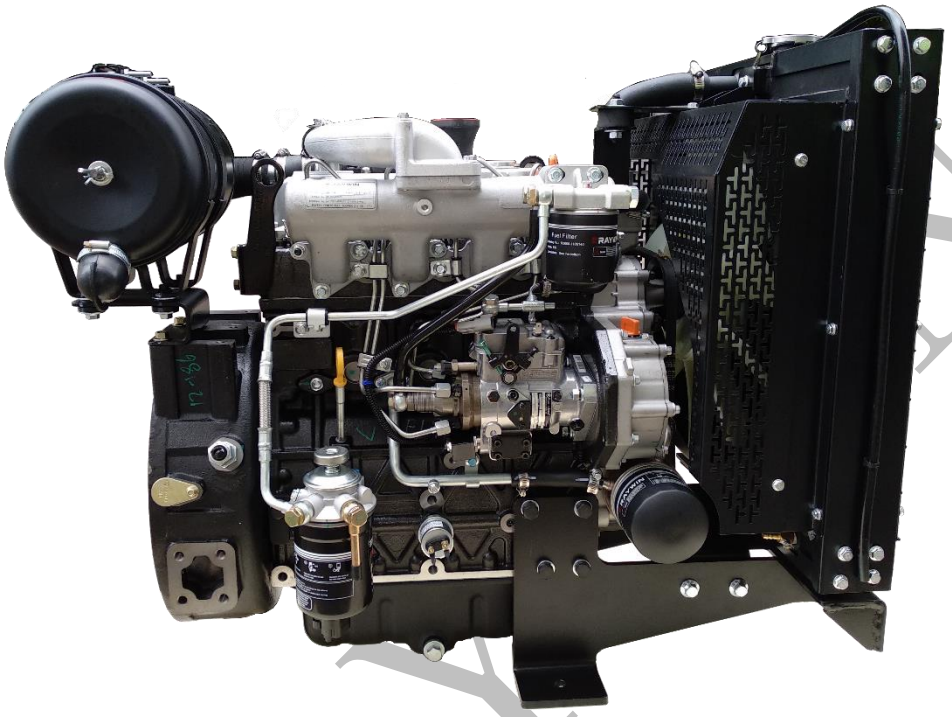
Stanadyne Rotary Pump Engine Electric System

Installation Guide



RAYWIN POWERTRAIN TECHNOLOGY CO., LTD.
Add: NO.99 JIUJIANG RODE, SHUANGFU DISTRICT, Chongqing, China
Tel: +86 23 85557257

Stanadyne Rotary Pump Engine Electric System Installation Guide 1
Update History 3
I.Fuel System Introduction 4
II.Sensors Introducing.....5
1.Water Temperature Sensor 5
2.Oil pressure sensor.....5
3.Speed sensor 5
III.Alternator, starter introduction.....6
1.Alternator.....6
1.2.Marine alternator.....7
2.Starter 8
2.2.Marine starter 9
IV.Sensor Location 10
V.Important parts installation instructions 11
1.Fuel pump wiring 11
2.Alternator wiring 11
3.Starter Wiring.....12
4.Preheating system wiring.....12
VI.Operating Requirement（must read） 13
1.Control panel requirements: (important) 13
2.Fuel lift pump installation 13
3.Battery requirements： 13
3.1. Requirement for marine engine batteries.....15
4.Generator set model: 15
5.Cold start solenoid valve (CSA function) application example 16

Appendix 1： Electrical System Schematic Diagram

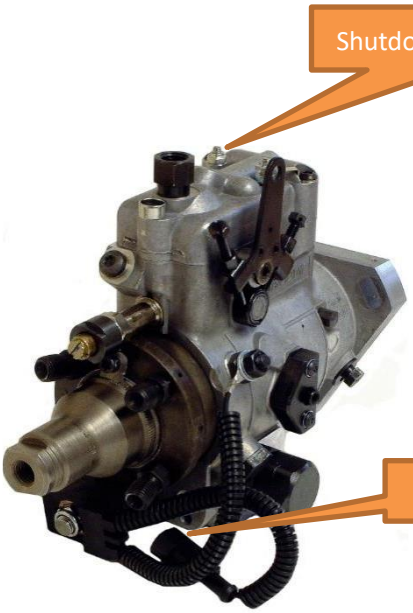
Update History

Version	Date	Author	Updates	
1.0	2019/6/12	HWL	Created	N/A
1.1	2019/6/18	HWL	Add electric lift pump	N/A
1.2	2019/7/1	HWL	Add schematic diagram Add pre-heating system	N/A
1.3	2023/7/24	CYX	Modify the wiring instructions and successful startup conditions of the ship's engine	N/A

I.Fuel System Introduction

Fuel system: Imported Stanadyne rotor pump, up to Euro III emission standard

Model:DB4 （For 4-Cylinder）ECO（For 3-Cylinder）



Function: Control engine oil supply during operation

Positive and negative polarity: no distinction between positive and negative poles (Note: When one of the two terminals is connected to the fuel pump body, the other is the positive pole)

Connection method: 0.8*6.3 plug spring or ϕ4 stud

Operating mode：Power off Stop （power on，Fuel circuit is normally open，power off stop）

Function: Control the injection angle in advance during cold start

Positive and negative polarity: does not distinguish between positive and negative

Operating mode：Below 50-60℃with power on

Method：Connector

Emphasis: If there is no special requirement for starting smoke, it is not recommended to use.

Remark： Cold start (CSA function) solenoid valve needs to add electrical components. See Chapter 6 for practical applications.

II.Sensors Introducing

Sensor introducing： Stanadyne rotary pump system use traditional VDO sensing system

1.Water Temperature Sensor

water sensor： VDO 120℃

Thread： NPT 3/8

G （ signal terminal ） Negative temperature coefficient temperature-sensitive resistor

W（alarm terminal）97-101℃ alarm Switch

温度（℃）	静态阻值（Ω）
40	(390±30)
80	$83^{+6}_{-3.5}$
100	$42^{+5}_{-3.2}$
(120)	(24±3)

2.Oil pressure sensor

Oil pressure sensor： VDO 10Bar

Installation threads： NPT 1/4

G (signal terminal) varistor

W（alarm terminal）100kPa Low pressure alarm switch

压力Mpa	0	0.2	0.4	0.6	0.8	1
电阻Ω	10^{+2}_{-4}	58±3	88±3	124±4	155±4	184^{+20}_{-10}

3.Speed sensor

Speed sensor：

Installation threads：M18X1.5

Installation distance：0.7-1mm to flywheel gear

Note：No speed sensor used with genset application, Controller can monitor frequency of power generation for speed calculation

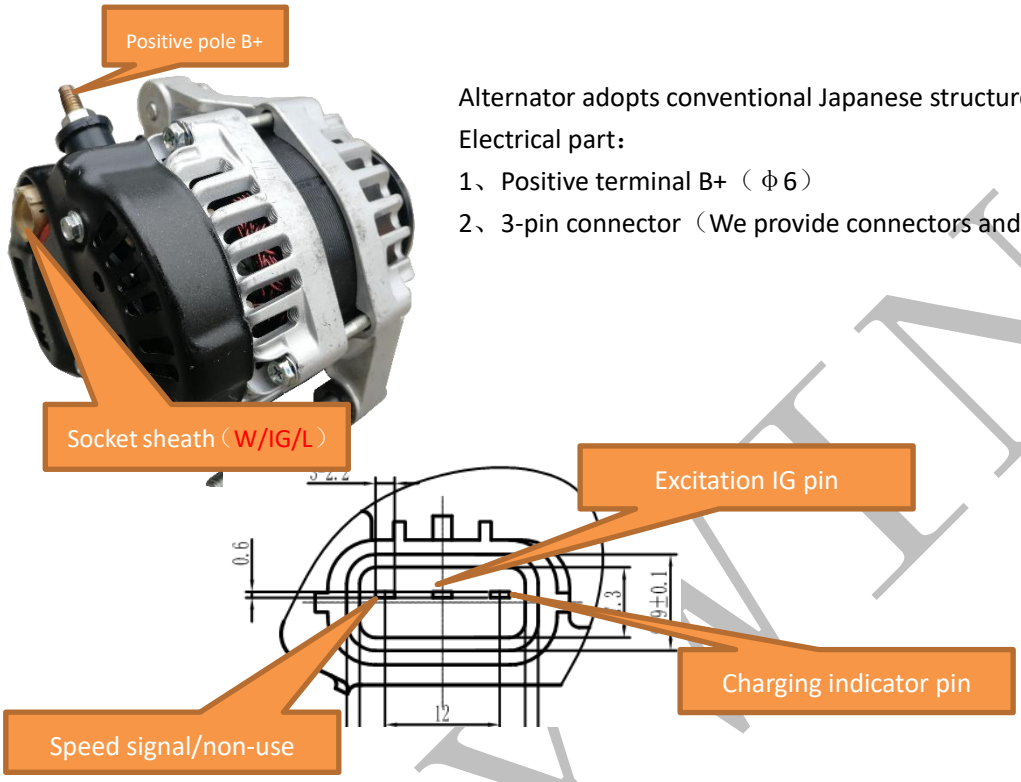
Remark：

1.All sensors with 0.8*6.3 spring connection wire

2.Because the sensor selection design needs to match the monitoring instrument, this guide only guides the traditional mainstream monitoring mode. The sensor and its characteristics are Raywin standard. If you need to use other sensor monitoring methods, please contact our technical staff directly.

III.Alternator, starter introduction

1.Alternator



Alternator adopts conventional Japanese structure

Electrical part：

1、Positive terminal B+（ϕ6）

2、3-pin connector（We provide connectors and pins）

IG pin： Pre-excitation signal, which need to always provide power positive signal max（12V/24V　30-50mA）

Recommended connection method 1: IG → key switch ON→ battery +

Recommended connection method 2：IG→Positive power switch inside of control cabinet →Battery+

L pin： Charging indicator pin, the voltage rises to the power generation voltage after normal power generation

Recommended connection method：L→（2-3W）indicator→IG or L→ indicator →power +

Charging performance requirements：

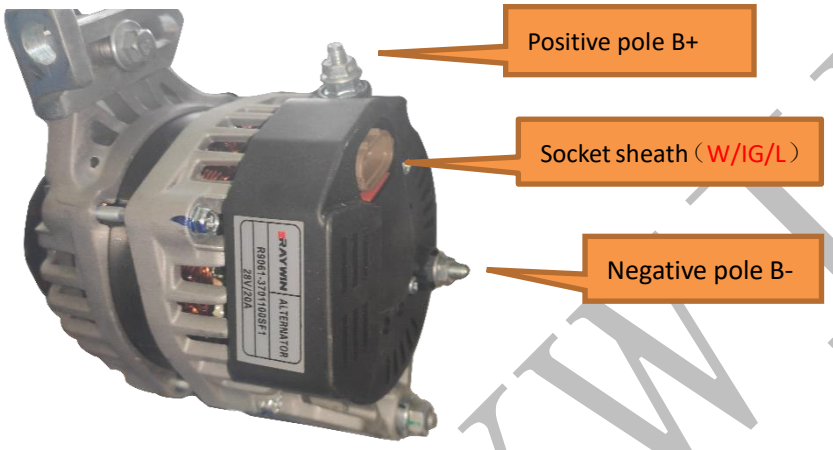
1.The charger B+ cable is not less than 10mm2

2.The excitation of the charger is compound excitation, but the IG must not be powered off during charging.

3.The B+ pole charging cable must not be loose or disconnected during operation.

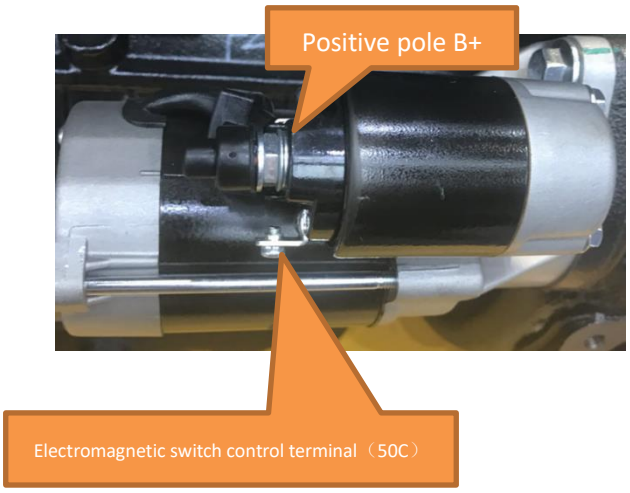
1.2.Marine alternator

Special note: Due to market demand, the marine alternator is a dual wire system, and the negative electrode needs to be grounded. The negative electrode B- of the marine alternator is led out with a bolt and not connected to the engine casing. The details are as follows



Requirement: In addition to the onshore alternator, the marine alternator B - also needs to be directly connected to the negative terminal main switch of the battery, otherwise the generator cannot generate electricity normally. The recommended wire diameter from generator B+to battery charging line is 10mm ^{2} (It can be adjusted appropriately according to the generator current)

2.Starter



The starter is a DC geared motor

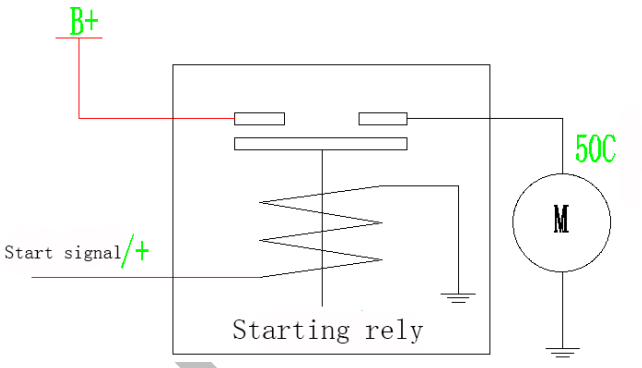
Electrical part：

1、Positive terminal B+（Φ8）

2、Electromagnetic switch control terminal (also called 50C terminal or S terminal)

（Φ4）

Recommended wiring method



Starting performance requirement：

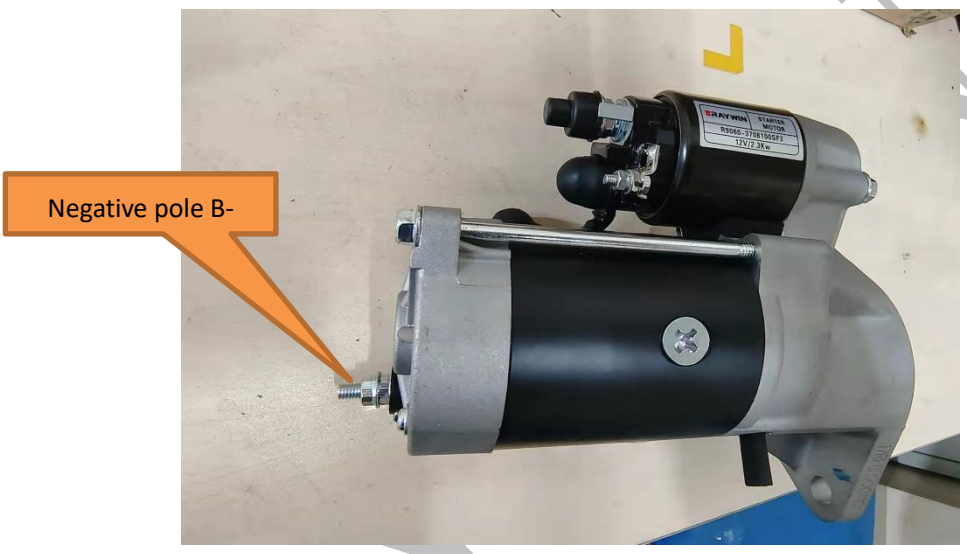
1、Starter relay：12V/24V 40A

2、Power main line（B+）：Wire diameter 25-30mm² above Length＜2m

3、Start success determining condition：Speed≤350 rpm; Oil pressure=125 kPa

2.2.Marine starter

Special note: Due to market demand, the marine starter is a dual wire system, and the negative pole needs to be grounded. The negative pole B- of the marine starter is led out with a bolt and not connected to the engine casing. The details are as follows

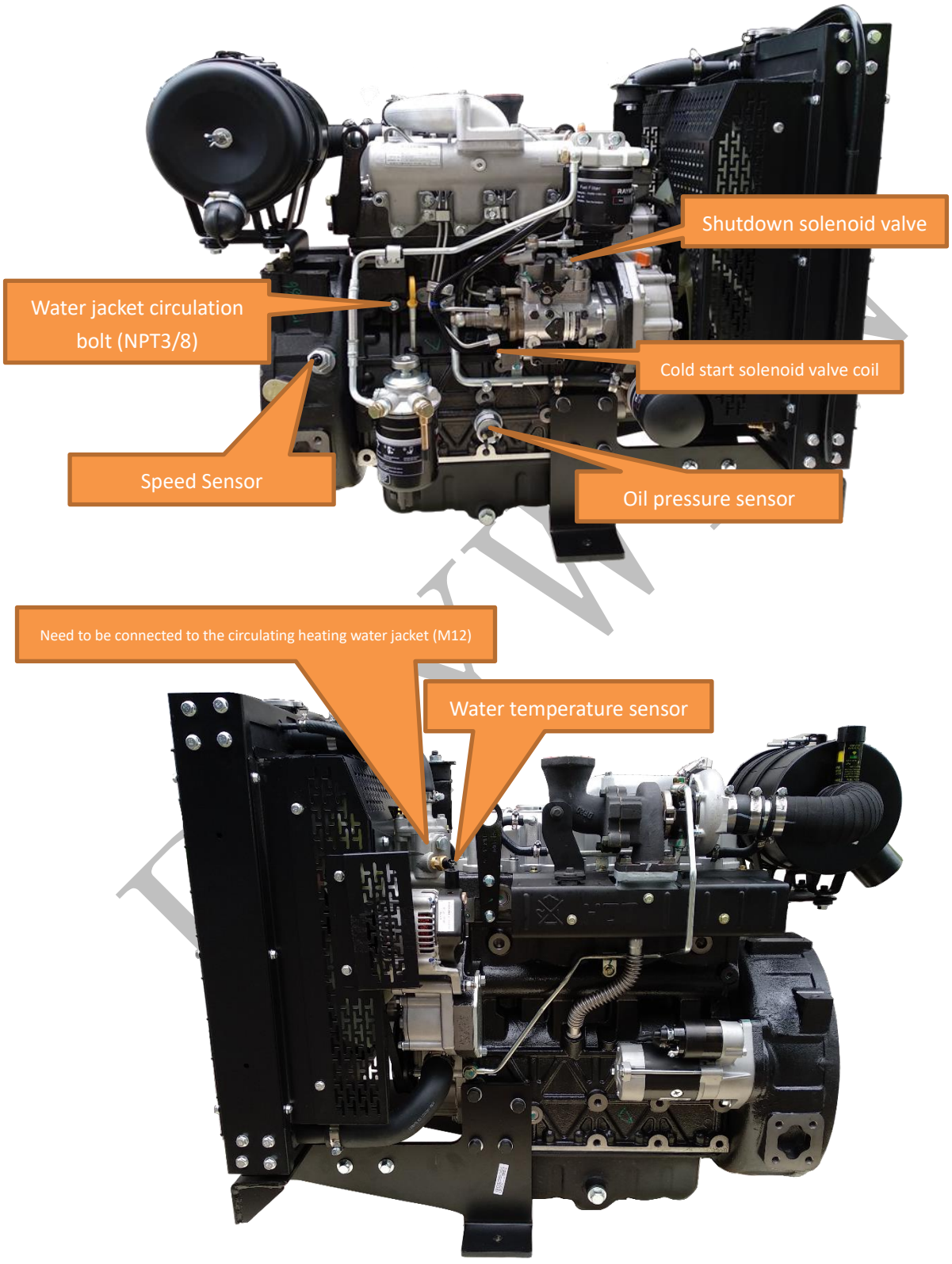


Requirements:

1. On the basis of land starter, marine starter B - needs to be directly connected to the negative terminal main switch of the battery.

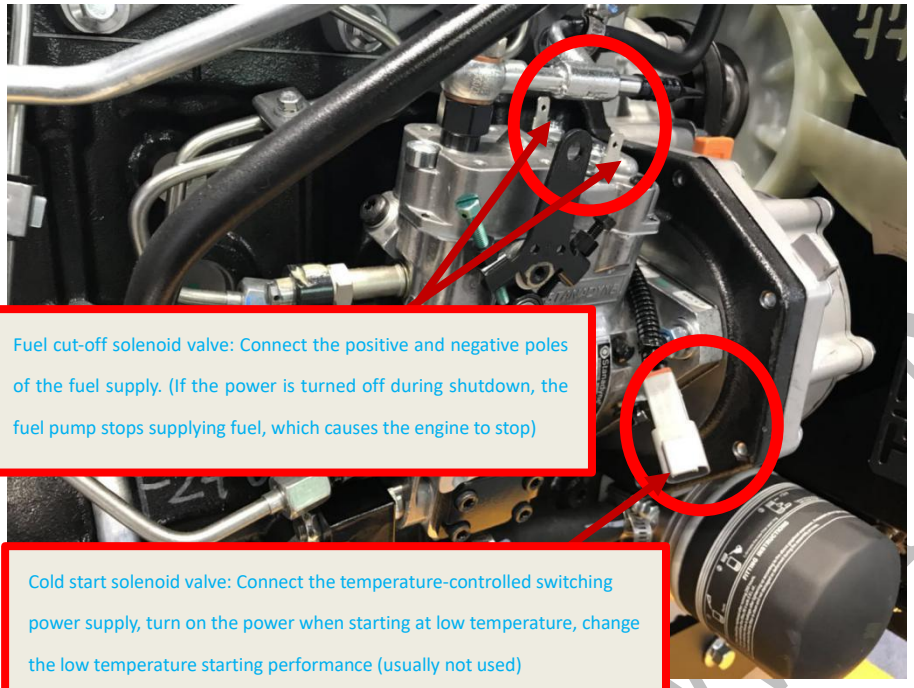
2. The wiring harness of marine main engines is generally equipped with a starting relay, which can also be directly controlled by customers by installing a new relay (refer to the following three requirements for details)

IV.Sensor Location



V.Important parts installation instructions

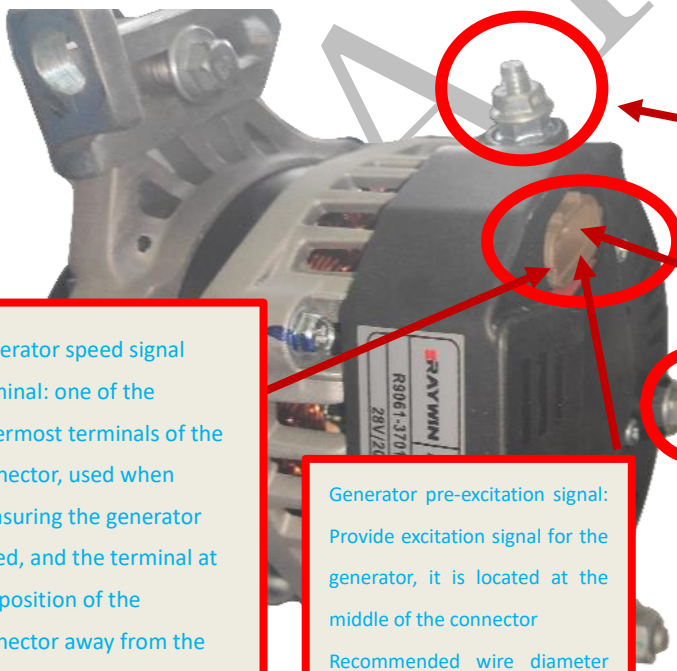
1.Fuel pump wiring



Fuel cut-off solenoid valve: Connect the positive and negative poles of the fuel supply. (If the power is turned off during shutdown, the fuel pump stops supplying fuel, which causes the engine to stop)

Cold start solenoid valve: Connect the temperature-controlled switching power supply, turn on the power when starting at low temperature, change the low temperature starting performance (usually not used)

2.Alternator wiring



Battery charging terminal (B+): Connected to the battery positive or starter B+ to charge the battery, you need to remove the plastic sheath (connecting wire diameter using 10m 2)

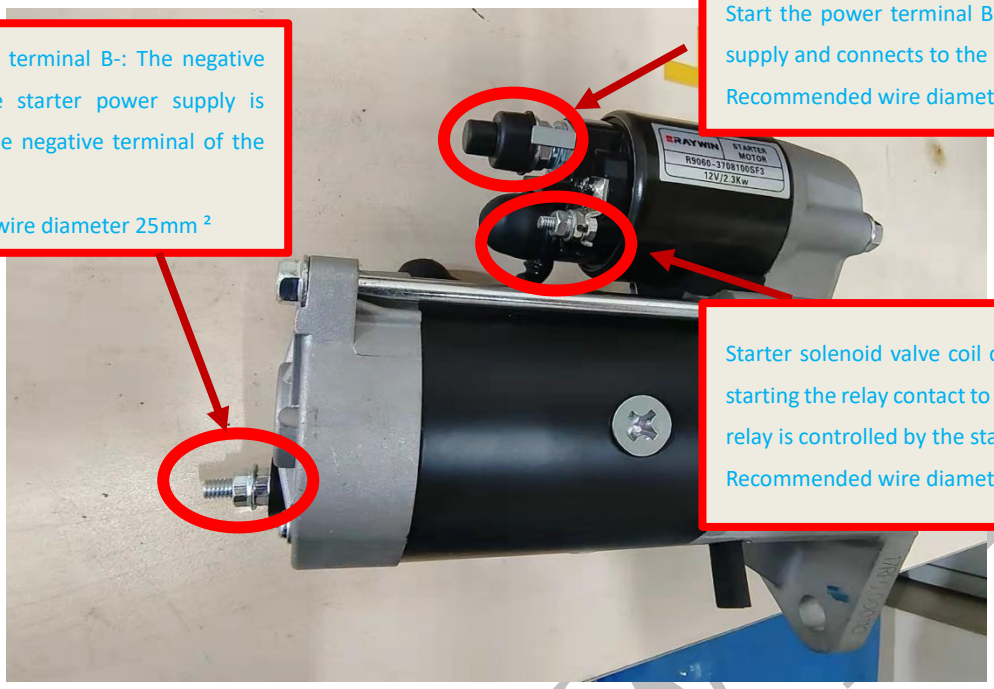
The generator charging fault indicator is at the terminal closest to the body position of the connector.
Recommended wire diameter 1mm2

Generator speed signal terminal: one of the outermost terminals of the connector, used when measuring the generator speed, and the terminal at the position of the connector away from the body

Generator pre-excitation signal: Provide excitation signal for the generator, it is located at the middle of the connector
Recommended wire diameter 1mm2

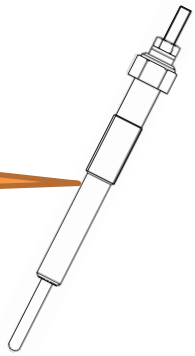
The negative terminal B- is only used on ships, located at the rear cover of the generator and connected to the negative terminal of the battery. The recommended wire diameter is 10mm ²

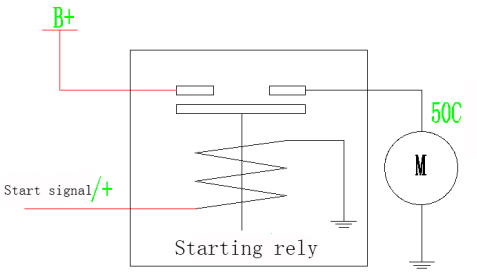
3.Starter Wiring



4.Preheating system wiring

In order to meet the different temperature grade requirements of our customers, our engine adopts air intake preheating mode, and the glow plug is installed beside the engine injector to meet the low temperature service conditions.。





Recommended wiring method

Preheating related requirements：

1.Preheat relay requirements：12V（24V）/70A

2.Wire diameter：≥4mm²

3.Preheat control settings: Preheating is affected by temperature. Generally, the preheating time is set at about 10s, which can be set according to the actual ambient temperature.

Remark: Without specific requirements, our engines do not have preheating related accessories.

The glow plug can be configured to meet the ambient temperature above -15 °C. If the ambient temperature is more severe, it is necessary to increase the auxiliary heating device such as water jacket and increase the battery specification.

VI.Operating Requirement（must read）

1.Control panel requirements: (important)

In order to prevent the starter from being damaged due to reverse drag, the control panel is used for start control.

1.1 Start success determination condition: speed ≤350rpm oil pressure=125kPa

1.2 If the engine fails to start three times in a row, 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 gas circuit before starting the operation.

2.Fuel lift pump installation

In order to improve the starting performance and accelerate the oil draining, the oil inlet pressure should be maintained at 21~34kpa. It is recommended to maintain a positive pressure on the DB mechanical pump inlet pressure. Therefore, it is recommended to install an electronic lift pump in the fuel system of the DB mechanical pump.

3.Battery requirements：

12V System ≥85Ah 630CCA

24V System ⩾85Ah 630CCA*2

It is recommended to increase the battery capacity in high-altitude and cold regions.

Main line requirements for power supply: wire diameter 50-75mm ² Above length<2m

The power system needs to be equipped with a negative main switch. Except for the grounding wire, all negative electrodes need to be controlled by the negative main switch.

Suggestion: Connect the positive wire of the battery to the positive wire B+of the starter, and connect the negative wire controlled by the main switch directly to the bolt of the flywheel housing. The connection should be firm and reliable. For the selection of the main line diameter, please refer to the following table. The line diameter in the table is only for calculation purposes. Please choose the appropriate line diameter according to the actual situation.

Nominal voltage	Drop Vd/100A	Conditions of Use
12V	0.2	Good/General
24V	0.4	
12V	0.1	Bad
24V	0.17	

The usage conditions in the table are "good", "general", and "bad", which need to be determined by experience based on the degree of impact of the actual usage environment on the engine, including temperature, humidity, vibration, corrosion, and other factors. They are also related to the engine's usage time, area, and purpose

Average starting current	Drop Vd/100A	Conditions of Use	Line length L	1m	2m
300A	0.2	general	Wire diameter S（mm²）	40	50
	0.1	bad		50	75
S=I*2L/(54.4*Vd)					

3.1. Requirement for marine engine batteries

The environmental requirements for the use of marine engines require high electrical performance. It is recommended that customers use large capacity batteries to meet the engine's battery requirements to the greatest extent possible:

12V system ≥ 150Ah 1000CCA

24V system ≥ 150Ah 1000CCA * 2

Main line requirements for power supply: wire diameter 50-75mm ² The above length is less than 2m.

4.Generator set model:

Directly into the working speed after starting

5.Cold start solenoid valve (CSA function) application example

1.Adding electrical devices：

1.1. Thermo switch（Temperature sensor，60℃dividing point，The temperature range can be adjusted up and down）

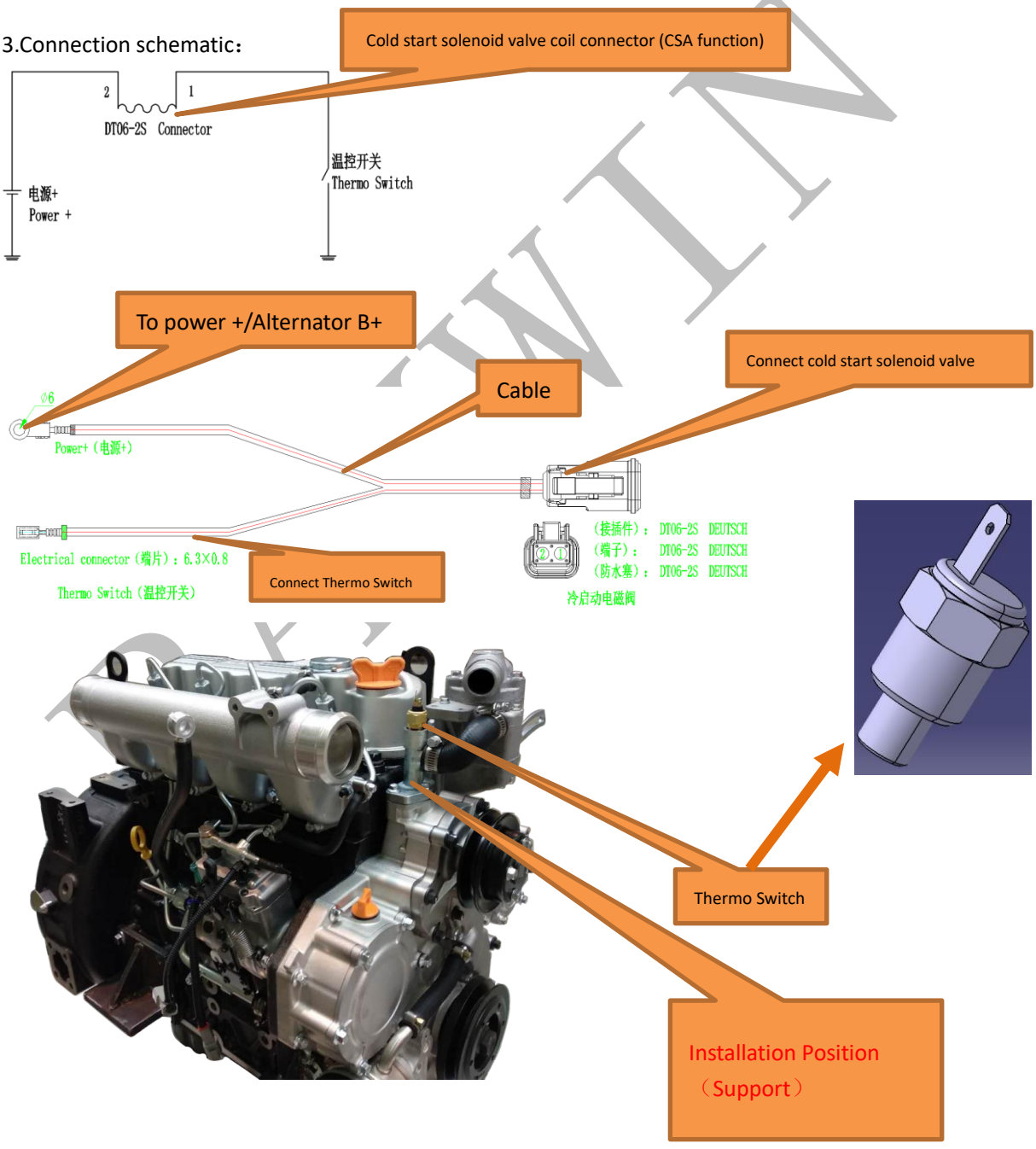
≤60℃ connected with housing

＞61℃ disconnect with housing

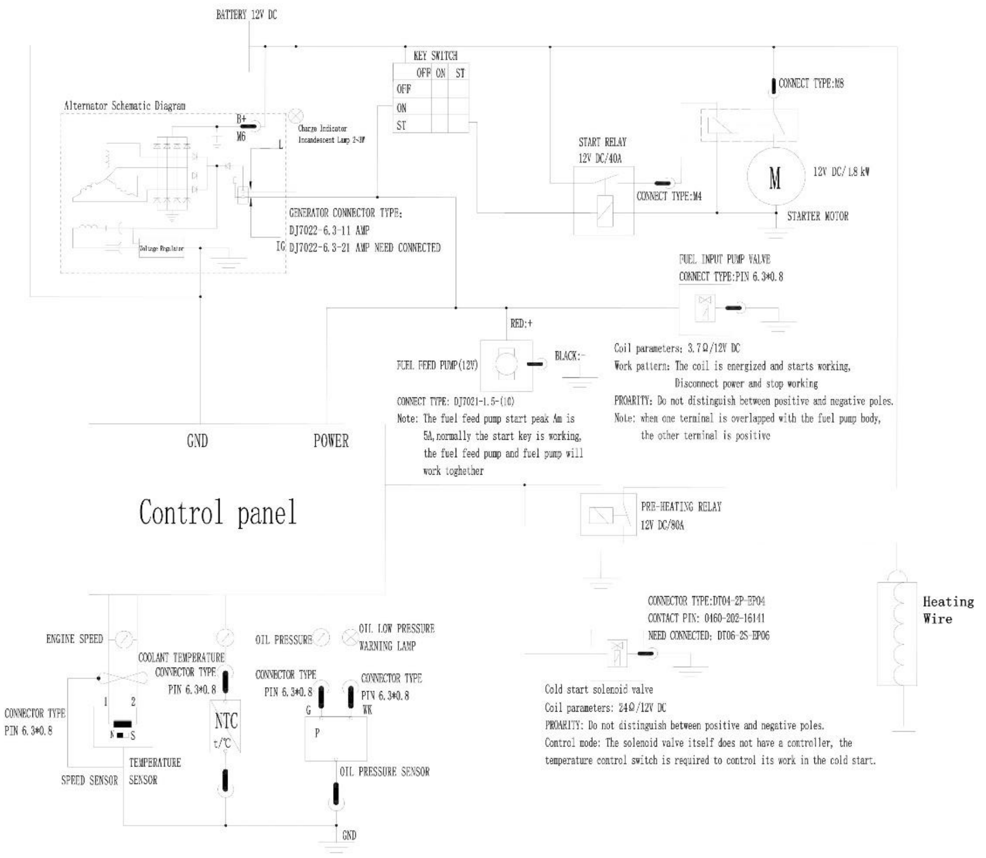
1.2. Connection cable harness

2.Electrical properties: working voltage: system voltage power 6W

3.Connection schematic：



RAYWINM 3M16 SERIES DIESEL ENGINE SCHEMATIC DIAGRAM



TECHNICAL REQUIREMENTS

1. The system power supply voltage has 12v DC
   If it needs to be changed to 24v DC, the relay, fuel pump and starter must be changed to 24v DC;
2. The coolant temperature sensor is NTC type;
3. Oil pressure sensor connector G is the pressure valve, WK is the low oil pressure switch;
4. The flywheel has a total of 127 teeth;
5. Starting power: 1.8 KW/12V DC ;
6. Engine power 40A/14V DC ;
7. NTC thermistor:
   Resistance value: +25C; 560 ohms;
   Error ratio: 3930 K+-1.5%;
   Resistance and temperature ratio table for coolant temperature sensor: (VDO 120℃)

TEMP ℃	40	50
Ohm	276-325	189-220
TEMP ℃	60	70
Ohm	132-151	94-107
TEMP ℃	80	90
Ohm	68-76	50-56
TEMP ℃	100	110
Ohm	37-41	28-31
TEMP ℃	120	
Ohm	21-24	

8. Resistance and pressure ratio for Oil pressure sensor: (VDO 10Bar)

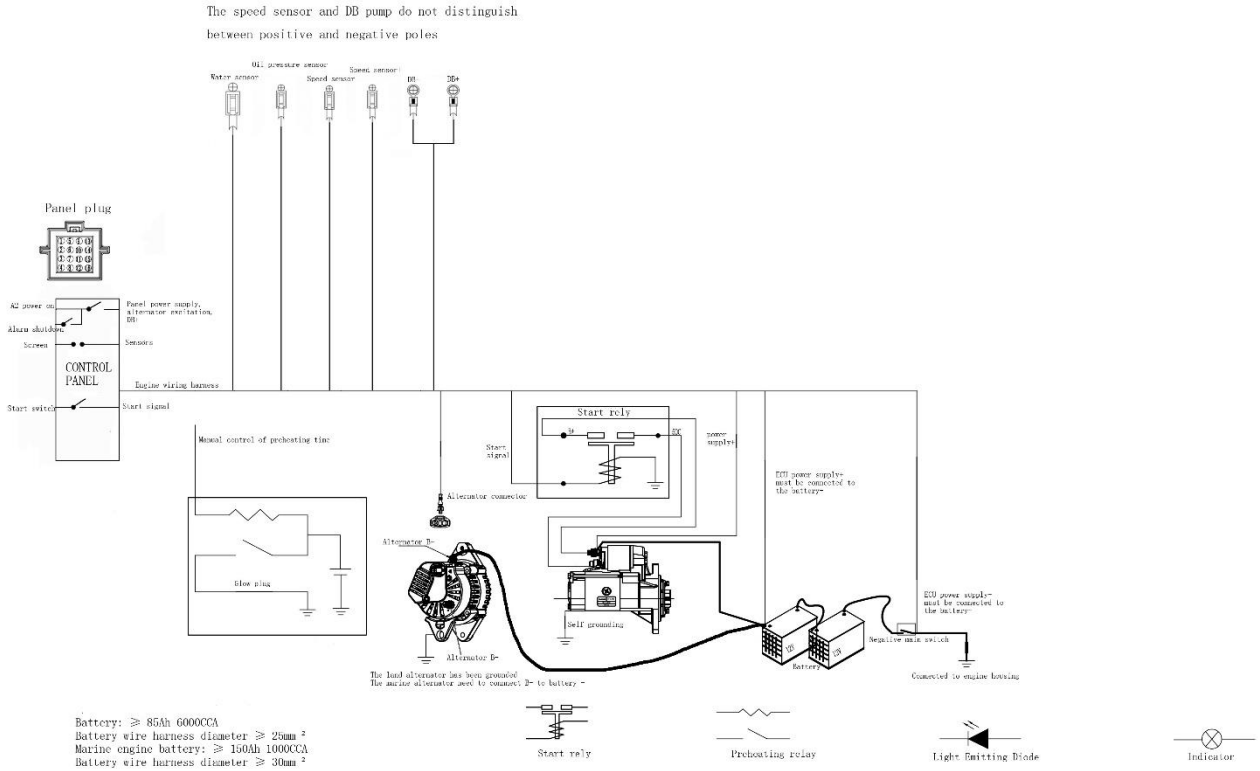
Xpa	0	200	400	600	800	1000
Ohm	10	52	88	124	155	184

9. Preheating System:
   Glow Plug parameter: 12V/24V DC / 25AMAX;
   Time of preheating:Setting is according to the different using environment, normally it is30-40s;
10. Fuel injector cold start solenoid valve is generally not used

ATTENTION:

1. If engine's working environment is lower than -15C, it must use external heating to guarantee the normally start performance of engine;
2. Engine's accumulator requirement:(appropriate increase in accumulator specifications at low temperatures)
   12V System: 85Ah/600 CCA
3. The controller requires reliable grounding for the sensor common ground pins and multi-point grounding if necessary to preventsignal interference. The wire connecting the speed sensor to the controller pin should be twisted pair and added to the single-ended shielded wire.

※ This schematic diagram applies to all the Stanadyne rotor pump



RAYWIN POWERTRAIN TECHNOLOGY CO., LTD.
Add: NO.99 JIUJIANG RODE, SHUANGFU DISTRICT, Chongqing, China
Tel: +86 23 85557257