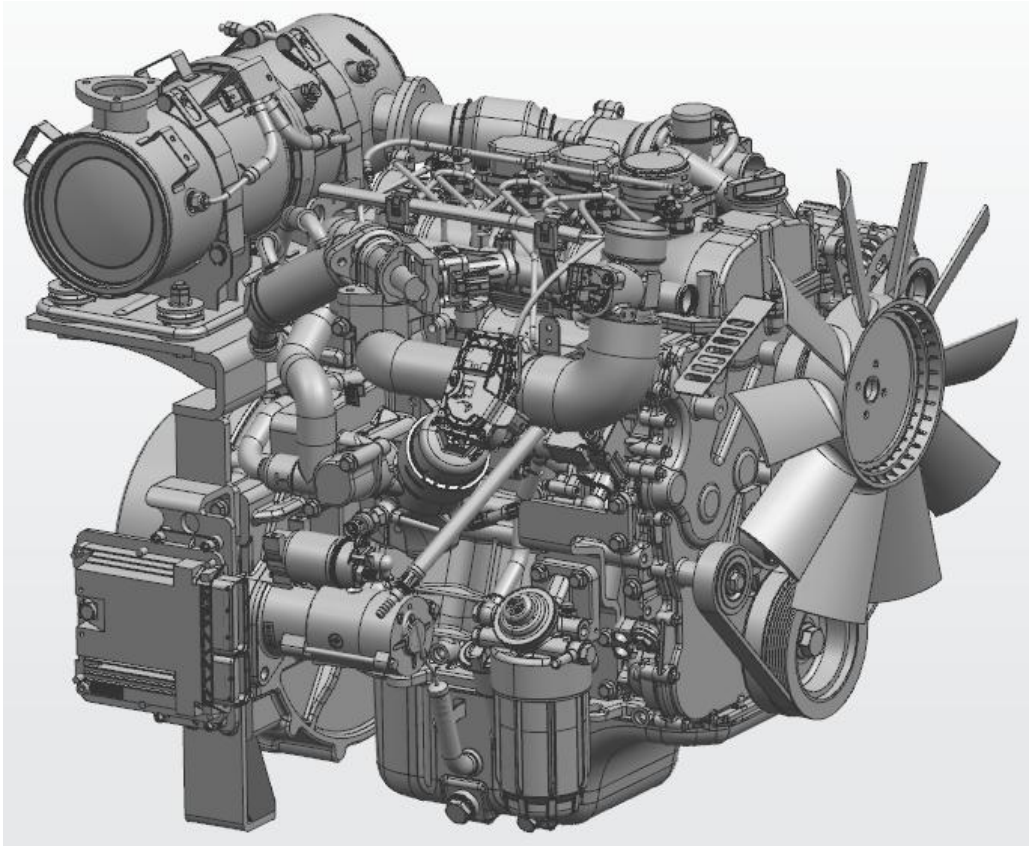
4D Series Engine electrical system installation guide



Organization:：_____

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Catalogue

Attached file：

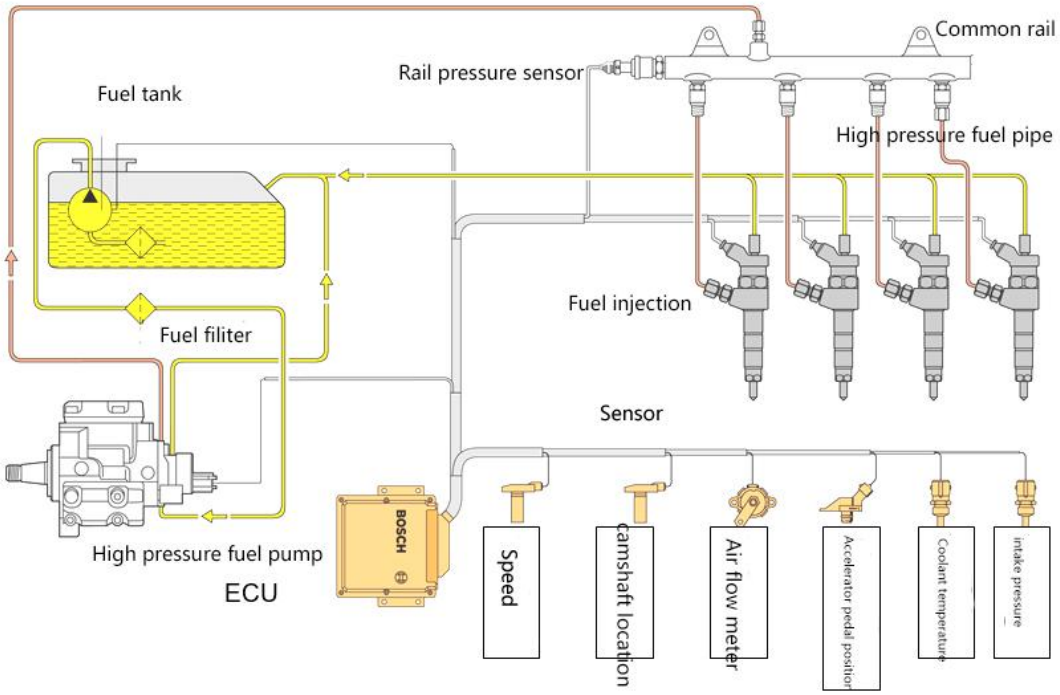
4D series electrical schematics
4D20 Wiring harness diagram

Modify history

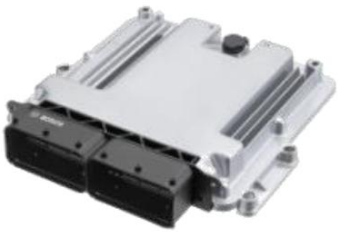
Version	date	author	Modify content	Examine and approve
1.0	2023/08/03	陈宇轩	Create a document	N/A

1.System introduction

(1).Fuel system composition:



(2).ECU appearance

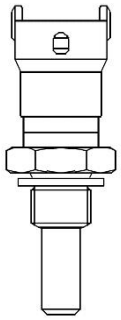


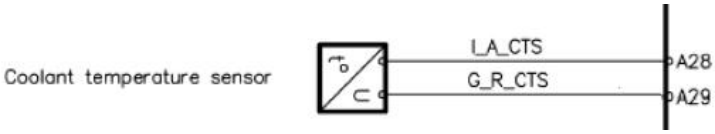
MD1CC878

Attention： ECU 154pin。

2.Sensor introduction

(2).Water temperature sensor





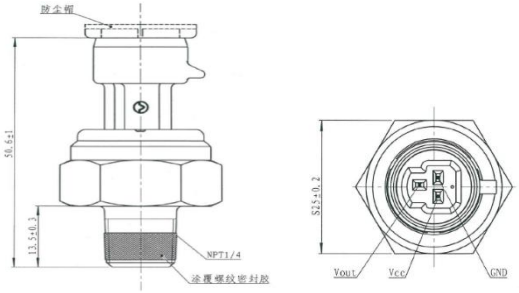
The temperature sensor is composed of NTC thermistor, the thermistor resistance changes with the temperature of the coolant, so that the voltage value of the sensor output also changes, ECU calculates the current coolant temperature value according to the collected signal, mainly for cold start control.

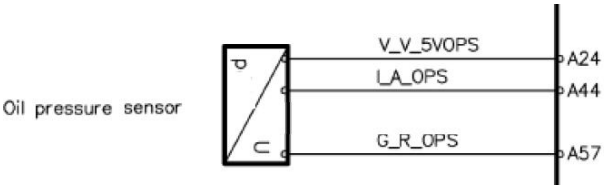
The water temperature sensor is sent to the meter through CAN communication, and the water temperature alarm value is:

105℃ water temperature alarm, engine torque limit. The machine was stopped at 110℃

功能 Function	PGN	byte (1-8)	bit (1-8)	地址位/报文ID Address bit / ID	比例/bit Proportion / bit	偏移 Shifting	单位 Unit	有效值 Valid value	周期 Cycle	备注 Notes
冷却液温度 ET1 Coolant temperature	65262	1	1-8	0x18FEEE00	1℃/bit	-40℃	℃	-40-210℃	1000ms	ECU发送Tx ECU sends Tx

(2).Oil pressure sensor

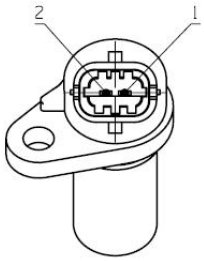


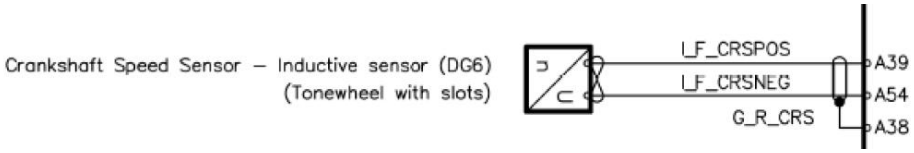


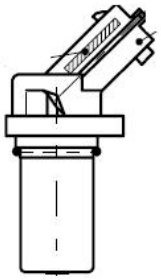
VDO 10Bar，Output oil pressure signal to ECU, through CAN communication finally feedback to the instrument, in digital form display

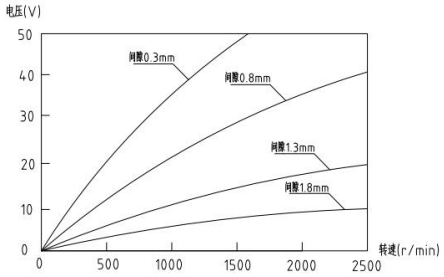
功能 Function	PGN	byte（1-8）	bit（1-8）	地址位/报文ID Address bit / ID	比例/bit Proportion / bit	偏移 Shifting	单位 Unit	有效值 Valid value	周期 Cycle	备注 Notes
机油压力 EFL Oil pressure	65263	4	1-8	0x18FEEF00	4kpa/bit	offset = 0 hPa and factor = 40 hPa	kpa	0-1000kpa	500ms	ECU发送Tx ECU sends Tx

(3).Speed sensor









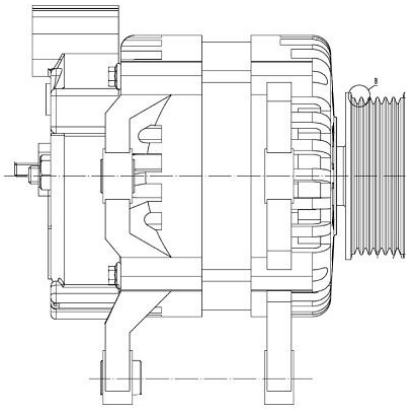
Installation thread: M18X1.5, installation distance: 0.7-1mm from the fly gear tooth

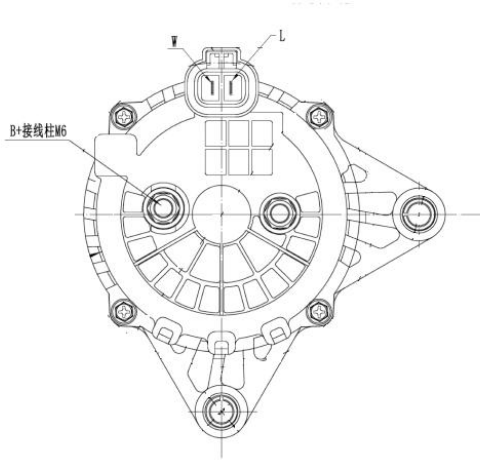
Output engine speed signal to ECU, through CAN communication finally feedback to the instrument, in the form of digital display.

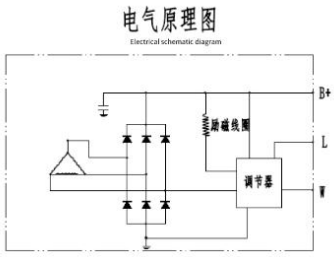
功能 Function	PGN	byte（1-8）	bit（1-8）	地址位/报文ID Address bit / ID	比例/bit Proportion / bit	偏移 Shifting	单位 Unit	有效值 Valid value	周期 Cycle	备注 Notes
发动机转速 EEC1 Engine speed	61444	5-4	1-8	0x0CF00400	0.125rpm/bit	0	rpm	0-8031.875rpm	10ms	ECU发送Tx ECU sends Tx

3.Generator and starter introduction

(1).Generator



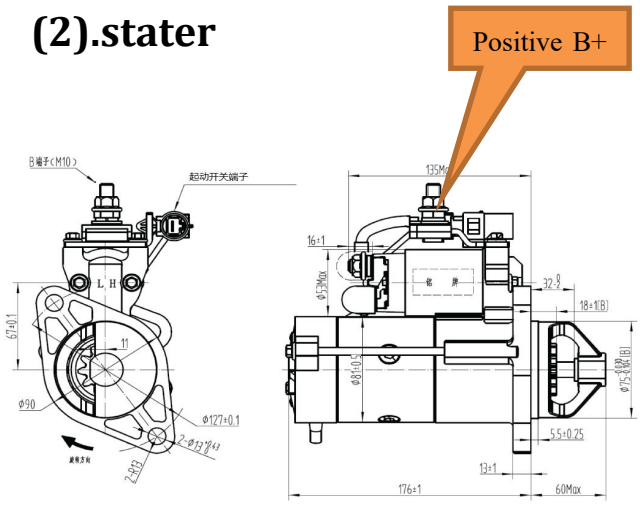




The AC generator is integral type, claw pole log 6 to the pole, the negative pole is grounded, B+ (M6) connected to the positive electrode of the battery, W is the generator speed frequency signal output, L is the power supply terminal of the generator indicator light.

Generator parameters: regulated voltage 14.5±0.25V, 70A

(2).stater



Electrical part：

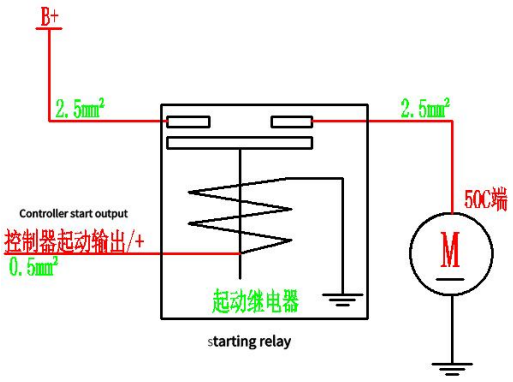
a.Positive B+ terminal（φ8）

b.Electromagnetic switch control end (also called 50C or S end)
（φ4）

c.Both B+ and the electromagnetic switch have corresponding interfaces on the main wire bundle. B+ needs to connect an additional wire from the starter B+ to the positive electrode of the battery.

Starting machine parameters: 12V, 2.9KW, starting electromagnetic switching current 45-60A,B terminal maximum current 650A

3.Usage Requirements (required reading)



(1).Starting relay requirement

The starting mode is relay controlled starting, and the principle is shown in the right picture.

Starting relay requirements ≥12V/70A；

(2).Control panel Requirements (important)

In order to prevent the starter from being damaged due to anti-tow, the

control panel is used for starting control.

a. Engine starting success criteria: speed =350rpm oil pressure =125kPa

b. If the engine fails to start for three consecutive times, it should be shut down for a short time to wait for the starter to cool down, and check whether there is a fault in the oil, electricity and air circuits before starting operation

(3).Basic introduction

a.The engine ECU adopts CAN communication, following the J1939 protocol, can display water temperature, oil pressure, power supply voltage and speed, and has a fault code, can not connect the fault light, charging instructions

b.The ECU power cord in the reserved interface must be connected to the battery connector to the maximum extent, and other electrical appliances are not allowed to be connected in the middle except for the switch

c.The power system needs to set up a main negative switch, except for the tie wire, all negative poles need to be controlled by the main negative switch.

d.For generating set, the control strategy starts at idle speed, and automatically rises to the working speed in 5s without connecting the speed switch

(4).Battery and main l0ine requirement (recommended)

Battery requirements: 12V system ≥85Ah　630CCA

It is suggested to increase the battery capacity in plateau and alpine regions.

Power main line requirements: wire diameter 50-75mm² or more; Length < 2m

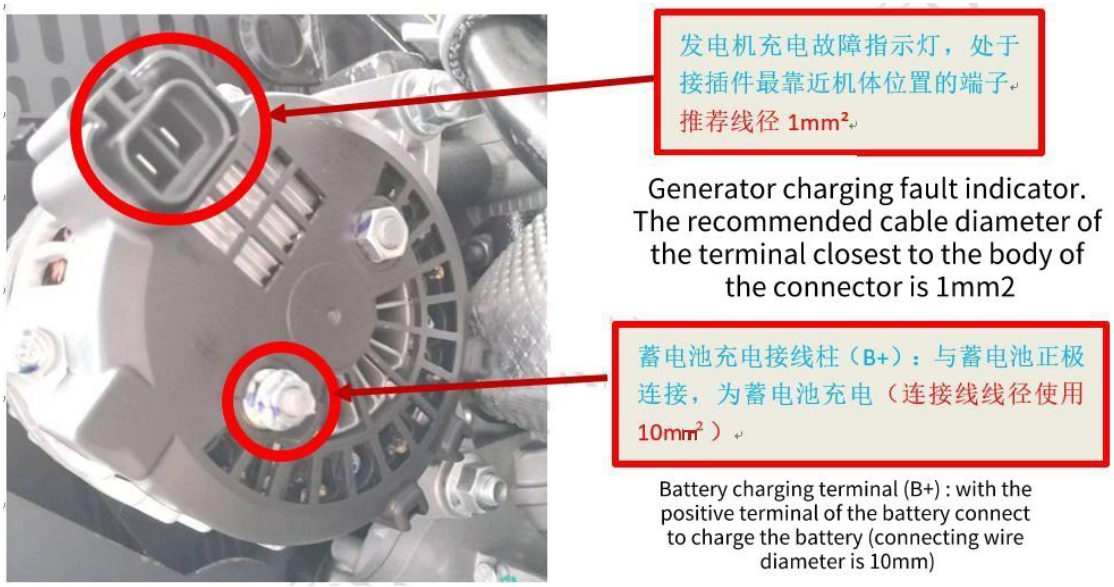
Recommendation: The battery positive main line is connected to the starter positive B+, and the negative pole controlled by the main switch is directly connected to the bolt of the flywheel shell, and the connection is required to be firm and reliable. Please refer to the following table for the selection of the main wire diameter. The wire diameter in the table is only calculated for reference. Please choose the appropriate wire diameter according to the actual situation.

Voltage	Voltage drop Vd/100A	Conditions of use
12V	0.2	Good/fair
12V	0.1	badness
The "good", "general" and "bad" conditions in the table should be based on the impact of the actual use environment on the engine, including temperature, humidity, vibration, corrosion and other factors, and also related to the engine use time, area and purpose, determined by experience		

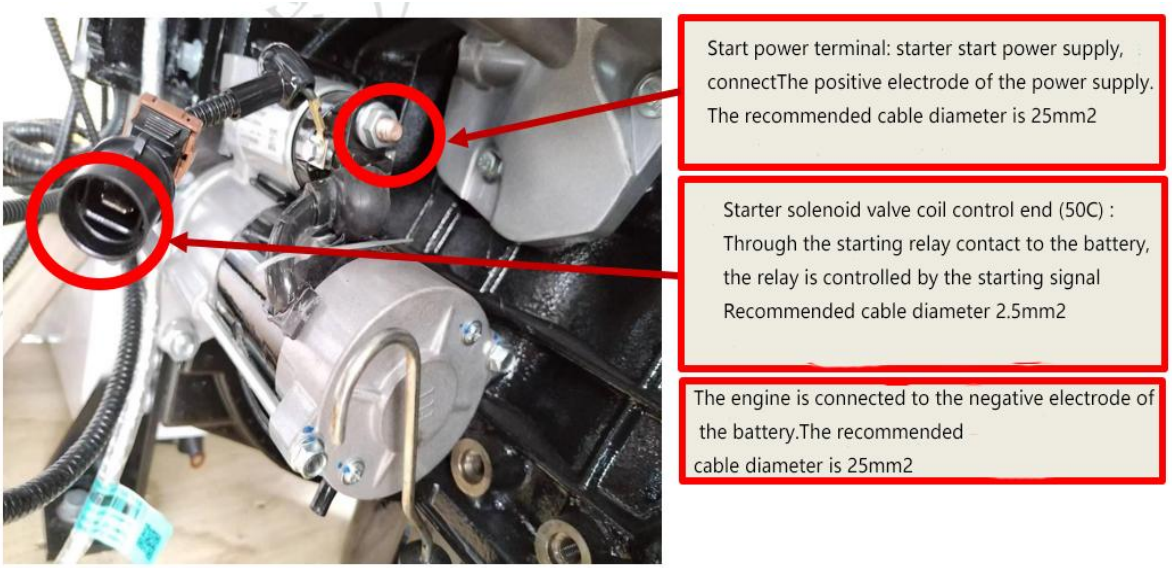
Average starting current	Voltage drop Vd/100A	Condition of use	Line lengthL	1m	2m
300A	0.2	normal	Lines S （mm²）	40	50
	0.1	badness		50	75
S=I*2L/(54.4*Vd)					

4.Important parts actual installation instructions

(1).Generator connection



(2).Wiring at the starter



5.Common electrical system failures

(1).Battery loss

General engine starting requires the battery power of more than 60%-70%, the static discharge current is very low under normal conditions, the battery can be placed for more than 1 month. If the battery loses power in a short time, there may be a continuous discharge of electrical appliances. All electrical appliances need to go through the main negative switch, when not in use can disconnect the main negative switch, to the greatest extent to eliminate electrical consumption; Check whether the engine belt is slack, slack belt may lead to poor engine charging, may also lead to power loss. Tighten or replace the belt.

(2).Engine cannot be stopped

The engine shutdown is achieved by cutting off power on the T15 signal line; T15 is constant current during normal operation; The power will stop when the power is cut off. If you can't stop the machine, check whether the T15 wiring is disconnected.

(3).Generator monitor cannot be extinguished

The control instrument can be able to stop the motive. However, the instrument cannot be put out without power when the terminal switch is disconnected. This situation is generally a monitoring instrument plus and minus the battery plus electrode, without the negative electrode total switch; It is recommended that the negative electrode switch. The reason of the occurrence is that the monitor is fully in the loop, and there are other electric devices that apply the reverse voltage through the line, which may cause the instrument to be able to go out, but by the connection of the connection and the instrument.

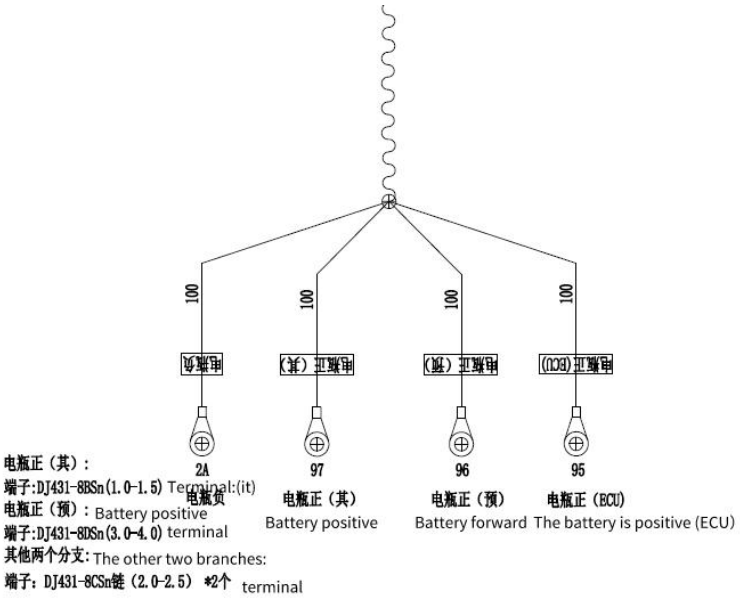
(4).Generator does not produce electricity

The normal generator output voltage is about 14.5±0.25V, which is slightly higher than the battery voltage. The normal working condition of the generator: the speed of the generator gear train is greater than 1000rpm; There is excitation signal, excitation needs to be ON file

power, work has been electricity; Generator B+ to form a complete loop with the battery; If you think the generator is faulty, check that the above three conditions are met.

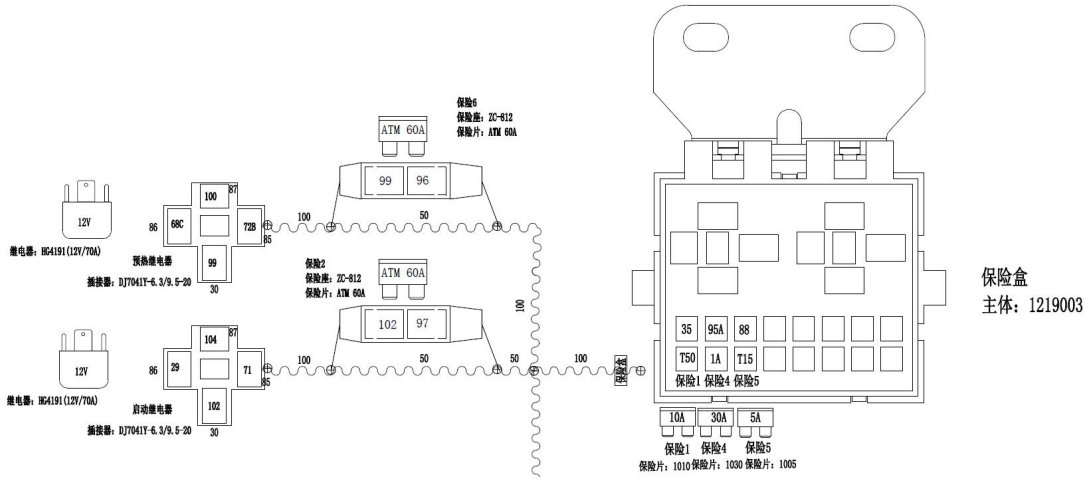
6.Precautions for installing and connecting cables

(1).Wiring positions of battery + and battery - on the engine harness assembly



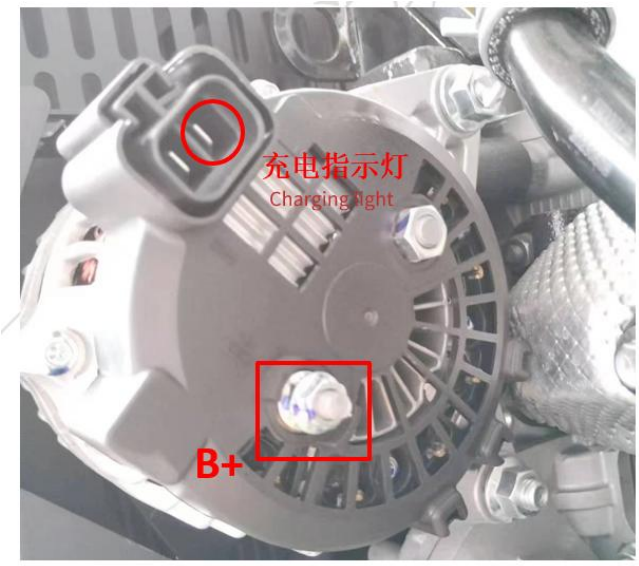
In order to avoid excessive voltage drop at the distal end during starting, which eventually leads to starting failure. When the machine is not in use for a long time, the negative main switch must be closed to avoid the battery feeding (all negative circuits must be controlled negative main switch).

(2).Confirmation check of safety film



If the instrument shows that the communication is faulty, the starter works normally and cannot be started, please check whether the ECU safety plate is normal.

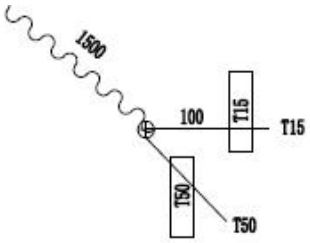
(3).Charger wiring

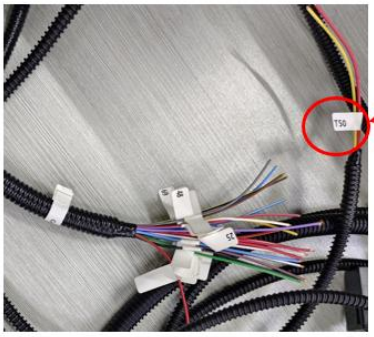


The excitation line of the generator is combined with B+, and the power can be generated normally when the B+ terminal post and the charging indicator light are connected.

(4).Wiring the engine harness to the instrument

a.T15 ECU power-on switch and T50 ECU start switch are connected.





T15为ECU上电开关，T50为起动机运行开关信号。
T15需常通，断开熄火停机。
T50接通后起动机工作，发动机起动成功需立即断开T50。

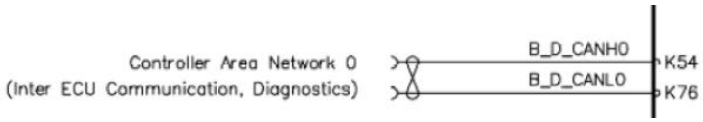
T15 is the ECU power-on switch and T50 is the starter operation switch signal.T15 needs to be on, disconnect and shut down.After the T50 is connected to the starter, disconnect the T50 immediately after the engine starts successfully.

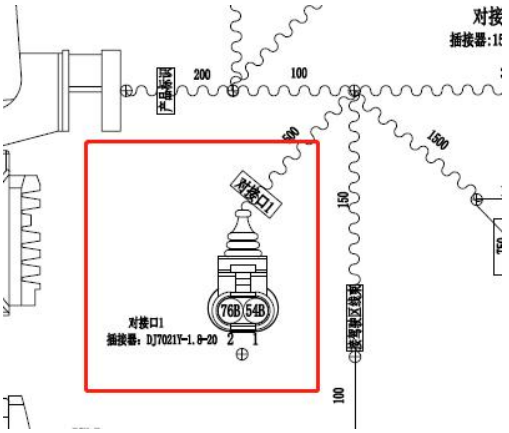
b.Driving area wiring harness connection

Yellow indicates that it must be connected to the instrument switch, and other connections should be made according to the actual situation.

number	Location 1	Location 2	color	Cross-sectional area of the wiremm²	Remarks
11	ECU K-11	Connect to the driving area harness	Black	0.75	Speed sensor
14	ECU K-14	Connect to the driving area harness	white	0.75	Standby brake switch (high)
15	ECU K-29	Connect to the driving area harness	purple	0.75	DPF No Regeneration switch (high)
19	ECU K-19	Connect to the driving area harness	gray	0.75	Neutral switch (high voltage)
25	ECU K-25	Connect to the driving area harness	red	0.75	DPF request indicator
28	ECU K-28	Connect to the driving area harness	blue	0.75	Oil-water indicator light
34	ECU K-34	Connect to the driving area harness	Red white	0.75	Speed sensor signal
38	ECU K-38	Connect to the driving area harness	Green white	0.75	DPF Regenerative Switch (high)
41	ECU K-41	Connect to the driving area harness	Red brown	0.75	Main brake switch (high)
48	ECU K-48	Connect to the driving area harness	brown	0.75	Cold start light
58	ECU K-58	Connect to the driving area harness	Gray red	0.75	Diagnostic request switch (high
62	ECU K-62	Connect to the driving area harness	White yellow	0.75	throttlingly
65	ECU K-65	Connect to the driving area harness	blue	0.75	Fault diagnosis light
69	ECU K-69	Connect to the driving area harness	blackyellow	0.75	OBD light ground
70	ECU K-70	Connect to the driving area harness	Red blue	0.75	The fault diagnosis indicator is positive
74	ECU K-74	Connect to the driving area harness	Blue white	0.75	Multistate switching signal
79	ECU K-79	Connect to the driving area harness	yellow	0.75	Polymorphic switching ground
90	ECU K-90	Connect to the driving area harness	Red yellow	0.75	V8 power positive node
92	ECU K-92	Connect to the driving area harness	White black	0.75	DPF status indicator
68B	C3	Connect to the driving area harness	red	1	V3 power supply positive node

c.. Attached interface 1 is connected to the instrument CAN.

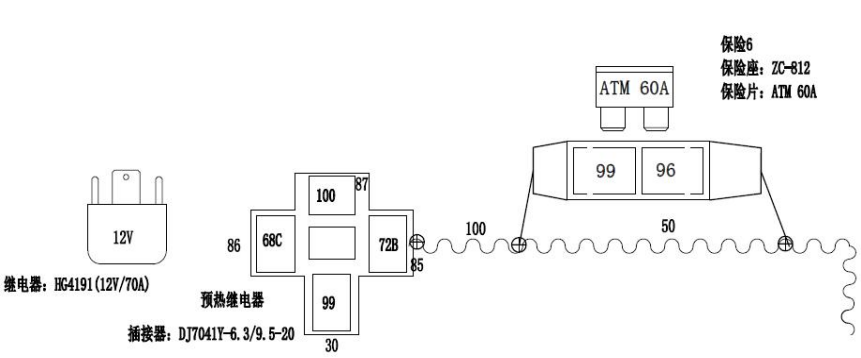


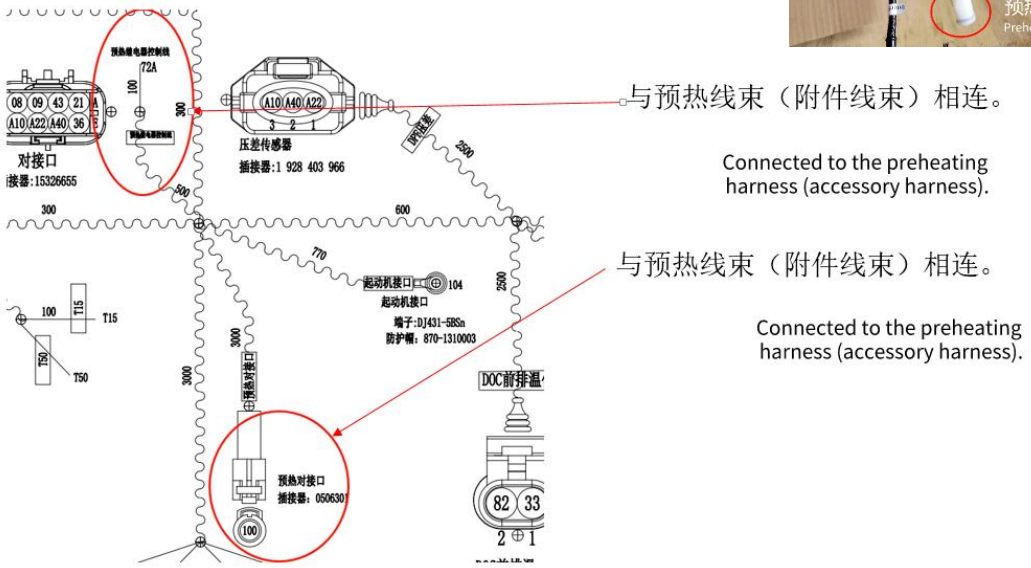


对接口1线连接仪表
（CAN信号线）

Interface 1 wire connection meter (CAN signal cable)

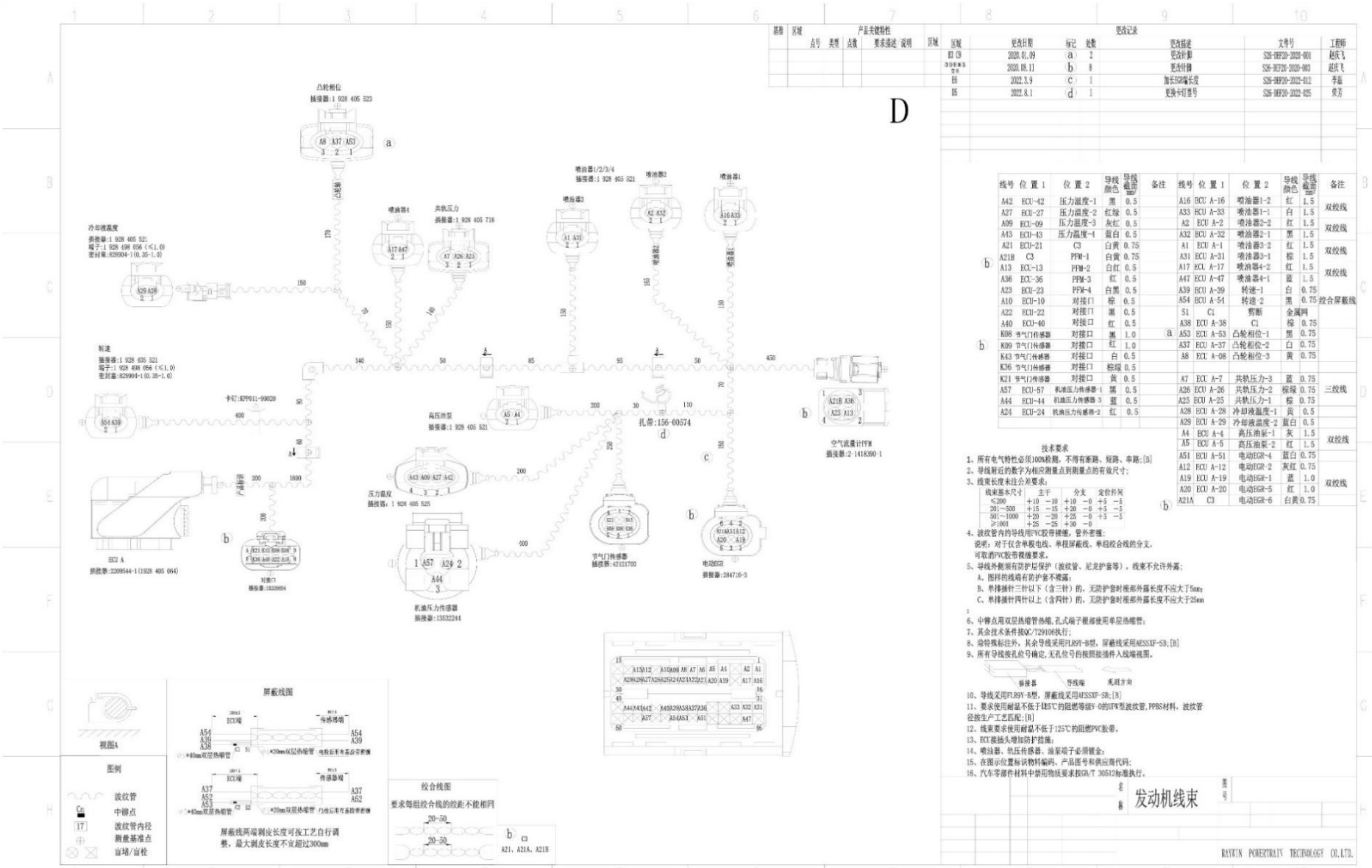
(5).Glow plug check and confirm





The above picture shows the preheating harness. This connector is connected to the preheating interface on the vehicle harness.

Note: The working time of the preheating plug is controlled by the engine ECU. First, confirm whether the plug of the preheating plug is connected correctly during the wiring process. Second: whether the preheating relay works.



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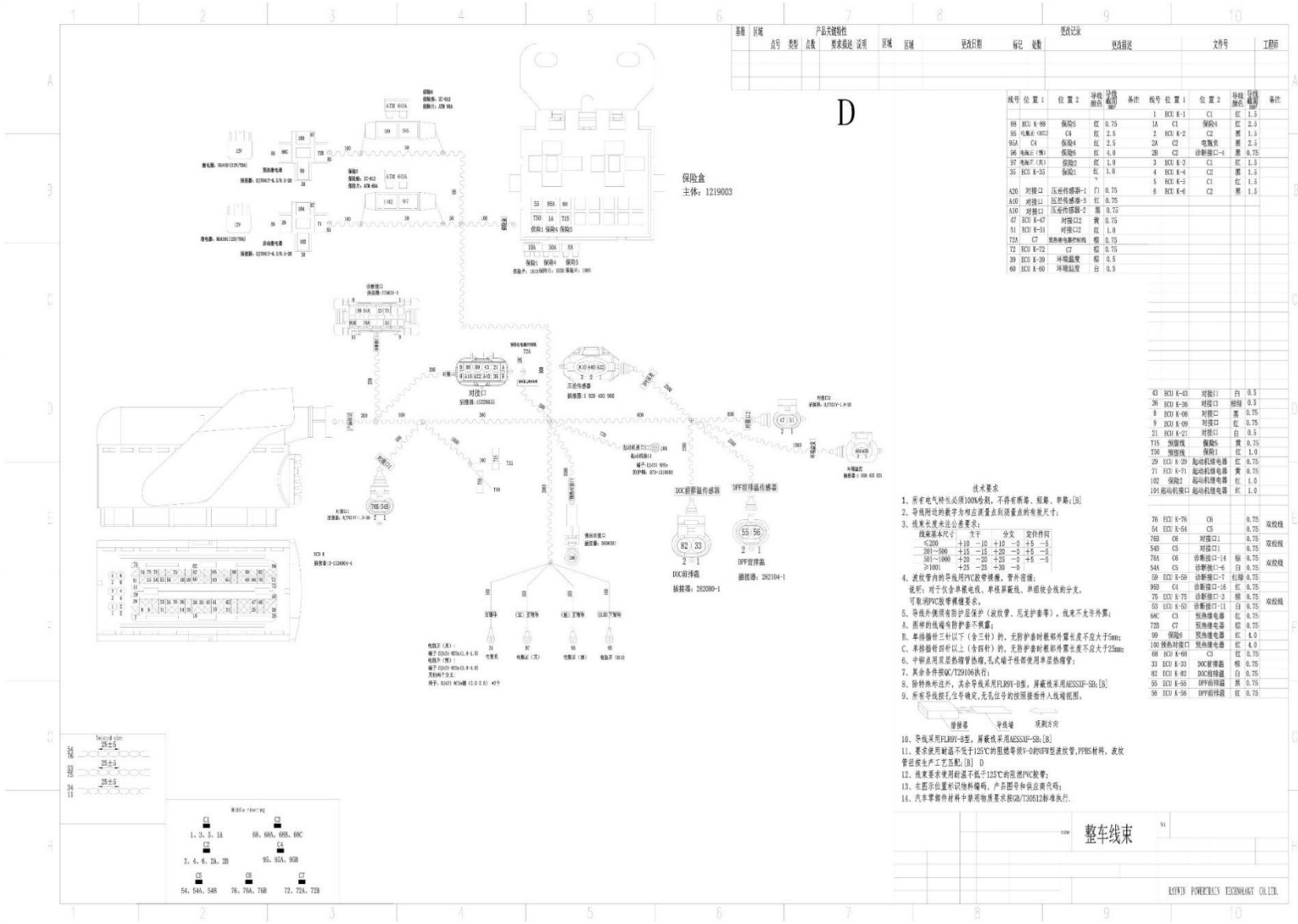

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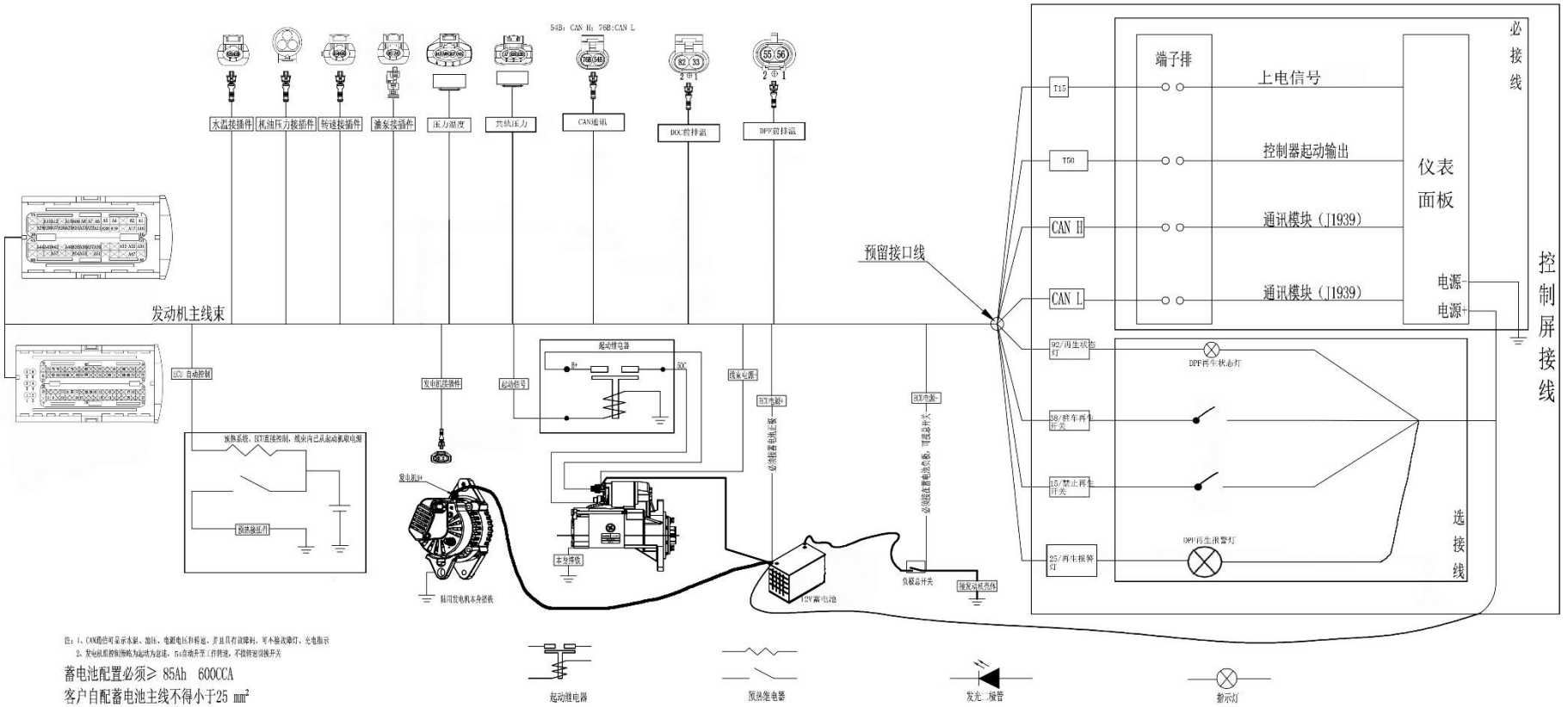

注：1、CAN线色可显示水温、油压、电源电压转速，并且具有故障码，可不接故障灯、充电指示
2、发电机原控制策略为起动为常速，5s自动升至工作转速，不接转速预热开关

蓄电池配置必须≥ 85Ah 600CCA
客户自配蓄电池主线不得小于25 mm²
船机蓄电池推荐≥150Ah 1000CCA
蓄电池主线径不小于30mm²