

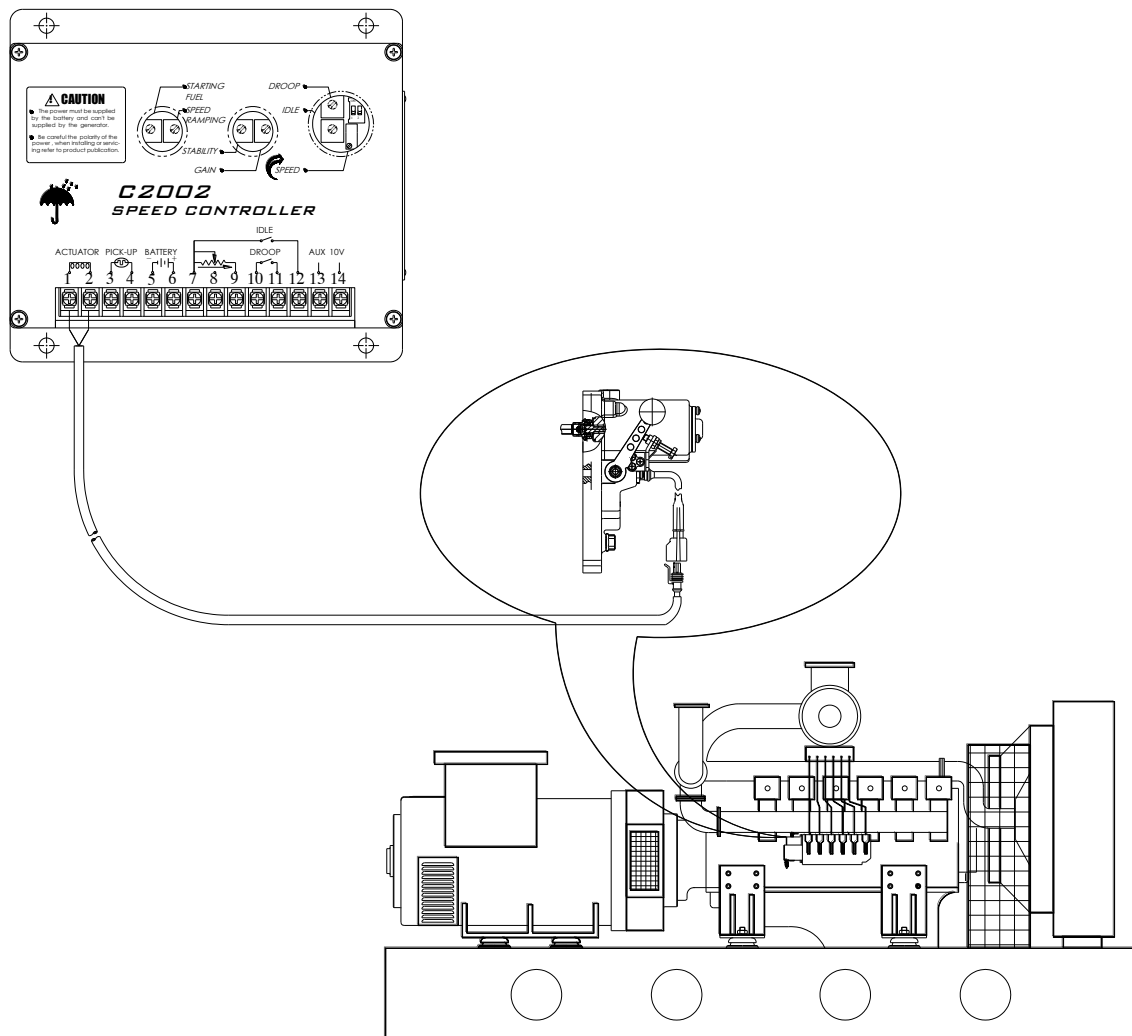
fORTRUST®

ESG2002A07A-WL

SERIES

ELECTRONIC GOVERNOR

INSTRUCTION



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The Principle Of The Electronic Governor System

Electronic governor, with its simple structure, high reliability, convenient operation, easy function extension and high cost performance, applies to all kinds of diesel generating sets, vehicles and marine diesel engines.

Its normal type is all-electronic single pulse speed and close loop position structure, provided with functions of non-corresponding or corresponding control, speed and rated speed during running maximum fuel supply control, emergency stop and etc.

It is also capable of adding other control functions according to the customer's particular requirements.

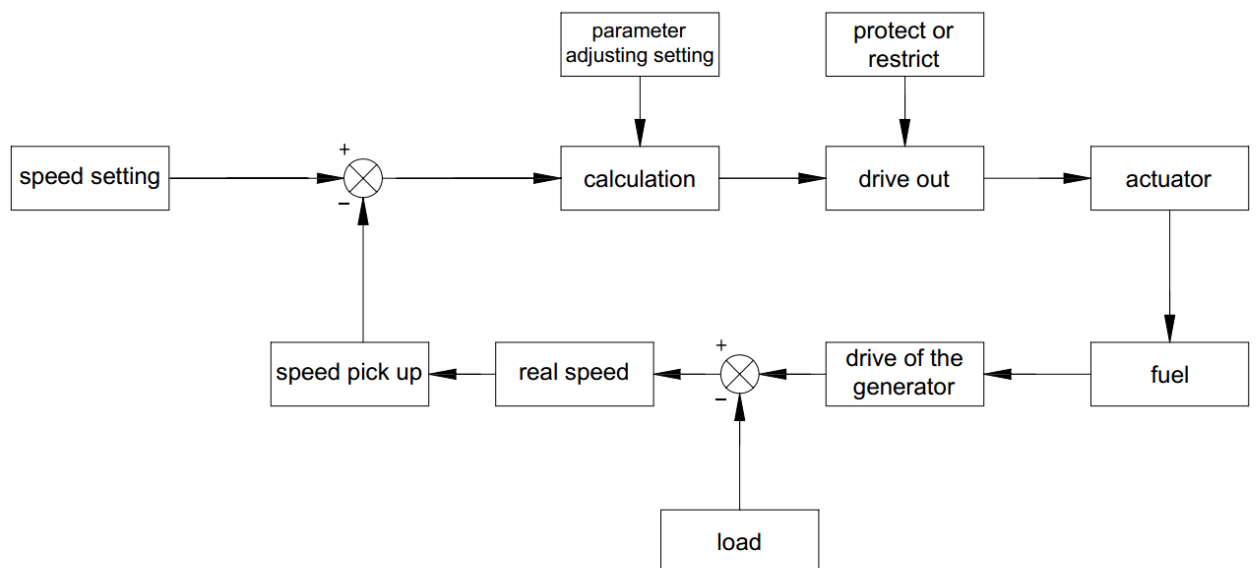
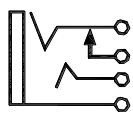


Figure 1.1 Electronic governor system



2 The Structure Of The Electronic Governor System

2.1 Speed Control Unit

2.1.1 The basic electronic characteristics

- OPERATING VOLTAGE : 12VDC/24VDC available
- SUPPLY CONSUMPTION : < 0.1A (without actuator)
- SPEED FLUCTUATION RATIO : $\leq \pm 0.25\%$
- STEADY STATE SPEED DROOP : 0~10%
- OPERATING TEMPERATURE RANGE: -40°C ~ +85°C
- RELATIVE HUMIDITY : <95%

2.1.2 The outline and installing size of the C2002 speed control unit (figure 2.1.2)

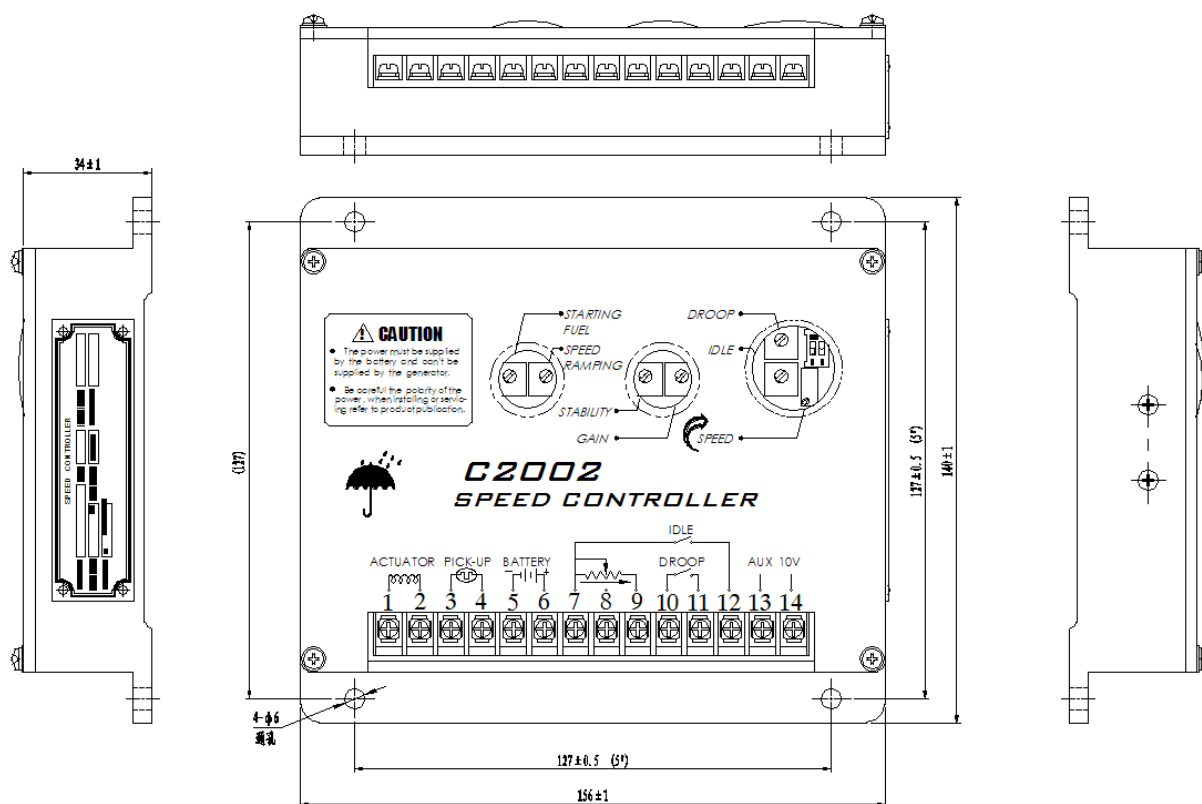


Figure 2.1.2 : The outline and installing size of the C2002 speed control unit

2.1.3 Connection diagram of the C2002 speed control unit (figure 2.1.3) .

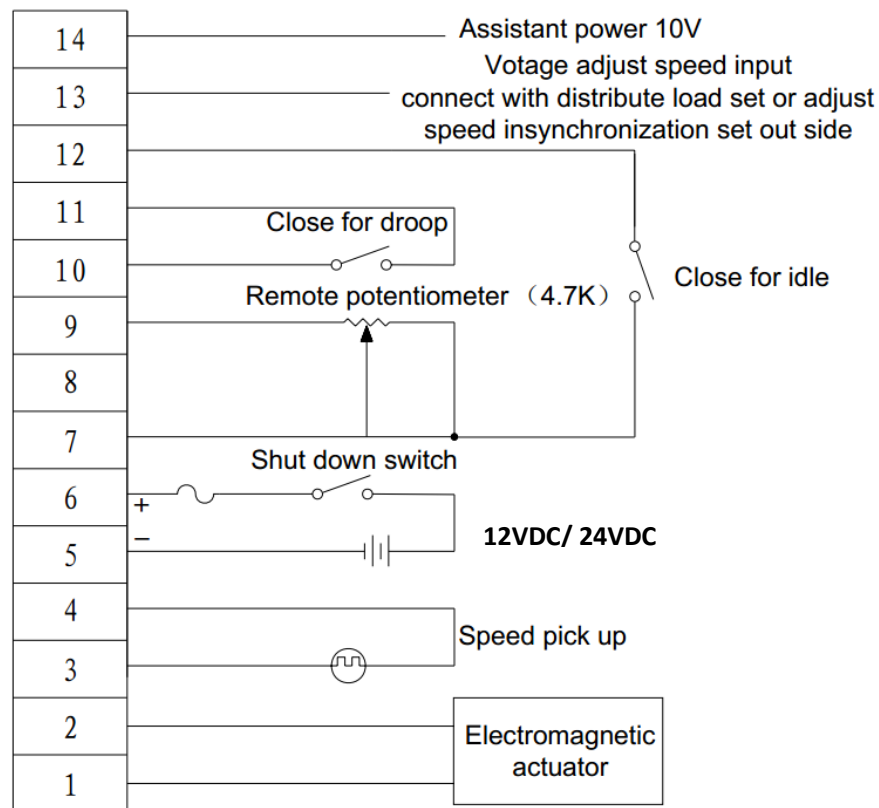


Figure 2.1.3 Connection diagram of the C2002 speed control unit for normal generator set

2.2 The Electromagnetic Actuator

2.2.1 The basic electronic characteristics

- ☑ OPERATING VOLTAGE: 12VDC (Suitable for 9~16V) / 24VDC (Suitable for 16~32V)
- ☑ OPERATING TORQUE: 0.8 Nm
- ☑ OPERATING STROKE: 15mm
- ☑ OPERATING TEMPERATURE RANGE: -40°C ~ 95°C
- ☑ WEIGHT: 1.49kg
- ☑ RELATIVE HUMIDITY: <95%
- ☑ MOUNTING: According to the left or right side of the oil pump

on the engine

2.2.2 The outline and installing size

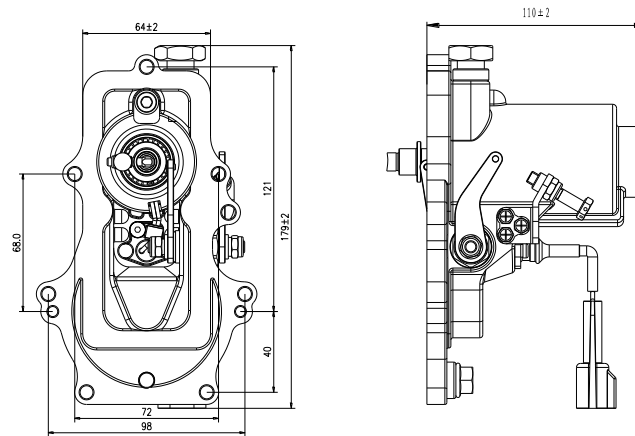


Figure 2.2.2.1 The outline and installing size of the A07A-WL-BQ (left and right can choose, This chart is right) electromagnetic actuator

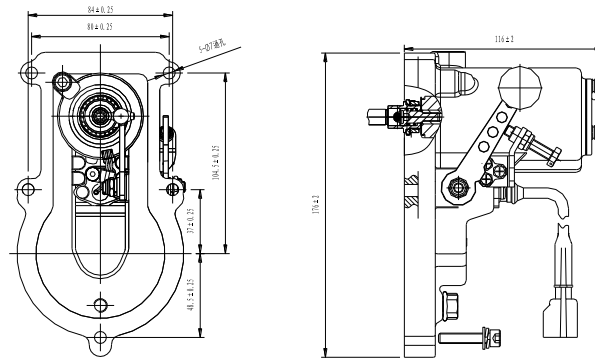


Figure 2.2.2.2 The outline and installing size of the A07A-W-LL(LR)-PL (left and right can choose, This chart is right) electromagnetic actuator

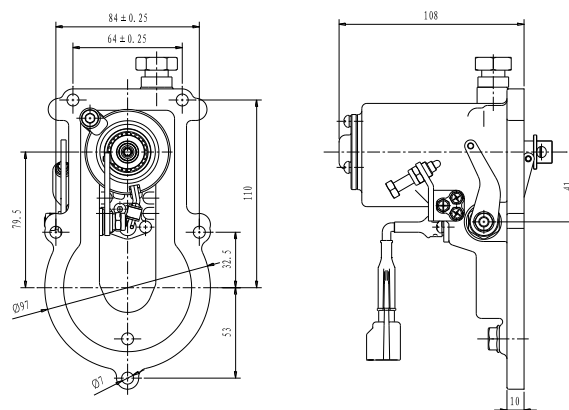


Figure 2.2.2.3 The outline and installing size of the A07A-W-LL(LR)-PM (left and right can choose, This chart is left) electromagnetic actuator

2.3 Speed Pick-up

2.3.1 The outline and installing size of the A07A –WL series speed pick-up (Figure 2.3.1)

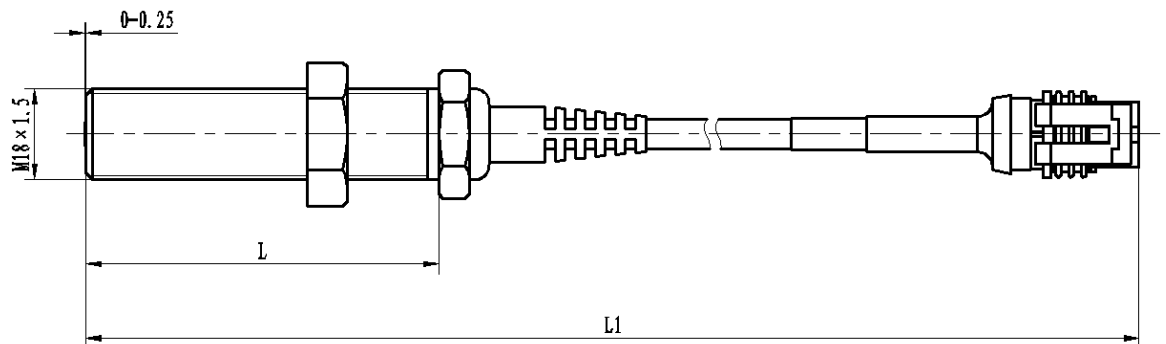


Figure 2.3.1 The outline and installing size of the A07A –WL speed pick-up

TM18X1.5-(L)A Series of speed sensor		
Model	L (MM)	L1 (MM) ± 0.5 MM
TM18X1.5-50A-00	50	315
TM18X1.5-70A-00	70	330
TM18X1.5-90A-00	90	353
TM18X1.5-130A-00	130	392

* Provision of rotate speed sensor according to customer orders



3 Installing and Debugging

3.1 Installing Of The Electronic Governor

The C2002 speed control unit is rugged enough to be placed in a control cabinet or engine mounted enclosure with other dedicated control equipment. If water, mist, or condensation may be in contact with the controller, it should be mounted vertically. This will allow the fluid to drain away from the speed control unit.

Warning !

An overspeed shutdown device, independent of the governor system, should be provided to prevent loss of engine control which may cause personal injury or equipment damage. Do not rely exclusively on the governor system of electric actuator to prevent overspeed. A secondary shut off device, such as a fuel solenoid, should be used.

3.2 Connection Diagram Of The A07A-WL Electronic Governor System

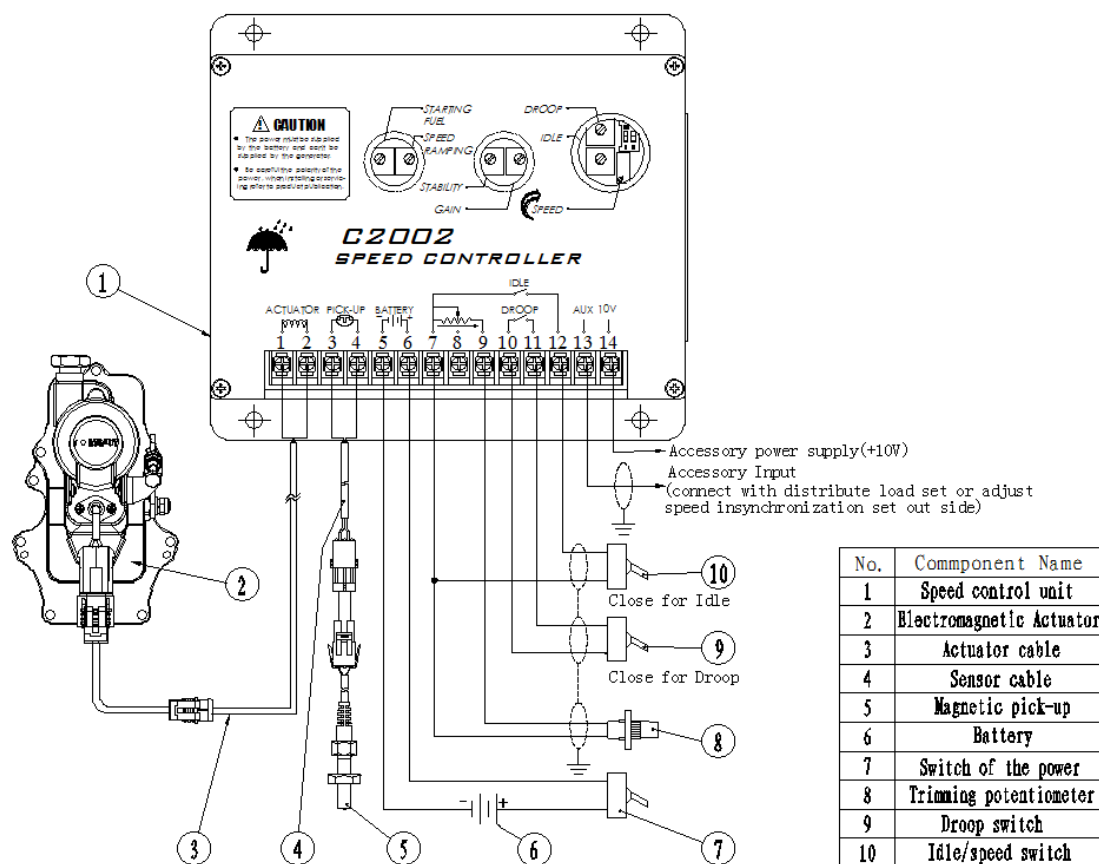



Figure 3.2 Connection diagram of the A07A-WL series electronic governor system

3.3 Adjustments before Starting Engine

3.3.1 Check to insure the **GAIN** and **STABILITY** adjustments, normally this value is set mid

position by factory. Leave factory conditions of Red State Switch is  , namely RSW-1, RSW-3 = OFF, RSW-2 = ON.

3.3.2 Rated and idle speed of the speed control unit had been set by factory. Normally, this value is near from the user's engine working rotate speed value. In practice, after some adjustments, controller can achieve rated and idle speed, and the stability would be very well.

3.4 Adjustment of the Controller after Starting

3.4.1 Crank the engine with D.C. power applied to the governor system. Start fuel quantity varies with environmental temperature of engine start. Though adjusting start fuel quantity potentiometer; exhaust smoke from the engine can be adjusted to the best state.

3.4.2 The governor system should control the engine at low idle speed. If the engine is unstable after starting, turn the **GAIN** and **STABILITY** adjustments counterclockwise until the engine is stable.

3.4.3 The governed speed set point is increased by clockwise rotation of the **SPEED** adjustment control. Remote speed adjustment can be obtained with an optional Speed Trim Control.

3.4.4 Once the engine is at the operating speed and at no load, the following governor performance adjustments can be made.

3.4.4.1 Rotate the **GAIN** adjustment clockwise until instability develops. Gradually move the adjustment counterclockwise until stability returns. Move the adjustment one division further counterclockwise to insure stable performance.

3.4.4.2 Rotate the **STABILITY** adjustment clockwise until instability develops. Gradually move the adjustment counterclockwise until stability returns. Move the adjustment one division further counterclockwise to insure stable performance.

3.4.4.3 Gain and stability adjustments may require minor changes after engine load is applied. Normally, adjustments made at no load achieve satisfactory performance. A strip chart recorder can be used to further optimize the adjustments.

3.4.5 After the governor speed setting has been adjusted, place the optional external selector switch in the **IDLE** position. The idle speed set point is increased by clockwise rotation of the **IDLE** adjustment control. When the engine is at idle speed, the speed control unit applies droop to the governor system to insure stable operation.

3.4.6 Through the above adjustments engine still unable to stability, it needs to be adjusted Red State Switch now, figure 3.2 four cases (a: RSW-1, RSW-3 = ON, RSW-2 = OFF; b: RSW-1, RSW-2 = OFF, RSW-3 = ON; c: RSW-1, RSW-2 = ON, RSW-3 = OFF; d: RSW-1, RSW-3 = OFF, RSW-2 = ON). After every adjusting Red State Switch go on the 3.4.4.1 and 3.4.4.2 adjusting procedure again. If it is still unable to stability, should inspect engine and fuel pump for service condition. And then, contact with manufacturer.

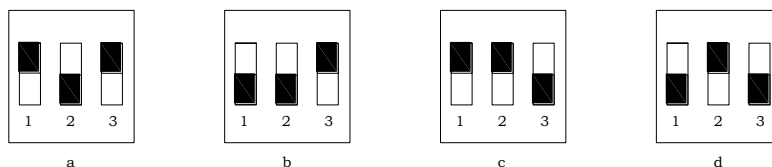


Figure 3.4.6 Red State Switch

3.5 Speed Droop Operation

3.5.1 Droop is typically used for the paralleling of engine driven generators.

3.5.2 Place the optional external selector switch in the **DROOP** position, that is connected Terminals 10 and 11. Droop is increased by clockwise rotation of the **DROOP** adjustment control. When in droop operation, the engine speed will decrease as engine load increases. The percentage of droop is based on current change from no load to full load of the actuator.

3.5.3 After the droop level has been adjusted, the rated engine speed setting may need to be reset. Check the engine speed and adjust the speed setting accordingly.

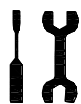
3.6 Accessory Input

3.6.1 When the Auxiliary Terminal 13 accepts input signals from load sharing units, auto synchronizers and other governor system accessories are directly connected to this terminal. It is recommended that this connection form accessories should be shielded as it is a sensitive input terminal.

3.6.2 When an accessory is connected to Terminal 13, the speed will decrease and the speed adjustment must be reset.

3.7 Accessory Output

The +10 volt regulated supply, Terminal 14, can be utilized to provide power to governor system accessories. Up to 20 mA of current can be drawn from this supply. Ground reference is Terminal 7. Caution - a short circuit on this terminal can damage the speed control unit.



4 System Troubleshooting

4.1 Check-up the Fault

When any incorrect matter happens during installation testing or using, please clear the problem referring to following diagrams.

Symptom	Test	Probable Fault
Engine can not start	Battery	voltage between Terminals 5 and 6 Should be 12VDC/24VDC.
	Pick-up	1、 the setting of the speed pick up is not correct and the space is too big.
		2、 Impedance between Terminals 3 and 4 Should be 830 to 970 ohms.
	Actuator	1、 Actuator or linkage binding.
		2、 impedance between Terminals 1 and 2 Should be 3~4ohms.
Actuator does not energize fully	Battery	If the voltage is less than 9V for a 12V system(16V for a 24V system), replace the battery if it is weak or undersized.
	Actuator	Actuator or linkage binding.
Unsteady engine speed	Speed Control Unit	1、 adjust the stability and the gain of the control unit according to 3.4.4
		2、 voltage between Terminals 14 and 7 Should be 10±0.5V.
	Actuator	Check the actuator and the oil pump's rack and make sure their connect is not loose.
Engine Overspeed	Speed Control Unit	1、 the number of engine gear is wrong and the rate speed is high
		2、 the gain is set too low and sensitive degree is not enough, which bring about too high instant speed
		3、 Defective speed control unit.
	Actuator	1、 Actuator or linkage binding.
		2、 if zero position of the actuator is not according to actuator of the oil pump, actuator cannot cut up the oil to the oil pump after losing power
	Pick-up	If error speed sensor signal happens, please Check wiring.

4.2 Insufficient Magnetic Speed Sensor Signal

A strong magnetic speed sensor signal will eliminate the possibility of external pulses. The speed control unit will govern well 0.5 volts RMS speed sensor signal. A speed sensor signal of 3 volts RMS or greater at governed speed is recommended. Measurement of the signal is made at Terminals 3 and 4.

The amplitude of the speed sensor signal can be raised by reducing the gap between the speed sensor tip and the engine ring gear. The gap should be smaller than 0.45mm .When the engine is stopped, back the speed sensor out by 3/4 turn after touching the ring gear tooth to

achieve a satisfactory air gap.

4.3 Electromagnetic Compatibility (EMC)

EMI SUSCEPTIBILITY -The electronic governor system can be adversely affected by large interfering signals that are introduced through the cabling or through direct radiation into the control circuits.

All speed control units contain filters and shielding designed to protect the sensitive circuits from moderate external interfering sources

Although it is difficult to predict levels of interference, applications that include magnetos, solid state ignition systems, radio transmitters, voltage regulators or battery chargers should be considered possible interfering sources.

If it is suspected that external fields are either radiated or conducted, they will affect the electronic governor system operation; it is recommended to use shielded cable for all external connections. Make sure that only one end of the shields including the speed sensor shield, is connected to a single point on the case of the speed control unit. Mount the speed control unit on a grounded metal back plate or place it in a sealed metal box.

What is called radiation is when the interfering signal is radiated directly through space to the electronic governor system. A metal shield or a solid metal container is usually effective to isolate the electronic governor system from this type of interference source.

What is called conduction is when the interfering signal is conducted through the interconnecting wiring to the electronic governor system. Shielded cables and filters are common preventive measures.



5 Caution

- Every time before starting engine, make sure the “idle/run” switch is at “idle”.
- The engine must be installed an independent overspeed protection device.
- Electronic governor system and other system isolation to reduce interference.
- All potentiometers on the controller have been tested by the manufacture. Any non-professional staff are forbidden to do any adjustment or removing.
- After 2000 running HRS, the actuator should be checked. If there is no any seizing, just leave it, otherwise drop some L.O. on the actuator bearing, then operate the actuator manually for a few times, if it is smooth without any seizing, then it can be used normally.



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