed	(0-6000) r/min	1450	
45	Speed Control Selection		(0-1)	0	0: Discharge pressure 1: Capacity modulation pressure
46	Capacity Modulation Curve Setting				Users can customize the capacity modulation curve by themselves

No.	Item		Range	Default	Description
47	High Discharge Pressure Start Inhibit	Enable	(0-1)	0	When it is enabled, the engine is prevented from starting if the detected current discharge pressure is higher than the set value.
		Pressure Value	(0-1000)kPa	50	
Analog Sensor Setting					
Engine Temperature (ECU) Setting					
1	Display Unit		(0-1)	0	0: °C; 1: °F
2	Over Shutdown	Enable	(0-1)	1	0: Disable 1: Enable When external temp. sensor value is larger than this value, controller issues
		Set Value	((-50)-300)°C	98	
		Delay Value	(0-3600)s	3	
3	Over Warn	Enable	(0-1)	1	0: Disable 1: Enable When external temp. sensor value is over this value, controller issues temp. high shutdown alarm; This value is detected only after safety on delay. Return and delay value can be set.
		Set Value	((-50)-300)°C	95	
		Return Value	((-50)-300)°C	93	
		Delay Value	(0-3600)s	5	
4	Under Warn	Enable	(0-1)	0	0: Disable 1: Enable When external temp. sensor value is less than this value, controller issues temp. low warning alarm; This value is detected always. Delay value and return value can be set.
		Set Value	((-50)-300)°C	70	
		Return Value	((-50)-300)°C	75	
		Delay Value	(0-3600)s	5	
5	Heater Control	Enable	(0-1)	0	0: Disable 1: Enable When external temp. sensor value is less than this value, heater control outputs. Delay value and return value can be set.
		Open	((-50)-300)°C	50	
		Close	((-50)-300)°C	55	
		Max. Open Time	(0-3600)min	60	
6	Cooler Control	Enable	(0-1)	0	0: Disable 1: Enable When external temp. sensor value is larger than this value, cooler control outputs. Delay value and return value can be set.
		Open	((-50)-300)°C	80	
		Close	((-50)-300)°C	75	
		Max. Open Time	(0-3600)min	60	
Engine Oil Pressure (ECU) Setting					
1	Display Unit		(0-2)	0	0: kPa 1: bar 2: psi
2	OP Low Shutdown	Enable	(0-1)	1	0: Disable 1: Enable When external oil pressure
		Set Value	(0-1000) kPa	103	

No.	Item		Range	Default	Description
		Delay Value	(0-3600)s	3	sensor value is less than this value, controller issues OP low shutdown alarm. This value is detected only after safety on delay. Delay value can be set.
3	OP Low Warn	Enable	(0-1)	1	0: Disable 1: Enable When external oil pressure sensor value is less than this value, controller issues OP low warning alarm. This value is detected only after safety on delay. Delay value and return value can be set.
		Set Value	(0-1000) kPa	124	
		Return Value	(0-1000) kPa	138	
		Delay Value	(0-3600)s	5	
Fuel Level Sensor Setting					
1	Curve Type		(0-15)	1	Custom curve; For details please refer to Table 12.
2	Open Action		(0-2)	0	0: Warning 1: Shutdown 2: None
3	Display Unit		(0-1)	0	0: % 1: L
4	Under Shutdown	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is less than this value, controller issues shutdown alarm; Alarm enable and delay value can be set.
		Set Value	(0-300) %	10	
		Delay Value	(0-3600)s	5	
5	Under Warn	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is less than this value, controller issues warning alarm; Alarm enable, return and delay value can be set.
		Set Value	(0-300) %	20	
		Return Value	(0-300) %	30	
		Delay Value	(0-3600)s	5	
6	Fuel Pump Control	Enable	(0-1)	0	0: Disable 1: Enable When external fuel level sensor value is less than this value, fuel pump control outputs; return value and delay value can also be set.
		Open	(0-300)%	10	
		Close	(0-300)%	80	
		Max. Open Time	(0-3600)s	60	
7	Fuel Tank Capacity Set		(0-10000)L	1000	
8	Custom Curve				When custom resistance is chosen in the curve type, corresponding curve shall be set.
Discharge Pressure Sensor Setting					

No.	Item		Range	Default	Description
1	Curve Type		(0-15)	2	Custom 4-20mA curve; Please refer to Table 12 for details.
2	Open Action		(0-2)	0	0: Warning 1: Shutdown 2: None
3	Display Unit		(0-3)	0	0: kPa; 1: bar; 2: psi; 3: MPa
4	Over Shutdown	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is larger than this value, controller issues shutdown alarm; Alarm enable and delay value can be set.
		Set Value	(0-30000) kPa	6000	
		Delay Value	(0-3600)s	5	
5	Under Shutdown	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is less than this value, controller issues shutdown alarm; alarm enable and delay value can be set.
		Set Value	(0-30000) kPa	100	
		Delay Value	(0-3600)s	5	
6	Over Warn	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is larger than this value, controller issues warning alarm; alarm enable, return and delay values can be set.
		Set Value	(0-30000) kPa	5000	
		Return Value	(0-30000) kPa	4500	
		Delay Value	(0-3600)s	5	
7	Under Warn	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is less than this value, controller issues warning alarm; alarm enable, return and delay values can be set.
		Set Value	(0-30000) kPa	200	
		Return Value	(0-30000) kPa	300	
		Delay Value	(0-3600)s	5	
8	Over Shut Target PCT	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is larger than this value, controller issues shutdown alarm; alarm enable and delay value can be set.
		Set Value	(0-300.0) %	120.0	
		Delay Value	(0-3600)s	5	
9	Over Warn Target PCT	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is larger than this value, controller issues warning alarm; alarm enable and delay value can be set.
		Set Value	(0-300.0) %	110.0	
		Return Value	(0-300.0) %	90.0	
		Delay Value	(0-3600)s	5	
10	Custom Curve				When custom resistance/current/voltage types are selected; related

No.	Item		Range	Default	Description
					curve needs to be set.
Discharge Temperature Sensor Setting					
1	Curve Type		(0-15)	0	Changes according to sensor types;
2	Open Action		(0-2)	0	0: Warning 1: Shutdown 2: None
3	Display Unit		(0-1)	0	0：℃； 1：℉
4	Over Shutdown	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is larger than this value, controller issues shutdown alarm; Alarm enable and delay value can be set.
		Set Value	(0-9000)℃	100	
		Delay Value	(0-3600)s	5	
5	Under Shutdown	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is less than this value, controller issues shutdown alarm; alarm enable and delay value can be set.
		Set Value	(0-9000)℃	10	
		Delay Value	(0-3600)s	5	
6	Over Warn	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is larger than this value, controller issues warning alarm; alarm enable, return and delay values can be set.
		Set Value	(0-9000)℃	90	
		Return Value	(0-9000)℃	80	
		Delay Value	(0-3600)s	5	
7	Under Warn	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is less than this value, controller issues warning alarm; alarm enable, return and delay values can be set.
		Set Value	(0-9000)℃	20	
		Return Value	(0-9000)℃	30	
		Delay Value	(0-3600)s	5	
8	Custom Curve				When custom resistance type is selected; related curve needs to be set.
Aux. Sensor 2~4 Setting					
1	Sensor Type		(0-5)	0	0: Not Used 1: Engine Temperature Sensor 2: Engine Oil Pressure Sensor 3: Temperature Sensor 4: Pressure Sensor 5: Level Sensor
2	Curve Type				Changes according to sensor types;

No.	Item		Range	Default	Description
3	Open Action		(0-2)	0	0: Warning 1: Shutdown 2: None
4	Display Unit		(0-1)	0	0: °C 1: °F **NOTE**: Unit is different for different sensor.
5	Over Shutdown	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is larger than this value, controller issues shutdown alarm; Alarm enable and delay value can be set.
		Set Value	(0-9000)	100	
		Delay Value	(0-3600)s	5	
6	Under Shutdown	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is less than this value, controller issues shutdown alarm; alarm enable and delay value can be set.
		Set Value	(0-9000)	10	
		Delay Value	(0-3600)s	5	
7	Over Warn	Enable	(0-1)	0	0: Disable 1: Enable When external sensor value is larger than this value, controller issues warning alarm; alarm enable, return and delay values can be set.
		Set Value	(0-9000)	90	
		Return Value	(0-9000)	80	
		Delay Value	(0-3600)s	5	
8	Under Warn	Enable	(0-9000)	20	When external sensor value is less than this value, controller issues warning alarm; alarm enable, return and delay values can be set.
		Set Value	(0-1)	0	
		Return Value	(0-9000)	20	
		Delay Value	(0-9000)	30	
9	Custom Curve				When custom resistance/current/voltage types are selected; related curve needs to be set.
Engine Temperature Related Setting					
1	Sensor Correlate Set		(0-3)	0	0: Not Used 1: Aux. Sensor 2 2: Aux. Sensor 3 3: Aux. Sensor 4
2	Heater Control	Enable	(0-1)	0	0: Disable 1: Enable When the external temp. sensor value is less than this value, heater control outputs; Return and delay value can be set.
		Open	((-50)-300)°C	50	
		Close	((-50)-300)°C	55	
		Max. Open Time	(0-3600)min	60	
3	Cooler Control	Enable	(0-1)	0	0: Disable 1: Enable When the external temp.
		Open	((-50)-300)°C	80	

No.	Item		Range	Default	Description
		Close	((-50)-300)°C	75	sensor value is higher than this value, cooler control outputs; Return and delay value can be set.
		Max. Open Time	(0-3600)min	60	
Engine Oil Pressure Related Setting					
1	Sensor Correlate Set		(0-3)	0	0: Not Used 1: Aux. Sensor 2 2: Aux. Sensor 3 3: Aux. Sensor 4
Screw Oil Cooler Control Setting					
1	Screw Oil Cooler Control 1 Setting	Enable	(0-1)	0	0: Disable 1: Enable According to the current discharge temperature, when temperature is higher that it, screw oil cooler control 1 will output, temperature will be closed and open time can be set.
		Open	(0-300)°C	80	
		Close	(0-300)°C	75	
		Max. Open Time	(0-3600)min	0	
2	Screw Oil Cooler Control 2 Setting	Enable	(0-1)	0	0: Disable 1: Enable According to the current discharge temperature, when temperature is higher that it, screw oil cooler control 2 will output, temperature will be closed and open time can be set.
		Open	(0-300)°C	80	
		Close	(0-300)°C	75	
		Max. Open Time	(0-3600)min	0	
Capacity Modulation Pressure Related Setting					
1	Sensor Correlate Set		(0-3)	0	0: Not Used 1: Aux. Sensor 2 2: Aux. Sensor 3 3: Aux. Sensor 4
Digital Input Ports					
Digital Input 1					
1	Contents Setting		(0-53)	3	Alarm Reset; Please refer to Table 11 for details.
2	Active Type		(0-1)	0	0: Close 1: Open
Digital Input 2					
1	Contents Setting		(0-53)	26	High Temp. Shutdown Input; Please refer to Table 11 for details.
2	Active Type		(0-1)	0	0: Close 1: Open
Digital Input 3					
1	Contents Setting		(0-53)	27	Low Oil Pressure Shutdown

No.	Item	Range	Default	Description
				Input; Please refer to Table 11 for details.
2	Active Type	(0-1)	0	0: Close 1: Open
Digital Input 4				
1	Contents Setting	(0-53)	0	Users defined; Please refer to Table 11 for details.
2	Active Type	(0-1)	0	0: Close 1: Open
3	Active Range	(0-3)	2	0: From Safety On 1: From Crank 2: Always 3: Never
4	Active Action	(0-2)	0	0: Warning 1: Shutdown 2: Indication
5	Active Delay	(0-20.0)s	2.0	Time from detecting input is active to confirm;
6	Input Description			Users defined;
Digital Input 5				
1	Contents Setting	(0-53)	0	Users defined; Please refer to Table 11 for details.
2	Active Type	(0-1)	0	0: Close 1: Open
3	Active Range	(0-3)	2	0: From Safety On 1: From Crank 2: Always 3: Never
4	Active Action	(0-2)	0	0: Warning 1: Shutdown 2: Indication
5	Active Delay	(0-20.0)s	2.0	Time from detecting input is active to confirm;
6	Input Description			Users defined;
Auxiliary Outputs				
Auxiliary Output 1				
1	Contents Setting	(0-119)	29	Fuel relay output; Please refer to Table 10 for details.
2	Output Type	(0-1)	0	0: Normally Open 1: Normally Close
Auxiliary Output 2				
1	Contents Setting	(0-119)	28	Starting relay output; Please refer to Table 10 for details.
2	Output Type	(0-1)	0	0: Normally Open 1:

No.	Item	Range	Default	Description
				Normally Close
Auxiliary Output 3				
1	Contents Setting	(0-119)	30	Idle speed control; Please refer to Table 10 for details.
2	Output Type	(0-1)	0	0: Normally Open 1: Normally Close
Auxiliary Output 4				
1	Contents Setting	(0-119)	26	Load control; Please refer to Table 10 for details.
2	Output Type	(0-1)	0	0: Normally Open 1: Normally Close
Auxiliary Output 5				
1	Contents Setting	(0-119)	39	Normal running output; Please refer to Table 10 for details.
2	Output Type	(0-1)	0	0: Normally Open 1: Normally Close
Auxiliary Output 6				
1	Contents Setting	(0-119)	42	Common alarm; Please refer to Table 10 for details.
2	Output Type	(0-1)	0	0: Normally Open 1: Normally Close
Alternate Configuration Setting				
Alternate Configuration 1				
1	Enable Choose	(0-1)	0	0: Disable 1: Enable
2	Engine Rated Speed	(0-6000)r/min	2200	When this is enabled, if input is configured to “Alt Config. 1 Active”, and if input is active, speed shall be adjusted according to alternate configuration settings after load.
3	Engine Unload Speed	(0-100.0)%	70.0	
4	Air Com. Rated Pressure	(0-30000)kPa	700	
5	Air Com. Unload Act Press	(0-30000)kPa	600	
6	Engine Load Speed	(0-100)%	70	
7	Overload Maintained Speed	(0-100.0)%	70.0	
8	Capacity Modulation Curve Setting			
Alternate Configuration 2				
1	Enable Choose	(0-1)	0	0: Disable 1: Enable
2	Engine Rated Speed	(0-6000)r/min	2200	When this is enabled, if input is configured to “Alt Config. 2 Active”, and if input is active, speed shall be adjusted according to alternate configuration settings after load.
3	Engine Unload Speed	(0-100.0)%	70.0	
4	Air Com. Rated Pressure	(0-30000)kPa	700	
5	Air Com. Unload Act Press	(0-30000)kPa	600	
6	Engine Load Speed	(0-100)%	70	

No.	Item	Range	Default	Description
7	Overload Maintained Speed	(0-100.0)%	70.0	
8	Capacity Modulation Curve Setting			
Alternate Configuration 3				
1	Enable Choose	(0-1)	0	0: Disable 1: Enable
2	Engine Rated Speed	(0-6000)r/min	2200	When this is enabled, if input is configured to "Alt Config. 3 Active", and if input is active, speed shall be adjusted according to alternate configuration settings after load.
3	Engine Unload Speed	(0-100.0)%	70.0	
4	Air Com. Rated Pressure	(0-30000)kPa	700	
5	Air Com. Unload Act Press	(0-30000)kPa	600	
6	Engine Load Speed	(0-100)%	70	
7	Overload Maintained Speed	(0-100.0)%	70.0	
8	Capacity Modulation Curve Setting			
Maintenance Setting				
1	Oil Filter Set	(0-1)	0	0: Disable 1: Enable Maintenance time, maintenance time due action, maintenance timing method, maintenance time reset can also be set at the same time; After maintenance, maintenance time due alarm can be removed by resetting maintenance time; Please refer to Table 14 for details.
2	Oil Separator Set	(0-1)	0	
3	Air Filter Set	(0-1)	0	
4	Lubrication Set	(0-1)	0	
5	Engine Oil Filter Set	(0-1)	0	
6	Engine Fuel Filter Set	(0-1)	0	
7	Engine Lubrication Set	(0-1)	0	
8	Air Filter Maintenance Set	(0-1)	0	
9	Maintenance 9 Set	(0-1)	0	
10	Maintenance 10 Set	(0-1)	0	
ECU Information Display Setting				
1	ECU Info Smart Display	(0-1)	1	0: Disable (Display "###" when ECU doesn't send data); 1: Enable (Remains blank when ECU doesn't send data).
2	Engine Oil Temp.	(0-1)	1	0: No display; 1: Display (Smart display remains blank when no data is received during active operation).
3	Fuel Temp.	(0-1)	1	
4	Fuel Pressure	(0-1)	1	
5	Intake Port Temp.	(0-1)	1	
6	Exhaust Port Temp.	(0-1)	1	
7	Turbo Pressure	(0-1)	1	
8	Coolant Pressure	(0-1)	1	
9	Coolant Level	(0-1)	1	
10	Fuel Consumption	(0-1)	1	
11	Total Fuel Consumption	(0-1)	1	
12	Load Rate	(0-1)	1	

No.	Item	Range	Default	Description
13	Torque Percentage	(0-1)	1	
14	Water in Fuel	(0-1)	1	
15	Ash Content Percentage	(0-1)	1	

NOTES:

— Regarding parameter setting on PC software, it isn't needed to input default factory password "1234" if not changed; if it is the first time to do configuration on PC, then it is needed to input module password in password screen;

— Digital input ports cannot be set the same items (except for user-defined). Otherwise function shall not work correctly; Output ports can be set the same item;

— Engine temperature related settings: if it is ordinary engine and engine temperature is needed, any one of Aux. sensors 2~4 shall be set engine temperature sensor; and at the same time curve type shall be set the corresponding one; Next is to set engine temperature related sensor; Select corresponding Aux. sensor, which is engine temperature sensor at this time, heater control and cooler control can be realized. If alarm output function will be set, corresponding Aux. sensor output shall be set;

— Engine oil pressure related settings: if it is conventional engine and it is needed to use engine oil pressure to judge crank disconnect, if it is ordinary engine and it is needed to use engine oil pressure to judge crank disconnect, any one of the Aux. sensors 2~4 shall be set engine oil pressure, meanwhile curve type shall be set to the corresponding one. Then set engine oil pressure related sensor; Choose corresponding sensor, and at this time oil pressure is displayed, which can be one of the crank disconnect conditions; if alarm output function will be set, corresponding Aux. sensor output shall be set;

— Discharge temperature display related settings: if discharge temperature is needed to display in the first page of main screen, then any one of the Aux. sensors 2~4 shall be set temperature, and at the same time curve type shall be set corresponding curve; Then set discharge temperature display related setting; Choose corresponding sensor, and at this time first page shall have discharge temperature. If alarm output function will be set, corresponding Aux. sensor output shall be set.

SmartGen

8.2 DEFINABLE CONTENTS OF AUXILIARY OUTPUT PORTS 1~6

8.2.1 DEFINABLE CONTENTS OF AUXILIARY OUTPUT PORTS 1~6

Table 10 Definable Contents of Auxiliary Output Ports 1~6

No.	Type	Function Description
0	Not Used	
1	Custom Period 1	Please refer to the following contents for function details.
2	Custom Period 2	
3	Custom Period 3	
4	Custom Period 4	
5	Custom Period 5	
6	Custom Period 6	
7	Custom Combined 1	
8	Custom Combined 2	
9	Custom Combined 3	
10	Custom Combined 4	
11	Custom Combined 5	
12	Custom Combined 6	
13	Reserved	
14	Reserved	
15	Air Flap Control	Act at the time of over speed shutdown alarm and emergency stop; Air flap can be closed to realize fast stop.
16	Audible Alarm	Act at the time of warning and shutdown alarms; Announciator can be connected externally; It can be inhibited to output when input port “Alarm Mute” is active or any key is pressed; When there is new warning or shutdown alarm, it outputs again.
17	Louver Control	Act at the time of engine start; Disconnect after engine stop.
18	Fuel Pump Control	Act by fuel pump control upper and lower limits of fuel level sensor.
19	Heater Control	Act by heater control upper and lower limits of temp. sensor.
20	Cooler Control	Act by cooler control upper and lower limits of temp. sensor.
21	Fuel Pre-supply	Under standby state, fuel pre-supply output port is active and it outputs circularly according to pre-set “Fuel Pre-supply Rest Time” and “Fuel Pre-supply Time”; If “Fuel Pre-supply Rest Time” is 0h, then it doesn't output; Before start, pre-set pre-supply time is outputted; If pre-heat time is not configured, pre-supply outputs; If pre-heat time is configured, then pre-heat phase outputs.
22	Screw Oil Cooler Control 1	When the current discharge temperature is higher than cooler control 1 open value, it will output; when the value is lower than close value, it stops output.
23	Pre-lubricate	Act at the phase of pre-heating, fuel, start, and start rest time.
24	Remote Control	Controlled by communication port RS485.
25	Screw Oil Cooler Control 2	When the current discharge temperature is higher than cooler

No.	Type	Function Description
		control 2 open value, it will output; when the value is lower than close value, it stops output.
26	Load Control	Load/Unload key is pressed or load control input is active, then load control outputs; If load/unload key is pressed again or load input is inactive, then load control stops outputting.
27	Reserved	
28	Starting Relay	Act at engine start; and disconnect after successful start.
29	Fuel Relay	Act at engine start; and disconnect at ETS stop.
30	Idle Control	Used for engine with idle speed; Pull in before start, and disconnect at entering warming up time; Pull in at the process of stop idle speed, and disconnect when engine stops completely.
31	Speed Raise Output	Act in warming up period, and controlled by speed regulator in normal running period.
32	Speed Drop Output	Act from stop idle to waiting for stop period and controlled by speed regulator in normal running period.
33	Energize to Stop	Used for engine with stop ETS; Pull in when stop idle speed is over, and disconnect when pre-set “ETS Solenoid Hold” is over.
34	Run Key Switch Control	Used for checking ECU data once at power on; it outputs once it is power on; it stops outputting the signal at ETS stop time and failed to stop time;.
35	ECU Stop	Applicable for engine supporting ECU, and used to control ECU stop.
36	ECU Power Supply	Applicable for engine supporting ECU, and used to control ECU power.
37	Reserved	
38	Crank Success	Pull in when it detects crank success signal.
39	Normal Running	Pull in and output when it is in normal running period.
40	Reserved	
41	Reserved	
42	Common Alarm	Act at the time of common alarm and common shutdown.
43	Common Shutdown	Act at the time of common shutdown.
44	Common Warning	Act at the time of common warning.
45	Reserved	
46	Battery Overvolt	Act when battery voltage high warning occurs.
47	Battery Undervolt	Act when battery voltage low warning occurs.
48	Failed to Charge	Act when failed to charge warning occurs.
49	Preheat	Output in preheat period; output when manual preheat is active.
50	ECU Warning	ECU issued a warning alarm signal.
51	ECU Shutdown	ECU issued a shutdown alarm signal.
52	ECU Comm. Failure	Controller cannot communicate with ECU.
53	Air Preheat	Output when air preheat is active.
54	NCD Lamp Output	DPF regeneration related lamp outputs of Euro V engine.
55	Regen Req Lamp	
56	Regen Inhibit Lamp	

No.	Type	Function Description
57	Discharge Temp Lamp	
58	Regen Response Lamp	
59	Input 1 Active	Act when input port 1 is active.
60	Input 2 Active	Act when input port 2 is active.
61	Input 3 Active	Act when input port 3 is active.
62	Input 4 Active	Act when input port 4 is active.
63	Input 5 Active	Act when input port 5 is active.
64	Reserved	
65	Reserved	
66	Reserved	
67	Emergency Stop	Act when emergency stop alarm occurs.
68	Failed to Start	Act when failed to start alarm occurs.
69	Failed to Stop	Act when failed to stop alarm occurs.
70	Under Speed Warn	Act when engine under speed warning occurs.
71	Under Speed Shutdown	Act when engine under speed shutdown occurs.
72	Over Speed Warn	Act when engine over speed warning occurs.
73	Over Speed Shutdown	Act when engine over speed shutdown occurs.
74	Reserved	
75	Reserved	
76	Load Control 1	When “Alt Config. 1 Active” is active, under normal running state, load control 1 outputs.
77	Load Control 2	When “Alt Config. 2 Active” is active, under normal running state, load control 2 outputs.
78	Load Control 3	When “Alt Config. 3 Active” is active, under normal running state, load control 3 outputs.
79	High Temp Warning	Act when high temp. warning alarm occurs.
80	Low Temp Warning	Act when low temp. warning alarm occurs.
81	High Temp Shutdown	Act when high temp. shutdown alarm occurs.
82	Reserved	
83	Engine Low OP Warn	Act when low oil pressure warning occurs.
84	Engine Low OP Shut	Act when low oil pressure shutdown occurs.
85	Reserved	
86	Reserved	
87	Reserved	
88	Low Fuel Level Warn	Act when low fuel level warning occurs.
89	Reserved	
90	Low Fuel Level Shut	Act when low fuel level shutdown occurs.
91	Reserved	
92	Reserved	
93	High Discharge Pressure Warn	Act when discharge pressure high warning occurs.
94	Low Discharge Pressure Warn	Act when discharge pressure low warning occurs.
95	High Discharge Pressure	Act when discharge pressure high shutdown occurs.

No.	Type	Function Description
	Shut	
96	Low Discharge Pressure Shut	Act when discharge pressure low shutdown occurs.
97	High Discharge Temp. Warn	Act when high discharge temperature warning occurs.
98	Low Discharge Temp. Warn	Act when low discharge temperature warning occurs.
99	High Discharge Temp. Shut	Act when high discharge temperature shutdown occurs.
100	Low Discharge Temp. Shut	Act when low discharge temperature shutdown occurs.
101	Aux. Sensor 2 High Warn	Act when sensor 2 high warning occurs.
102	Aux.e Sensor 2 Low Warn	Act when sensor 2 low warning occurs.
103	Aux. Sensor 2 High Shut	Act when sensor 2 high shutdown occurs.
104	Aux. Sensor 2 Low Shut	Act when sensor 2 low shutdown occurs.
105	Aux. Sensor 3 High Warn	Act when sensor 3 high warning occurs.
106	Aux. Sensor 3 Low Warn	Act when sensor 3 low warning occurs.
107	Aux. Sensor 3 High Shut	Act when sensor 3 high shutdown occurs.
108	Aux. Sensor 3 Low Shut	Act when sensor 3 low shutdown occurs.
109	Aux. Sensor 4 High Warn	Act when sensor 4 high warning occurs.
110	Aux. Sensor 4 Low Warn	Act when sensor 4 low warning occurs.
111	Aux. Sensor 4 High Shut	Act when sensor 4 high shutdown occurs.
112	Aux. Sensor 4 Low Shut	Act when sensor 4 low shutdown occurs.
113	Reserved	
114	Reserved	
115	Reserved	
116	Reserved	
117	Reserved	
118	Reserved	
119	Reserved	

SmartGen

8.2.2 CUSTOM PERIOD OUTPUT

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



S1 and S2 both are true, then it outputs; S1 or S2 is false, it doesn't output;

Period output S1 can be configured randomly to one, or several period outputs; Delay time and output time after entering period can be set;

Condition output S2 can be any contents of output settings.

NOTE: When period output S1 delay time and output time are both 0, configurations of period output S1 are both true.

Output period: Start

Delay output time: 2s

Output time: 3s

Condition output contents: Input 1 is active;

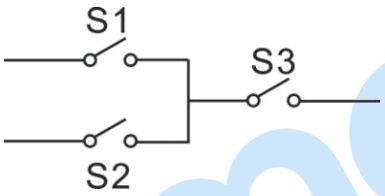
Condition output active/inactive close; close when active (disconnect when inactive)

When input port 1 is active, and it enters start time and delays for 2s, custom period output starts to output, after outputting for 3s, it stops outputting;

When input port 1 is inactive, custom output doesn't output.

8.2.3 DEFINED COMBINATION OUTPUT

Defined combination output is composed by 3 parts: OR condition output S1, OR condition output S2, AND condition output S3.



S1 or S2 is true, and S3 is true, then combination output works.

S1 and S2 both are false, or S3 is false, then combination output doesn't work.

NOTE: S1, S2 and S3 can be any contents except itself defined combination output of the output settings.

NOTE: S1, S2 and S3 cannot include or recursively include itself.

Contents of OR condition output S1: input port 1 is active;

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

Contents of OR condition output S2, input port 2 is active;

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

Contents of AND condition output S3: input port 3 is active;

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

When input port 1 is active or input port 2 is active, if input port 3 is active, defined combination output is working; if input port 3 is inactive, defined combination output is not working;

When input port 1 is inactive and port 2 is inactive, no matter port 3 is active or not, defined combination output is not working.

8.3 DEFINED CONTENTS OF DIGITAL INPUT PORTS

Table 11 Defined Contents of Digital Input Ports

No.	Type	Description
0	Users Configured	Users can define the following functions: Indication: indicate only, not warning or shutdown. Warning: warning only, not shutdown. Shutdown: alarm and shutdown immediately Never: input is inactive. Always: input is active all the time. From crank: start to detect at the time of start. From safety on: start to detect after safety on run delay.
1	Reserved	
2	Alarm Mute	Can prohibit output configurations “Audible Alarm” outputs when input is active.
3	Alarm Reset	Can reset shutdown alarm when input is active.
4	Reserved	
5	Lamp Test	All LED indicators are illuminated when input is active.
6	Panel Lock	All buttons in panel is inactive except UP/DOWN/CONFIRM keys. Parameters cannot be configured. But users can set language, check event log and controller information. There is 🔒 in the bottom right corner on LCD when input is active.
7	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 of crank success conditions will be invalid.
8	Reserved	
9	Reserved	
10	Reserved	
11	Speed Control Inhibit	When input port is active, controller will not send the speed control command.
12	Reserved	
13	Reserved	
14	Reserved	
15	Reserved	
16	DPF Manual Regeneration Request	A button can be connected externally (not self-lock); For engine with Euro V standard, if PDF regeneration is needed, press the button and controller shall issue manual request command to ECU.
17	DPF Regeneration Inhibit	For engine with Euro V standard, if DPF regeneration Inhibit is needed, so when input is active, controller issues inhibition command to ECU.
18	Reserved	
19	Reserved	
20	Reserved	
21	Alarm Stop Inhibit	All shutdown alarms are inhibited except emergency stop and over speed shutdown. (Override mode)

No.	Type	Description
22	Instrument Mode	All outputs are inhibited in this mode.
23	Reserved	
24	Reset Maintenance	Controller will set the time and date of maintenance 1 as default value when input is active.
25	External Charging Failure	When input is active, failed to charge warning alarm occurs.
26	High Temp Shutdown	Connects to digital input of temperature sensor.
27	Low OP Shutdown	Connects to digital input of oil pressure.
28	Reserved	
29	Low Coolant Level Shutdown	Connects to digital input of coolant level sensor. When input is active, controller will send low coolant level shutdown alarm.
30	Reserved	
31	Reserved	
32	Manual Start Input	When input is active, engine can be started automatically; when input is inactive, engine can be stopped automatically.
33	Reserved	
34	Simulate Stop key	An external button (unlatched) can be connected and pressed as simulate panel.
35	Simulate Load/Unload key	An external button (unlatched) can be connected and pressed as simulate panel.
36	Reserved	
37	Simulate Start key	An external button (unlatched) can be connected and pressed as simulate panel.
38	Reserved	
39	Reserved	
40	Reserved	
41	Reserved	
42	Alt Config. 1 Active	When input port is active, configuration is active; Different parameters can be set for it, making convenience for users to choose current configuration by input port.
43	Alt Config. 2 Active	
44	Alt Config. 3 Active	
45	Reserved	
46	Reserved	
47	Load Input	Act between start idle and stop idle; When input is active, load control outputs; When it is inactive, load control stops outputting.
48	Reserved	
49	Manual Preheat	In standby status, the preheat output activates when manual preheat input is active; while the preheat output deactivates when preheat input is inactive, or preheating time dues, or the engine temperature reaches the correlated temperature.
50	Reserved	
51	Screen Off Mode	When input port is active, controller will enter the screen off mode, both the LCD and indicator are not on.
52	Reserved	
53	Reserved	

8.4 SELECTION OF SENSORS

Table 12 Sensors Selection

No.	Items	Description	Remark
1	Temperature Sensor	0 Not used 1 Custom Res 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 Cu50 13-15 Reserved	Defined resistance's range is (0~1)kΩ, default is "Not Used"; Users can select the corresponding curve by themselves; If pre-set sensor channel doesn't support current, and voltage type, then curve type item 2 and 3 display "Reserved".
2	Oil Pressure Sensor	0 Not used 1 Custom Res Curve 2 Custom (4-20)mA Curve 3 Custom Volt Curve 4 VDO 10bar 5 CURTIS 6 VOLVO-EC 7 DATCON 10bar 8 SGX 9 SGD 10 SGH 11 -15 Reserved	Defined resistance's range is (0~1)kΩ, default is "Not Used"; Users can select the corresponding curve by themselves; If pre-set sensor channel doesn't support current, and voltage type, then curve type item 2 and 3 display "Reserved".
3	Fuel Level Sensor	0 Not used 1 Custom Res Curve 2 Custom (4-20)mA Curve 3 Custom Volt Curve 4 SGD 5 SGH 6 4-126Ω 7 0-130Ω 8 0-190Ω 9 10-180Ω 10 10-120Ω 11-15 Reserved	Defined resistance's range is (0~1)kΩ, default is "Not Used"; Users can select the corresponding curve by themselves; If pre-set sensor channel doesn't support current, and voltage type, then curve type item 2 and 3 display "Reserved".

8.5 CONDITIONS OF CRANK DISCONNECT SELECTION

Table 13 Crank Disconnect Conditions

No.	Setting Description
0	Engine Speed
1	Oil pressure
2	Oil pressure + Engine Speed

NOTES:

— There are 2 conditions to make starter disconnected with engine. Engine speed and oil pressure can be used separately. We recommend that oil pressure should be used with speed sensor together, in order to make the starter motor separate with engine immediately and can check crank disconnect exactly;

— Speed sensor is the magnetic equipment installed in starter for detecting flywheel teeth;

— When set it speed sensor, users must ensure that the number of flywheel teeth is the same as settings, otherwise, "over speed shutdown" or "under speed shutdown" may be caused;

— If engine doesn't have speed sensor please don't select corresponding items, otherwise, "start failure" or "loss speed signal" may be caused;

— If engine doesn't have oil pressure sensor, please don't select corresponding items.

8.6 MAINTENANCE SETTING

Table 14 Maintenance Setting

Item	Content	Description
Enable Choose	0: Disabled, 1: Enabled	Set maintenance function active or not;
Maintenance Time	(0-30000)h	It is the number of hours from the time the maintenance is enabled to when maintenance is required.
Maintenance Due Action	0: No Action; 1: Warning; 2: Shutdown; 3: Indication.	Alarm action when maintenance left time is 0.
Maint. Timing Method	0: Running Time 1: Real Time Clock	The timing of maintenance.
Pre-maint. Time	(0-30000)h	
Pre-maint. Due Action	0: No Action; 1: Warning; 2: Shutdown; 3: Indication.	Alarm action when pre-maintenance left time is 0.
Reset Maintenance		After maintenance completion, through this item reset maintenance time.
Maintenance Description		The character string of maintenance description can be set by maintenance 8, 9 and 10; Users can input maintenance name, like Change Engine Oil.

9 PARAMETERS SETTING

Press key and enter into setting menu after controller is power on. The menu list is as below:

>Return
>Parameters Set
>Override Mode
>DPF Regeneration
>Language
>LCD Backlight
>Event Log
>Module Info

Select “Parameters Set” and input correct password (default: 1234) to enter setting interface.

Parameter setting process is as below:

Parameters Set >Return >Module Set >Timers Set >Engine Set	Screen 1: Enter setting, press to change settings, press to enter setting (Screen 2), press to return. Or select “Return” by pressing and and press to go back to previous screen.
Timers Set >Return >Preheat Delay >Prestart Fuel Time >Cranking Time	Screen 2: Press to change settings, press to enter setting (Screen 3), press to return (Screen 1). Or select “Return” by pressing and and press to go back to the previous screen 1.
Preheat Delay 00000s	Screen 3: Press and move cursor, select the value and press to modify. Press to save your modification. Then press to return (Screen 2).
Timers Set >Return >Preheat Delay >Prestart Fuel Time >Cranking Time	Screen 4: Press , select and modify the value (it is the same method as Screen 2 and Screen 3).
Over Shutdown Enable Choose: Enabled Set Val: +00098 Delay 00003s	Screen 5: Set temp. sensor shutdown parameters. Select >Over Shutdown, press to enter setting, then press again to enter Screen 5, press to select settings, then press to save and meanwhile the cursor will move down (as Screen 6).
Over Shutdown Enable Choose: Enabled Set Val: +00098	Screen 6: Press to change plus or minus, then press to next bit. After setting finished, press to enter delay setting. If it is not

Delay 00003s	need to modify, press to return.

NOTES:

— Please modify internal parameters (eg: Crank disconnect conditions, programmable input/output configuration, delay, etc.) in standby status, otherwise it probably shutdowns or faults may occur;

— Over high threshold must be greater than lower threshold, otherwise over high and over low circumstances may occur simultaneously;

— Please set return value correctly when warning alarm is set, otherwise the controller can't alarm normally. When over warning is set, the return value should be set lower than set value; when low warning is set, return value should be set greater than set value;

— Programmable inputs can't be set the same item (except for user-defined), otherwise it won't arise valid function. But programmable outputs can be set the same.

SmartGen

10 SENSOR SETTING

- If a sensor is needed to change again, the sensor curve will be transferred into the standard value. For example, if the default temperature sensor is SGD, the sensor curve is SGD curve; if it is set SGX, the temperature sensor curve is SGX curve.
- If there is difference between standard sensor curve and the used sensor, users can choose “defined sensor”, and input defined sensor curve.
- At the time of inputting the sensor curve, X value must be inputted from small to large, otherwise, some mistake may occur.
- If sensor is selected to “Not Used”, then sensor curve doesn't work.
- If corresponding sensor only has alarm switch, then it is a must that set the sensor “Not Used”, otherwise shutdown alarm or warning may occur.
- It is applicable to set the headmost and backmost values in the vertical coordinate as the same as the Figure 7.

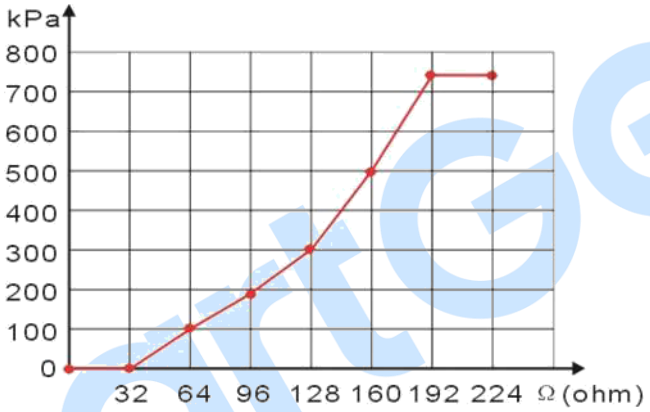


Fig.7 Sensor Curve Setting

Table 15 Common Pressure Unit Conversion Table

Item	N/m^2 (pa)	kgf/cm^2	bar	(p/in^2.psi)
1Pa	1	$1.02x10^{-5}$	$1x10^{-5}$	$1.45x10^{-4}$
$1kgf/cm^2$	$9.8x10^4$	1	0.98	14.2
1bar	$1x10^5$	1.02	1	14.5
1psi	$6.89x10^3$	$7.03x10^{-2}$	$6.89x10^{-2}$	1

11 COMMISSIONING

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

a) Check all the connections are correct and wire diameter is suitable.

b) Ensure that controller DC power has fuse, controller's positive and negative are correctly connected to starting battery.

c) Take proper action to prevent engine from crank disconnect (e. g. Remove the connection wire of fuel valve). If everything is OK, make the starting battery power on and controller will execute routine.

d) Press "start" button, engine will start. After pre-set start times, controller will send failed to start signal; then press "stop" button to reset controller.

e) Recover the action of stop engine start (e. g. Connect wire of fuel valve), and press start button again, then engine will start. If everything goes well, engine will go to normal running after idle running (if idle running is set). During this time, please observe engine's running situation.

f) If there is any other question, please contact SmartGen's service.

12 TYPICAL APPLICATION

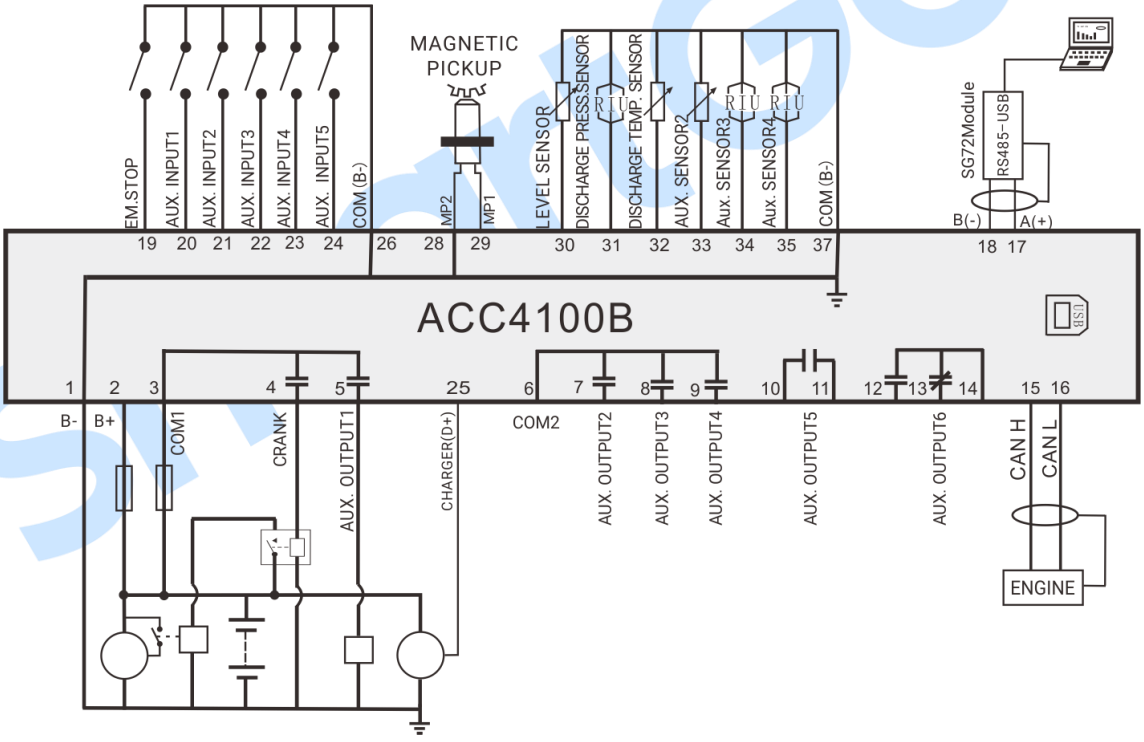


Fig.8 ACC4100B Typical Application Diagram

13 INSTALLATION

13.1 CLIPS

Controller is panel built-in design; and it is fixed by clips for installation.

— Withdraw the fixing clip screws (anticlockwise) until they reach proper position;
— Pull the fixing clips backwards (towards the back of the module) and ensure two clips are inside their allotted slots;
— Turn the fixing clip screws clockwise steady until they are fixed on the panel.

NOTE: Care should be taken not to over tighten the screws of the fixing clips.

13.2 OVERALL & CUTOUT DIMENSIONS

Unit: mm

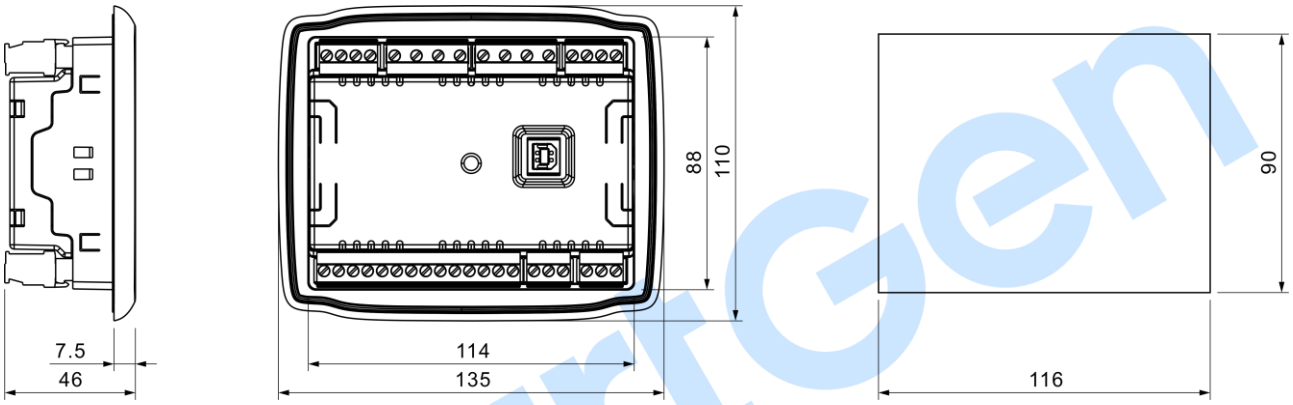


Fig.9 Overall & Cutout Dimensions

— **BATTERY VOLTAGE INPUT:** ACC4100B controller can suit battery voltage environment of DC (8~35)V. Negative of battery must be connected with the engine shell. Diameter of wire which connects power supply B+ and B- with battery positive and negative must be over 1.5mm^2. If floating charger is configured, please firstly connect output wires of the charger to battery's positive and negative directly, then connect wires from battery's positive and negative to controller's positive and negative input ports in order to prevent charger disturbing the controller's normal working;
— **SPEED SENSOR INPUT:** Speed sensor is the magnetic equipment installed in the starter for detecting flywheel teeth. The connection wires with controller should apply 2-core shielding line. The shielding layer should be connected to No. 28 terminal in the controller and another side is hanging up in the air. The other two signal wires are connected to No. 28 and No. 29 terminals. The output voltage of speed sensor should be within AC (1~24)V (effective value) during the full speed range. AC12V is recommended (at rated speed). When speed sensor is installed, let the sensor spun to contacting flywheel first, then, port out 1/3 lap, and lock the nuts of sensor at last;
— **OUTPUT AND EXPAND RELAYS:** All controller outputs are relay contact output type. If expansion relay is needed, please add freewheel diode to both ends of expansion relay's coils (when relay coils have DC current) or, increase resistance-capacitance return circuit (when relay coils have AC current), in order to prevent disturbance to the controller or other equipment.

14 CONNECTIONS OF CONTROLLER WITH J1939 ENGINE

14.1 CUMMINS ISB/ISBE

Engine type: CUMMINS-ISB.

Table 16 Connector B

Terminals of controller	Connector B	Remark
Fuel relay output	39	
Starting relay output	-	Connect with starter coil directly.
Auxiliary output port 1	Expansion 30A relay, providing battery voltage for 01, 07, 12, 13 terminals.	ECU power; Set configurable output 1 as “ECU power”.

Table 17 9-pin Connector

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

14.2 CUMMINS QSL9

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

Table 18 50-pin Connector

Terminals of controller	50 pins connector	Remark
Fuel relay output	39	
Starting relay output	-	Connect to starter coil directly.

Table 19 9-pin Connector

Terminals of controller	9 pins connector	Remark
-	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.

14.3 CUMMINS QSM11(IMPORT)

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

Table 20 C1 Connector

Terminals of controller	C1 connector	Remark
Fuel relay output	5&8	Outside extended relay, make port 5 and port 8 of C1 connected at fuel output;
Starting relay output	-	Connect to starter coil directly.

Table 21 3-pin Data Link Connector

Terminals of controller	3 pins data link connector	Remark
-	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.

14.4 CUMMINS QSX15-CM570

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

Table 22 50-pin Connector

Terminals of controller	50 pins connector	Remark
Fuel relay output	38	Oil spout switch.
Starting relay output	-	Connect to starter coil directly.

Table 23 9-pin Connector

Terminals of controller	9 pins connector	Remark
-	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.

14.5 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 24 D-SUB Connector 06

Terminals of controller	D-SUB connector 06	Remark
Fuel relay output	5&8	Outside extended relay, make port 5 and 8 of connector 06 connected at fuel output.
Starting relay output	-	Connect to starter coil directly.

Table 25 D-SUB Connector 06

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

14.6 CUMMINS QSM11

Engine type: Common ECU.

Table 26 Engine OEM Connector

Terminals of controller	OEM connector of engine	Remark
Fuel relay output	38	
Starting relay output	-	Connect with starter coil directly.
CAN(H)	46	Using impedance 120Ω connecting line.
CAN(L)	37	Using impedance 120Ω connecting line.

14.7 CUMMINS QSZ13

Engine type: CUMMINS-QSZ13; Speed governing can be realized.

Table 27 Engine OEM Connector

Terminals of controller	OEM connector of engine	Remark
Fuel relay output	45	
Starting relay output	-	Connect to starter coil directly.
Auxiliary output 1	16&41	Idle speed control, normally close output. Make 16 connected with 41 during high-speed running via external extended relay.
Auxiliary output 2	19&41	Pulse speed raising control, normally open output. Make 19 connected with 41 for 0.1s during warming up via external extended relay.
CAN(H)	1	Using impedance 120Ω connecting line.
CAN(L)	21	Using impedance 120Ω connecting line.

14.8 DETROIT DIESEL DDEC III / IV

Engine type: Common ECU.

Table 28 Engine CAN Port

Terminals of controller	CAN port of engine	Remark
Fuel relay output	Expansion 30A relay, providing battery voltage for ECU.	
Starting relay output	-	Connect to starter coil directly.
CAN(H)	CAN(H)	Using impedance 120Ω connecting line.
CAN(L)	CAN(L)	Using impedance 120Ω connecting line.

14.9 DEUTZ EMR2

Engine type: DEUTZ-EMR2.

Table 29 F Connector

Terminals of controller	F connector	Remark
Fuel relay output	Expansion 30A relay, providing battery voltage for 14; Fuse is 16A.	
Starting relay output	-	Connect to starter coil directly.
-	1	Connect to battery negative pole.
CAN(H)	12	Impedance 120Ω connecting line is recommended.
CAN(L)	13	Impedance 120Ω connecting line is recommended.

14.10 MTU MDEC

Suitable for MTU engines: 2000 series, 4000 series; Engine type: MTU-MDEC-303

Table 30 X1 Connector

Terminals of controller	X1 pins connector	Remark
Fuel relay output	BE1	
Starting relay output	BE9	
-	E	Communication shielding line (connect with ECU this terminal only).
CAN(H)	G	Using impedance 120Ω connecting line.
CAN(L)	F	Using impedance 120Ω connecting line.

14.11 MTU ADEC (SMART MODULE)

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

Table 31 ADEC (X1 Port)

Terminals of controller	ADEC (X1port)	Remark
Fuel relay output	X1 10	X1 Terminal 9 connected to negative of battery.
Starting relay output	X1 34	X1 Terminal 33 connected to negative of battery.

Table 32 ADEC (X4 Port)

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

14.12 MTU ADEC (SAM MODULE)

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

Table 33 ADEC (X1 Port)

Terminals of controller	ADEC (X1port)	Remark
Fuel relay output	X1 43	X1 Terminal 28 connected to negative of battery.
Starting relay output	X1 37	X1 Terminal 22 connected to negative of battery.

Table 34 SAM (X23 Port)

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

14.13 PERKINS

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

Table 35 Connector

Terminals of controller	Connector	Remark
Fuel relay output	1, 10, 15, 33, 34	
Starting relay output	-	Connect to starter coil directly.
CAN(H)	31	Using impedance 120Ω connecting line.
CAN(L)	32	Using impedance 120Ω connecting line.

14.14 SCANIA

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

Table 36 B1 Connector

Terminals of controller	B1 connector	Remark
Fuel relay output	3	
Starting relay output	-	Connect to starter coil directly.
CAN(H)	9	Using impedance 120Ω connecting line.
CAN(L)	10	Using impedance 120Ω connecting line.

14.15 VOLVO EDC3

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

Table 37 “Stand alone” Connector

Terminals of controller	“Stand alone” connector	Remark
Fuel relay output	H	
Starting relay output	E	
Programmable output 1	P	ECU power; Set configurable output 1 “ECU power”.

Table 38 “Data Bus” Connector

Terminals of controller	“Data bus” connector	Remark
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.

14.16 VOLVO EDC4

Suitable engine models are TD520, TAD520 (optional), TD720, TAD720 (optional), TAD721, TAD722, and TAD732. Engine type: VOLVO -EDC4.

Table 39 Connector

Terminals of controller	Connector	Remark
Fuel relay output	Expansion 30A relay, providing battery voltage for terminal 14; Fuse is 16A.	
Starting relay output	-	Connect to starter coil directly.
	1	Connected to negative of battery.
CAN(H)	12	Using impedance 120Ω connecting line.
CAN(L)	13	Using impedance 120Ω connecting line.

14.17 VOLVO-EMS2

Volvo Engine models are TAD734, TAD940, TAD941, TAD1640, TAD1641, and TAD1642. Engine type: VOLVO -EMS2. Speed regulating can be realized.

Table 40 Engine CAN Port

Terminals of controller	Engine's CAN port	Remark
Auxiliary output 1	6	ECU stop; Set configurable output 1 to "ECU stop".
Auxiliary output 2	5	ECU power; Set configurable output 2 to "ECU power".
	3	Negative power.
	4	Positive power.
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.

14.18 YUCHAI

Suitable for BOSCH common rail electronic-controlled engine. Engine type: BOSCH; and speed regulating can be realized.

Table 41 Engine 42-pin Port

Terminals of controller	Engine 42 pins port	Remark
Fuel relay output	1.40	Connect to engine ignition lock.
Starting relay output	-	Connect to starter coil directly.
CAN(H)	1.35	Using impedance 120Ω connecting line.
CAN(L)	1.34	Using impedance 120Ω connecting line.

Table 42 Engine 2-pin Port

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

14.19 WEICHAI

Suitable for Weichai BOSCH common rail electronic-controlled engine. Engine type: GTSC1; and speed regulating can be realized.

Table 43 Engine Port

Terminals of controller	Engine port	Remark
Fuel relay output	1.40	Connect to engine ignition switch.
Starting relay output	1.61	
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.

SmartGen

15 TROUBLE SHOOTING

Table 44 Troubleshooting

Symptoms	Possible Solutions
Controller no response with power	Check starting battery; Check controller wirings; Check DC fuse.
Engine stop	Check water/cylinder temperature is too high; Check DC fuse.
Controller emergency stop	Check emergency stop button function is right or not; Check wire connection is open circuit or not.
Oil pressure low alarm after crank disconnection	Check oil pressure and its wire connections.
Water temp. high alarm after crank disconnection	Check water temperature sensor and its wire connections.
Shutdown alarm in running	Check related switch and wirings according to LCD information; Check programmable input ports.
Crank failure	Check fuel circuit and related wirings; Check starting battery; Check speed sensor and its wire connections; Refer to engine manual.
None response for starter	Check starter wire connections; Check starting battery.
RS485 communication abnormal	Check RS485 wire connections; Check RS485 COM port settings are correct or not; Check RS485 A and B are connected reversely or not; Check RS485 conversion module is damaged or not; Check PC communication port is damaged or not.
ECU communication failure	Check wire CAN high and CAN low polarity; Check 120Ω resistor is connected correctly or not; Check engine type is selected right or not; Check wire connection between controller and engine is right or not; output port settings are right or not.
ECU warning or shutdown	Refer to alarm screen to obtain information; If there is detailed alarm information, then check engine according to it; If there is not, refer to engine manual to obtain information according to SPN alarm code.

16 PACKING LIST

Table 45 Packing List

No.	Name	Number	Remark
1	Controller	1	
2	Fixing Clips	2	
3	Certificate	1	
4	User Manual	1	

SmartGen